DEVELOPMENT AND VALIDATION OF A COMPETENCY-BASED EDUCATION MODEL FOR STRENGTHENING UNDERGRADUATE TRAINING IN HUMAN NUTRITION AND DIETETICS IN UGANDA

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or any other award.

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DEDICATION

This work is dedicated to my wife, children, and workmates of the Department of Nutritional Sciences and Dietetics of Kyambogo University.

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ABBREVIATIONS AND ACRONYMS

ACEND:	Accreditation Council for Education in Nutrition and Dietetics
ANOVA:	Analysis of Variance
BTVET:	Business, Technical and Vocational Education and Training
CBE:	Competency-based education
CBME:	Competency-based medical education
CDS:	Competency by Design Series
DeSeCo:	Definition and Selection of Competencies: Theoretical and Conceptual Foundations
EAC:	East African Community
EC:	European Commission
ECTS:	European Credit Transfer and Accumulation System
FANTA:	Food and Nutrition Technical Assistance
FAO:	Food and Agriculture Organization
GDP:	Gross Domestic Product
GMP:	Growth Monitoring and Promotion
HMIS:	Health Management Information System
HN:	Human Nutrition
HND:	Human Nutrition and Dietetics
IFPRI:	International Food Policy Research Institute

MDAs:	Ministries, Departments, and Agencies
MDGs:	Millennium Development Goals
MESAU:	Medical Education Partnership for Equitable Services to all Ugandans
MIYCAN:	Maternal, Infant, Young Child, and Adolescent Nutrition
MoESS:	Ministry of Education, Science, and Sports
MoH:	Uganda Ministry of Health
MUHAS:	Muhimbili University of Health and Allied Sciences
NACS:	Nutrition Assessment, Counselling, and Support
NCDs:	Non-communicable diseases
NCHE:	National Council for Higher Education
NCPM:	Nutrition Care Process and Model
NCST:	National Council for Science and Technology
NEs:	Nutrition experts
OECD/DAC:	Organization for Economic Cooperation and Development/ Development Assistance Committee
OECD:	Organisation for Economic Co-operation and Development
SDGs:	Sustainable Development Goals
SNCC:	Sub-county nutrition coordination committees
SPSS:	Statistical Package for Social Scientists
UBOS:	Uganda Bureau of Statistics

UCPDAA:	Uganda Continuing Professional Development Accreditation Agency
UN:	United Nations
UNESCO:	United Nations Educational, Scientific and Cultural Organization
US$:	United States Dollar
USA:	United States of America
VET:	Vocational education training
WHA:	World Health Assembly
WHO:	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Attitude: The way a person views something or tends to behave towards it, often in an evaluative way (Collins English Dictionary, 2022).

Community: A group of people that may or may not be spatially connected, but who share common interests, concerns, or identities. These communities could be local, national, or international, with specific or broad interests[1]. In this study, the term community is used to refer to different members of the Ugandan population that are served or seek services of Human Nutrition/Human Nutrition and Dietetics (HN/HND) practitioners employed in different areas of the country.

Competence: The ability to do something successfully or efficiently (Oxford University Press, 2016d).

Competency: An important skill that is needed to do a job (Cambridge University Press, 2016).

Competency-based education (HN/HND)

in Uganda: Education approach that focuses on equipping undergraduate HN/HND trainees with the competencies required to perform in the varied and complex health systems settings of Uganda and in accordance to a specified scope of training and practice as defined by employers,

[1] https://www.who.int/teams/health-promotion/enhanced-wellbeing/seventh-global-conference/community-empowerment. Accessed 28th March 2022

policymakers, the HN/HND professionals, related professionals that work with HN/HND undergraduates, training institutions, and the national development partners.

Competency-based education: A disciplined approach that specifies the health problems to be addressed, identifies the requisite competencies required of graduates for health systems performance, tailors the curriculum to achieve competencies, and assesses achievements and shortfalls (Frenk et al., 2010).

Competent: Able to do something well (Cambridge University Press, 2016a).

Continuous professional development (CPD): "The means by which members of the profession maintain, improve and broaden their knowledge, expertise, and competence, and develop the personal and professional qualities required throughout their professional lives (Nursing & Midwifery Board of Australia, 2016:4)" (Baloyi & Jarvis, 2020, p. 1). For this study, the term is used to refer to formal professional training outside of undergraduate and postgraduate training designed to improve and broaden HN/HND knowledge, expertise, and competence in the HN/HND profession and through which HN/HND graduates can gain credit points.

Curriculum: Is the vehicle through which a country empowers its citizens with the necessary knowledge, skills, attitudes, and values that enable them to be socially and economically engaged and empowered, for personal and national development (Kabita & Ji, 2017).

Delphi Method: A process of establishing consensus on a given phenomenon whereby written documents are circulated to a group of experts in a series of rounds, with each round incorporating the feedback from the previous round, until consensus has been achieved among the experts (Haggerty et al. 2007 cited by Moaveni et al., 2010).

Dietetics: The branch of knowledge concerned with the diet and its effects on health, especially with the practical application of a scientific understanding of nutrition (Oxford University Press, 2016a).

Dietitian: A person who scientifically studies and gives advice about food and eating (Cambridge University Press, 2016b).

Expert: Having, involving, or displaying special skill or knowledge derived from training or experience (Merriam Webster, 2022).

Health workforce: "All people engaged in actions whose primary intent is to enhance health" (WHO, 2006). This "includes physicians, nurses and midwives, but also laboratory technicians, public health

professionals, community health workers, pharmacists, supply chain managers, physical therapists, dentists and oral health professionals, and all other support workers whose main function relates to delivering or supportive the provision of preventive, promotive or curative health services" (WHO & Global Health Workforce Alliance, 2015, p.27).

Human Nutrition/Human Nutrition and Dietetics Competencies: Combination of technical knowledge, skills, abilities, job-relevant behaviour and motivation required of HN/HND professionals to address community nutrition and dietetic needs and demands in Uganda's health systems settings.

Human Nutrition/Human Nutrition and Dietetics Competency-based Education Model: Refers to a framework developed as an outcome of this study that outlines a set of validated competencies required of HN/HND professionals to perform in the varied and complex health systems settings of Uganda.

Knowledge: Understanding of or information about a subject that you get by experience or study, either known by one person or by people generally (Cambridge University Press, 2022a).

Nutrition/Dietetics Needs: Refer to the nutrition and dietetics challenges faced by different communities as per the services providers' (HN/HND graduates, academic staff that train HN/HND, and employers of HN/HND graduates) perspectives.

Nutritionist: A person who studies or is an expert in nutrition (Oxford University Press, 2016b).

Profession: Any type of work that needs special training or a particular skill, often one that is respected because it involves a high level of education (Cambridge University Press, 2016c).

Professional: Relating to or belonging to a profession (Oxford University Press, 2016c).

Professionalism: The combination of qualities and conduct regarded as essential to professional practice. These include knowledge, skills, relevant competence, behavioural qualities, and values of honesty, integrity, ethical probity, and capability of working well with patients or clients, colleagues, and representatives of the public (Oxford University Press, 2021).

Scope of Human Nutrition/Human Nutrition and dietetics training and practice in Uganda: Encompasses the requisite professional competencies, range of roles, activities, and regulations within which nutrition and dietetics practitioners in Uganda train and practice.

Skill: A particular ability that you develop through training and experience and that is useful in a job (Cambridge University Press, 2022c).

Validation: The act or process of making something officially or legally acceptable or approved (Cambridge University Press, 2022b). For this study, validation is used to mean the process through which study participants were engaged in the process of developing and reaching consensus on the competency domains, subdomains and competency statements as comprised in HN/HND competency model developed as part of this study.

ABSTRACT

Human Nutrition/Human Nutrition and Dietetics (HN/HND) training in Uganda follows the traditional credit system of education, a system criticized for inadequately equipping graduates with the requisite competencies for health systems performance. Competency-based education (CBE) is advocated to improve the competency of health professionals for health systems performance. However, the competencies expected of HN/HND graduates are undefined in Uganda limiting undertaking CBE for the profession. This study aimed to develop and validate a CBE model suitable for strengthening undergraduate HN/HND training in Uganda under four main objectives: to determine the nutrition/dietetic needs in Uganda; to establish the competencies required of HN/HND graduates for health systems performance in Uganda; to assess the current scope of HN/HND training and practice in Uganda; and to develop and validate a competency-based education model suitable for teaching HN/HND at the undergraduate level in Uganda. This study used a cross-sectional mixed method and was undertaken in two phases from December 2017 to June 2020. The first phase (competency needs assessment) targeted 450 HN/HND graduates, 14 HN/HND academic staff, and 11 HN/HND employers/internship supervisors. Data from graduates were collected using a cross-sectional email-based survey; while that from other participants were through face-to-face interviews. The second phase (model development and content validation) had three stages; validation workshop, focus group discussion, and consensus development undertaken in two modified Delphi rounds. The workshop had 31 participants, the focus group had eight; the first and second modified Delphi rounds had 70 and 55 respectively. Graduates' responses from the first phase were coded in Microsoft Excel Professional Plus version 10, emerging themes and sub-themes were quantitized, and descriptive and multiple response analyses done using IBM Statistical Package for Social Scientists version 20. Other participants' responses, coding, and content analysis were done using NVivo 12 Plus software. For data from the modified Delphi study, content analysis and analysis of percentage responses were done in Microsoft Excel Professional Plus version 10 with participant consensus for each statement set at ≥80%. Of the 450 targeted graduates, 132 responded to the needs assessment phase, 64.4% of these, and 64.3% of academic staff were females. 63.6% of the work/internship supervisors were males. Generally, results show that respondents viewed communities as facing multiple nutrition/dietetics challenges; graduates were expected to possess diverse competencies but had competency gaps even in core areas. Undergraduate HN/HND curricula differed across universities; besides accreditation of universities and their curricula, mechanisms for regulation, registration, and certification of HN/HND graduates were slowly established. In the second study phase, a HN/HND competency-based education model framework was developed and validated. It comprised seven domains, 22 subdomains, and 153 competency statements evaluated as both relevant and suitable for undergraduate HN/HND training in Uganda. The study recommends evaluating the extent to which HN/HND curricula in Uganda's Universities address the competencies comprised in the developed CBE model; translating the developed CBE model into a standard curriculum that can be taught and evaluated; and assessing Uganda's higher education institutional capacity readiness to offer CBE in HN/HND.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Nutrition is essential for social-economic growth and development (Haddad, 2015; World Bank, 2006) and general human well-being (Fanzo et al., 2015). Promoting nutrition is presently endorsed by the United Nations (UN) 2030 Global Agenda for Sustainable Development under Sustainable Development Goals two, three, and four on hunger, health, and education; the World Health Organisation (WHO) 2025 global nutrition targets (Branca et al., 2012); and the UN 2016-2025 Decade of Action on Nutrition (United Nations [UN], 2015 & 2016).

Global estimates indicate that for all children below five years 21.3% are stunted, 6.9% are wasted, and 5.6% are overweight (FAO, IFAD, UNICEF, & WHO, 2020). According to the UN Food and Agriculture Organisation (FAO) of the United Nations, 821 million people were undernourished globally in 2017; undernourishment was highest in Africa at 21%, followed by Asia at 11.4% and South America at 5% (FAO, IFAD, UNICEF, WFP, & WHO, 2018). The Uganda demographic and health survey statistics (Uganda Bureau of Statistics [UBOS] & ICF, 2018) show that for all children under five, 29% are stunted, 4% are wasted and 11% are underweight. Furthermore, micronutrient deficiencies, iron deficiency, in particular, are a public health concern given that 53% of the children below five years and 32% of women are anemic (UBOS & ICF, 2018). Due to malnutrition-related effects and costs, Uganda lost 5.6% of its Gross Domestic Product (GDP) in 2009 alone (African Union, 2013).

Competent Human Nutrition/Human Nutrition and Dietetics (HN/HND) professionals are an essential health workforce for they support the implementation of the different nutrition interventions (Sodjinou et al., 2016) in the prevention and management of malnutrition. Although HN/HND professionals are trained at different levels in Uganda and awarded degrees in HN and or HND following the requirements of degree-awarding institution, the requisite practice competencies of HN/HND graduates in Uganda are currently inadequately defined and undergraduate University training in HN/HND is not competency-based. Additionally, there exists no uniform officially defined scope of training and practice for the HN/HND profession in the country that is followed by all Universities offering training in HN/HND.

Research by Frenk et al (2010) observed that health professional's training is not moving at the same pace with the health challenges of the 21st century for the training is outdated, fragmented, and using static curricula that fall short of equipping graduates with the competencies required for health systems performance and hence recommended for the adoption of competency-based education (CBE). According to Oyugi (2015), CBE defines the particular competencies that are expected of graduates and "sends a message to those outside the institution about what a university degree holder should know and be able to do" (p. 74). Hughes, Shrimpton, Recine, and Margetts (2011) argued that CBE improves the responsiveness of the education sector to the economy. Education systems, mainly in the developed countries, have undertaken reforms to adopt CBE in institutions of higher learning (Harris & Frank, 2014). In most low-developed nations, CBE remains a prerogative of technical training in vocational institutions. Although CBE for the

HN/HND profession is yet to take root in Uganda, an attempt to identify the required competencies and implement competency-based medical education (CBME) is in progress (Kiguli et al., 2014).

The United Nations Educational, Scientific and Cultural Organisation (UNESCO), observes that relevant and effective learning outcomes in higher education can only be achieved if instructional processes and quality inputs are provided to enable learners to acquire relevant knowledge, skills, and competencies (UNESCO, 2015). Similarly, Africa's Continental Education Strategy 2016-2025 recognizes the need to transform the prevailing education and training systems to produce graduates having the competencies i.e. knowledge, skills, attitudes innovations, and the creativity essential for promoting sustainable development (African Union, 2016). In Uganda, the government recognises the existence of human capacity gaps in its workforce and envisages transforming the education sector towards training and equipping graduates with the knowledge, skills, and abilities required for promoting overall national social economic growth and development (National Planning Authority, 2010; Republic of Uganda, 2015a, 2020)..

1.2 Problem Statement

Nutrition is essential for development (Haddad, 2015; World Bank, 2006) and good nutrition is the bedrock for human well-being (Fanzo et al., 2015). The FAO projected a failure by some countries to achieve the 2030 SDG target on hunger reduction (FAO et al., 2018). The African continent as a whole is also reported to be off track to achieving the 2030 Zero Hunger target (FAO et al., 2020). In Uganda, eight of the 15 main health

risk factors are directly related to poor nutrition (Uganda Ministry of Health [MoH], 2015). Improving nutrition, especially for women and children is upheld as key to fostering Uganda's social-economic growth and development (Republic of Uganda, 2011, 2015; Uganda National Planning Authority, 2010; Uganda Office of the Prime Minister, 2013).

Despite the high burden of malnutrition at the global and national level, the quality of care accorded to malnourished individuals is reported to be substandard in some low and middle-income countries (Lazzerini et al., 2019). Although several factors could be responsible for this, the competence of health care service providers is one of the likely critical determinants. Thus, countries need to have a competent HN/HND workforce, education, and health systems that respond to the national nutrition and dietetic needs and demands if they are to meet the nutrition/dietetics of their citizenry. Uganda's human resource is considered inadequate, poorly educated, and poorly skilled (Liesdek, 2020) despite the government's longstanding plans to accelerate transformations in the system of education (National Planning Authority, 2010; Republic of Uganda, 2015b, 2020). Because of this, the Ugandan government aspires to train and equip graduates with the requisite knowledge, skills, and abilities necessary for fostering national social-economic growth and development (Republic of Uganda, 2015b) by bridging "the gap between the requirements of industry and the skills taught in the education institutions" (Republic of Uganda, 2020, p.4).

As is for many other academic programs (NCHE, 2014b), HN/HND training at the undergraduate level in Uganda's higher education institutions of learning and the related assessment of academic progress is currently mainly content-based and follows the traditional "Credit Hour/Unit" curriculum based on the number of contact hours students spend in class per week in a given semester. Still, although this training has been ongoing since 2002, the legal recognition of the Nutrition and Dietetics profession is recent (Allied Health Professional Council, 2018; Republic of Uganda, 2018) and the health systems performance competencies required of HN/HND professionals and related professional training and practice standards are still inadequately defined.

The limited competency of health professionals in the 21st century has been associated with the inefficiencies in the education and health systems and the continued use of the traditional content time-based curricula-itself criticised for falling short of preparing graduates and inadequately equipping them with the competencies required for health systems performance due to being insufficiently adapted to the local contexts (Frenk et al., 2010). Given the failings of the traditional-time-based education systems and the changing health needs, a global shift towards the adoption of CBE if countries are to have competent health professionals that can respond to health systems challenges of the 21st century was proposed (Frenk, Chen, et al., 2010). Already, some countries including the USA, Canada, Australia, New Zealand, the United Kingdom, and South Africa have undertaken reforms to adopt CBE for their HN/HND profession by developing standards that describe a dietician graduate's capabilities (Harris & Frank, 2014; Palermo et al., 2016; Wentzel, 2016).

In Uganda, besides the strategy to reform training in Business, Technical and Vocational Education and Training (BTVET) towards competency-based training (Uganda Ministry of Education, 2012) and attempts to identify the required competencies and implement competency-based medical education (Kiguli et al., 2014), minimal efforts have been undertaken to design and adopt CBE for the HN/HND profession. Relatedly, there is limited literature regarding the relevancy of HN/HND knowledge and skills attained during undergraduate training to the job market requirements. However, a Tracer study by the Uganda National Council for Higher Education (NCHE) highlighted that "university graduates' training was not exactly linked to the skills required by the employers" (NCHE, 2013, p.3). These different observations point to possible gaps not only in HN/HND training in Uganda but also in other professions that ought to be addressed.

Amidst the prevailing global and national trends in the prevalence of malnutrition, the need for countries to delineate the competencies expected of their HN/HND professionals as well as developing and adopting CBE in HN/HND training is paramount. This study sought to identify the competencies required of HN/HND undergraduates in Uganda and to develop and validate a CBE model suitable for use in the training of HN/HND at the undergraduate level in the country.

1.3 Purpose of the Study

The purpose of this study was to develop and validate a CBE model suitable for strengthening undergraduate HN/HND training in Uganda.

1.4 Objectives of Study

1. To determine the nutrition/dietetic needs in Uganda.
2. To assess the current scope of HN/HND training and practice in Uganda.
3. To establish the competencies required of HN/HND graduates for health systems performance in Uganda.
4. To develop and validate a competency-based education model suitable for teaching HN/HND at the undergraduate level in Uganda.

1.5 Research Questions

1. What are the nutrition/dietetic needs in Uganda?
2. What is the current scope of HN/HND training and practice in Uganda?
3. What are the competencies required of HN/HND graduates to perform in Uganda's health systems?
4. What competency-based education model is suitable for teaching HN/HND at the undergraduate level in Uganda and how can this be developed and validated?

1.6 Significance of the Study

This study addresses a critical but currently under-focussed issue to the need to strengthen undergraduate training of HN/HND in Uganda through the adoption of CBE as opposed to the currently used traditional-time-based training curricula whose grading is based on the credit hour unit or the Carnegie Unit. The study results provide a prototype HN/HND CBE model that can be used for developing a CBE HN/HND curriculum in Uganda and partly elaborates on the scope of HN/HND training and

practice in Uganda. Beneficiaries of this study are HN/HND professionals, researchers in HN/HND, academic institutions training HN/HND, Professional bodies for HN/HND, Government, non-government nutrition services delivery agencies in Uganda, and the community members served by HN/HND professionals. The HN/HND institutions benefit through being trained and equipped with the competencies required for health systems performance. The Academic institutions, researchers, and employers (both government and non-government) benefit by getting to know the exact competencies expected of HN/HND graduates while the community benefits by receiving better services from competent HN/HND graduates

1.7 Limitations of the Study

1. Emailed questionnaires as used in the competency needs assessment phase predisposed the study phase to low response rates. Measures including undertaking repeated reminders, and extending the time within which to respond.
2. Some graduates with limited access to computers and internet connections and those who perceived the study questions to be targeted to employed graduates/graduates with experience in nutrition and dietetics did not respond. Printed questionnaires were distributed to accessible graduates and phone interviews conducted.

1.8 Delimitations of the Study

1. Besides other participants categories, only the graduates possessing HN/HND degrees obtained in the years 2005-2016 from academic institutions accredited in Uganda were included
2. The identification of the nutrition/dietetics needs in Uganda was based on the service providers' (i.e. HN/HND graduates, academic staff that trains HN/HND, and employers of HN/HND graduates) perspectives based on the nutrition/dietetics related challenges faced by the different communities these served.
3. The CBE model as developed and validated in this study was not translated to a standard curriculum hence not practically taught and evaluated

1.9 Assumptions of the Study

This study had the following assumptions:

1. The health systems performance competencies required of HN/HND undergraduates in Uganda were not clearly defined before undertaking this study.
2. By identifying the health systems performance competencies required of HN/HND professionals, it is possible to design a CBE model framework suitable to guide the development of CBE curricula for the training of HN/HND at the undergraduate level in Uganda
3. Accurate information will be provided even when it affects the performance/ mandate of institutions

1.10 Operational Conceptual Framework

The Conceptual Framework for this study (Figure 1.1) was adapted from the Frenk et al., (2010) Systems Framework for understanding the linkage between education and health systems. Rather than using the overarching term "health workforce", the Conceptual Framework singled out and focussed on the Nutrition and Dietetics workforce and their related training and practice in Uganda. The Framework drew from the recognition that the orientation of curriculum content and processes towards professional competencies is one of the functions of health education institutions (WHO, 2006) and took into consideration the observation by Wright, Williams, & Wilkinson (1998) that to improve health, it is important to assess and react to the population health needs instead of the health demands.

The Framework recognises that health needs and demands are vast, and hence focuses on nutrition needs. The concept of "nutrition/dietetic needs" as used in this study takes into recognition the Bradshaw Taxonomy of Social Needs that categorizes human needs into four, normative needs, felt needs, expressed needs or demands, and comparative needs (Bradshaw, 1972 cited Sainsbury, Glendinning, & Cookson, 2013). As per this definition, the identification of the nutrition/dietetics needs in Uganda was based on the normative concept of need using the service providers' (i.e. HN/HND graduates, academic staff that trains HN/HND and employers of HN/HND graduates) perspectives based on the nutrition/dietetics related challenges faced by the different communities these served.

Nutrition needs create demands in both the health and education systems. In the health system, it creates a demand for competent Nutrition and Dietetics professionals possessing the requisite health system performance competencies; these must be supplied by the education system. Competencies are composed of knowledge, skills, and attitudes and are dependent on the roles/tasks expected to be played by the HN/HND graduates in the health systems settings. In the education system, the nutrition needs raise the demand for training of competent Nutrition and Dietetics graduates and a specified scope of training and practice. Training competent nutrition and dietetics graduates for health system performance however necessitates that the curriculum used in training are competency-based.

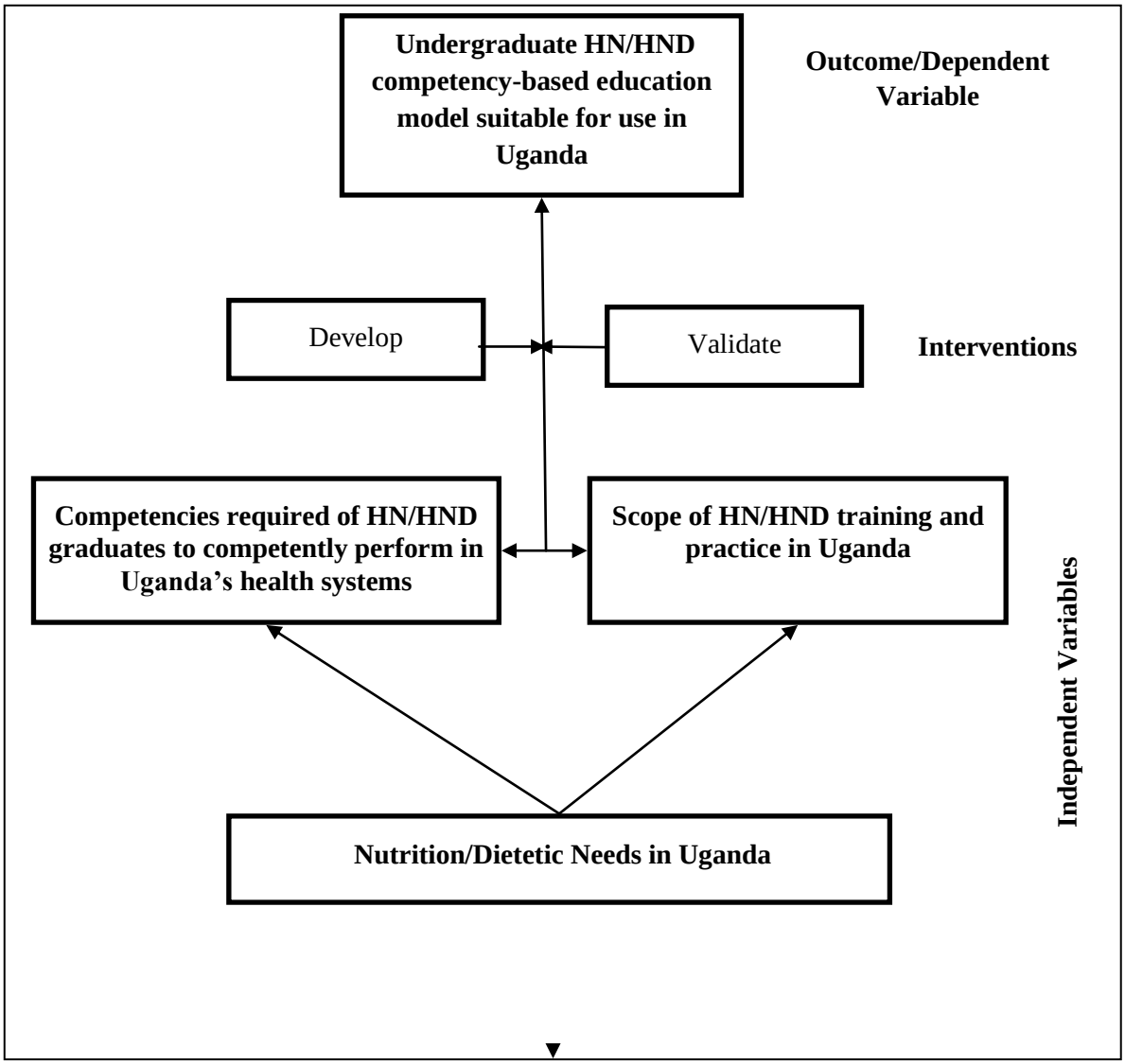

Figure 1. 1. Operational Conceptual Framework: Modified from the Systems Framework (Frenk et al., 2010).

CHAPTER TWO: LITERATURE REVIEW

2.1 Defining Needs and Demands in Health Care

The concept of "need" is complex to understand and different authors have defined it differently (Asadi-Lari, Packham, & Gray, 2003). According to Wright et al. (1998), different professionals have varying views of what needs are. "Need in health care is commonly defined as the capacity to benefit … demand is what patients ask for; it is the needs that most doctors encounter; supply is the health care provided… this will depend on the interests of health professionals, the priorities of politicians, and the amount of money available" (Wright et al., 1998, p. 1311). Bradshaw (1972 cited Sainsbury, Glendinning, & Cookson, 2013), in a paper titled "The Taxonomy of Social Need" differentiated need into four as follows:

1. **Normative Need:** Normative need is what the expert or professional, administrator, or social scientist defines as a need in any given situation. A 'desirable' standard is laid down and is compared with the standard that actually exists – if an individual or group falls short of the desirable standard then they are identified as being in need.

2. **Felt Need:** Here need is equated with want. When assessing need for a service, the population is asked whether they feel they need it. Felt need is, by itself, an inadequate measure of 'real need'. It is limited by the perceptions of the individual– whether he/she knows there is a service available, as well as a reluctance in many situations to confess a loss of independence.

3. **Expressed Need:** Expressed need or demand is felt need turned into action. Under this definition, total need is defined as the need of those people who

demand a service. One does not demand a service unless one feels a need, but on the other hand, it is common for felt need not to be expressed by demand. Expressed need is commonly used in health services where waiting-lists are taken as a measure of unmet need.

4. **Comparative Need:** By this definition, a measure of need is obtained by studying the characteristics of the population in receipt of a service. If there are people with similar characteristics not in receipt of a service, then they are in need. Need established by this method is the gap between what services exist in one area and what services exist in another, weighted to take account of the difference in pathology.

The normative concept of need was adapted for this study; the nutrition/dietetic needs were hence investigated based on what the HN/HND graduates, academic staff that trains HN/HND, and employers of HN/HND graduates defined as the needs of the communities they served.

2.1.1 Nutrition Situation, Needs, and Interventions in Uganda

The different forms of malnutrition: undernutrition; micronutrient deficiencies; overweight, obesity; and the associated diet-related non-communicable disease are a key health challenge at global and national level due to the multifaceted nature of their causes and the related effects (FAO & WHO, 2018; Sauer, Li, Partridge, & Sulo, 2018). According to the 2016 Uganda census survey statistics, the population of Uganda was 34.6 million people; infant and under-five mortality rates were 53/1000 and 83/1000 live births respectively (UBOS, 2016). Of the 15 major health risk factors in Uganda, eight

are reported to be directly related to poor nutrition (MoH, 2015). According to the 2016 UDHS statistics, 29% of all children below five years are stunted, 4% wasted, and 11% underweight (UBOS & ICF, 2018). Also, micronutrient deficiencies are of public health concern; iron deficiency affects almost half of the children below five years (53%) and 32% of women (UBOS & ICF, 2018).

Improving nutrition, especially for women and children is considered key to fostering Uganda's social-economic growth and development (Republic of Uganda, 2011, 2015; Uganda National Planning Authority, 2010; Uganda Office of the Prime Minister, 2013). The nutrition/dietetic needs in Uganda are documented to arise from multi-faceted causes of malnutrition that vary from frequent illness; inadequate dietary intake; inadequate maternal and child care; household food insecurity; limited livelihood opportunities; inadequate access to health care and a healthy environment; limitations in policy and financing; and culture, education, and awareness (Government of Uganda, 2011). To meet the different nutrition/dietetic needs in Uganda, nutrition interventions are addressed multisectorally (Government of Uganda, 2011), and improving health and nutrition is recognised as essential for national development (Republic of Uganda, 2015a, 2020).

Nutrition interventions, differentiated into nutrition-specific and nutrition-sensitive (Ruel, Alderman, & Maternal and Child Nutrition Study Group, 2013) are recommended to be implemented at multiple levels under multisectoral partnerships (Scaling Up Nutrition (SUN) Movement, 2015). However, multisectoral nutrition collaborations are still low in

middle and low-income countries (Rasanathan et al., 2017). Recognising the challenges of malnutrition in Uganda, nutrition stands high on Uganda's national social-economic and health development agenda and the third National Development Plan envisages putting in place strategies to promote maternal and child nutrition by promoting the consumption of diversified diets; increasing consumption of fortified foods paying special attention to schools and establishing a national food law and food fortification policy (Republic of Uganda, 2020).

2.2 Scope of Human Nutrition and Dietetics Training and Practice in Uganda

The term 'Scope of HN/HND training and practice in Uganda' as applied in this study describes the requisite professional competencies, the range of roles, activities, and regulations within which nutrition and dietetics practitioners in Uganda perform; this definition was adapted from that by the ACEND (ACEND, 2012).

2.2.1 Human Nutrition and Dietetics Training and Practice

HN/HND professionals are recognised human resources for health (European Federation of the Associations of Dietitians [EFAD], 2012; Institute of Medicine, 2000; Kabene, Orchard, Howard, Soriano, & Leduc, 2006) that deliver nutrition and diet-related services. They thus ought to have the necessary competencies, i.e. the nutrition and dietetics skills, knowledge, and abilities required for health systems performance (Fanzo et al., 2015). The roles and definitions of a Nutritionist and or Dietitian may vary from one country to another subject to country-specific overall credentialing, training, and

practice mechanisms (ACEND, 2017; Health Professions Council of South Africa, 2016; Republic of Kenya, 2017).

HN/HND training at the undergraduate in Uganda was started in 2002 by Kyambogo University; this was followed by Makerere University in 2010, and later on by other Universities (NCHE, 2010, 2011, 2014 & 2016). As of December 2016, five institutions of higher learning in Uganda (Bugema University, Kyambogo University, Makerere University, Uganda Christian University, and Victoria University) had undergraduate HN/HND programs accredited by the NCHE (NCHE, 2010, 2011, 2014 & 2016). The undergraduates are awarded degrees in Human Nutrition and Dietetics, Human Nutrition, and/or Human Nutrition and Clinical Dietetics depending on the program of the institution awarding the degree. However, the Allied Health Professionals Council (AHPC) of Uganda recognised only the graduates from Makerere, Kyambogo, and the Uganda Christian University to graduate as nutritionists in the country (Republic of Uganda, 2018). The term Human Nutrition/Human Nutrition and Dietetics (HN/HND) professionals as used throughout this thesis hence refers to the Nutrition professionals trained at the undergraduate level in Uganda and recognised as so by the AHPC of Uganda (Republic of Uganda, 1996b, 2018).

Besides being explicit to HN/HND training, other programmes related to food science (food science, food processing, and preservation; food security; and food production) and nutrition accredited by the NCHE are offered in Uganda at different levels as presented in Table 2.1. Makerere and Kyambogo Universities also have accredited Bachelor's

programs in Food Science and Technology and Food Processing Technology respectively. The Ndejje University also offers a Bachelor of Sports Nutrition and Management (National Council for Higher Education, 2016).

Across the different universities in Uganda, the curricula used for teaching HN/HND specify learning outcomes but are still mainly content based-following the traditional "Credit Hour/Unit", a metric derived from the Carnegie Unit and based on the number of contact hours students spend in class per week in a given semester (NCHE, 2014b; Republic of Uganda, 2005b). The content time-based curricula are criticized for not adequately equipping the graduates with the required competencies owing to it being inadequately adapted to prevailing national contexts (Silva, White, & Toch, 2015). Also, by mainly stressing the amount of time students spend in the classroom instead of students' mastery of subjects, the traditional credit hour/Carnegie Unit do discourage educators from closely examining students' strengths and weaknesses and falls short of equipping graduates with the requisite competencies due to it being insufficiently adapted to the national contexts (Silva et al., 2015).

Table 2. 1. *Accredited Academic Programmes in Uganda with a Bias to Food, Nutrition and Dietetics*

University	Programme Name
Bugema University	Bachelor of Food Science and Human Nutrition
Gulu University	Master of Science in Food Security and Community Nutrition
	Bachelor of Science in Food and Agribusiness
Islamic University in Uganda	Bachelor of Food Science and Nutrition
Jimmy Sekasi Institute of Catering	Certificate in Food Production Management
	Diploma in Food Production Management
Kyambogo University	Bachelor of Food Science and Processing Technology
	Master of Science in Food Technology
	Bachelor of Science in Human Nutrition and Dietetics*
	Certificate in Food Processing Technology
	Diploma in Food Processing Technology
	Certificate in Food Processing and Preservation
Makerere University	Bachelor of Science Food Science and Technology
	Bachelor of Science Human Nutrition*
	Master of Science Applied Human Nutrition
	Master of Science Food Science and Technology
Mildmay Uganda	Diploma in Human Nutrition and Clinical Dietetics
Ndejje University	Bachelor of Sports Nutrition and Management
Uganda Christian University, Mukono	Bachelor of Science in Human Nutrition and Clinical Dietetics*
	Master of Science in Human Nutrition
Uganda Institute of Allied Health and Management Science	Diploma in Clinical and Community Nutrition**
Victoria University	Bachelor of Science in Human Nutrition and Dietetics
St. Francis School of Health Sciences	Diploma in Clinical and Community Nutrition
Uganda Catholic Management Training Institute	Diploma in Food Science and Nutrition
Bishop Stuart University	Master of Science in Climate Change and Food Security
Uganda Martyrs University	Doctor of Philosophy in Agroecology and Food Systems
St. Augustine International University	Bachelor of Clinical Nutrition

*Graduates Recognised as Nutritionist; **Graduates Recognised as Assistant Nutritionists (Republic of Uganda, 2018)

Source: National Council for Higher Education (2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018)

Examples of HN/HND study units as offered by different universities in Uganda include Human Anatomy, Principles of Human Nutrition, Pharmacology, Project Planning, and Management Basic Chemistry, Human Physiology, Communication Skills, Food and Nutrition Security,. Diet Therapy, Computing, Dietetic Guidance and Counselling, Farming, Professional Ethics, Biostatistics, Food Microbiology, Nutrition Assessment, Resource and Institutional Catering, Entrepreneurship Skills, Clinical Medicine, Sports Nutrition, Research Methods, Mother and Child Care and Development, Emergency Nutrition, Food Chemistry and Analysis, Immunology, and Product Development. These are mainly stated as outcomes but not levels of competence that the students ought to demonstrate after completing studies.

In terms of nutrition and dietetics practice, the training received is expected to empower the graduates to work in the different districts/regions and settings of Uganda (hospitals, community, hospitality, and academic/research institutions) being employed by Government Ministries, Departments and Agencies (MDAs), United Nations agencies, and other National development partner agencies, NGOs, and the Private sector.

2.2.2 Regulation of the Human Nutrition and Dietetics Profession in Uganda

Despite the existence of HN/HND programmes in Uganda, the diverse roles and competencies of HN/HND professionals are not fully recognized by the Acts of the existing Legal Health Professional Councils of Uganda (Republic of Uganda, 1996a, 1996b, 1998). The mechanisms of credentialing i.e., accreditation, licensure/registration, and certification are used widely to promote the quality training and practice of health care professionals in different contexts. According to Necochea & JHPIEGO (2006),

licensure/registration are sometimes used interchangeably but serve to verify "that a health provider meets the basic minimum standards of competency to perform their work safely and effectively" (p.1) and may be undertaken by specific units in government, professional associations or affiliated bodies. The individual requirements for this may include the need to undertake and complete formal education training in a given program; institutional requirements on the other hand involve the need for an institution to meet the standards set as a basic minimum for an institution to be considered able to effectively and sufficiently offer stipulated services.

Certification serves to indicate that one has through added training, obtained additional competencies in a given area of professional specialisation beyond established pre-service training standards and is often done by professional associations. Though usually done for individuals, organisations can also receive certification to indicate that they meet set standards to offer specialised services (Necochea & JHPIEGO, 2006). Accreditation is a quality mechanism applicable to organisations not individuals, education programs, and certifying bodies. It serves to ensure and communicate that the given institution meets the pre-established standards and can reliably deliver quality outputs (ibid.).

Credentialing[2], certification[3], accreditation[4], and licensing[5] are crucial for building a professional nutrition workforce (Mucha & Tharaney, 2013). At the statutory level,

[2] The establishment of a self-regulatory process instituted by the relevant profession to determine and acknowledge that an individual has demonstrated competence to practice (Mucha & Tharaney, 2013)
[3]Signifies that one has successfully completed a training course and met performance standards (Mucha & Tharaney, 2013)

professional regulation usually involves determining eligibility criteria for registering individuals under a given profession e.g. having a degree, undertaking specific training and supervised practice under a set curriculum; registering individuals that meet the set eligibility criteria; maintenance of professional registers; investigating and addressing complaints against errant registered professionals; adopting credentialing mechanisms; and the development of guidelines and standards of professional ethics and conduct (Ritchie & Edwards, 1998).

The regulation and registration of Nutrition Professionals is recent in Uganda; the mandate of which was granted in 2018 to the AHPC (Republic of Uganda, 2018). Nutrition and Dietetic graduates were formerly practicing unregulated having obtained degrees from different universities. Some of the graduates registered under the Uganda Dietetic Association and the Uganda Action for Nutrition (now known as the Nutrition Society of Uganda) the then existing professional bodies. However, neither of these two bodies was legally recognised as a professional body by the existing national laws or ACTs.

The AHPC requirements presently only state who Nutritionists are in the context of Uganda but, don't distinguish Nutritionists from Dietitians, they also do not stipulate the standards of training and practice for these two distinct but related professions (APHC,

[4]Means that training programmes are periodically evaluated based on well-defined standards (Mucha & Tharaney, 2013)

[5]Involves individuals adhering to formal legal requirements for practicing a profession and may include competency testing (Mucha & Tharaney, 2013)

2018; Republic of Uganda, 1996b, 2018). In certain countries, Dietitians and Nutritionists are regulated and registered differently with each requiring different training and accreditation requirements to enter the profession. The mandate of the AHPC in Uganda entails the registration of qualified allied health professionals; registration and licensing; and taking disciplinary actions against Allied Health Professionals (ibid.). Important to note also is that the draft revised scheme of service for Allied Health Professionals of Uganda having lacks a "clearly defined scheme of service for the Nutritionists to facilitate the recruitment, motivation and retention of such a skilled workforce." (Uganda Ministry of Health, 2021c, p.176) and that a revised structure for Nutritionists together with expected qualifications, experience and competencies expected of Nutritionists is proposed.

2.3 The Credit System of Education

Using the credit system of education was initiated in 1905 by the Trustees of the Carnegie Foundation for the Advancement of Teaching founded by the U.S. industrialist Andrew Carnegie to support college professors through a pension scheme. The Trustees through a wide range of consultations concluded that student entrance requirements to different colleges needed to be based on the metric of study Units (Silva et al., 2015). A unit at the preparatory school level denoted a course comprising five periods undertaken weekly through the academic year with fourteen units being the minimum requirement for student admission to college (Silva et al., 2015). It was Morris Cooke who suggested using Carnegie's student hour unit as a standard metric in higher education (Silva et al., 2015). This was described as:

> 120 hours of contact time with an instructor, which translates into one hour of instruction on a particular subject per day, five days a week, for twenty-four weeks annually….In higher education, students receive "credit hours", a metric derived from the Carnegie Unit and based on the number of "contact hours" students spend in class per week in a given semester. A typical three-credit course, for example, meets for three hours per week over a fifteen-week semester. A student, then, might earn fifteen credit hours per semester (fifteen is standard full-time registration for a semester, thirty for an academic year) en route to a four-year bachelor's degree requiring a total of 120 credits (Silva et al., 2015, p. 8).

Since its adoption in America, the Credit unit system of education/Credit hour/Carnegie unit has been used for standardizing the educational system of most countries globally. Seymour, Everhart, & Yoshino (n.d.) highlight that adapting the Carnegie unit was founded on the need to designate the meaning and use of the credit hour units in determining teaching loads not to assess student learning as currently done. Regel (1992) highlighted that using the Credit Unit education system promotes student engagement; motivation; eases the processes of making course combinations and choices; allows for continuous semester assessments, therefore, decreasing the pressure of examination on students; permits improved understanding of study materials and contents; and to extent reduces repetitions by students. However, they criticized this system for splitting knowledge and learning into small and sometimes unrelated units.

2.3.1 Critique of the Credit Hour/ Carnegie Unit System of Education

Silva et al. (2015) argue that given its main emphasis on the time that learners spend learning in the classroom rather than the degree of mastering subjects, the Credit hour/Carnegie Unit metric discourages educators from carefully examining the weaknesses and strengths of the learners which affect the quality and effectiveness of learning. Due to the continued use of the Credit system of education, a perceived mismatch between the knowledge and skills provided by the traditional education system vis-à-vis the needs of the employers has also been viewed to exist (Seymour et al., n.d.).

The credit system is also viewed to be "based on industrial-age, highly-structured, time-based educational models, presenting challenges in adapting these processes in an information-age economy that relies on greater flexibility and the ability to apply learning in rapidly changing circumstances" (Seymour et al., n.d., p. 4). It is additionally criticized for distortion of what students learn and fragmentation of higher education study content into small unrelated segments that usually fall short of producing an educated person; rather than being focussed on gainful learning, students under this system usually aim towards accumulating academic credits (Regel, 1992).

Though the Credit hour system has its failings, getting a measurement for CBE is still a challenge and universities have low willingness to use other measures for assessing students learning other than those based on time (Garn, 2019). To defend the usefulness of the Credit Unit, the Carnegie Foundation explained that this Unit was only developed

for purposes of standardizing how students should be exposed to the learning materials and instruction, not the actual measurement learning as this is a mandate of instructors through use of various assessments (Silva et al., 2015). As such, the foundation concluded that the use of the Carnegie Unit for assessing the quality of student learning overlooks the envisioned use of the Carnegie Unit (ibid.). The Carnegie Foundation also contends that minimal evidence supporting the shift from the Credit Unit would reduce the inequities and insufficiencies existent in education as well as lead to the improvement of students' performance. Nonetheless, the Foundation called upon policymakers and educators to "systematically test new learning standards, high-quality assessments, and accountability models that focus greater attention on student learning-exploring not only which innovations work, but for whom and in what circumstances" (Silva et al., 2015, p. 31).

2.4 Conceptualising Competence, Competency, and Competency-Based Education

2.4.1 Competence and Competency

Authors tend to interchange use of the terms competency (ies) and competence (s) yet distinctions exist between the two. According to Royce Sadler (cited Blömeke, Zlatkin-Troitschanskaia, Kuhn, & Fege, 2013), competency refers to a skill and or practice that is identifiable while competence entails a set of distinct competencies that can objectively and individually be assessed and it involves the ability to be able to choose and organise different competencies to accomplish a precise goal in a specific context.

The European Commission (2015) defined competence as "the proven ability to use knowledge, skills, and personal, social, and/or methodological abilities, in work or study situations and in professional and personal development" (p.22). Accordingly, competence can be divided into four: (i) cognitive competence which involves the use of theory and concepts, as well as informal tacit knowledge, gained experientially; (ii) functional competence (skills or know-how), those things that a person should be able to do when they are functioning in a given area of work, learning or social activity; (iii) personal competence involving knowing how to conduct oneself in a specific situation; and (iv) ethical competence involving the possession of certain personal and professional values (European Commission, 2005 cited Sultana, 2009).

The East African Qualifications Framework for Higher Education highlights that "Competences are fundamentally a statement that a person is able to do after achieving a particular level of learning. Some formulations of learning outcomes may not be able to satisfy this requirement for contextual specification" (East African Community, 2015, p. 32). Though interchangeably used, learning outcomes differ from competencies;

> Student learning outcomes can be defined in terms of "the particular levels of knowledge, skills, and abilities that a student has attained at the end (or as a result) of his or her engagement in a particular set of collegiate experiences" (p. 6), but when describing learning outcomes in terms of competencies, "such goals describe not only what is to be learned but also the specific levels of performance that students are expected to master…(Klein-Collins, 2012, p. 9).

According to the Uganda Public Service Competence Dictionary, “Competencies are specific and observable knowledge, skills and behaviours that are associated with effective functioning of the job/task” (Ministry of Public Service, 2007, p.1). The competencies are subdivided into four levels of proficiency. Level one, also referred to as the *learning level* is considered to involve general awareness and basic understanding. Individuals at this level still require a significant amount of learning, and a clear and specific direction to get a job done. Level two is also known as the *working knowledge level*; individuals at this level are anticipated to be knowledgeable and able to handle most tasks independently but they still require direction on work objectives and need more practice. Level three is also known as the *experienced knowledge level*. Individuals at this level are considered to be technically experienced and able to undertake independent judgment of technical issues; they also understand how different areas of knowledge relate to broader issues and can be relied upon for guidance. Level four is also referred to as the *expert knowledge level*. At this level, individuals are considered to be fully competent, they understand how different areas of knowledge relate to the broader organizational and national goals; are reliable for advice; and can perform adviser or trainer roles (Ministry of Public Service, 2007).

In reference to the Dreyfus Model of Adult Skills Acquisition (Dreyfus, 1986 cited Dreyfus, 2004), the ACEND (Bruening et al., 2015) recognised that the development of professional skills development in the field of nutrition and dietetics requires professional training and supervised practice for one to progress from one being a novice to an advanced beginner, competent, proficient, and eventually an expert. For nutrition and

dietetics training in the US, Bruening et al. (2015) further highlight that the first two stages are required as part of the didactic education (novice) and supervised practice experience (advanced beginner) for one to be considered competent for professional practice.

2.4.2 Competency-Based Education

In the health domain, Frenk et al. (2010) describe CBE as a disciplined approach that specifies the health problems to be addressed, identifies the requisite competencies required of graduates for health systems performance, tailors the curriculum to achieve competencies, and assesses achievements and shortfalls. The Council on Education for Public Health, (2011) defined CBE as:

> An institutional process that moves education from focusing on what academics believe graduates need to know (teacher-focused) to what students need to know and be able to do in varying and complex situations.…CBE is focused on outcomes (competencies) that are linked to workforce needs, as defined by employers and the profession. … Competencies reinforce one another from basic to advanced as learning progresses (Council on Education for Public Health, 2011, p. 1).

While Medina (2017) highlighted that:

> In CBE, students demonstrate mastery of explicit and measurable knowledge, skill, and attitude outcomes (competencies) and receive individualized support that is tailored to their specific developmental needs [7]. Students progress in the program by demonstrating they have mastered the knowledge and skills

> (competencies) for a course regardless of time, meaning they could take more or less time [8], therefore studying and learning at their own pace (Medina, 2017, p.3).

Although CBE is traceable to the mid-20th century, it gained momentum in the early 21st century and is now forecast to be at the forefront of reforms and transformations in education (Frenk et al., 2010; González & Wagenaar, 2003; and Organisation for Economic Co-operation and Development [OECD], 2001). Adopting CBE has practice, social, and policy implications (Seymour et al., n.d.). At the social level, CBE creates leverage for higher education to shift from an industrial to an information society; allows for possibilities to restructure higher education; and increases access to higher education amongst poor/low-income populations. At the practice level,, CBE can resolve issues of accountability and the achievement of outcomes in different institutions. At the level of policy, creating opportunities for funding CBE will lead to the growth of CBE programs (Seymour et al., n.d.). Oyugi (2015) however argues that people implementing CBE with "very complex problems [that] go beyond the capacity of any one organisation to understand and or respond to" (p. 74).

2.4.3 Global and National Reforms towards CBE in Higher Education

Frenk et al. (2010) observed that the wholesale adoption of competencies from other country contexts is inappropriate to the progression of local health systems, leads to the embracing of unsuitable competencies, and causes ineffective investments in education. Two projects; Tuning Education Structures in Europe (also known as Tuning Project) and

the Definition and Selection of Competencies: Theoretical and Conceptual Foundations (DeSeCo) understanding of competence and its ultimate foundation in reforming the higher education system of Europe through the adoption of CBE (OECD, 2001 and González & Wagenaar, 2003). The African Union envisages enhancing the quality of higher education with the Continental Education Strategy for Africa 2016-2025 being focused on enhancing competency-based learning outcomes (African Union, 2016).

As summarised in Table 2.2, reforms to adopt CBE are being undertaken at different levels. Already, some developed countries including the USA, Canada, Australia, New Zealand, the United Kingdom, and some other European countries have taken reforms to adopt CBE for their HN/HND profession and have developed standards that describe a dietician graduate's capabilities (Harris & Frank, 2014; Palermo et al., 2016). Reforms to adopt CBE in the training of HN/HND in Sub-Saharan Africa are still low, South Africa is however noted to have defined competencies required of their nutrition profession (Wentzel, 2016). However, efforts to adopt CBE are taking shape though more in CBME (Ngassapa et al., 2012). For instance, in Nigeria, the College of Medicine of the University of Ibadan adopted the CBME for its medical and dental students (Olopade, Eniola, et al., 2016). In the same country, the University of Ibadan had earlier adopted CBME in 2011 (Kiguli-Malwadde et al., 2014). In East Africa, the Muhimbili University of Health and Allied Sciences (MUHAS) of Tanzania undertook curriculum reforms leading to the adoption of CBE competency-based education for different health cadres trained by the University (Ngassapa et al., 2012).

Table 2.2. Nutrition and Dietetics Competencies in Selected Regional and National Competency-Based Education Frameworks/Models

Region/ Country	Competency frameworks	Identified Competency Areas /Domains/Themes
Europe	Yes	Healthcare professionalism; knowledge base of dietetics; dietetic process and reasoning; evidence-based dietetic practice; autonomy, accountability, and quality in dietetic practice; [and] communication, relationships, and partnerships skills in dietetics (European Federation of the Associations of Dietitians, 2016, p.2).
United States of America	Yes	Ethics and professionalism; communications; leadership and advocacy; critical thinking and decision making; informatics; research and quality improvement; safety and risk management; food, nutrition and dietetics and physical activity; education and counselling; clinical care; product development and marketing; community and population health; food service management; and organization management (Accreditation Council For Education in Nutrition and Dietetics, 2015, p.5).
Canada	Yes	Professional practice, communication and collaboration, nutrition care, population, and public health, and management (Partnership for Dietetic Education and Practice, 2013, p.2).
Australia	Yes	Practices professionally; positively influences the health of individuals, groups and/or populations to achieve nutrition outcomes; applies critical thinking and integrates evidence into practice; collaborates with clients and stakeholders (Dietitians Association of Australia, 2015, p. 1-2).
Newzealand	Yes	Food, Nutrition and health; communication and collaboration; management and leadership; professionalism; and scholarship (Dietitians Board, 2017).
United Kingdom	Yes	Communication; personal and people development; health, safety, and security; service development; quality; equality, diversity, and rights; promotion of health and prevention of adverse effects; assessment and treatment planning; interventions and treatment; and information collection & analysis (British Dietetic Association, 2018a, British Dietetic Association, 2018b, p.4).
East, Central, and Southern Africa Health Community	Yes	Communication skills; basic applications in information communication technology; principles of human nutrition; nutrition in the life cycle; nutrition assessment; ethics and integrity for professional practice; health education; nutrition in disease/conditions management; basic health information systems management; basic sociology; basic psychology; and leadership and management (East, Central, and Southern Africa-Health Community, 2017, p.14).
South Africa	Yes	Nutrition and other basic sciences; screening/needs assessment/situation analysis; nutrition planning, implementation, monitoring and evaluation; food service(management); food and nutrition security; communication and advocacy; management and leadership; education, training, promotion and capacity building; research; strategies, policies, and guidelines; and critical cross-field outcomes/student attributes (Health Professions Council of South Africa, 2016, p.5).
Ethiopia	Yes	Community mobilization; nutrition counselling; prevention and dietary management of diet-related, non-communicable diseases; nutrition information system-maintaining records, compiling and reporting; rapid assessment and management of nutrition problems in emergencies; nutrition program planning (nutrition intervention planning); application of lifecycle approach in addressing nutrition problems in a lifecycle perspective); nutrition surveillance; nutrition-related operational research; and nutrition-related capacity-building (Save the Children & Jhpiego, 2012, p.5-6).

In Uganda, there is limited evidence and effort toward developing and adopting CBE in the field of HN/HND. However, institutions of higher learning under the Medical Education Partnership for Equitable Services to all Ugandans (MESAU) consortium developed and agreed to adopt a list of competencies to inform CBME (Kiguli et al., 2014). At the national level, an attempt toward adopting CBE in the area of BTVET also exists (MoEs, 2011).. During the 1st National Conference on Learning Outcomes in Uganda, it was noted that "High academic qualifications are achieved without students developing and demonstrating key job-related competencies" (Twaweza East Africa, 2017, p.2). The conference participants strongly recommended that " Uganda's education system should focus on preparing young people for the world of work … who will help build Uganda as a modern and prosperous country" (Twaweza East Africa, 2017) to achieve the Uganda Vision 2040.

2.5 Practices used in the Development and Validation of CBE Programmes

Mcclarty & Gaertner (2015) elucidated that models of CBE exist in different forms though the majority are constituted by (1) a competency framework and (2) competency assessments. A competency framework refers to the "skills, abilities, and knowledge needed to perform a specific task" (p. 2). An assessment of the different practices considered effective in the development of competency-based models (McIntyre-Hite, Monica, 2016) recognized the following effective: ascertaining who the stakeholders are prior to writing competencies; involving subject matter specialists, external experts and employers; defining competencies first at the outset of program development; using a backward design process i.e. what students need to know and be able to do to be

successful; engaging in an iterative process; gathering information from multiple employers within the degree field so that competencies capture the variety of potential expectations and roles; and using industry professionals standards.

The process of developing and validating CBE programs also requires that participating stakeholders have a consensus on key aspects. According to Felicity, Keeney, & Mckenna (2000), the use of the 'Delphi' survey technique enables the establishment of consensus on several aspects hence facilitating decision-making in situations where information may be contradictory or insufficient.

> Delphi is a process of establishing consensus on a given phenomenon whereby written documents are circulated to a group of experts in a series of rounds, with each round incorporating the feedback from the previous round, until consensus has been achieved among the experts (Haggerty et al. 2007 cited by Moaveni et al., 2010).

Felicity et al. (2000) also observed that individuals participating in a Delphi need to be knowledgeable of the topic and hence are referred to as experts. No universally agreed proportion for defining consensus exists in a Delphi, however;

> "McKenna (1994)… suggests that consensus should be equated with 51% agreement amongst respondents, Sumsion (1998) recommends 70%, while Green et al. (1999) opted for an 80%. Alternatively, Crisp et al. (1997) questioned the value of using percentage measures, suggesting that the stability of the response

> through a series of rounds is a more reliable indicator of consensus" (Felicity et al., 2000).

According to Keeney, Hasson, & McKenna (2011), several modifications of the original Delphi technique exist as summarised in Table 2.3, but no official universally agreed upon guidelines on using the Delphi exist. The original Delphi also known the classical Delphi;

> Involves the presentation of a questionnaire to a panel of 'informed individuals' in a specific field of application, in order to seek their opinion or judgement on a particular issue. After they respond, the data are summarised and a new questionnaire is designed based solely on the results obtained from the first round. This second instrument is returned to each subject and they are asked (in the light of the first round's results), to reconsider their initial opinion and to once again return their responses to the researcher. Repeat rounds of this process may be carried out until consensus of opinion, or a point of diminishing returns, has been reached (Keeney et al., 2011, p.6).

The Delphi technique has been used in developing competency standards for dieticians in Australia (Dart et al., 2016), developing consensus on the professionals and clinical competencies for nutrition and dietetic programs in the USA (ACEND, 2017), and developing a competency framework for the public health nutrition workforce by the World Public Health Association (Hughes et al., 2011). For this study, the modified

Delphi variant of the Delphi technique was used to generate consensus on the different aspects of the HN/HND CBE model framework developed and validated a part of this study.

Table 2.3. *Different Modifications of the Original Delphi Technique*

Delphi Types	Summary Characteristics
Classical Delphi	Uses an open first round to facilitate idea generation to elicit opinion and gain consensus Uses three or more postal rounds Can be administered by email
Modified Delphi	Modification usually takes the form of replacing the first postal round with face-to-face interviews or focus group May use fewer than three postal or email rounds
Decision Delphi	Same process usually adopted as a classical Delphi Focuses on making decisions rather than coming to consensus
Policy Delphi	Uses the opinions of experts to come to consensus and agree future policy on a given topic
Real Time Delphi	Similar process to classical Delphi except that experts may be in the same room Consensus reached in real time rather than by post Sometimes referred to as a consensus conference
e-Delphi	Similar process to the classical Delphi but administered by email or online web survey
Technological Delphi	Similar to the real time Delphi but using technology, such as hand held keypads allowing experts to respond to questions immediately while the technology works out the mean/median and allows instant feedback allowing experts the chance to re-vote moving towards consensus in the light of group opinion
Online Delphi	Same process at classical Delphi but questionnaires are completed and submitted online
Argument Delphi	Focused on the production of relevant factual arguments Derivative of the Policy Delphi Non-consensus Delphi
Disaggregative Delphi	Goal of consensus not adopted Conducts various scenarios of the future for discussion Uses cluster analysis

Source: Adopted from Keeney, Hasson, and McKenna (2011)

2.6 Summary of the Literature

The causes of malnutrition in Uganda are multifaceted; hence the nutrition/dietetic needs and demands vary. To meet the different nutrition needs in Uganda, the government considers improving health and nutrition as a development issue. There is a need to train competent HN/HND professionals if governments are to improve nutrition services delivery. To improve the training of health professionals for health systems performance in the 21st Century, National governments and their respective institutions of higher learning have been recommended to undertake education reforms towards the adoption of CBE. In the health domain, CBE requires the specification of health problems to be addressed, identification of the competencies required to address the given problems, tailoring the curriculum to achieve the specified competencies, and assessing achievements and shortfalls therein.

Some developed countries have undertaken reforms in their education systems to adopt CBE in the training of health professionals. There is however limited evidence towards developing and adopting CBE in the field of HN/HND in Uganda. Attempts to institute CBE in Uganda however exist in medical education and BTVET institutions. This study filled this gap by developing and validating a CBE model that can be used for training in Human Nutrition/Human Nutrition and Dietetics at the undergraduate level in Uganda.

CHAPTER THREE: METHODOLOGY

3.1 Research Design

This study utilised a cross-sectional mixed methods design and was undertaken in two study phases; (1) competency needs assessment and (2) model development and content validation. The competency needs assessment phase used an explanatory sequential mixed methods design (Schoonenboom & Johnson, 2017; Zheng, 2015) in two cross sectional surveys while the model development and content validation phase were iterative (Mills, Durepos, & Wiebe, 2012) and involved hosting a workshop, undertaking focus group discussions, and a modified Delphi study. The two phases were inter-linked in that results from the first phase formed the basis for the second phase. The study design allowed for triangulation in both data collection and analysis hence providing complementary data on study objectives and strengthening the study conclusion (Schoonenboom & Johnson, 2017; Zheng, 2015).

The whole study was initially planned to be undertaken in three independent phases of competency needs assessment, development of a HN/HND competency-based education model, and model validation as shown in Appendix A. However, given the field situation, some modifications to the initial design were undertaken and implementation of the second and third phases jointly undertaken as one, model development and content validation phase as summarised in Figure 3.1.

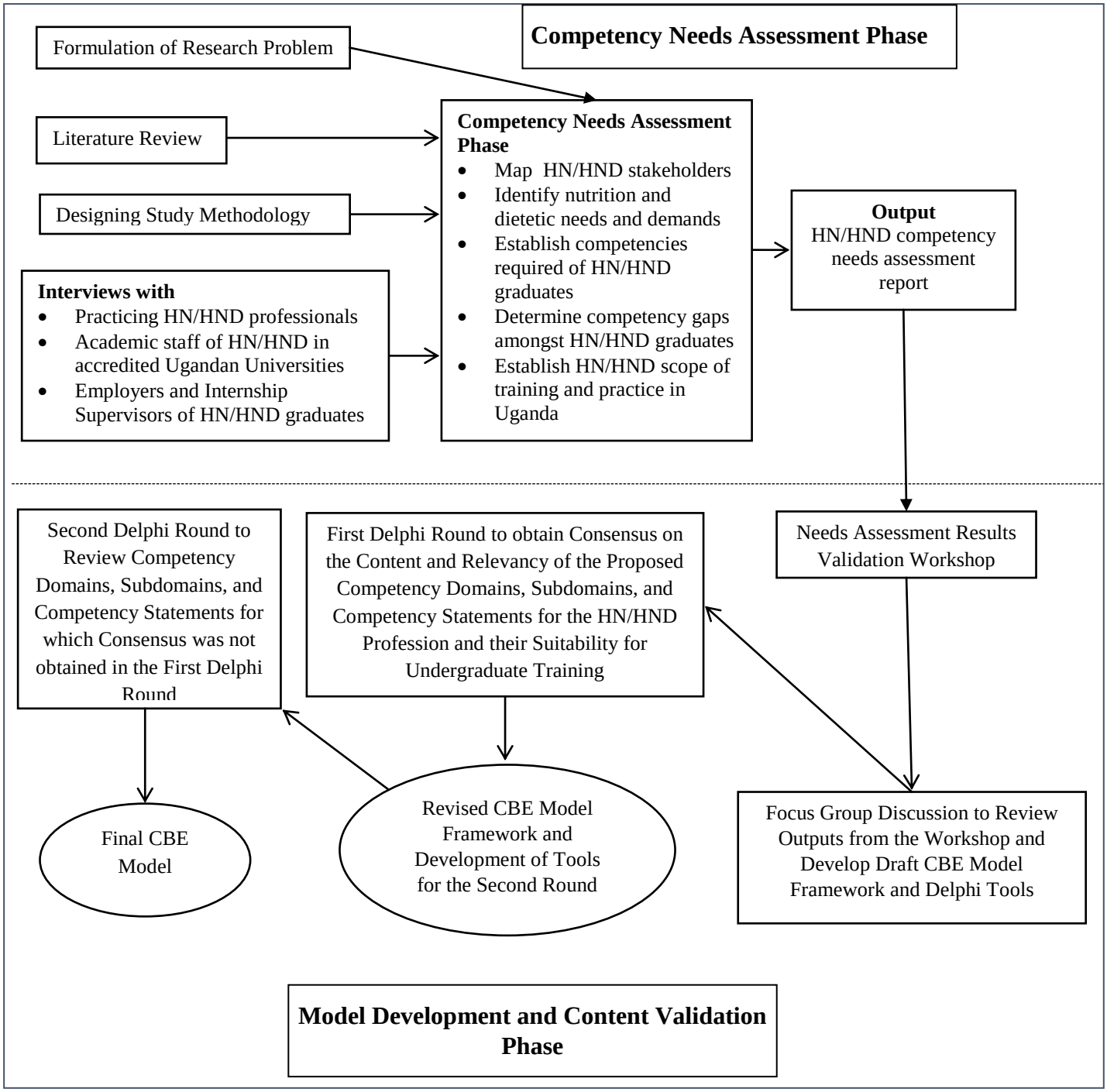

Figure 3.1. Overall Research Flow Process

HN/HND: Human Nutrition/Human Nutrition and Dietetics; CBE: Competency-Based Education

All the different research processes for the competency needs phase were undertaken from December 2017 to May 2019. The same processes for the model development and content validation phase lasted from October 2019 to June 2020. As can be observed, the study design used in this study utilised aspects of a stakeholder-engaged research approach. Stakeholder-engaged research allows stakeholders to provide their perspectives on the different research questions and outcomes beyond what a single research team can do hence improving the overall quality of research and its related outcomes (Goodman, Ackermann, Bowen, Thompson, & Goodman, 2019; Ray & Miller, 2017). This approach allowed for the active engagement of the stakeholders in the development of a CBE framework that they could easily relate to and own.

3.1.1 Phase 1: Competency Needs Assessment

This phase utilised an explanatory sequential mixed methods design (Schoonenboom & Johnson, 2017; Zheng, 2015) in two cross sectional surveys to understand the nutrition/dietetic needs in Uganda; the respondents' perceptions of the competencies required of Nutrition and Dietetics professionals to perform in Uganda's varied health systems settings, and the scope of HN/HND training and practice in Uganda.

It should be particularly noted that the assessment of the nutrition/dietetics needs in Uganda was based on the service providers' (i.e. HN/HND graduates, academic staff that trains HN/HND, and employers of HN/HND graduates) perspectives. The basis for this decision was that the targeted service providers, most especially the HN/HND graduates,

worked in different contexts across the country; their aggregated responses on the nutrition/dietetic needs/demands encountered would give a broader view of the nutrition/dietetic needs in Uganda. Incorporating the community perspectives of the nutrition/dietetic needs and challenges these encounter could have provided added rich data on the subject matter; this was not undertaken as part of this study but is recommended for further research.

3.1.2 Phase 2: Development and Content Validation of a HN/HND Competency-based Education Model

The process for developing and undertaking content validation of an undergraduate HN/HND CBE model was undertaken in three iterative phases. The first stage was a participatory face-to-face stakeholder workshop to validate results from the competency needs assessment and to propose competency domains for the CBE model. The second stage was in the form of a focus group discussion to refine the outputs from the first stage and also develop tools for the third stage. The third stage was on consensus development to identify the relevance of the competency domains, subdomains, and competency statements comprised in the Draft 1 HN/HND model competency framework well as their suitability for undergraduate training of HN/HND in Uganda. This was undertaken in two rounds of the modified Delphi technique (Keeney et al., 2011). This phase also allowed for validation of the content in the developed model.

3.2 Research Variables

3.2.1 Dependent Variable

The outcome variable of this research was a developed and validated undergraduate HN/HND competency-based education model suitable for use in Uganda. This variable was attained through an iterative process as described in section 3.1.2 of this thesis.

3.2.2 Independent Variables

This study made use of the following independent variables:

1. Nutrition/dietetic needs in Uganda
2. Competencies required of HN/HND graduates to competently perform in Uganda's health system
3. Scope of HN/HND training and practice in Uganda

The assessment of the variable on nutrition/dietetics needs in Uganda adapted the normative concept of need i.e. what the expert or professional, administrator, or social scientist defines as a need in any given situation as defined by Bradshaw (1972 cited Sainsbury, Glendinning, & Cookson, 2013) was adapted. As such, assessment of these needs was as per the service providers' (i.e. HN/HND graduates, academic staff that trains HN/HND and employers of HN/HND graduates perspectives of the nutrition/dietetic challenges faced by communities and the nutrition/dietetics services requested and provided to communities.

The assessment of the variable on competencies required of HN/HND graduates to competently perform in Uganda's health system was attained through obtaining respondents' perceptions of the nature of work and the respective job roles performed by HN/HND graduates and the knowledge and skills that are required of the graduates for health systems performance.

The variable on the scope of HN/HND training and practice in Uganda was assessed by obtaining the respondents' perspectives under the guidance of six qualitative indicators: regulation of HN/HND training and practice in Uganda; the existence of national minimum training and practice requirements for HN/HND; the existence of HN/HND training/practice guidelines or standards besides institutional HN/HND curricula; challenges towards the implementation of HN/HND competency-based education in Uganda; opportunities for continuous professional development of HN/HND in Uganda; and strategies to foster the continuous professional development of HN/HND in Uganda.

3.3 Targeted Institutions

This study targeted institutions of higher learning in Uganda that had undergraduate training programs in HN/HND accredited by the NCHE (Kyambogo University, Makerere University, Uganda Christian University, Victoria University, Bugema University) at the time of the study (NCHE, 2016, 2018) and selected Government, Non-government organisations, and health facilities that employ and or offer HN/HND training internships in Uganda.

3.4 Target Population

The study target population comprised HN/HND bachelor's degree holders from the Makerere and Kyambogo Universities of Uganda in the years of 2005 to 2016[6]; academic staff that trains HN/HND in Uganda's institutions of higher learning; and workplace/internship supervisors of HN/HND graduates in Uganda. Only academic staff from Kyambogo and Makerere Universities and their respective graduates participated in the needs assessment phase given that no other institutions had graduated these within the study reference period. The model development and content validation phase also targeted academic staff from other Universities meeting the inclusion criteria. Appendix B shows the map of Uganda and its respective districts while Appendix C lists the different hospitals in Uganda some of which employ HN/HND graduates and student interns.

3.4.1 Inclusion Criteria

1. **HN/HND Graduates:** These must have held an undergraduate degree in HN/HND obtained in Uganda in the period 2005 to 2016 from an accredited University. The rationale for including the graduates of this period was the expectation that most of the graduates would have had professional working experience in the field of HN/HND and hence provides information based on practical experience. The HN/HND professionals included on the team of experts that participated in the

[6] The system of graduation in Kyambogo and Makerere Universities of Uganda is that candidates who fulfill university academic graduation requirements either graduate towards the end of the same year in which they completed the studies, which usually is in December or in the first two months of the following year, An example is that graduates completing studies in 2016 may graduate in December of 2016 or in January or February of 2017. In this research, all candidates who indicated having graduated in 2017 actually completed studies in 2016 and were hence considered as graduates of the 2016 class not the 2017 class.

different stages of CBE model development included only those that contributed to the competency needs assessment phase. Only the graduates from the Makerere and Kyambogo Universities met these criteria.

2. **Training Institutions:** Only those Universities accredited and or having a provisional operational licence in Uganda and offering an NCHE accredited undergraduate training program having the term "Human Nutrition" and or "Human Nutrition and Dietetics" in the title of the degree awarded were included. For the needs assessment phase, the universities must have outed HN/HND graduates meeting the inclusion criteria; on this, only the Makerere and Kyambogo Universities met this criterion. The model development phase invited staff from the other qualifying universities.

3. **Employers of HN/HND Graduates/Interns:** To be regarded and included as an employer of HN/HND graduates, the entity (whether government or non-government) must either have been employing at least one HN/HND professional or be known to have hosted HN/HND student interns consecutively for the previous three years (i.e. 2014, 2015, and 2016 respectively). The basis for this was that by having hosted HN/HND interns for this period, the given entity was expected to have familiarity with the knowledge and skills required of HN/HND graduates.

4. **Delphi Participants:** To be included, selected participants had to have experience in different areas of HN/HND practice in Uganda including inpatient and outpatient clinical nutrition; community nutrition and outreach programmes; food and nutrition

security; food service; nutrition/dietetic counselling, advocacy and behaviour change communication; public health nutrition; nutrition research; nutrition policy and programming; monitoring and evaluation; and nutrition. Besides knowledge and experience, the members selected had to express willingness and availability to participate in the study (Palinkas et al., 2015) while the HN/HND graduates must have contributed to the competency needs assessment phase.

3.4.2 Exclusion Criteria

Excluded from the study were HN/HND graduates who for varying reasons could not be reached, and did not respond within the time of collecting competency needs assessment data. Employers of HN/HND Graduates/Interns were excluded if their main area of work was not health and nutrition-related. Also excluded were all targeted and invited potential participants who did not express interest in contributing to the different phases of model development and validation. Uganda Christian University, Victoria University, and Bugema University did not have graduates meeting the inclusion criteria, their graduates were hence excluded from all study phases. The categories of participants that were involved in the study are summarised in Table 3.1.

Table 3. 1: *Summary of Participants Considered for Inclusion in the Study*

Category A: HN/HND professionals

- HN/HND graduates from Kyambogo University and Makerere University in the period 2005-2016

Category B: Training Institutions with accredited HN/HND undergraduate programs

- Makerere University, Kyambogo University, Victoria University, Uganda Christian University, and Bugema University
- Lecturers of HN/HND were targeted for inclusion in the study as per set criteria

Category C: Employers/Internship supervisors of HN/HND Graduates/Interns

- Hospitals (National referral hospitals, Regional referral hospitals, District hospitals, Private for-profit hospitals, Non-government non-profit hospitals, and Other government hospitals)
- Government ministries of health, agriculture, education, Uganda National planning authority, UNCHE, Office of the Prime Minister
- NGO's employing HN/HND undergraduates
- UN agencies and Development partners supporting health and nutrition programs

3.5 Sample Size Determination and Sampling Techniques

3.5.1 Sample Size of HN/HND Graduates in Different Study Phases

3.5.1.1 Competency Needs Assessment Phase

Development of a master sampling frame (Turner, 2003) was initially undertaken using the graduation lists of HN/HND graduates from the participating Universities for the period 2005 to 2016. Accordingly, a total of about 607 HN/HND graduates; 493 from Kyambogo University and 114 from Makerere University had graduated in the reference period (Appendix D). The existing graduates' contacts in the form of email and phone contact numbers were attained from the individual university departments. Beginning with these, more graduate contacts were attained by calling the known contacts,

explaining to them the purpose of the study, and the approaches to be used in collecting data and eventually requesting for email and phone contacts of their fellow graduates. This process was continued until no further contacts could be attained; at which point 450 of the 607 graduates' email and mobile phone contacts had been obtained.

As per the proposal, determining the number of HN/HND participants had been planned to occur in two stages. First, a representative number of graduates was to be determined using the Krejcie and Morgan Table (Krejcie & Morgan, 1970) based on a population of 607 HN/HND graduates as per the identified University graduation records. From the Krejcie and Morgan Table (Appendix E), 234 respondents are representative of a population of 600 members. In the second stage, the proportional allocation method of sampling (Bowley, 1926 cited Singh & Mangat, 1996) was to be used to compute the sample size of graduates to be selected from each University per graduation year/class (here referred to as a stratum) using the equation as follows:

$$n_h = \frac{n}{N} N_h$$

Where; n_h represents the sample size for a given stratum, n represents the sample size computed for the overall population, N_h represents the population size of the h^{th} strata and N represents the overall population size. To cater to non-response, the computed proportional sample sizes for each stratum were to be increased by a non-response factor of 10% (Magnani, 1997). The overall computed sample size taking into consideration the non-response factors amounts to 257 participants. The calculations for n_h for each stratum that had been proposed to be used are as shown in Table 3.2.

Table 3. 2. *Sample Size of HN/HND Graduates as Initially Planned for the Competency Needs Assessment*

Student Intakes	**KyU (N_h)**	**Computing n_h for KyU**	**Kyu Sample (n_h) +10% n_h**	**Mak (N_h)**	**Computing n_h for Muk**	**Mak Sample (n_h) +10% n_h**
2002-2005	17	(234 x17) ÷ 607 = 6.6	**7**	0		0
2003-2006	22	(234 x 22) ÷ 607 = 8.5	**9**	0		0
2004-2007	20	(234 x 20) ÷ 607 = 7.7	**9**	0		0
2005-2008	30	(234 x 30) ÷ 607 = 11.6	**13**	0		0
2006-2009	24	(234 x 24) ÷ 607 = 9.3	**10**	0		0
2007-2010	55	(234 x 55) ÷ 607 = 21.2	**23**	0		0
2008-2011	67	(234 x 67) ÷ 607 = 25.8	**28**	0		0
2009-2012	31	(234 x 31) ÷ 607 = 12	**13**	0		0
2010-2013	41	(234 x 41) ÷ 607 = 15.8	**17**	22	(234 x 22) ÷ 607 = 9	**10**
2011-2014	79	(234 x 79) ÷ 607 = 30.5	**34**	24	(234 x 24) ÷ 607 = 9	**10**
2012-2015	38	(234 x 38) ÷ 607 = 14.7	**16**	36	(234 x 36) ÷ 607 = 14	**15**
2013-2016	69	(234 x 69) ÷ 607 = 26.6	**29**	32	(234 x 32) ÷ 607 = 12	**13**
Total	493	(234 x 493) ÷ 607 = 190	**209**	114	(234 x 114) ÷ 607 = 44	**48**

KyU: Kyambogo University; Mak: Makerere University. Bolded figures represent sample sizes after being increased by a non-response factor of 10%

Undertaking the research as initially planned required obtaining all the contacts of the 607 HN/HND graduates in the first stage. In reality, two main challenges were experienced. First, there was a failure to develop a complete sampling master frame (Turner, 2003) as only 450 of the 607 contacts of the former HN/HND graduates were obtained despite the numerous trials and time allocated for this purpose. Even then, the obtained contacts were not fully representative of the different graduation classes. Second, there was a challenge of the geographical distribution of the graduates as many

worked in different parts of the country with some working outside Uganda. Such related challenges have been encountered in other research (Rinken, 2013).

To maintain representativeness as initially planned, a decision was undertaken to vary the method of sample size determination. First, it was recognised and accepted that obtaining a sufficiently complete master sampling frame having all contacts of the 607 HN/HND graduates from which to draw a probability sample as initially planned was impossible. Hence, the developed list bearing the 450 contacts was used as the master sampling frame Second, given that the developed sampling frame had a lower number of HN/HND graduates than expected; the exhaustive sampling procedure (Ridenhour & Grimmett, 2006) was instead adopted. Using exhaustive sampling is permissible and meets sampling requirements for a study employing aspects of a qualitative descriptive sampling approach (Colorafi & Evans, 2016) as was the case in this study. Exhaustive sampling gave a chance to all HN/HND graduates whose contacts were established to participate in the study thereby introducing an element of randomness in the responses received.

3.5.1.2 Model Development and Validation Phase

Purposive sampling was used to select HN/HND graduates meeting the set-out inclusion criteria to the team of Delphi Participants (see inclusion criteria 4 under section 3.4.1). Figure 3.2 provides a summary of the number of graduates included in the different stages of this phase. Communication in this phase was mainly email-based; hence the physical location of the participants did not matter for as long as he/she could access the internet and communicate through emails.

3.5.2 Sample Size of Academic Staff in the Different Study Phases

3.5.2.1 Competency Needs Assessment Phase

For the competency needs assessment phase, names of the 21 permanent academic staff that teach HN/HND were obtained from the respective university departments of Makerere and Kyambogo Universities. From the lists, the names of seven academic staff who responded to the HN/HND graduate's study instrument were excluded. The remaining list had 14 contacts; eight from Kyambogo University and 6 from Makerere University. Since the staffs usually teach dissimilar study units, a deliberate decision to purposively include all the 14 identified staff was undertaken. A summary of the academic staff as engaged in the different study phases and respective stages is provided in Figure 3.2.

3.5.2.2 Model Development and Validation Phase

All academic staff from the five universities meeting the inclusion criteria (Bugema, Kyambogo, Makerere, Uganda Christian University, and Victoria University) were purposively selected reached and requested to participate irrespective of whether they contributed to the needs assessment phase or not. Actual participants included 21 academic staff of Kyambogo and Makerere Universities; one staff from Bugema University; and two staff each from the Uganda Christian University and the Victoria University (Figure 3.2).

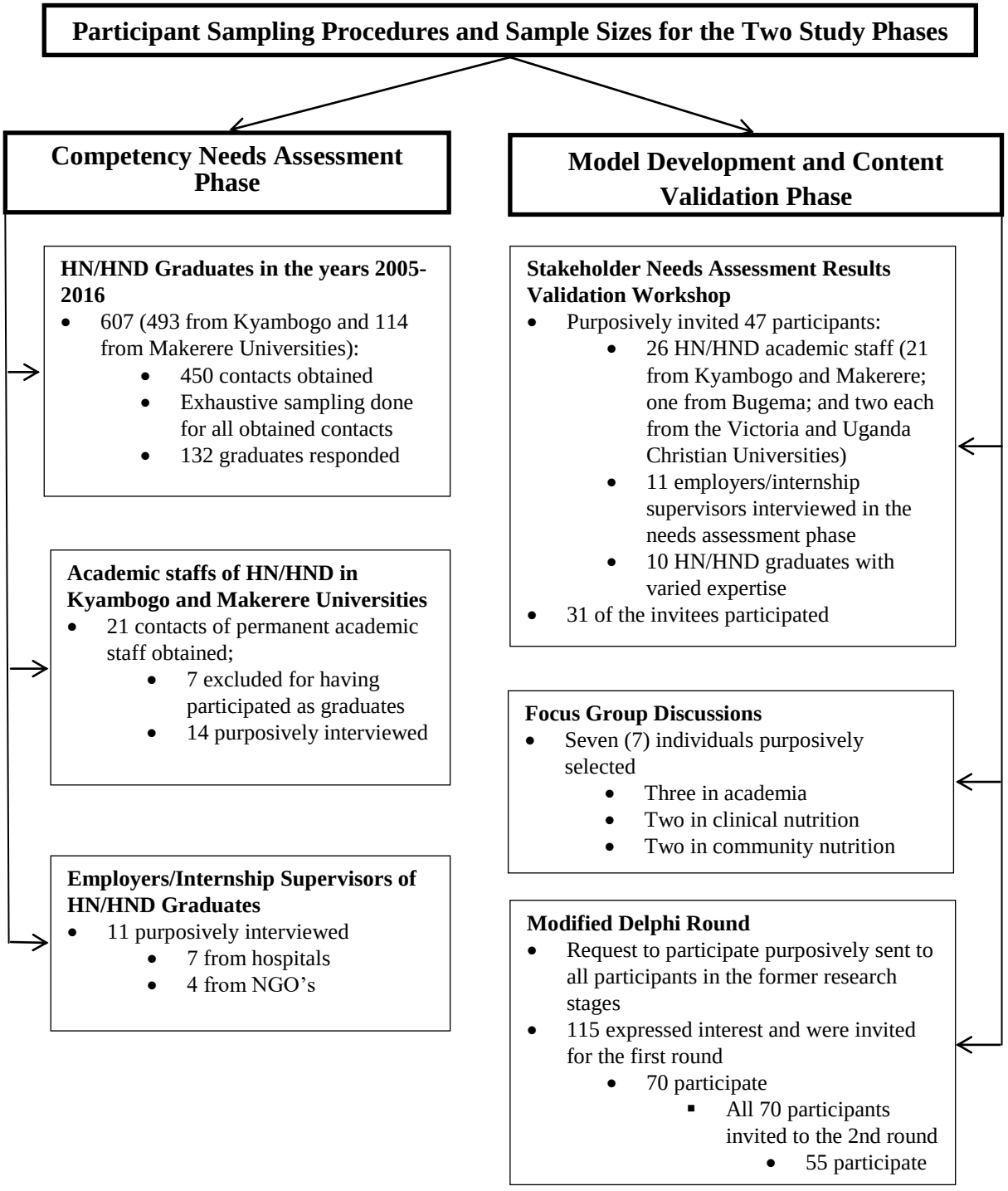

Figure 3. 2. Participant Selection and Inclusion in the Different Study Phases

3.5.3 Selection of Organisations Employing Graduates /Hosting Study Interns

3.5.3.1 Competency Needs Assessment Phase

Most of the graduates that responded to the competency needs assessment phase of this study highlighted having done one of their study internships in the national and or regional referral hospitals and in NGOs in operating in different regions of Uganda. Hence purposive selection and inclusion of 11 employers/supervisors of HN/HND graduates/interns was done. Seven of these worked in hospitals (six in regional referral hospitals and one in the Mulago national referral hospital) while four worked in the NGO sector (one with a humanitarian agency found to be employing the majority of the graduates that participated in this study phase, one with an HIV/AIDS research-based institution, one with an agency engaged in nutrition and livelihoods promotion, and the other was an NGO director engaged in nutrition and health promotion).

As a control measure, graduates who had contributed in the needs assessment phase were not re-interviewed in this phase. Inclusion of the HN/HND work/internship supervisors was based on the view that having employed/supervised HN/HND graduates, these could offer an expert evaluation of the knowledge and skills required of HN/HND graduates for work performance, that exhibited, and the respective gaps.

3.5.3.2 Model Development and Content Validation Phase

In the model development and content validation phase, only those organisational representatives interviewed in the competency needs phase were purposively selected and invited to contribute to the study phase. Figure 3.2 provides a summary of all the

sampling techniques and sample sizes for each category of study participants under the different study phases and respective stages.

3.7 Research Assistants

Ten research assistants (RAs) were engaged in the different study phases. The selection criteria included; knowledge of the nutrition situation in Uganda, having a minimum of a Bachelor's degree in a field relevant to the practice of HN/HND in Uganda (e.g. HN/HND, Food Science, Health Sciences, Agriculture), having prior experience of conducting qualitative surveys. The RAs were trained in ethical issues in conducting research; probing skills; interview and focus group facilitation skills, and how to use the research instruments designed for each of the phases of this study. The training for each phase lasted for two days; used facilitation, discussion, and role-play strategies; and was conducted by the principal researcher. The RAs receive remuneration for the work performed.

3.8 Research Instruments

3.8.1 Competency Needs Assessment Phase

The competency needs assessment phase made use of three types of instruments: a self-administered questionnaire for HN/HND graduates (Appendix F), a researcher administered questionnaire for academic staff that trains HN/HND in the participating universities (Appendix G), and a researcher administered questionnaires for workplace supervisors of HN/HND graduates/interns (Appendix H). All the questionnaires were mainly comprised of open-ended questions. Data collected included respondents'

demographics; training and occupation history of the HN/HND bachelor's degree graduates; and the participants' perceptions of the nutrition and dietetic challenges faced by community members; nutrition and dietetic services demanded by communities, those provided, and those considered a priority; the knowledge and skills required of graduates of the Bachelor's degree in HN/HND to competently perform in Uganda's health system; knowledge and skills gaps amongst HN/HND professionals; the knowledge and skills inadequately attained during training; and the participant's awareness of the scope of HN/HND training and practice in Uganda as per the existing regulations and minimum training and practice standards in Uganda. All study instruments were developed by the principal researcher with support and input from the study supervisors; additional revisions were done based on comments received during the ethical review process.

3.8.2 CBE Model Development and Validation Phase

Each modified Delphi round used a specific study instrument the development of which was informed by the "Patient Satisfaction Questionnaire Short Form (PSQ 18)" (Marshall & Hays, 1994). The instrument used for the first modified Delphi round (Appendix I) was developed by transforming the draft 1 HN/HND competency-based education model and was comprised of four sections. The first section consisted of the competency domains, subdomains, and the knowledge and skills statements (competency statements) which participants had to read before proceeding to the next section. The second section was the Likert type item relevancy rating section which required participants to rate the relevancy of each of the domains, subdomains, and the competency statements by indicating the degree to which they agreed or disagreed with the given statement on five-point Likert-

type items ranging from Strongly Disagree (SD), Disagree (D), Neither Agree nor Disagree (NAD), Agree (A), and Strongly Agree (SA). For this study, relevancy meant that the given competency was expected of a qualified nutrition and dietetics practitioner. The third section required participants to indicate the level of training for which they recommended the given competency statement to be learned; options varied from Diploma only, Diploma and Bachelors Degree, Bachelors Degree only, Masters and Bachelors Degree, Masters only, and All levels. The fourth was a comments section that required participants to justify their responses.

Consensus on a given domain, subdomain, and competency statement was considered to have been attained if ≥80% of all the participants were in agreement with the given domain, subdomain, and or the competency statement in terms of considering the same as (1) relevant to be demonstrated by HN/HND graduates and (2) recommending the same to be learned during the undergraduate level of training. All items for which the ≥80% set level of respondent consensus was not attained for either level of assessment were subjected to the second Delphi round. Using the ≥80% cut-off was informed by research by Eubank et al. (2016) where “eighty percent was chosen as an appropriate cut off based on work by Lynn [32], who suggested that at least 80 % of experts must agree on an item in order to achieve content validity when there are at least 10 experts participating in consensus development” (p. 4).

The study instrument for the second modified Delphi round (see Appendix J) was an adaptation of the first modified Delphi round instrument and was developed after the

analysis of participant feedback from the first Delph round. Unlike the round one study instrument, the instrument for the second round only consisted of those competency domains, subdomains, and or statements whose rating for either relevancy or recommendation for undergraduate training or even both were below the ≥80% set level of respondent consensus in the first round. This instrument had six columns the first of which was the competency domain, subdomain, and or statement; the second column summarised the level of consensus for the given statement in the first round; the third column contained a summary of the justifications for the given statement as was raised by the participants in the first round; the fourth column asked participants to re-evaluate the given statement and again evaluate their agreement or disagreement with the competency using only two options of "disagree" or "agree"; the fifth column required participants to make a recommendation for the level of training at which the competency should be learned using two options of "undergraduate" or "masters", and the final column required participants to provide a new justification for the provided ratings.

3.9 Pre-testing of Study Instruments

The pretesting of all the study instruments for the competency needs assessment was done to ascertain the comprehension, relevancy of the questions, as well as general applicability of the study instruments. A participatory pre-test (Presser, Couper, Lessler, Martin, & Rothgeb, 2004) for both variants (Microsoft word and web-based versions) of the HN/HND study instrument was undertaken among two purposively selected HN/HND graduates; one from Kyambogo University and one from Makerere University. The suggestions received were used to improve the questions, ensure that the right

options for question types were programmed in the web-based version of the questionnaire, and ascertain the ease of use of the questionnaire when responding on a smartphone and a personal computer. Undeclared pre-tests (Presser et al., 2004) were then undertaken on each variant of the HN/HND study instrument using three purposively selected HN/HND graduates for each variant of the questionnaire but no major modifications were found necessary to be done on either variant of the questionnaire. The responses obtained from the undeclared pre-tests were jointly analysed with other graduate responses.

The study instrument for the academic staff was subjected to a participatory pre-test by three academic staff members that train HND at Kyambogo University and revised based on the comments received. Relatedly, participatory pretesting of the study instrument for the work/internship supervisors was also done by two purposely selected graduates, one working in the Humanitarian sector and another working in a hospital setting. The members engaged in the pretesting of study instruments for the academic staff and work/internship supervisors were not interviewed under the two respective categories having initially responded as former HN/HND graduates.

As was for the study instruments used in model development and validation, undeclared pre-tests (Presser et al., 2004) for each variant of the study instrument were undertaken on five HN/HND graduates to ensure content and face validity. These were randomly selected from those who had expressed interest in contributing to the Delphi consensus approach. All the study pilot participants responded but minimal queries were raised on

the clarity of the content. Minor modifications to the wording were made to study instruments before being sent out to the broader group of participants. The responses obtained from the undeclared pre-tests were jointly analysed with other graduate responses. The pre-testing helped to improve comprehension of the study tool (Skulmoski, Francis Hartman, & Krahn, 2007). Worthy further noting is that the involvement of several participants in a Delphi reduces the likelihood of making a wrong decision compared to when one individual is engaged; the fact that participants are also knowledgeable and interested in the topic under study also increases the content validity. On the other hand, the use of successive rounds increases concurrent validity (Felicity et al., 2000).

3.10 Data Collection Procedures

3.10.1 Competency Needs Assessment Phase

A Google email-based group account was created to facilitate the process of collecting data from HN/HND graduates. The account was comprised of the valid emails identified when developing the HN/HND graduate sampling frame. Data collection was undertaken using a cross-sectional email-based survey that entailed emailing the 450 participants a structured questionnaire in the form of a Microsoft word document (Appendix F); a consent form (Appendix K); and a URL link to the web-based version of the study instrument as hosted in Google forms. The two options allowed for the participants to either fill the questionnaire online and submit filled or have the questionnaire downloaded, filled offline, and then email the filled questionnaire to the researcher. An acknowledgment receipt was sent for each received response.

The use of email questionnaires was done because they are cost-effective in reaching a population sample that is widely distributed and easy to transmit. In comparison to paper-based surveys, online-based surveys have lower response rates (Nulty, 2008). Numerous strategies were employed to improve the study response rate including; sending out repeated reminders, providing respondents an extended time to respond, giving assurance of anonymity of responses as these would be de-identified, giving assurance that the responses were vital and would be used, and providing notification for receipt of responses (Nulty, 2008).

Face-to-face interviews by the principal researcher were undertaken to collect data from the academic staff and the employers/supervisors of HN/HND study interns using researcher administered questionnaires (Appendixes G and H). The interviews were conducted in a convenient office at the interviewee's workplace, on a date and time agreed upon before the actual interview and upon obtaining approved consent (Appendix L). The interviews lasted for 45 minutes to one hour on average. Responses were concurrently written in a notebook during the interview. An audio recording was also done only for those participants who accepted to be recorded.

3.10.2 CBE Model Development and Validation Phase

Data collection in this phase was undertaken in three iterative phases beginning with a stakeholder workshop to validate the results of the competency needs assessment, focus group discussions, and consensus development and content validation in two rounds of the modified Delphi technique (see the summary process in Figure 3.1, section 3.1). It

should be noted that results from the competency needs assessment phase formed the basis for the model development and validation phase; as such, this phase should be looked at as a continuation of the needs assessment phase.

3.10.2.1 Stage One: Stakeholder Needs Assessment Results Validation Workshop

A one-day workshop to validate results from the competency needs study (the first three objectives) was held at the Grand Global Hotel (Located along Sir Apollo Kaggwa Road, Makerere Kikoni) Kampala-Uganda on the 3rd Oct-2019. This venue was chosen because it was centrally located and had appropriate conferencing facilities at affordable rates. The objectives of the workshop were to:

i. Validate key results of the competency needs assessment phase.
ii. Prioritize nutrition and dietetics-related challenges for which undergraduate training in nutrition and dietetics should be focused.
iii. Identify competency domains and the respective competencies (knowledge and skill areas) for which undergraduate training in nutrition and dietetics should be focused.
iv. Build consensus on the performance indicators for use in assessing the achievement of the mentioned competencies.

Invitations to participate in this validation workshop were sent to purposively selected individuals who included 26 HN/HND academic staff (21 from Kyambogo and Makerere Universities; one from Busitema University; and two each from the Uganda Christian University and the Victoria University); all the 11 employers/internship supervisors of

the graduates that contributed to the Needs Assessment study phase; and 10 HN/HND graduates with varied expertise.

The workshop followed a formal agenda (See Appendix M). Major events included the presentation of the study background and key findings of the competency needs assessment phase which was followed by plenary reactions and three group activities (1) prioritization of nutrition and dietetics problems and needs for which undergraduate training in nutrition and dietetics should be focused, (2) developing consensus on competence domains/themes, and (3) brainstorming on competencies that HND professionals must be able to possess under each identified competence domain.

Upon presentation of the study background and the key results of the needs assessment phase of the study, workshop participants were subdivided into four different groups each comprising seven to eight participants for undertaking group exercises that were later presented and refined in plenary. In the first workshop group activity (Appendix N), participants were engaged in reviewing the results of the needs assessment that summarised the nutrition and dietetics-related challenges and were further asked to prioritise these under three categories; primary, secondary, and tertiary for training HN/HND. In the second workshop activity (Appendix O), participants were engaged in suggesting competence domains and further grouping the nutrition and dietetics challenges under the respective domains. Individual groups presented each of their

activity outputs in plenary, a summary of the different group outputs was created and a joint plenary session was undertaken to refine the different outputs into one major output.

3.10.2.2 Stage Two: Focus Group Discussions

The first two workshop objectives were achieved during the workshop while the third and fourth workshop objectives were not fully achieved. Having expressed their views, the workshop participants agreed upon the setting up of a dedicated group of individuals to finalise the remaining planned activities. This formed the basis for the focus group discussions. Hence, a group of seven individuals with demonstrated expertise in nutrition and dietetics; three (inclusive of the researcher) in academia, two in clinical nutrition practice, and two in community nutrition practice were convened for five working days (from the 14th to 18th of October 2019) in the Department of Human Nutrition and Home Economics of Kyambogo University. The group further discussed the outcomes of the stakeholder validation meeting; developed and refined competency statements under each identified domain.

In undertaking the focus group discussion, reference was made to the output of the needs assessment results validation workshop and the original data and results of the competency needs assessment. In so doing, the focus was put on the work roles reported to be performed by the employed HN/HND graduates and the knowledge and skills that were identified by study respondents as being essential for the practice of HN/HND in Uganda. To structure the wording of the competency statements, further reference was

made to different competency frameworks/models including those developed for the East, Central, and Southern Africa (East, Central, and Southern Africa Health Community, 2017), Ethiopia (Save the Children & Jhpiego, 2012), South Africa (Health Professions Council of South Africa, 2016), USA (Accreditation Council For Education in Nutrition and Dietetics, 2015), Canada (Partnership for Dietetic Education and Practice, 2013), Europe (European Federation of the Associations of Dietitians (EFAD), 2016), United Kingdom (British Dietetic Association, 2018a, 2018b), Australia (Dietitians Association of Australia, 2015), and Newzealand (Dietitians Board, 2017). Further reference to the Dreyfus five-stage model of adult skills acquisition (Dreyfus, 2004), and the updated Nutrition Care Process Model (K. Lacey et al., 2008). The output by the group, titled Draft 1 HN/HND competency-based education model, was subjected to further reviews, critique, and input by the study supervisors and amendments made by the researcher.

3.10.2.3 Stage Three: Consensus Development and Content Validation

This stage was undertaken in two modified Delphi rounds to obtain stakeholder views and consensus on the contents of the developed draft 1 HN/HND competency-based education model. The flow process undertaken for the modified Delphi technique as used in this research is summarised in Figure 3.3. Organizing for and undertaking the Delphi consultations was in itself a multistage process that involved the development of the study instruments (see description under section 3.8.2); selecting and inviting Delphi participants; undertaking the first Delphi round of consultations; analysing responses

from the first Delphi round; organising the second Delphi round; undertaking the second round of Delphi consultations; and analysing responses from the second Delphi round.

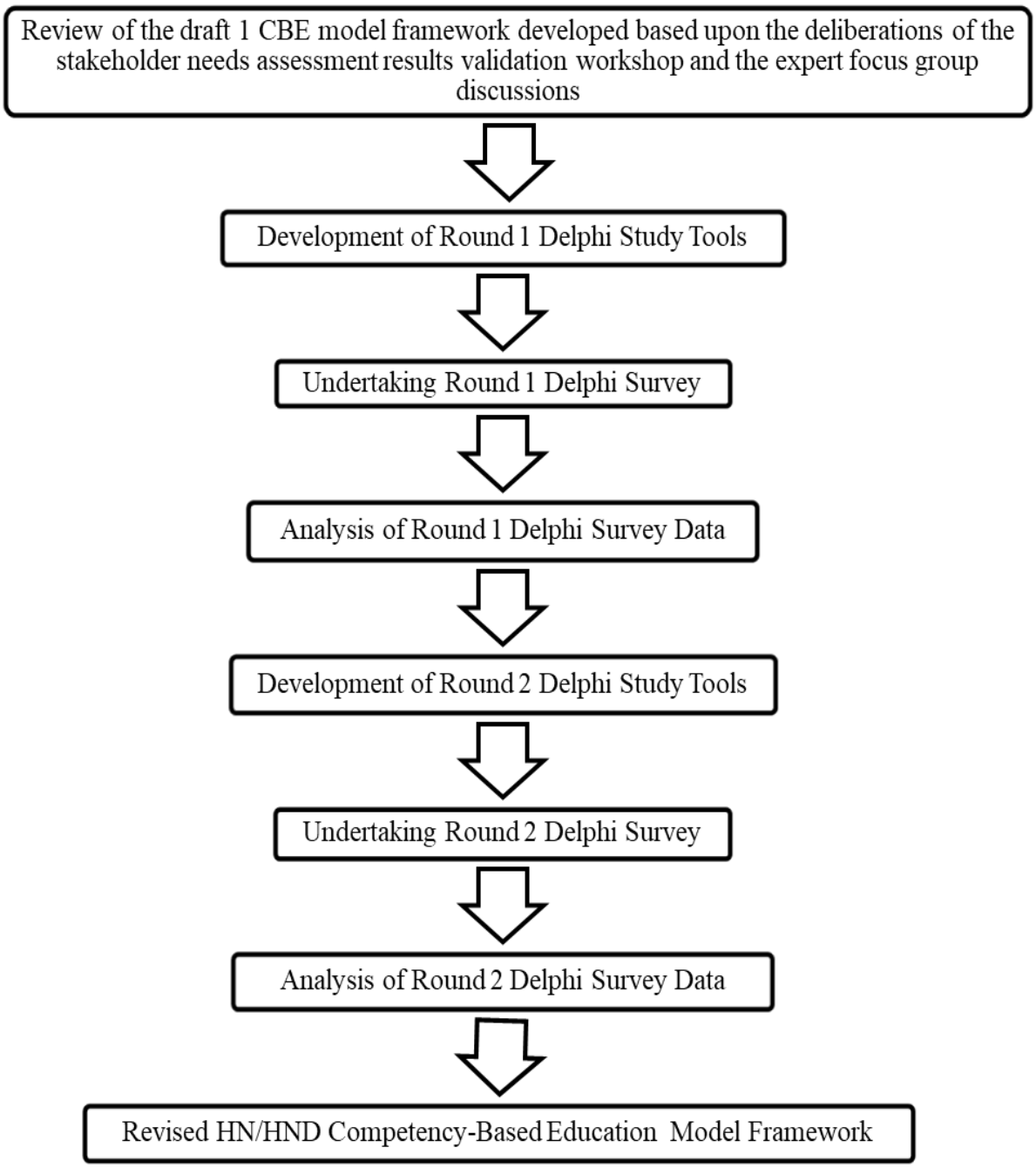

Figure 3. 3. Process flow chart for the Modified Delphi Process

3.10.2.3.1 Process for Selecting, Organizing, and Inviting Delphi Participants

The Delphi technique was conducted to refine the draft CBE Model (Felicity et al., 2000; Haggerty et al., 2007 cited by Moaveni et al., 2010) in two consensus development rounds of the modified Delphi technique. Hsu, (2007) recommends that "the selection of Delphi subjects is generally dependent upon the disciplinary areas of expertise required by the specific issue" (p. 3). The individuals selected to contribute to the Delphi rounds had varying expertise in nutrition training; service delivery; communication and advocacy; food security and livelihoods promotion; WASH; social and behaviour change communication and some had experience in curriculum development. They included trainers of HN/HND from the different participating institutions of higher learning, employee representatives, and practicing HN/HND professionals. Including the different categories of participants was based on the need to benefit from the divergent experiences of stakeholders engaged in HN/HND training and practice in Uganda.

Before the start of the first round of Delphi consultations, an invitation letter requesting targeted individuals to express interest to participate in the Delphi consultative process was sent out to all stakeholders that participated in the Needs Assessment Phase of the study (i.e 132 graduates, 14 academic staff, and the 11 employers/internship supervisors) and all the 31 participants that participated in the stakeholder Needs assessment results validation workshop. The invitation letter detailed information about the process to be followed in conducting the Delphi rounds and the period for which the Delphi rounds were anticipated to be open.

A consent form (Appendix P) was sent together with the invitation letter to give further details about the overall research process. Invitees interested in participating in the study were requested to provide their demographic information concerning age, sex, and area of expertise in nutrition and dietetics. Based on the invitation, 115 individuals expressed interest to participate; this was higher than the 70 participants initially planned. A Google groups account titled “nutrition-competency-based-education-model-for-Uganda-delphi ” consisting of the 115 email contacts of all the stakeholders that expressed willingness to participate in the Delphi consultations was then created and used for communication in the first Delphi round.

3.10.2.3.2 Undertaking the first Delphi Round

The invitation for participation in the first modified Delphi round of consultations was sent out to the 115 individuals considered to have expertise in HN/HND through the created Google groups account “nutrition-competency-based-education-model-for-uganda-delphi” using the principal researcher's personal Gmail account on the 10th of February 2020. Participants were sent the round one study instrument in the form of a Microsoft Excel spreadsheet. The email also contained instructions to guide participants on how to respond to the study instrument. Responding to the first round of modified Delphi consultations was left open for an initial period of two weeks with successive reminders sent after every three days. However, this period was extended for a third week given the low response rate in the first two weeks. By the end of the three weeks, a total of 70 of the 115 invited participants had provided feedback; subsequently, the first Delphi round of consultations was closed.

3.10.2.3.3 Undertaking the Second Delphi Round

The second round of modified Delphi consultations was undertaken to review only those competency domains, subdomains, and related statements for which the respondent consensus in the first Delphi round was below the ≥80% set level of respondent consensus for either the "Level of Relevancy/Agreement" with the statement and recommendation for the learning of the given competency during "Undergraduate Training". The second Delphi round was generally undertaken upon completing preliminary analysis of data from the first Delphi round and the development of the respective study instrument (see section). As a way of the procedure, only the 70 participants that contributed to the first round of Delphi consultations were invited to participate in the second round. The basis for limiting consultations to this group was that by having responded to the first round, these participants were considered to be more aware of the content, objectives, and study aims. As such, they could also easily relate to the tools and the procedure being used for this particular research.

For communication purposes, a Google email group consisting only of the emails of these 70 participants was created; the purpose for which the group was being created was clearly explained to the participants. Having created the group, an invitation to participate in the second round of consultations together with the tool for the second round was sent out to the participants on 18th March 2020. The invitation to participate provided summary rating statistics for the first round as well as the procedure to follow in contributing to the second Delphi round. A period of two weeks was initially given for participants to respond to the study instrument and reminders were sent after every three

days. The timeline for responding to the second round of Delphi consultations was however interrupted by the nationwide lockdown and curfew that was imposed by the Government of Uganda on the 30th March 2020 to limit the spread of the Coronavirus (COVID-19) infection (Margini et al., 2020). Because of this, some participants expressed having limited access to their offices and computers to use in responding to the study instrument. Due to this, the timelines for responding to the tool were extended for an additional three months by which period 55 of the 70 invited participants had given feedback on the study instrument.

3.11 Data Analysis and Presentation

3.11.1 Analysis and Presentation of Competency Needs Assessment Data

Feedback from the HN/HND graduates was consolidated and downloaded in the form of a Microsoft Excel Professional Plus version 10 spreadsheet, revised, cleaned, and inductively explored using the conventional content analysis technique of reading word by word before coding to identify and code the emerging themes (Colorafi & Evans, 2016). Additional coding was undertaken to create sub-themes from the initially created themes. The process of coding and the subsequent creation of themes and subthemes were stopped when no more of these could be generated from the data. The sub-themes and themes were quantitized (Nzabonimpa, 2018) into dichotomous variables of 0 or 1 dependent on whether the coded response was absent or present in the specific participants' narratives (Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007).

Quantitizing of qualitative data can improve quantitative research as it enables one to capture and analyse features not that may not easily be captured by quantitative study tools (Nzabonimpa, 2018). Upon quantitizing, data were analysed using the IBM Statistical Package for Social Scientists software version 20. Descriptive statistics and multiple response analyses were done. The results are presented mostly in the form of percentage distributions. Although quantitizing of qualitative data presents some drawbacks, it permitted enumerating the percentages of respondents that mentioned specific themes and subthemes (Driscoll, Rupert, Appiah-Yeboah, & Salib, 2007) from the wide-ranging narrative responses.

For qualitative data obtained from the academic staff and HN/HND work/internship supervisors, interview responses were initially transcribed and cleaned in Microsoft Excel Professional Plus version 2010. Upon cleaning, the datasets were exported to the NVivo 12 Plus software where further exploration, coding, and content analysis were done using the same themes as those identified from the HN/HND responses. The coding of the different data sets was done by the principal researcher with support from two study assistants.

3.11.2 Analysis and Presentation of Data from the Delphi Responses

Three types of data were collected in the modified Delphi study; Likert-type item data from the ratings of the relevance of the competency domains, subdomains, and statements; categorical data from recommending the level of training; and qualitative data from the justifications given for the different individual ratings/responses. The individual

participants' responses were entered into three separate Google Forms. One form contained the participants' ratings on the levels of agreement for the different statements, the second contained participants' responses on the recommended level of education for learning each of the specific competencies, while the third contained participants' justifications/comments given for each competency statement. Upon collating all the responses into the respective Google Forms, the responses were extracted and downloaded as individual MS Excel files. Further cleaning of the extracted data and analysis was undertaken using the Microsoft Excel software 2010.

Contradictions on the options for analysing Likert-type items exist. Given the discrepancies in the best approach to analyse Likert-type data items, different studies tend to use different statistics (Sadeghi-Ghotbabadi, Shakibazadeh, Omidvar, Mortazavi, & Kolahdooz, 2014; Stewart et al., 2017; Tanya et al., 2019). Taking into consideration the statistics recommended and used for Likert-type data items and given the purpose for which the modified Delphi approach was used for this study i.e. to obtain consensus on different statements, summary statistics on the percentage of participants who selected the Agree and Strongly Agree Likert-items were done to determine attainment of ≥80% set level of participants consensus across the domains, subdomains, and competency statements.

For the summary statistics under the section on the level of education, percentage responses for each competency statement across all the response options were computed A new category "Undergraduate" allowed for computing the percentage of respondents

recommending the competency statement to be learned during the undergraduate level of training (i.e diploma and bachelors) was computed by summing all the response options (all levels + diploma only + diploma and bachelors + bachelors only + bachelors and masters + masters only); subtracting responses for those who selected masters only; dividing the resulting figure by the total number of responses to the given statement; and multiplying the ensuing result by 100 to obtain percentage responses for each statement. Content analysis was undertaken for the participants' justifications.

In undertaking content analysis, inter-rater reliability (Pope, Ziebland, & Mays, 2000), by three individuals (two of these were HND practitioners with expertise in clinical and community nutrition and research, the third was the lead researcher) was employed to limit likely researcher biases in selecting the most feasible justifications. Upon conducting the summary statistics and reviewing the comments given for all the statements; all competency statements for which the percentage agreement by the different respondents was below ≥80% for the level of "Agreement" and "Undergraduate Training" were identified, isolated together with their related justifications and saved in a new spreadsheet. This new spreadsheet formed the basis for the development of the study instrument for the second round of Delphi consultations. The entry and analysis of responses from the second round were handled in a similar way as was done for responses in the first round; summary statistics were run to obtain the percentage scores for each of the statements under the two response categories; i.e Level of Agreement and Level of Education.

3.12 Ethical and Logistical Considerations

3.12.1 Ethical Considerations

This study received initial approval from the Kenyatta University Graduate School (Appendix Q). Following this, ethical approval for the study was obtained from both the Kenyatta University ethical review board on the 14th-June 2018 under instrument number KU/ERC/Approval/Vol.1 (129) and application number PKU/837/1903 (Appendix R) and the International Health Sciences University Uganda (now Clarke International University) Ethical Review Board under instrument number IHSU-REC/0077 for the period April 2018 to April 2019 (Appendix S) which was consequently renewed under the same instrument number for May 2019 to May 2020 (Appendix T). A research permit was obtained from the Uganda National Council of Science and Technology under reference number HS206ES for May 2018 to May 2019 (Appendix U).

All study respondents were provided detailed consent forms explaining the background purpose, and procedures of the study. The consent forms also explained to participants their right to accept or refuse to participate; the minimal risks associated with the study; the benefits and compensation; and the associated participant confidentiality. Willing participants were then requested to consent by signing the participant's statement on the consent form. For the HN/HND graduates, the consent form (Appendix K) was sent together with the email as an attachment, or printed copies of the consent form were put together with the questionnaire and delivered to the respondents. By responding to the emailed questionnaire, participants were considered to have consented to the study.

For other study participants, consent was sought before the interviews using the consent forms as attached in Appendix L. For the competency needs assessment phase and the modified Delphi, the principal researcher could know the origin of the email responses; hence quasi-anonymity (Chase, Beatty, & Ondersma, 2011). In the stakeholder validation workshop, all participants knew each other hence. Total anonymity was maintained in the analysis and presentation of study results by ensuring that identifying information was delinked from the analysed results.

Financial support for undertaking this study was received from the Kyambogo University African Development Bank Higher Education Science and Technology Project and the PEARS Research Grant from the Hebrew University of Jerusalem. Funding agencies had no role in influencing any aspect of the study.

3.12.2 Logistical Considerations

The budget for this research amounted to Uganda shillings fifty-nine million shillings. The whole study from concept development and approval to examination lasted from May 2016 to December 2021.

CHAPTER FOUR: FINDINGS

4.1 Demographic Characteristics of Respondents

4.1.1 HN/HND Graduates

Results of the demographics, training, and occupation characteristics of HN/HND graduates who responded to the survey are summarised in Table 4.1. Of the 450 HN/HND participants invited to contribute to the study, 132 gave feedback; giving a response rate of 29.3%. The majority were females (64.4%) and most (56.8%) were in the age category of 25-29 years.

Regarding training, the majority of respondents (84.8%) obtained their HN/HND Bachelor's degree from Kyambogo University and most (61.4%) completed their studies in the years 2013-2016. Close to half of the respondents (44.7%) had undertaken further training at different levels; post-graduate diploma/certificate (19.7%), master's degree (23.5%), and Ph.D. (1.5%).

Most graduates practiced their first internship in regional referral hospitals and the national referral hospital at 42.5% and 20.5% respectively. On the contrary, non-government organizations and regional referral hospitals were mainly attended for the second internships at 30.2% and 16% respectively. As per the regions of Uganda where internships were undertaken, most respondents undertook their first internship in the central region (55.1%) followed by the western region (18.9%). The same trend was observed for the second internship with 60% and 20% of respondents respectively.

Table 4.1. *Demographic, Training and Occupation Characteristics of HN/HND Graduates*

Characteristic	**N**	**Category**	**n (%)**
Gender	132	Female	85 (64.4)
		Male	47 (35.6)
Age categories	132	20-24	12 (9.1)
		25-29	75 (56.8)
		30-34	31 (23.5)
		35-39	11 (8.3)
		40 and above	3 (2.3)
Institution attended	132	Kyambogo University	112 (84.8)
		Makerere University	20 (15.2)
Year of study completion	132	2013-2016	81 (61.4)
		2009-2012	36 (27.3)
		2005-2008	15 (11.4)
Post-graduate training	132	None	73 (55.3)
		Master's Degree	31 (23.5)
		Post-Graduate Diploma/Certificate	26 (19.7)
		Doctorate	2 (1.5)
Category of the place of the first internship	127	Regional referral hospital	54 (42.5)
		National referral hospital	26 (20.5)
		District hospital	16 (12.6)
		Non-Government non-profit hospital	11 (8.7)
		Other Government hospital	4 (3.1)
		Private for-profit hospital	4 (3.1)
		Health Center IV*	3 (2.4)
		Health Center III**	3 (2.4)
		Non-Government organization	3 (2.4)
		Research-based institution	2 (1.6)
		Donor project	1 (0.8)
Region where the first internship was undertaken	127	Central	70 (55.1)
		Western	24 (18.9)
		Eastern	18 (14.2)
		Northern	15 (11.8)

HN/HND: Human Nutrition/Human Nutrition and Dietetics; MDAs: Ministries, Departments, and Agencies

* Health Centre IV: A level IV primary care facility in Uganda is one immediately below a district hospital; targets 100,000 people; acts as a referral facility for lower primary care facilities under its jurisdiction; has provisions for in-patient and laboratory services, and an operating theatre. It is usually staffed by qualified clinical officers, nurses, nurse aides, and doctors (Republic of Uganda, 2014). ** Health Centre III: In Uganda, a Health Centre III is a mid-level primary care facility; has provisions for basic laboratory services, maternity care, and inpatient care (often for onward referral); and is usually staffed by nurse aides, qualified nurses and clinical officers (Republic of Uganda, 2014).

Table 4.1. Continued. *Demographic, Training and Occupation Characteristics of HN/HND Graduates*

Category of the second place of internship	106	Non-Government organization	32 (30.2)
		Regional referral hospital	17 (16.0)
		District hospital	11 (10.4)
		Donor project	10 (9.4)
		Non-Government non-profit hospital	7 (6.6)
		Health Center IV*	6 (5.7)
		Government Ministry Department/Agency	6 (5.7)
		Private for-profit hospital	6 (5.7)
		National referral hospital	5 (4.7)
		Research-based institution	5 (4.7)
		Other Government hospital	1 (0.9)
Region where the second internship was undertaken	105	Central	63 (60.0)
		Western	21 (20.0)
		Northern	12 (11.4)
		Eastern	9 (8.6)
Category of current place of employment	115	NGO	70 (60.9)
		Health Facility	14 (12.2)
		District Local Government	8 (7.0)
		Academia	7 (6.1)
		Donor Agency/United Nations	6 (5.2)
		Government MDAs	6 (5.2)
		Industry	4 (3.5)
Region of current employment	115	Northern	40 (34.8)
		Central	39 (33.9)
		Western	18 (15.7)
		Outside Uganda	11 (9.6)
		Eastern	7 (6.1)

HN/HND: Human Nutrition/Human Nutrition and Dietetics; MDAs: Ministries, Departments, and Agencies

* Health Centre IV: A level IV primary care facility in Uganda is one immediately below a district hospital; targets 100,000 people; acts as a referral facility for lower primary care facilities under its jurisdiction; has provisions for in-patient and laboratory services, and an operating theatre. It is usually staffed by qualified clinical officers, nurses, nurse aides, and doctors (Republic of Uganda, 2014). ** Health Centre III: In Uganda, a Health Centre III is a mid-level primary care facility; has provisions for basic laboratory services, maternity care, and inpatient care (often for onward referral); and is usually staffed by nurse aides, qualified nurses, and clinical officers (Republic of Uganda, 2014).

A total of 115 participants provided information regarding their employment; the majority (60.9%) were employed by non-governmental organizations; followed by healthcare-related facilities (12.2%), district local governments (7%), academia (6.1%),

Donors (including United Nations agencies) and MDAs (each 5.2% respectively), and industries (3.5%). Regarding the geographical region of Uganda where respondents were employed; the northern and central regions had the most graduates (34.8% and 33.9% respectively). About 15.7% of the graduates were employed in the western region while only 6.1% were in the eastern region. A small percentage of graduates (9.1%) reportedly worked outside Uganda.

4.1.2 Academic Staff and Work/internship Supervisors

A total of 14 academic staff and 11 work/internship supervisors were interviewed in this study and the results are presented in Table 4.2.

Table 4.2. *Demographic Characteristics of Interviewed Academic Staff and Work/Internship Supervisors*

Participant Category	**N**	**Characteristic**	**Category**	**n(%)**
Academic staff	14	Gender	Female	9 (64.3)
			Male	5 (35.7)
		University	Kyambogo	8 (57.1)
			Makerere	6 (42.9)
		Level of Training	Doctorate	8 (57.1)
			Masters	6 (42.9)
		Years of Lecturing Experience	≥10 years	6 (42.9)
			6-10 years	4 (28.6)
			≤ 5 years	4 (28.6)
Work/internship supervisors	11	Gender	Male	7 (63.6)
			Female	4 (36.4)
		Category of Employer	Regional referral hospital	7 (63.6)
			Non-government organisation	4 (36.4)
		Work Position	Senior Nutritionist	6 (54.5)
			Program Manager	2 (18.2)
			Nutritionist	2 (18.2)
			Director	1 (9.1)

HN/HND: Human Nutrition/Human Nutrition and Dietetics

In general, the majority (64.3%) were females, 57.1% worked in Kyambogo University, 57.1% had doctorate level of training, and 42.9% had more than ten years of lecturing experience. On the other hand, 63.6% of the work/internship supervisors were males, 63.6% worked in regional referral hospitals, 54.5% were in the position of a senior nutritionist, 18.2% respectively worked in the position of Nutritionist and Program Managers, and 9.1% worked as directors.

4.2 Nutrition/Dietetics Needs and Demands in Uganda

This section presents the results for objective one of the study which aimed to determine the nutrition/dietetics needs in Uganda. The results are presented in two sections of respondents' perceptions namely; (1) nutrition/dietetic challenges faced by communities and (2) nutrition/dietetics services requested and provided to communities.

4.2.1 Respondents' Perceptions of the Nutrition/Dietetics Challenges Faced by Communities

As summarised in Table 4.3, the top five challenges mentioned by the HN/HND graduates included malnutrition in its different forms (60.5%); poor nutrition knowledge (43%); food insecurity (37.7%); non-communicable/chronic diseases (25.4%); and undesirable cultural and religious beliefs and practices (14.9%). Other challenges mentioned by the graduates included low dietary diversity (10.5% respondents); misleading information on nutrition (9.6%); inadequate maternal, infant, young child, and adolescent nutrition feeding practices (7.9%); and inadequate water, sanitation, and hygiene practices (7%).

Based on the illustrative quotes by the academic staff and the work/internship supervisors as further summarised in Table 4.3, the nutrition-specific challenges were related to the high prevalence of malnutrition in its different forms; low dietary diversity as “very few families can afford to eat the recommended minimum dietary diversity…”; and inadequate maternal, infant, young child, and adolescent feeding due to the observation that “… most children are weaned early and left under the care of their grandparents…” Some of the nutrition-sensitive challenges were observed to be related to food insecurity due to “limitations in food access and availability…”; poor nutrition knowledge given that “some community members lack knowledge on which foods to eat, how to prepare food, and on the frequency of feeding…”; undesirable cultural and religious beliefs and practices; and misleading nutrition information due to “limited access to information on nutrition & dietetics…”

Table 4. 3. *Respondents' Perceptions of the Nutrition and Dietetics Related Challenges Faced by Communities*

Graduates Perceptions (N=114)		**Academic Staff and Work/internship Supervisors Perceptions**
Nutrition and dietetics related challenges	**Respondents n(%)***	**Illustrative quotes**
Malnutrition in its different forms	69(60.5)	"There is a high prevalence of acute and chronic malnutrition in addition to other diseases…" "Some clients present with obesity, diabetes, asthma, cancer, and constipation. We see people of three categories; those that come for prevention, those who seek curative services, and those seeking treatment for infectious conditions". "Disability due to micronutrient deficiencies, severe underweight, high stunting, wasting, anaemia, …"
Poor nutrition knowledge	49(43.0)	"Some community members lack knowledge on which foods to eat, how to prepare food, and on the frequency of feeding…" "Lack of extensive knowledge on cause-effect relation of disease and malnutrition…"
Food insecurity	43(37.7)	"90% of all the problems are because of food [insecurity]…" "Limitations in food access and availability…" "…household food insecurity…"
Non-communicable/chronic diseases	29(25.4)	"Increasing non-communicable disease rates…"
Undesirable cultural and religious beliefs and practices	17(14.9)	"Cultural beliefs and food taboos…"
Low dietary diversity	12(10.5)	"Very few families can afford to eat the recommended minimum dietary diversity…" "Most people only have two meals a day and children are fed the same number of times as adults…"
Misleading information on nutrition	11(9.6)	"Limited access to information on nutrition & dietetics…"
Inadequate maternal, infant, young child, and adolescent nutrition feeding practices	9(7.9)	"… most children are weaned early and left under the care of their grandparents…" "…poor maternal and child health care…" "Meeting the energy and nutrient requirements for children below 5 years is a major problem."
Inadequate water, sanitation, and hygiene practices	8(7.0)	"Poor hygiene and sanitation…"
Insecurity and economic related challenges	7(6.1)	"…sociocultural economic challenges…" "…border insecurity and cattle rustling by the Turkana…"
Limited access to and utilization of land for production	6(5.3)	
Climatic changes	5(4.4)	"…drought [and] occasional floods…"
Poor post-harvest handling and food quality control practices	2(1.8)	

*Multiple response analysis with percentage computed based on number of respondents rather than the total number of responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics

4.2.2 Respondent's Perceptions of the Nutrition/Dietetics Services Requested and Provided to Communities

4.2.2.1 Perceptions by the HN/HND Graduates

Graduates' responses were grouped under seven major domains as summarised in Table 4.4. Under the category of services requested by communities, responses were received from 109 graduates with the main services falling in the domains of nutrition awareness, education and counselling (55%); integrated management of acute malnutrition (46.8%); food security and livelihoods support (33.9%); management of non-communicable diseases (26.6%); nutrition screening (22.9%); maternal, infant, young child, and adolescent nutrition (17.4%); and water, sanitation and hygiene (WASH) (10.1%).

For the nutrition and dietetic services provided by employers, the majority of respondents (56%) mentioned nutrition awareness, education, and counselling services as being the main provided services; followed by integrated management of acute malnutrition (54%); food security, and livelihood support (47%); nutrition screening (28%); management of non-communicable and communicable diseases (22.0%); maternal, infant, young child and adolescent nutrition (19%); and WASH (14%).

When asked about their views on the would-be priority nutrition and dietetics services to provide, most graduates (64.3%) mentioned services under the domain of nutrition awareness, education, and counselling; followed by food security and livelihood support (41.8%); integrated management of acute malnutrition (31.6%); maternal, infant, young child, and adolescent nutrition (14.3%); management of non-communicable and communicable diseases (12.2%); and water, sanitation and hygiene (8.2%). Some

illustrative quotes to justify the responses are summarised along with the responses in Table 4.4.

4.2.2.2 Perceptions by the Academic Staff and the Work/Internship Supervisors

As further summarised in Table 4.4, the responses by the academic staff and the work/internship supervisors regarding the nutrition and dietetic services provided in communities were coded under similar themes as those used for the HN/HND graduate. Based on the illustrative quotes, under the theme of management of non-communicable and communicable diseases; respondents noted the provision of interventions that largely address the management of nutrition-related problems by 'fairly' large hospitals and referral hospitals. Relatedly, services regarding the treatment of severe acute malnutrition, therapeutic feeding, and supplementation with Ready-to-use-therapeutic feeds for those that meet the required criteria were perceived to be provided under the theme of integrated management of acute malnutrition.

Under the theme of food security and livelihood support (Table 4.4); mention was made for the provision of nutrition livelihood programs, food relief, and cash for work interventions. Some of the services perceived to be provided under the theme of maternal, infant, young child, and adolescent nutrition included child health and nutrition services in clinics, antenatal nutrition education, food demonstrations in infant and young child feeding, and health education. Under the theme of nutrition screening, mention was made of nutrition assessment and routine community nutrition screening for children.

Table 4. 4. *Stakeholders' Perceptions of the Demanded and Provided Nutrition/Dietetic Services*

Nutrition/Dietetic services domains	**HN/HND Graduates**			**Academic staff and Work/Internship Supervisors**
	Requested by communities (N=109)	**Provided by employers (N=100)**	**Considered a priority to provide (N=98)**	
	Respondents n(%)*	Respondents n(%)*	Respondents n(%)*	**Illustrative quotes on the nutrition/dietetic services provided in communities**
Nutrition Awareness, Education & Counselling	60(55)	56(56)	63(64.3)	"Guidance and counselling…" "Nutrition guidance and counselling…" "Mainly nutrition education is provided…" "Nutrition education in the community…"
Integrated management of acute malnutrition	51(46.8)	54(54)	31(31.6)	"It is mainly the treatment of severe acute malnutrition through hospitals…" "Supplementation with ready-to-use-therapeutic feeds for those that meet the required criteria …" "Therapeutic feeding …"
Food Security and livelihood support	37(33.9)	47(47)	41(41.8)	"Nutrition livelihood programs…" "Food relief…" "Cash for work intervention …"
Management of non-communicable diseases	29(26.6)	22(22)	12(12.2)	"Interventions that largely address management of nutrition-related problems…" "Nutrition in illness in fairly larger hospitals and regional referral hospitals…" "Diet/meal planning…"
Nutrition Screening	25(22.9)	28(28)	7(7.1)	"Nutrition assessment …" "Routine community nutrition screening for children …"
Maternal, infant, young child, and adolescent nutrition	19(17.4)	19(19)	14(14.3)	"Child health nutrition services at clinics and hospitals…" "Antenatal nutrition education…" "Food demonstration in infant and young child feeding …" "Health education on infant and young child feeding practices …"
Water, sanitation, and hygiene	11(10.1)	14(14)	8(8.2)	"Water sanitation and hygiene services"
Business and industry	_	_	_	"Product development, food processing …"

* Multiple response analysis with percentage computed based on number of respondents rather than the total number of responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics

Some of the services mentioned under the theme of nutrition awareness, education, and counselling included guidance and counselling and community nutrition education. Other mentioned services included WASH; and product development and food processing under the themes of WASH, and business and industry respectively (Table 4.4).

4.3 Competencies Required of HN/HND Graduates in Uganda

This section presents results for objective two of the study which sought to assess the competencies required of HN/HND undergraduates for health systems performance in Uganda. To answer this objective, the study collected information on the respondents' perceptions of the nature of work and job roles performed by practicing HN/HND graduates as well as the knowledge and skills required of HN/HND graduates for health systems performance. The latter comprised of four sections: knowledge and skills expected of HN/HND graduates; knowledge and skills gaps amongst HN/HND graduates; knowledge and skills inadequately attained during training; and the knowledge and skills recommended as a training minimum.

4.3.1 Respondents' Perceptions of the Nature of Work and Job roles Performed by Practicing HN/HND Graduates

4.3.1.1 Perceptions by the HN/HND Graduates

As per the graduates' responses (Table 4.5), the nature of work done by the practicing graduates was categorised under seven major domains of organizational leadership and management (69.6%); management of nutrition-related disease conditions at the health facility and or community level (59.1%); nutrition and health promotion (57.4%);

research and documentation (53%); advocacy, communication, and awareness (23%); academia (7.1%); and that of the business/industry (3.6%). For the respondents whose work entailed aspects of organizational leadership and management; the main mentioned roles included leadership (75%); project planning, management, and implementation (53.8%); project monitoring and evaluation (30.4%); budgeting and accountability (22.5%); and human resources management (18.8%).

For the respondents with job roles categorized under the domain of management of nutrition conditions at the health facility and community level, the main mentioned work roles included nutrition screening or assessment (76.1% of respondents); offering of inpatient and outpatient therapeutic care each at 58.2%; supplementary feeding (52.2%); nutrition education and counselling (39.4%), nutrition supplies management (20.9%); monitoring, supervision and quality improvement (19.4%); and community nutrition work (16.4%).

The main roles performed by graduates engaged in nutrition and health promotion included nutrition and health promotion (62.1%); capacity building (52.3%); offering technical support (18.5%); and growth monitoring and promotion (3%). For undergraduates engaged in research and documentation, results show that all of them (100%) reportedly participated in dissemination; followed by 73.8% that undertook report writing, 45.9% that participate in carrying out nutrition surveys, 8.2% that did data entry and analysis, and 6.6% that contributed to proposal writing (Table 4.5).

Table 4. 5. *Categories of Work and Related Roles Performed by HN/HND Professionals Practicing in Uganda*

Categories of Work			**Identified Work/Job Roles**		
Category of Work Domain	**N**	**Graduates whose work relates to the domain n(%)***	**Work/roles**	**N**	**Graduates performing mentioned role n(%)***
Organizational Leadership and Management	115	80(69.6)	Leadership	80	60(75)
			Project planning, management, & implementation		43(53.8)
			Project monitoring and evaluation	79	24(30.4)
			Budgeting and accountability	80	18(22.5)
			Human resources management		15(18.8)
			Organizational representation and networking		13(16.3)
			Proposal/report writing	79	5(6.3)
			Resource mobilization	80	3(3.8)
			Technical support/guidance	79	3(3.8)
Management of Nutrition Conditions at Health Facility and or Community level	115	68(59.1)	Nutrition screening or assessment	67	51(76.1)
			Inpatient therapeutic care		39(58.2)
			Outpatient therapeutic care		39(58.2)
			Supplementary feeding	66	35(52.2)
			Nutrition education and counselling		26(39.4)
			Nutrition supplies management/procurement	67	14(20.9)
			Monitoring, supervision, and QI		13(19.4)
			Community nutrition work	66	11(16.4)
			Management of other nutrition-related disease conditions		5(7.6)
			Emergency nutrition	66	4(6.1)
			MIYCAN	67	4(6.0)
Nutrition and health promotion	115	66(57.4)	Nutrition and health education	66	41(62.1)
			Capacity building	65	34(52.3)
			Technical support		12(18.5)
			Growth monitoring and promotion	66	2(3)
Research and documentation	115	61(53)	Dissemination	61	61(100)
			Report writing		45(73.8)
			Undertaking research		28(45.9)
			Data entry and analysis		5(8.2)
			Proposal writing		4(6.6)

* Multiple response analysis with percentage computed based on number of respondents rather than the total number of responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics**;** MIYCAN: Maternal, infant, young child, and adolescent nutrition; QI: quality improvement

Table 4.5 Continued. Categories of Work and Related Roles Performed by HN/HND Professionals Practicing in Uganda

Categories of Work			Identified Work/Job Roles		
Category of Work Domain	**N**	**Graduates whose work relates to the domain n(%)***	**Work/roles**	**N**	**Graduates performing mentioned role n(%)***
Advocacy, Communication, and Awareness	113	26(23)	Community/stakeholder engagements	26	20(76.9)
			Stakeholder orientation		2(7.7)
			Networking		2(7.7)
			Resource mobilization		1(3.8)
			Coordinating advocacy events		1(3.8)
Academia	112	8(7.1)	Lecturing and student supervision	8	87.5
			Research	8	12.5
Business/Industry	112	4(3.6)	Product development	4	1(25)
			Product marketing	4	1(25)
			Technical Assistance	4	1(25)
			Product certification	4	1(25)

* Multiple response analysis with percentage computed based on number of respondents rather than the total number of responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics**;** MIYCAN: Maternal, infant, young child, and adolescent nutrition; QI: quality improvement

For the undergraduates whose job roles were categorized as falling in the domain of advocacy, communications, and awareness (Table 4.5), the majority (76.9%) mentioned carrying out community/stakeholder engagements. This was followed by undertaking stakeholder orientations and networking each at 7.7% and coordinating advocacy events (3.8%).

4.3.1.2 Perceptions by the Academic Staff and the Work/internship Supervisors

Besides the feedback from the HN/HND graduates, this study also explored the views of academic staff and those of the work/internship supervisors on the types of employment in which the HN/HND graduates were engaged as well as the work/roles they performed.

These views were mapped under the same work domains as those created for responses from the HN/HND respondents using the NVivo 12 Plus qualitative software. From the responses, it was evident that employed graduates mainly worked as nutritionists in different positions; across different sectors; and in both government and non-government agencies. As per the following respondents' narratives, the ministry of health, non-governmental organizations, academic institutions, private health facilities, United Nations agencies, hotels, district local governments, and special care homes included some of the mentioned employers.

> "They are employed in the public service as nutritionists at the national level, in the ministry of health, in regional referral hospitals, and at local government level …. [They] also work as nutrition specialists with various NGO's and United Nations bodies."

> "Nutritionists in humanitarian relief based organizations; nutrition program managers in NGOs; nutritionists and dieticians in the national referral hospital, district hospitals, and private hospitals; nutrition and diet consultants; lecturers; and researchers."

The graduates were regarded to be performing multiple cross-cutting roles in the different types of employment. As highlighted by one of the respondents, the HN/HND job roles involve *"conducting nutrition education for various groups; individual nutrition counselling sessions for various nutrition-related conditions; dietary assessment; conducting of food demonstration sessions in infant and young child feeding; and nutrition project planning and implementation."* The performed roles were however

observed by one of the respondents to vary according to the job position, *"Roles vary depending on the rank. Supervisory work is done as one grows in rank; other roles assigned depending on rank include nutrition assessment; ... undertaking nutrition interventions for clients; giving food supplements, and client follow up."* Results of a word cloud visualization of the top 100 most frequently mentioned words under the domains of management of nutrition conditions; organizational leadership and management; nutrition and health promotion; research and documentation; and academia are presented in Figure 4.1.

Figure 4. 1. The 100 words most frequently mentioned by academic staff and work/internship supervisors regarding work done by Nutrition and Dietetics graduates in Uganda

Under the domain of management of nutrition conditions; “nutrition, assessment, counselling, therapeutic, food, meals, dietary, special, planning, feeding, and education” were some of the most frequently mentioned words. The most frequently used words under the domain of organizational leadership and management included “nutrition, monitoring, project, planning, health, support, activities, work, evaluation, plans, and implementation”. Under the domain of nutrition and health promotion, “nutrition, education, outreach, and support were the most frequently used words. The commonly used words under the domain of research and documentation were “nutrition, research, develop, disseminate, compile, reports, and circulate”. While “nutrition, knowledge, academia, and professional” were the most frequently used under the domain of academia.

4.3.2 Respondents’ Perceptions of the Knowledge and Skills Required of HN/HND Graduates

4.3.2.1 Perceptions of HN/HND Graduates

Twenty knowledge and skills themes were identified from the multiple responses by the HN/HND respondents. Based on these themes; an evaluation of the respondents' perceptions regarding knowledge and skills expected of HN/HND graduates; knowledge and skills gaps amongst individual graduates; knowledge and skills inadequately attained while at university; and the knowledge and skills recommended as a training minimum for HN/HND was done as summarised in Table 4.6.

For the knowledge and skills expected of HN/HND graduates (Table 4.6), responses were received from 132 respondents. The top six mentioned themes were integrated management of acute malnutrition (75.8%); communication, education, and counselling (62.1%); medical/clinical nutrition therapy (56.8%); research, proposal and report writing (52.3%); nutrition screening and assessment (47.7%); and leadership and management (47%).

For the knowledge and skills gaps amongst individual graduates; responses were received from 120 graduates (Table 4.6). The top six themes included medical/clinical nutrition therapy (61.7%); project planning, management, monitoring and evaluation (38.3%); integrated management of acute malnutrition (31.7%); communication, education, and counselling (18.3%); leadership and management (11.7%); and research, data analysis, proposal and report writing (10%).

Concerning the knowledge and skills not adequately attained during undergraduate training, the feedback was received from 100 respondents (Table 4.6). The top six themes were medical/clinical nutrition therapy (61%); research, data analysis, proposal and report writing (23%); leadership and management (19%); project planning, management, monitoring and evaluation (17.6%); integrated management of acute malnutrition; and communication, education, and counselling (13% each); and nutrition advocacy (10%).

Table 4. 6. *HN/HND Graduates Perceptions of the Knowledge and Skills Required for Health Systems Performance*

Knowledge & Skills Themes	**Expected of HN/HND Graduates (N=132) Respondents n(%)***	**Gaps Amongst Individual Graduates (N=120) Respondents n(%)***	**Inadequately Attained while at University (N=100) Respondents n(%)***	**Recommended as Training Minimum (N=97) Respondents n(%)***
Integrated management of acute malnutrition	100(75.8)	38(31.7)	13(13)	40(41.2)
Communication, education, and counselling	82(62.1)	22(18.3)	13(13)	27(27.8)
Medical/clinical nutrition therapy	75(56.8)	74(61.7)	61(61)	43(44.3)
Research, data analysis, proposal, and report writing	69(52.3)	12(10.0)	23(23)	19(19.6)
Leadership and management	62(47)	14(11.7)	19(19)	19(19.6)
Nutrition screening and assessment	63(47.7)	13(10.8)	8(8)	25(25.8)
Project planning, management, monitoring, and evaluation	49(37.1)	46(38.3)	17(17)	6(6.2)
Nutrition Advocacy	46(34.8)	12(10)	10(10)	13(13.4)
Maternal, infant, young child, and adolescent nutrition	43(32.6)	7(5.8)	1(1)	9(9.3)
Nutrition computing	32(24.2)	8(6.7)	11(11)	11(11.3)
Agribusiness	11(8.3)	2(1.7)	-	3(3.1)
Public health	9(6.8)	1(0.8)	1(1)	3(3.1)
Quality improvement	9(6.8)	-	4(4)	-
Product development and food safety management	9(6.8)	6(5.0)	4(4)	-
Records and data management	6(4.5)	-	-	-
Emergency nutrition	2(1.5)	1(0.8)	1(1)	-
Water, sanitation, and hygiene	2(1.5)	-	-	2(2.1)
Professional ethics	1(0.8)	4(3.3)	-	-
Internal medicine	-	1(0.8)	-	-
Human anatomy	-	-	7(7)	-

* Multiple response analysis with percentage computed based on number of respondents rather than the total number of responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics

As relates to the knowledge and skills recommended for minimum training, 97 respondents provided feedback (Table 4.6). The top recommended knowledge and skills themes were in the categories of medical/clinical nutrition therapy (44.3%); integrated management of acute malnutrition (41.2%); communication, education, and counselling (27.8%); nutrition screening and assessment (25.8%); leadership and management (19.6%), and nutrition advocacy (13.4%).

4.3.2.2 Perceptions by the Academic Staff and the Work/internship Supervisors

Similar to the responses by HN/HND respondents, the perceptions of academic staff and work/internship supervisors were multifaceted. Illustrative quotes of their responses when coded to the same knowledge and skills domains as was for the HN/HND respondents are summarised in Table 4.7. Under agribusiness, the need for knowledge and skills in crop management and backyard farming were mentioned.

Under the domain of medical/clinical nutrition therapy, it was expressed that Nutrition and Dietetics professionals required knowledge and skills on how to assess, categorize and apply diet therapy to correct and manage disease abnormalities and dietary recommendations for specific age groups (Table 4.7). Relatedly, HN/HND graduates were noted to have knowledge and skills gaps in clinical care and support for clients; management of clients in the absence of medical officers; management of non-communicable diseases; making of proper diagnosis; and dietetic management. As a training minimum, recommendation for training in overall management of malnutrition in its different forms; community engagement and management of malnutrition in

communities and health facilities; and therapeutic feeding, meal planning, and management were made.

For the domain of nutrition computing, results in Table 4.7 show that undergraduates needed to have knowledge and skills necessary for the use of technology, basic computing, and data analysis. Knowledge and skills gaps were noted to exist in the form of inadequate mastery of statistics and limited exposure to the use of modern technology. As a basic minimum, recommendation for basic ICT skills that can enable graduates utilize technology in the provision of nutrition services was made.

In considering the domain of maternal, infant, young child, and adolescent nutrition, results in Table 4.7 show that stakeholders expressed a need for knowledge and skills in infant and young child feeding, as well as knowledge and skills in specific areas of maternal, infant, young child, and adolescent nutrition. However, some respondents noted the existence of knowledge and skills gaps in infant and young child feeding.

In the domain of leadership and management, knowledge and skills were noted to be required in team working skills, interpersonal and organizational skills; critical thinking; and the management of human and material resources. Respondents noted the existence of knowledge and skills gaps in leadership and governance, conflict management and negotiation, and mobilization and fundraising (Table 4.7). As a basic minimum, recommendation for training in leadership and governance; decision making; problem solving; and multisectoral nutrition coordination was made.

Some of the knowledge and skills noted as being required in the domain of communication, education, and counselling included nutrition education and counselling, facilitation skills, communication more so as relates to behaviour change, and nutrition education and advocacy. Knowledge and skills gaps were noted in communication skills and interpersonal skills, confidence talking to the public, education session planning and implementation, inability to effectively communicate with clients, development of IEC materials, and presentation skills. As a basic minimum, respondents highlighted the need for training in relationships management; client and customer care; and effective communication (Table 4.7).

Under the domain of nutrition screening and assessment, knowledge and skills were said to be expected of undergraduates in nutrition anthropometry, biochemical, clinical, and dietary assessment (Table 4.7). The undergraduates were however said to have inadequate skills in nutrition assessment. As a basic, a recommendation was made for training in nutrition status assessment for people of different age groups and dietary assessment.

In the domain of project planning and management, knowledge and skills were said to be expected of undergraduates in planning, budgeting, policy formulation, and nutrition governance; understanding of multisectoral nutrition programming, and project implementation. According to results (Table 4.7), notable knowledge and skills gaps existed in monitoring and evaluation, project planning, budgeting, and writing bidding proposals for organizations. As a recommendation for the minimum training

requirements, respondents identified training in resource mobilisation and management; monitoring; and general systems analysis (Table 4.7).

Considering the domain of research, data analysis, proposal, and report writing, results in Table 4.7 show the expected knowledge and skills to comprise being able to undertake field and laboratory-based research; statistical data analysis and interpretation; report writing; and analytical skills. However, knowledge and skills gaps were said to exist in different areas including proposal writing, general research knowledge, and report writing and data collection.

In the domain of anatomy, physiology, pharmacology, pathology, and biochemistry, results show that respondents expressed a need for knowledge and skills in anatomy, drug prescription with minimal reliance on medical doctors, understanding of the relationship between foods and the blood system, pharmacy and pathology, and biochemistry and food microbiology. Some of the participants noted that knowledge and skills gaps were in the ability to link nutrition and body system functions, and limitations in anatomy and physiology. As a recommendation for training, respondents highlighted the need for knowledge of physiology, anatomy, biochemistry, and pharmacology (Table 4.7).

In the broad domain of product development and food safety management, knowledge and skills were expected of undergraduates in quality control analysis, food safety in nutrition, and food standards and laws (Table 4.7). No illustrations on the knowledge and skills gaps were extracted from the data.

Under the domain of professional ethics, results in Table 4.7 show that respondents expressed the need for undergraduates to exhibit knowledge and skills in ethics and professionalism. However, knowledge and skills gaps were noted in work ethics and client management, and general ethics and professionalism.

An extra domain of laws, policies, and regulations was created based on the trainer's and supervisors' responses. Under this domain, HN/HND graduates were expected to exhibit an understanding of key policies and guidelines on nutrition at the global and national levels. However, it was echoed that HN/HND professionals exhibited knowledge and skills gaps in nutrition policy and legislation (Table 4.7).

Table 4. 7. *Academic staff and Work/internship Supervisors Perceptions on the Knowledge and Skills Required of HN/HND Graduates*

Knowledge and Skills Domain	**Illustrative quotes**		
	Required of Nutrition and Dietetics Professionals in Uganda	**Knowledge and Skills Gaps**	**Recommended as a Minimum**
Agribusiness	"Crop management, backyard farming …"		
Medical/clinical nutrition therapy	"How to apply diet therapy to correct or manage abnormalities …" "Dietetic management of some disease conditions …" "Prevention of overweight and obesity …" "Special preparation food skills for various age groups and health conditions …" "Assessment, categorization, and management of patients using therapeutic feeds …" "Dietary recommendations for specific age groups …"	"Clinical care and support for clients …" "Most lack the ability to manage a client in the absence of a medical officer …" "Nutrition management of non-communicable diseases …" "Inability to make a proper diagnosis of a disease … and manage it dietetically …"	"Knowledge and skills to manage all forms of malnutrition … including HIV, TB" "Ability to link nutrition to health, … and genetic conditions …" "Community engagement and management of malnutrition at community and health facility level." "Therapeutic feeding, meal planning, and management…"
Nutrition computing	"Use of technology …" "Basic computing …" "Data analysis …"	"Inadequate exposure to the use of modern technology…" "Statistics was not well mastered …"	"Basic ICT skills to be able to utilize technology to promote and provide nutrition services."
Maternal, infant, young child, and adolescent nutrition	"Integrated management of acute malnutrition; infant and young child feeding… nutrition assessment, counselling, and support …" "Infant and young child feeding …"	"Infant and young child feeding …"	
Leadership & Management	"Team working skills, good interpersonal, … organizational skills" "Critical thinking …" "Ability to execute … duties with minimum or no supervision"	"Lack of leadership and governance skills …" "Conflict management, negotiation skills, strategies to boost and sustain the performance of the organization and its employees …"	"Leadership, decision making, teamwork, responsibility, problem-solving… " "Multisectoral nutrition coordination and programing … global targets" "Leadership and governance …"

HN/HND: Human Nutrition/Human Nutrition and Dietetics

Table 4.7. Continued. *Academic staff and Work/internship Supervisors Perceptions on the Knowledge and Skills Required of HN/HND Graduates*

Knowledge and Skills Domain	**Illustrative quotes**		
	Required of Nutrition and Dietetics Professionals in Uganda	**Knowledge and Skills Gaps**	**Recommended as a Minimum**
Communication, education, and counselling	"Nutrition education and counselling …" "Facilitation skills since they are working with people …" "Communication skills … but also need skills that are more specific to behaviour change" "Nutrition education and advocacy …"	"Communication skills, interpersonal skills …" "Confidence talking to the public …" "Education session planning and implementation" "Inability to effectively communicate with clients …" "Development of IEC materials …" "Presentation skills …"	"People relationships, communication, conflict management …" "They need … customer care relationships …how to handle people and clients." "Ability to communicate effectively with communities to change their behaviours…"
Nutrition screening and assessment	"Nutrition assessment …" "Nutrition assessment i.e. anthropometry, biochemical, clinical, and dietary assessment for all people …"	"Nutrition assessment …"	"Assessment of nutrition status among different age groups …" "Nutrition assessment, dietary management, and community development…"
Project planning, management, monitoring, and evaluation	"Planning, budgeting, policy formulation and dissemination, nutrition governance …" "Understanding of multisectoral nutrition programming …" "Project implementation …"	"Monitoring and evaluation …" "Project planning …" "Budgeting …" "Writing bidding proposals for organizations …"	"Resource mobilisation and management to enable control losses in their respective workplaces…" "Monitoring because it is very relevant to maintain regular surveillance of an organisation…" "Systems analysis to observe and identify problems and finding solutions…"
Research, proposal, & Report writing	"Research both field-based and laboratory-based …" "Data analysis and report writing …" "Analytical skills to be able to carry out research and analyse different problems…" "Data collection, statistical analysis, and interpretation …"	'Proposal writing …" "General research knowledge …" "Report writing and data collection …"	

HN/HND: Human Nutrition/Human Nutrition and Dietetics

Table 4.7 Continued. *Academic staff and Work/internship Supervisors Perceptions on the Knowledge and Skills Required of HN/HND Graduates*

Knowledge and Skills Domain	**Illustrative quotes**		
	Required of Nutrition and Dietetics Professionals in Uganda	**Knowledge and Skills Gaps**	**Recommended as a Minimum**
Product development and food safety management	'Quality control analysis …" "Food safety in nutrition …" "Food standards and laws …"		
Professional Ethics	"Ethics and professionalism …"	"Work ethics, Client management …" "Ethics and professionalism …"	"They need to be trained in challenging systems, ethics and integrity and personal presentation." "Personal presentation is very important." "Work ethics; and communication…"
Anatomy, Physiology, Pharmacology, Pathology, Biochemistry	"Anatomy …" "Drug prescription with minimal reliance on medical doctors …" "Understanding of the relationship between foods and the blood system …" "Pharmacy and pathology …" "Biochemistry and food microbiology …"	"Linking nutrition and body system functions …" "Anatomy and physiology …"	"Knowledge of physiology, anatomy biochemistry, clinical pharmacology,"
Laws, policies, and regulations	"Knowledge and skills of key policies and guidelines that guide nutrition …"	"Nutrition policy and legislation …"	

HN/HND: Human Nutrition/Human Nutrition and Dietetics

4.4 Scope of Nutrition and Dietetics Training and Practice in Uganda

This section presents the results of objective three of the study which aimed to assess the current scope of nutrition and dietetics training and practice in Uganda. Data collection under this objective was guided by the following six qualitative indicators

i. Regulation of HN/HND training and practice in Uganda
ii. Existence of national minimum training and practice requirements for HN/HND
iii. Existence of HN/HND training/practice guidelines or standards besides institutional HN/HND curricula
iv. Challenges towards the implementation of HN/HND competency-based education in Uganda
v. Opportunities for continuous professional development of HN/HND in Uganda
vi. Strategies to foster continuous professional development of HN/HND in Uganda

4.4.1 Regulation of HN/HND Training and Practice in Uganda

Two main questions were asked of participants; the first sought to establish whether the training and practice of HN/HND are regulated in Uganda while the second sought for participants' awareness of the different legislations, regulations, policies, standards, and guidelines that influence/govern HN/HND training and practice in the country. Results are presented for each of these two questions.

4.4.1.1 Participants' Perceptions of Regulation of HN/HND Training and Practice

4.4.1.1.1 Perceptions of HN/HND Graduates

The graduates interviewed expressed mixed views as to whether the training and practice of HN/HND were regulated in the country. The majority (66.3%) did not consider the training and practice of HN/HND to be regulated in Uganda, 20.2% considered it to be regulated, and 13.5% did not know whether it was regulated or not

(Table 4.8). According to the graduates' narrative quotes, those of the view that the training was regulated pointed out the NCHE as being the national body in charge of regulating the training of the HN/HND profession given its core function of accrediting the academic programmes offered by higher academic institutions in the country, *"Yes, because institutions awarding Degrees and Diploma in Uganda must meet certain minimum requirements to be permitted by the National Council for Higher Education in Uganda [to offer the different programs]."* As for regulating the practice of HN/HND, the MoH and the AHPC were pointed out as being in charge. As further shown in the narratives (Table 4.8), the role of the AHPC in regulating HN/HND training and practice was highlighted to be recent.

The graduates who did not perceive the training and practice of the HN/HND profession to be regulated considered the lack of a legal HN/HND professional body and the infiltration of the profession by non-HN/HND professionals as being major hindrances, *"No it's not … this could be as a result of the profession being infiltrated by [other professions] at various stages. Accreditation would put them out of the system; thus they cause its frustration…."* Nonetheless, some graduates expressed hope that the profession would get regulated by the AHPC under the leadership of the MoH. As a recommendation, one graduate pointed out the urgency to institute mechanisms to monitor and regulate the HN/HND profession if the graduates are to be able to compete nationally and globally, *"None and this should be worked on for graduates to [be able to] compete globally."*

Table 4.8. *Graduates' Perceptions on the Regulation of HN/HND Training and Practice in Uganda (N=104)*

Question	Response	%	Illustrative Quotes
Is the training and practice of HN/HND regulated in Uganda?	No	66.3	*"None and this should be worked on for graduates to [be able to] compete globally."* *"No because there is no body that regulates the training and practice of nutrition in Uganda."* *"There is no body/council in which the nutritionist must be registered with and [there are] no annual practicing licenses needed to practice as a nutritionist in Uganda."* *"No. There is no body or registration council for HND. There [is] need to have one like the nurses or doctors or allied health."* *"No its not, because there is no standing regulatory body [to the extent]that …other professions practice nutrition [and dietetics] freely … "* *"No, there is no unifying body that accredits, except the Uganda Action for Nutrition [now the Nutrition Society of Uganda] that tries to bring Nutrition Professionals together in various fora"* *"No it's not … this could be as a result of the profession being infiltrated by [other professions] at various stages. Accreditation would put them out of the system; thus they cause its frustration…."* *"Not yet, still waiting for the MoH to approve the allied health professional's council.*" *"No, but the Allied Health Professionals Council is about to start regulation of nutrition professionals."*
	Yes	20.2	*"Yes, because institutions awarding Degrees and Diplomas in Uganda must meet certain minimum requirements [before being] permitted by the National Council for Higher Education in Uganda."* *"Yes, the Uganda National Council for Higher education is mandated to accredit all the courses offered in higher institutions of learning…."* *"The institutions recognised to train HN/HND professionals have programs accredited by National Council for Higher Education. However, the practice of HN/HND is not regulated; first nutrition practitioners have to be registered by a recognised national institution."* *"Yes, but by only the National Council for Higher Education…"*
	Not Sure	13.5	*"Not sure though I presume that [HN/HND] practice in hospital settings is regulated under MoH."*

HN/HND: Human Nutrition/Human Nutrition and Dietetics; MoH: Ministry of Health

4.4.1.1.2 Perceptions of the academic staff and the work/internship supervisors

Like the graduates, some academic staff and the work/internship supervisors considered regulations to be in place; some did not consider the training to be regulated; and some considered regulating HN/HND practice to be new and hence still taking shape. Those indicating that the training was not regulated observed that no accreditation body existed, *"Not yet because there is no accrediting body"* and suggested a need for a professional body for this cause *"No we need Uganda nutrition and dietetic association for registration and joint deliberation of issues."*

Those who viewed the training of the HN/HND profession as regulated noted that universities offering such training were regulated by the NCHE *"The universities offering [HN/HND] are regulated by the National Council for Higher Education"* and that the academic programmes were also accredited by the NCHE, "*Programmes are accredited by National Council for Higher Education."* Some respondents also noted that despite the training being regulated, supervision was inadequate and there was a duplication of HN/HND programs across the different universities which led to sub-standard graduates, "*Although it seems to be regulated, there is inadequate supervision [and] over duplication of the HN/HND program. This leads to production of sub-standard graduates."*

As for the practice of HN/HND, some academic staff and internship supervisors highlighted that the AHPC had recently been mandated to undertake this role, *"The practice is just beginning and it is to be carried out by the Allied Health Professionals Council."* Although the AHPC was highlighted as having been mandated to regulate the practice of the HN/HND profession, some views were expressed that credentialing and licensing of HN/HND graduates before the practice was still not being adequately done, "*Credentialing is indicated to be done by the Allied Health Professionals Council*

but it is not being done for nutritionists or at least it is not currently a requirement to be licensed before practicing."

4.4.1.2 Awareness of the Legislations, Regulations, Policies, Standards, and Guidelines Influencing HN/HND Training and Practice in Uganda

4.4.1.2.1 Perceptions of HN/HND Graduates

Graduates referred to some national and ministerial policies, guidelines, and plans as being applied in governing the training and practice of HN/HND in Uganda. Some of the mentioned legislation and policies/plans were the National Food and Drug Act, the University and other Tertiary Institutions Act, Acts under the AHPC, the Uganda Food and Nutrition Policy, the Uganda Nutrition Action Plan, the National Development Plans, and the Health Sector Policy and Strategic Plans. Mention was also made of sector-specific policies, standards, and guidelines in health, agriculture, and gender e.g., IMAM, IYCF, and Nutrition Assessment, Counselling and Support (NACS) guidelines under the ministry of health and the National School Feeding Guidelines and under the ministry of education.

Some graduates were dissatisfied with the effectiveness of some legislation as well as with the bodies responsible/mandated to regulate HN/HND training and practice in the country. For instance, respondents noted that the MDAs developed specific sectoral or ministerial policies and plans and expected nutrition and dietetic professionals to follow them, *"Almost every sector/ministry develops its policies and expects nutritionists [and dietitians] to follow them… the school feeding guidelines by Ministry of Education and Sports mention what has to be done but do not mention recruitment of nutrition experts in schools."* Though existent, the Food and Nutrition Policy was reported as mainly being focused on implementation, *"[The] Uganda Food and*

Nutrition Policy exists but it focuses more on the implementation process than the implementer" but silent on aspects of HN/HND training and practice, *"Even though we have the Food and Nutrition Policy, it's quiet on [HN/HND] training and practice."* As though to sum up the different observations, one respondent expressed that HN/HND professionals had a feeling of not being professionally protected; "*I feel we are not professionally protected in case of any problem at work."*

4.4.1.2.2 Perceptions of the Academic Staff and the Work/internship supervisors

Like the graduates, the academic staff and the work/internship supervisors mentioned national legislation, policies, and plans including the Constitution of the Republic of Uganda; National Food and Drug Act; the Universities and Other Tertiary Institutions Act; Allied Health Professional Act, and the related Code of Conduct for Allied Health Professionals; the Uganda Food and Nutrition Policy; and Uganda Nutrition Action Plan. At the ministerial level, respondents pointed to the existence of different nutrition policies and guidelines under the Ministries of Health and Agriculture but noted that gaps in legislation existed, *"There is… a gap in legislation but soon all policies will be in place."*

4.4.2 Existence of National Minimum Training and Practice Requirements for HN/HND

Two main questions were asked of participants, the first sought to understand respondents' perceptions as to whether there existed established minimum training requirements for HN/HND in Uganda while the second sought to understand the respondents' perceptions on the need for a national standard stipulating the minimum training requirements for HN/HND in Uganda

4.4.2.1 Respondents' Perceptions of the Existence of Minimum Training and Practice Requirements for HN/HND in Uganda

4.4.2.1.1 Graduates' Perceptions

Table 4.9 presents a summary of the graduates' perceptions regarding the existence of national minimum training and practice requirements for HN/HND in Uganda. About a third of the graduates (32.7%) were of the view that such requirements existed; 31.7% said none existed, while 35.6% did not know whether these existed or not. The graduates who felt that minimum training requirements existed observed that such requirements are set and enforced by the NCHE and that having a bachelor's degree in HN/HND was one of the minimum requirements. They also pointed out that the AHPC having been mandated to regulate the HN/HND profession had set up the given requirements. Also pointed out were the ECSA nutrition curriculum, in-service training guidelines by the MoH, and the IMAM guidelines (Table 4.9).

Graduates who did not consider HN/HND minimum training and practice requirements to be existent reasoned that there was no common curriculum followed by all institutions, rather universities followed their curricula and that differences existed in the different university curricula; there was no existent policy stipulating such requirements; there was no legally approved Professional Board for the HN/HND profession; the accrediting body, the AHPC, lacked standard requirements specific to HN/HND training at the time of the study; and that there was poor coordination amongst the different sectors (Table 4.9).

The graduates who were not sure of whether minimum HN/HND training requirements existed or not partly pointed to the lack of understanding of the standards used to develop HN/HND curriculum by the different Universities, *"There*

exist curricula, but I do not [know] what standard is used to come up with the nutrition curricula and the curricula is not shared widely with stakeholders. Stakeholders advertise positions based on their needs … Most positions that can suit nutritionists end up to other disciplines because not every stakeholder understands all the tasks of nutritionist and or dieticians." They also pointed to the existing ambiguities where graduates of different qualifications in HN/HND were employed in similar positions thus doing the same work (see Table 4.9).

Table 4.9. *Graduates Perceptions on whether Minimum Training Requirements for HN/HND Exist in Uganda (N=101)*

Response	**%(n)**	**Illustrative**
Yes	*31.7*	*"Yes, must have an honours Bachelor of Science degree in Nutrition, Dietetics or Food Science … or its equivalent from a recognized institution."* *"Yes, with the registration of Nutritionists under the Allied Health Professional's Council; the Council is establishing minimum requirements that will be enforced in all Universities and Institutions"* *"All employers expect nutritionists to be familiar with knowledge and practice of all IMAM components."* *"I think so; we need to check with the Universities and the NCHE, they should be there."* *"Yes, the ECSA/MOH pre-service and in-service training guidelines."*
No	32.7	*"Currently, there are no established minimum requirements. Each institution has its curriculum and is not uniform for all…"* *"No, because they are not stipulated by any policy in Uganda."* *"No, but the universities have a basic minimum that needs to be met."* *"None that I know of because different institutions have different syllabuses and durations."* *"No, every institute has its curriculum, the accrediting body lacks standard requirements specific to nutrition [and dietetics training]."* *"No, my thinking is that these would be available if the Nutrition team in Uganda had a Professional Board."* *"No because of lack of coordination between the various sectors involved in addressing nutrition …"*
Don't Know/Not Sure	*35.6*	*"There exist curricula, but I do not [know] what standard is used to come up with the nutrition curricula; the curricula is not shared widely with stakeholders. Stakeholders advertise positions based on their needs … Most positions that can suit nutritionists end up to other disciplines because not every stakeholder understands all the tasks of nutritionist and or dieticians."* *"I do not know of any, but in the stakeholders meeting for the Allied Health Professionals held in November 2017, it was mentioned that for one to qualify as a nutritionist they must have a Bachelor's Degree from either Kyambogo University, Makerere University, or Uganda Christian University."* *"Not sure, some people claim to have certificates, diplomas, and others degrees in nutrition yet doing the same work; it gets confusing."*

4.4.2.1.2 Perceptions of the Academic Staff and the Work/internship Supervisors

Just like the graduates, the trainers and the work/internship supervisors generally pointed to the absence of an established national minimum standard for guiding the training and practice of HN/HND, *"No documented minimum training requirements for HN/HND [for there are] no specific nutrition professional certification bodies established."* Due to the absence of such a standard, another respondent noted that university expectations as highlighted in the curriculum were usually followed, *"I am not informed about minimum national training requirements. We usually follow university [curriculum] ... expectations."* It was also observed that existing university requirements varied, *"No, there exist only university requirements and these vary from one university to another."* It was however noted that efforts were being undertaken to institute such standards, *"No, but processes are ongoing to put these in place, e.g. all nutritionists will be required to register before practice and this requires to have gained minimum requirements."*

4.4.2.2 Perceptions on the Need for a National Standard Stipulating the Minimum Training Requirements for HN/HND

4.4.2.2.1 Perceptions of the HN/HND Graduates

The survey further sought to understand the graduates' perceptions of the need for a national standard stipulating the minimum training and practice requirements for HN/HND. As summarised in Table 4.10, almost all the graduates (97.5%) were in support of the need for such a standard. The main reasons given by the graduates in support of this view were categorised into three; standardisation of training;

improving service delivery, and improving stakeholder understanding of the HN/HND profession.

Table 4. 10. *Graduates' Perceptions on the Need for a National Standard Stipulating the Minimum Training and Practice Requirements for HN/HND (N=119)*

Responses	**% (n)**	**Illustrative Quotes**
Yes	97.5	**Standardization of training** *"Yes, this will harmonize and standardize the teaching of nutrition and dietetics and thus ensure a minimum standard across the country"* *"Yes, currently, various universities offer such training courses yet a standardized curriculum does not exist"* *"Yes …it can be noted that Human Nutrition students [graduates from Makerere University] are better at clinical nutrition while Human Nutrition and Dietetics students [graduates from Kyambogo University] rank better in the community. It would thus be good to harmonize the two to ensure consistency."* *"Yes, this will enable all HN/HND graduates from various institutions to possess similar competencies and compete effectively in the job market"* *"Yes, because HN/HND is an area that deals with human life. Therefore, a proper national standard guideline is vital."* *"Yes …this will ensure uniformity of practice among professionals trained in the various institutions."* **Improvement of service delivery** *"Yes … there is a need to set minimum standard requirements so that there is an improvement in the quality of services offered."* *"Of course, this helps in ensuring adequate training for the graduates to ensure quality service delivery"* *"Yes … this will decrease the knowledge gap and ensure uniformity of practice among professionals trained in the various institutions"* *"Yes, this will help to reduce quacks and also provide the right positions for qualified nutritionists …"* **Improve stakeholder understanding of the HN/HND profession** "*Yes ... employers will distinctively know what to expect from nutritionists and dietitians"* *"Yes, this will help communicate … what is required and or expected from the nutritionists/dietitians"*
Don't Know	2.5	

As further highlighted in Table 4.10, some of the critical issues raised under standardisation were that a national standard would lead to harmonisation and standardisation of the teaching of nutrition and dietetics in universities across the country and enable graduates from all universities to possess similar competencies. Under the improvement of services delivery, the graduates noted that having a national standard could: direct practice and ensure quality services delivery; ensure adequate training for improved services delivery; reduce quacks in the profession. Under improving stakeholder understanding, the graduates noted that having a national standard had the benefit of enabling employers to know what to expect from graduates; create an avenue through which the general public could know about what is expected of nutrition and dietetic graduates; also provide a levelled ground based upon which individuals can assess their capacity.

4.4.2.2.2 Perceptions of the Academic Staff and the Work/internship Supervisors

The reasons given by trainers and internship supervisors in support of the need for a national standard stipulating the minimum training requirements for HN/HND were also grouped into two categories; standardisation of HN/HND training and improvement of stakeholder understanding of the HN/HND profession. Under standardisation of training, respondents observed that this would ensure that all universities have a common standard and that this would be of benefit to the nation; prevent “quack” training; ensure uniformity in the quality of graduates from the different universities; and foster regulation of universities and institutions on standards of training. Under improvement of stakeholder understanding, it was observed that having a minimum training standard could promote favourable

competition amongst graduates on the job market. Illustrative quotes of the respondents are summarised as follows:

Standardisation of HN/HND training

> *"There is a need for standardisation so that all universities have a generally agreed-upon standard. This would be for the benefit of the nation …"*
>
> *"There is an urgent need to prevent quack training that might be taking place in training institutions."*
>
> *"There is a need for common national … standards so that the quality of graduates produced is uniform and satisfactory…. Relatedly, there is a need for a certification body that enforces the minimum standards for the nutritionist profession…."*
>
> *"There is a need, otherwise most graduates usually only acquire skills provided by the institution they train with depending on the available need which leaves the graduates incompetent in other areas."*
>
> *"Yes, to regulate the universities and institutions on standards of training…"*

Improvement of stakeholder understanding of the HN/HND profession

> *"Yes, so that it is easy for graduates to compete favourably in the job market and for the public to be able to identify qualified nutritionists [and dietitians] and the services these can offer"*

4.4.3 Existence of HN/HND Training and Practice Guidelines or Standards besides Institutional HN/HND Curricula

Two main questions were asked of participants; the first sought to establish the existing national HN/HND training/practice guidelines or standards besides institutional HN/HND curricula while the second sought to establish whether the mentioned guidelines/standards reflected the competencies required of HN/HND graduates for performance in Uganda's varied health systems settings.

4.4.3.1 Existing National HN/HND Training/Practice Guidelines or Standards besides Institutional HN/HND Curricula

4.4.3.1.1 Perceptions of the HN/HND Graduates

As summarised in Table 4.11, of the 110 HN/HND respondents, the majority (66.4%) indicated not knowing whether there existed National HN/HND Training/Practice guidelines/standards besides HN/HND institutional curricula and only about 33.6% indicated that these existed. Examples of the mentioned existing guidelines/standards included the Integrated Management of Acute Malnutrition (IMAM) Guidelines, Baby-Friendly Hospital Initiative (BFHI) Training Guidelines, Infant and Young Child Feeding (IYCF) Guidelines, the Nutrition Assessment Counselling and support (NACs) Guidelines, IYCF in Emergency Guidelines, National Nutrition Planning Guidelines for Uganda, Guidelines on Maternal Nutrition, and the Nutrition Survey Methodology guidelines for Uganda. Mention was also made of organisational-based manuals/guidelines such as the Nutrition Training Manual Developed for Tea Communities of Uganda (Table 4.11).

Also worth noting from these responses was that most of the mentioned guidelines were developed by different ministries (Ministry of Health, Ministry of Agriculture

Animal Industry and Fisheries, Ministry of Gender Labour and Social Development) in collaboration with different stakeholders and these guidelines/standards were already in use.

Table 4.11. *Graduates' Perceptions on whether there Existed HN/HND Training/Practice Guides/Standards besides Institutional HND Curricula (N=110)*

Response	%(n)	Illustrative Quote
No	66.4	*"No, because i have not seen any."* *"None that I know of"*
Yes	33.6	*"IMAM [Integrated Management of Acute Malnutrition] guidelines, although these are silent on some aspects like those with disabilities so they are not very helpful."* *"Some training guides or manuals have been designed; these include IYCF [Infant and Young Child Feeding] and NACS [Nutrition Assessment, Counselling, and Support], and a Nutrition Manual for developed for tea communities in Uganda."* *"Practice guides like the guidelines on maternal nutrition, IMAM [Integrated Management of Acute Malnutrition] guidelines, guidelines on nutrition survey methodology, Uganda Policy guidelines on Infant and Young Child Feeding, National Nutrition Planning Guidelines for Uganda (2015)exist"* *"There are some materials under Ministry of Health, MAAIF [Ministry of Agriculture Animal Industry and Fisheries] and MGLSD [Ministry of Gender Labour and Social Development]. Development partners and Non-governmental Organisations have also developed many materials that can qualify here."* *"Yes there are many guidelines for various training in the field of nutrition like the … BFHI [Baby-Friendly Health Initiative] guidelines among others"* *"Yes; technical guidelines… Nutrition in emergencies, Nutrition in HIV/AIDS [Human Immunodeficiency Syndrome/Acquired Immunodeficiency Syndrome] exist."*

4.4.3.1.2 Perceptions of the Academic Staff and the Work/Internship Supervisors

The academic staff and the work/internship supervisors expressed mixed views on the existence of HN/HND training and practice guidelines or standards. Some of

those who viewed guidelines and standards to be existent pointed out that these existed in form of interventions or protocols by different ministries especially the Ministry of Health, *"These are in form of interventions such as IMAM [Integrated Management of Acute Malnutrition], BFHI [Baby Friendly Hospital Initiative], ENA [Essential Nutrition Actions], NACS [Nutrition Assessment, Counselling, and Support], PD Hearth protocols and training guidelines."*

It was also highlighted that different workplaces and organisations supporting nutrition under the United Nations umbrella had nutrition guidelines and standards "*Guidelines and manuals other than those in different government institutions and ministries such as the Ministry of Health are only available in workplaces and organizations, United Nations, and others."* The additional guidelines/standards identified by the academic staff and work/internship supervisors, besides those mentioned by the graduates, included the East Central and Southern Africa-Health Community (ECSA-HC) pre-service nutrition curriculum for frontline health nutrition workers, HIV/AIDS nutrition, and care guidelines, Essential Nutrition Actions (ENA), and the Positive deviance (PD) hearth protocols and training guidelines. However, it was noted that a number of the existent guidelines/standards were intervention-based.

The academic staff and work/internship supervisors that did not consider such guidelines and standards existent pointed out the failure to bring stakeholders together to support HN/HND training as the main hindrance. Due to this, higher institutions of learning were reported to independently undertake HN/HND

training. As a consequence, the employers of HN/HND graduates did not fully know the competencies to expect from the graduates they employ, *"I have not seen any and I think the reason is that all stakeholders haven't been brought together to contribute to the training of our [HN/HND] professionals. Institutions train and send the workforce to the world, what happens may not be their concern. The employment agencies including the Government institutions employ professionals [whose competencies] they don't know … at times."*

4.4.3.2 Whether Existent Guidelines and Standards Reflect the Required HN/HND Competencies

4.4.3.2.1 Perceptions of the HN/HND Graduates

Amongst the HN/HND graduates, 37.5% of the respondents felt the guidelines reflected the required competencies, slightly more than a quarter (27.8%) were of the view that the guidelines did not reflect the required competencies, about a quarter (23.6%) did not know, while 11.1% were of a view that the guidelines partially reflected the required HN/HND training and practice competencies (Table 4.12).

Meanwhile, as per the participants' narratives, the main reference was made to the IMAM guidelines which were on one hand considered to specify the procedures for the management of malnutrition at different levels but judged as not being broad enough to capture other nutrition problems on the other hand. Some other points of concern by the graduates were that primary health care was adequately captured in

most of the guidelines but some of the competencies reflected by the guidelines fell short of meeting the ever-changing market needs.

Table 4.12. *Graduates Perceptions of Whether Existent Guidelines Reflect the Competencies Required of HN/HND Professionals (N=72)*

Response	% (n)	Illustrative Quote
No	27.8	*"Primary Health Care is not well articulated in the guidelines ...."* *"IMAM guidelines are not broad enough to capture other nutrition problems like nutrition systems, medical complications ..."* *"No, it's [IMAM guideline] only a guideline for use in the management of cases ... with no attention to required competencies."*
Yes	37.5	*"Yes it [IMAM guideline] does, it stipulates how malnutrition can be managed both at facility and community basis"* *"Yes, they emphasise the need for integrated nutrition approaches and give working guidelines for any nutrition projects or interventions"* *"Yes, the guides reflect required competencies. These include the ability to accurately diagnose nutrition-related health conditions using the available up-to-date tools, the capacity to conduct needs assessments, and recommend or implement an appropriate nutrition intervention."*
I don't know	23.6	*"I don't know of any guidelines."*
Partially	11.1	*"Partially yes, although the [reflected] competencies do not address the [changing] market needs."*

4.4.3.2.2 Perceptions of the Academic Staff and the Work/Internship Supervisors

As per the feedback from the academic staff and the work/internship supervisors, some did not consider the existing guidelines to be fully reflective of the competencies required of HN/HND professionals for performance in Uganda's health system. One respondent noted that *"most of the guides [were] customized to the needs and structure of the health system in Uganda."* Also, in comparison to other mentioned guidelines, the ECSA-HC guidelines were highlighted as being more comprehensive in reflecting the competencies required of HN/HND graduates, *"Not all, except ECSA-HC guidelines.*" As a recommendation, a revision

of the guidelines was suggested by one of the respondents "…*the guidelines have to be reformed to reflect the current realities."*

4.4.4 Challenges towards Implementing HN/HND Competency-based Education in Uganda

4.4.4.1 Perceptions of the HN/HND Graduates

The challenges that may impede the implementation of CBE in the training of HN/HND in Uganda and the related narratives as per the graduates' perceptions are presented in Table 4.13. The main challenges included inadequate institutional staffing (27.8%) reported to be due to a few dedicated and qualified lecturers and a general shortage of teaching staff; limitations in training policies and legislations (24.1%) said to be due to low prioritization of CBE in the national education system and the reluctance of policymakers to recognize HN/HND as being critical for public health; limitations in financial resources (21.5%) given that funds to support CBE programs may be unavailable; and limitations in infrastructure (13.9%) supposedly due to limitations in the availability of facilities that may be required for practice by the students.

Other mentioned challenges included limitations in time allocation (12.7%) given that the current semester system may not allow enough time for CBE and training; and the lack of harmonized curriculum (10.1%) given that there are currently no agreed upon specific HN/HND competencies used across the universities; low stakeholder awareness of CBE (6.3%); low political will and lack of regulatory and accreditation body (each 5.1%); lack of technical expertise to design and implement CBE (3.8%); and low stakeholder collaborations (1.3%).

Table 4.13. *Graduates Perceptions of the Challenges that may Curtail Implementation of Competency-Based Education of HN/HND (N=79)*

Expected Challenges	**% Respondents***	**Illustrative Quotes**
Inadequate institutional staffing	27.8	*"Inadequate human resource i.e. few dedicated and qualified lecturers to implement [competency-based education in HN/HND]."* *"Shortage of teaching staff as the student-teacher ratio is currently too big. CBE may be inefficient with large classes."*
Limitations in training policies & legislations	24.1	*"With the Uganda education system …. Competency-based education is not prioritized. …"* *"Reluctance of policymakers in recognizing HN/HND as [being critical] in public health."*
Limited financial resources	21.5	*"Funds to support such programs [may be unavailable]."* *"Institutions lack [adequate] resources required to provide all competence as required …"*
Limitations in infrastructure	13.9	*"Lack of infrastructures to facilitate the development of these skills."* *"Inadequate infrastructural facilities"* *"[Limitations] with resources and facilities; e.g. students may require equipment to [practice]."*
Limitations in time allocation	12.7	*"The semester schedule may fail to have adequate time allocated for [competency-based training]."* *"Lack of enough time to interact with every student at large"*
Lack of harmonised curriculum	10.1	*"Failure to agree on specific competencies due to different HN/HND curriculums in training institutions"* *"Lack of a harmonized curriculum …"* "*Difficulty to integrate it into the University system because universities have to review the curriculum"*
Low stakeholder awareness of CBE	6.3	*"There is limited understanding of competency-based education [and] … unwillingness to change from contents based curricula"*
Low Political will	5.1	*"Lack of enabling laws and policies, and political interference"* *"Poor government policies and low commitment"*
Lack of regulatory & accreditation body	5.1	*"Lack of guidelines, regulatory body/association, and policy on the training of nutritionists"* *"Lack of strong governing policies and bodies"*
Low technical expertise to design & implement CBE curriculum	3.8	*"The technical expertise to deliver this model may not be readily available"* *"Lack of skilled /competent lecturers with a grounding in theoretical and practical nutrition issues"*
Low stakeholder collaborations	1.3	*"Inadequate collaboration among stakeholders*" *"Inability of the teaching institutions to make partnerships with [employers] of nutritionists* *"Lack of university-affiliated health facilities to attach nutrition students for … hands-on classes"*

*Multiple response analysis with percentage computed based on number of respondents rather than the total number of responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics; CBE: Competency-based education

4.4.4.2 Perceptions of the Academic Staff and the Work/Internship Supervisors

The challenges anticipated by the academic staff and the work/internship supervisors were categorised into financial and human-related challenges; policy and regulatory challenges; infrastructure-related challenges; and curriculum and training-related challenges (Table 4.14). Some of the mentioned financial and human resources-related challenges included increased expenditures by the students, inadequate funding and low staffing, and limited availability of resources for retooling existent staff.

The lack of supportive/enabling legislation and the existence of weak nutrition policies and programs to push for CBE in Uganda were some of the challenges grouped under the policy and regulatory related challenges. The lack of sufficient facilities such as laboratories and equipment was the main challenge mentioned under infrastructural related challenges. On the other hand, the lack of a uniform set of competencies in curriculum across the different universities; incompatibility of the currently used curriculum to CBE curriculum; unwillingness of universities to adjust their training methods; a large number of students that may make the assessment of competency less objective; and failure to update the curriculum to fit the current knowledge requirements in nutrition were some of the mentioned challenges grouped under curriculum and training related challenges.

Table 4.14. *Academic Staff and Employers Perceptions of the Challenges that May Curtail Implementation of HN/HND Competency-Based Education in Uganda (N=25)*

Financial and Human Resources Related Challenges
"It may require extra expenditure on the side of the students."
"Inadequate funding [and] low human resource [staffing]"
"Competent human resources to act as models for fresh graduates in the field may be limited"
"Limited knowledge of competency-based education training techniques by the instructors"
"Limited availability of resources for re-tooling trainers to meet the demands of competency-based education and shortage of trainers for nutrition"
Policy and regulatory related challenges
"Lack of supportive/enabling legislation"
"Weak nutrition policies and programs to push [for competency-based education]"
Infrastructure
"Lack of sufficient facilities like modern teaching aids, laboratories and equipment"
Curriculum and training related challenges
"Lack of a uniform set of [competencies in]curriculum across different universities ...semester-based systems in universities are time-bound"
"Incompatibility of the current curricula with competency-based education"
"A large number of students, assessment of competences may not be objective or standard"
"Most training institutions are rigid and unwilling to adjust their training methodologies. They are more focused on theoretical approaches than the more empowering daily practical sessions."
"[Failure] of updating the curriculum to fit the current knowledge in nutrition"
"An out-dated curriculum, with limited hands-on skills course units"
"A lot of theory learning other than practical experiences"
"Time factor may be a challenge"
"Short time internships"
"Inter-institutional competition e.g. in student enrolment"

4.4.5 Opportunities for Continuous Professional Development of HN/HND in Uganda

4.4.5.1 Perceptions of the HN/HND Graduates

Besides the master's and Ph.D. programmes that can be undertaken by graduates of the bachelor's degree HN/HND as offered in different universities, some graduates were of a view that continuous professional development (CPD) opportunities in HN/HND existed while others did not consider such opportunities existent.

> *"CPD's are available both on the job and out of job…"*

> *"No specific CPD programmes [exist] apart from undertaking further degree studies at either masters or Ph.D. level."*

> *"None that I am aware of except on job [training] opportunities…"*

For the "informal" organisational-based programmes, graduates highlighted that opportunities for CPD in HN/HND existed in the different NGOs, private companies, and hospitals implementing nutrition activities in different parts of the country.

> *"Community-based organizations implementing nutrition programmes; private companies providing nutrition services; and hospitals for internship placements…"*

> *"Refugee camps with donor-funded nutrition programmes. Karamoja region has lots of donor-funded nutrition programmes; this can offer an opportunity for field visits"*

> *"IP [implementing Partner] supported nutrition retreats for nutritionists by MoH, Workshops on nutrition and updated guidelines organised by the MoH"*

United Nations agencies such as the UNICEF, WHO, and the WFP were in particular singled out for playing a leading role in providing and supporting organizational-based CPD opportunities for the HN/HND professionals employed by the ministry of health, district local governments, and for other organisations.

> *"The Ministry of Health is usually supported by UNICEF or WFP to train nutritionists based in hospitals and those employed by partnering organisations. Focus is on rolling out updated versions of practice guidelines."*

> *"I believe most organisations do capacity building for their staffs. However, [United Nations agencies] such as UNICEF and WFP have tried to build capacity for nutritionists through the ministry/local governments.*

It was also noted from the graduates' responses that some efforts had previously been undertaken by some institutions to initiate and provide CPD opportunities to HN/HND graduates out of the formal university training structures in Uganda. Those mentioned included the National Nutrition Fellowship Program initiated by the Food and Technical Assistance (FANTA) project- a USAID funded project in Uganda from the years 2014 to 2018 and the Nutrition Fellowship Program undertaken by Kyambogo University in partnership with the SPRING Project- also a USAID funded project in Uganda during the years 2014-2017. "*SPRING and FANTA and other organizations provided internships programs, but none has been established by Government of Uganda."* Other mentioned opportunities that have previously benefited HN/HND graduates included competitive scholarships including the MasterCard Foundation scholarships, Commonwealth scholarships, the Global Health Corps, and the Young African Leadership Initiative programmes *"Like MasterCard,*

Commonwealth … and other leadership programs like the Global health corps and YALI [Young African Leaders Initiative."

Besides these, respondents noted that Universities and the Ministry of Education and Sports could play a leading role to promote formal CPD programs for HN/HND by ensuring that Universities form partnerships with different organisations backed by binding Memorandums of Understanding (MoU's). It was highlighted that graduates could undertake voluntary internship roles in different organisations and or seek professional membership in existing Nutrition professional bodies.

> *"Developing MoU's with several projects, organizations to allow capacity building for fresh graduates."*
>
> *"Partnerships of organisations with universities to provide students with practical knowledge…"*
>
> *"Seeking membership to Nutrition bodies e.g. Uganda Nutrition Action Society [currently re-named the Uganda Nutrition Society]."*
>
> *"Volunteering and internships in the different organisations"*

4.4.5.2 Perceptions of the Academic Staff and the Work/Internship Supervisors

Some academic staff and employer representatives highlighted that there were no clearly defined CPD programs that existed besides the formal master's degree programmes offered in some universities in the country, *"There are no clearly defined opportunities except for the specialized courses offered in higher education institutions…"* The existent CPD opportunities were considered to be workplace-based and or through undertaking seminars, conferences, and or workshops:

"For those in Public services, they can receive continuous training in community health promotion targeting different competencies like management of malnutrition"

"Involvement of CPDs [continuous professional development sessions] at workplaces such as health facilities, organizations"

"On-going hospital CPDs [continuous professional development sessions] integrated with routine health care and short fully sponsored…by some nutrition stakeholders."

"…the rest can be periodical conferences, workshops, and seminars".

"All universities have such programs; there are many workshops for continuous professional development particularly by the FAO."

"Yes, fellowship programs by implementing & development partners."

Some recommendations were made towards promoting CPD in HN/HND; these included the need to institute relevant policies, *"Having the policies, guidelines & legislation in place"*; develop CPD packages, *"Develop packages for CPD [continuous professional development] for the nutrition professionals"*; and seeking opportunities of engagement with professional bodies as follows, *"Engagement in professional nutrition bodies such as the Uganda Dietetic Association."*

4.4.6 Strategies to Foster Continuous Professional Development in HN/HND

4.4.6.1 Perceptions of the HN/HND Graduates

The graduates recommended a range of options. These were grouped into four major themes; instituting training opportunities suggested by 52.7% of the respondents, enacting effective legislation suggested by 37.4% of the respondents, partnerships, and collaborations suggested by 8.8%, and funding and resources mobilization suggested by 1.1% of the respondents (Table 4.15). The proportions as presented in the Table are for the respondents who mentioned the theme.

Under the theme of instituting training opportunities, the need for developing a standard national HN/HND training guide; organising short CPD courses; creating more opportunities for long-distance training; instituting a national fellowship HN/HND program; establishing a CPD centre of excellence for HN/HND professionals; sharing updates on new opportunities, guidelines, and standards; refresher courses, workshops, conferences were emphasised.

Under the theme of enacting effective legislation, emphasis was put on the need to: formulate policies that promote CPD in HN/HND at the workplace; institution of a legal association with the mandate to design and undertake CPD programs; undertaking registration, certification, credentialing, and accreditation of HN/HND professionals in Uganda. Strengthening of interprofessional and inter-institutional collaborations within and outside Uganda was highlighted under the theme of partnerships and collaborations. Providing financial support to undergraduates wishing to enroll for CPD programmes was also mentioned under the theme of funding and resource mobilization.

Table 4. 15. *Strategies for Undertaking Continuous Professional Development in HN/HND Recommended by the Graduates (N=91)*

Strategies	**n (%)**	**Illustrative quotes**
Instituting Training Opportunities	48(52.7)	*"Developing a standardised national guideline for HN/HND training… for the graduates to acquire adequate knowledge required at both the national and international level."* *"Universities ought to organise short [CPD] courses informed by bottleneck analysis about existing knowledge gaps. The courses can be organised jointly."* *"Create more long-distance nutrition or public health programs, or weekend programs at most of the public institutions to support study alongside work."* *"Establish a [CPD] centre of excellence for HN/HND professionals."* *"Providing updates on new/emerging opportunities, guidelines, and standards in the field of nutrition at both the national and regional level."* *"[Having] refresher courses, workshops, and or conferences [and] … sponsored short professional courses to update nutritionists…"* *"Starting fellowship programs that integrate the best students for mentorship and coaching [and] continuously tracking the progress of HND students to identify an opportunity for others."*
Enacting Effective Legislation	34(37.4)	*"Formulation of policies by the government to the [effect that] organizations employing the graduates include at least one or more CPD programs for [HN/HND] graduates."* *"Create a legal association of nutritionists/dietitians in Uganda that has the mandate to certify and offer CPD for nutrition graduates…"* *"Create a standing nutrition professional body and register all nutritionists appropriately."* *"Create an Accreditation agency which can be the link point for all [HN/HND] professionals."* *"[Institute] policy and legislative measures specific for the [HN/HND] profession."* *"Make practicing licences [mandatory] for the graduates and also have guidelines."*
Partnerships and Collaborations	8(8.8)	*"Increasing engagement and collaborations with other health professionals during training and internships…"* *"Strengthen the coordination system between institutions and undergraduates."* *"[Instituting] Inter-institutional collaborations and partnerships."* *"Networking with international institutions to build the capacity of [HN/HND graduates in] Uganda."* *"Institutions should sign MOU's with organisations to take up [HN/HND] graduate students for internship opportunities."*
Funding and Resources Mobilization	1(1.1)	"*Need to financially support undergraduates for professional development."*

4.4.6.2 Perceptions of the Academic Staff and the Work/Internship Supervisors

The strategies recommended by the academic staff and the employers mirrored those by the graduates and were hence grouped and analysed under the same themes as was done for the graduates' responses as summarized in Table 4.16. Under the theme of instituting training opportunities, the academic staff and employers among other strategies recommended the need for developing and promoting CPD packages; developing and offering more nutrition programmes up to the doctorate level; and providing specific postgraduate courses, and on-job mentorships.

Some of the strategies proposed under the theme of enacting effective legislation included making CPD compulsory; instituting an HN/HND specific professional body; registering and monitoring HN/HND professional training and practice; making CPD in HN/HND one of the mandates of universities offering related training. Strategies recommended under the theme partnerships and collaborations included creating partnerships among different stakeholders and the formation of professional networks. The two main strategies highlighted under the theme of funding and resources mobilisation included the provision of funding opportunities for CPD and the motivation of supervisors through the provision of allowances.

Table 4. 16. *Strategies for Undertaking Continuous Professional Development in HN/HND Recommended by the Academic Staff and Employers (N=25)*

Strategies	**Illustrative quotes**
Instituting Training Opportunities	*"Develop CPD [continuous professional development] packages for the nutrition professionals"* *"Designing and promoting nutrition professional development courses/training."* *"Design average short courses for in-service training [and] offer certificates of attendance for courses undertaken."* *"More specific post-graduate courses are vital, short courses/seminars can also be helpful."* *"[Provide] training and on-job mentorships"* *"Develop nutrition programmes from diploma level up to doctorate level"*
Enacting Effective Legislation	*"Making [continuous professional development] compulsory … and ensuring that nutrition graduates practice."* *"HN/HND should have their own regulatory body …"* *"Register Nutritionists [and dietitians]; monitor their practice, and only have their certificates renewed after attaining a certain number of CPDs."* *"Enacting laws which are direct to nutrition* *"Development of [professional] associations that can help to draft guidelines to ensure that graduates receive a good curriculum while in the university and in the field."* *"Position professional organizations to take lead in [continuous professional development"* *"[Continuous Professional Development] could be made part of the mandates of universities which train HN/HND"*
Partnerships and Collaborations	*"[Create] partnerships among the different stakeholders"* *"Formation of professional networks"*
Funding and resources mobilisation	*"Motivate student supervisors by providing allowances"* *"[Provide] more funding opportunities"*

4.5 HN/HND Competency-based Education Model Development and Validation

4.5.1 Stage One: Stakeholder Validation of the Needs Assessment Results

The validation workshop was attended by 31 participants (one from the food business industry, five working with private hospitals, twelve working with universities, two working with district local governments, six working with NGOs, one working with a research-based institution, two working with regional referral hospitals, one working as a private consultant, and one working with the ministry of health).

4.5.1.1 Presentation of Findings from the Competency Needs Assessment Phase

A presentation of the preliminary competency needs assessment results was made by the principal researcher and ensuing discussions were captured (Appendix V). The participants judged the study to be vital and timely in informing the development of a national HN/HND training and practice standard. This was considered inexistent at the time of the study, "Uganda has no National standard stipulating the training and practice requirements for nutrition and dietetics …. We hope this research can be used to inform such a process". One of the participants sought clarification on how the study links and informs curriculum reforms; "At what point do the study findings link with the curriculum; is it the issue of competencies not being in the curriculum or is it due to how the teaching is done? How do we link these?"

Participants recognised the multisectoral nature of implementing nutrition interventions at the global and national level and called for the need to take caution when identifying the knowledge and skills required of HN/HND graduates to perform in a multisectoral setting:

"Issues like water, sanitation, and hygiene; food security; and livelihood support as reported in the findings are very key as they introduce an element of multisectorality… caution needs to be undertaken in regards to the nutrition and dietetics training needs under the multisectoral approach. We must be cautious about the knowledge and skills required under the multisectoral setting."

Relatedly, the need to appreciate the roles of other professions in the multisectoral approach; link with them, and understand their views regarding the knowledge and skills they expect of HN/HND professionals was emphasised:

"We should appreciate that other professions providing services that are supportive of nutrition and dietetics services do exist. We need to know how to link with them to implement multisectoral nutrition and dietetics services."

"We need to know how other professionals perceive of our profession, and the knowledge and competencies they expect of us…. Coming from a clinical and research setting, I sense others don't know what to expect of nutritionists. Can we collect additional data on this? Getting the perceptions of other professionals that work with nutritionists and dietitians on what they expect of nutritionists and dietitians can enable us to make better curriculum reforms in nutrition and dietetics training."

In discussing the knowledge and skills required for the practice of HN/HND in Uganda, observations were made that some knowledge and skills areas had been lowly ranked and some missed:

> *"Why was the response rate on professional ethics low? Is it because adherence to ethics is low in professional nutrition and dietetics practice or is it because nutrition and dietetics professionals do not value ethics? The curriculum needs to fully equip trainees with professional ethics because there is still a challenge on which ethics guide nutrition and dietetics practice in Uganda."*

> *"Patient clerking was missed out in the results yet it is an important competency that has to be mastered by nutritionists and dietitians…"*

Some participants also argued that graduates exhibited minimal competency in some of the areas considered core for the practice of HN/HND in Uganda

> *"Nutrition in emergencies is not well taught in Uganda to Bachelor's students of nutrition yet many undergraduates work in emergency contexts and or with humanitarian agencies whose work entails aspects of emergency nutrition…"*

> *"The current transmission of knowledge is insufficient… fresh undergraduates severely lack practical clinical skills…"*

> *"The undergraduates we have can generate statistics but not use the information yet professionals should be able to interact with the information, generate evidence to guide programming … statistics are basic at the undergraduate level but undergraduates need more than is stipulated for this*

level…. [Graduates] don't appreciate the use of statistics to guide programming, this is reflected when they start working."

"Knowledge and skills need to be tailored to the environment in which the undergraduates operate. What challenges are undergraduates facing in the environments they are operating? We should consider the policy and planning environment because these affect professional work."

The need to introduce and or strengthen training in family planning, procurement, leadership, and nutrition policy formulation was recommended:

"It may be important to consider including family planning, strengthening training in procurement and logistics of nutrition materials and supplies, and adding nutrition leadership and management as these are lacking in the HN/HND Bachelors training curriculum."

"Many of the challenges presented are in the services sector but not in policy yet [many] challenges exist in the implementation of nutrition-related policies. Nutrition and dietetics-related challenges presented have limited focus on policies being implemented yet the government, in terms of systems capacity, under the Ministries of Health and Agriculture focuses on implementing what is stipulated in the policies. I suggest for the need to undertake further reflection on nutrition-related policies in the country and the capacity of concerned ministries to implement nutrition as stipulated in the existing policies and sectoral strategies…"

"There is a need to improve utilization of HMIS [Health Management Information Systems] data collected from the community by nutritionists."

The need to undertake assessments to determine the capacity readiness of institutions of higher learning to train HN/HND in Uganda was also emphasised; “Have you considered looking at the capacity of the different institutions training nutrition undergraduates in Uganda in terms of research, equipment, and human resources…?”

4.5.1.2 Prioritization of the Nutrition and Dietetics Related Challenges

A summary of the two group exercises on prioritization of the nutrition problems/challenges for which HN/HND training ought to be focussed is provided in Table 4.17. Eight domains were suggested for grouping the different challenges as follows:

- Prevention and management of malnutrition in all its forms;
- Food security (with climate change, livelihoods/land use, and gender as cross-cutting issues)
- Advocacy and social behavior change communication;
- Entrepreneurship/financial management;
- Nutrition in the lifecycle;
- Ethics and professionalism in nutrition;
- Post-harvest handling, food quality and safety management; and
- Water sanitation and hygiene in nutrition.

Table 4.17. *Workshop Participants Prioritizations of the Nutrition and Dietetics Related Challenges Faced by Communities and the Competency Domains Suggested for Grouping the Different Challenges*

Graduates Perceptions of the Nutrition Challenges Faced by the Communities	**Participants' Consensus on:**		
	Wording	**Relevancy to HN/HND Training**	**Suggested Domain Category**
Climatic changes	Inadequate food production due to changes in climate	3	Food Security (Climate as a cross-cutting issue)
Engrained cultural beliefs	Undesirable/un-intended Cultural and religious beliefs and practices	2	Advocacy and Social and Behaviour Change Communication
Economic challenges (poverty, low incomes, poverty)	Inadequate household incomes	2	Entrepreneurship/Financial Management
Food insecurity	Food insecurity	2	Food Security
Limited access to fertile land for agriculture	Limited access to and utilization of land for food production	3	Food Security (Livelihood/land use and gender as a cross-cutting issues)
Low diet diversification	Low diet diversification	1	Prevention and Management of Malnutrition in all its Forms
Deficiencies in micronutrients	Micronutrient deficiencies	1	Prevention and Management of Malnutrition in all its Forms
Unreliable media information on nutrition	Low awareness and misleading information on nutrition	1	Advocacy and Social and Behaviour Change Communication
Chronic diseases (Diabetes, Hypertension, coronary heart diseases, overweight, and obesity)	Non-communicable diseases	1	Prevention and Management of Malnutrition in all its Forms
Poor MIYCAN	Inadequate maternal, Infant, young child, and adolescent nutrition	1	Nutrition in the Lifecycle
	Malnutrition amongst the elderly and people with special needs	1	Prevention and Malnutrition in all its Forms
Poor regulation of professional nutrition practices	Lack of regulation and protection of professional nutrition practices	1	Ethics and Professionalism in Nutrition
Poor post-harvest handling practices	Poor post-harvest handling and food quality control	2	Post-Harvest Handling, Food Quality and Safety Management

Description of Codes: 1 – Primary/Specific/Essential; 2-Secondary/Sensitive/Relevant; 3-Tertiary/Enabling

Table 4.17.Continued. *Workshop Participants Prioritizations of the Nutrition and Dietetics Related Challenges Faced by Communities and the Competency Domains Suggested for Grouping the Different Challenges*

Graduates Perceptions of the Nutrition Challenges Faced by the Communities	**Participants' Consensus on:**		
	Wording	**Relevancy to HN/HND Training**	**Suggested Domain Category**
Limited access to safe water	Inadequate water, sanitation, and hygiene	2	Water Sanitation and Hygiene in Nutrition
Gender inequalities	Gender inequality (low women empowerment, GBV, male involvement)	3	Food Security (Gender as a Cross-Cutting Issue)
Food safety	Food safety and food handling	1	Food Security
Political will	Low political commitment for nutrition	2	Advocacy and Social and Behaviour Change Communication
Policymaking and implementation	Inadequate policy and advocacy for nutrition	2	Advocacy and Social and Behaviour Change Communication
	Inadequate leadership and governance for nutrition	2	Management of Malnutrition in all its Forms
	Inadequate competency of nutritionists/dietitians to work in emergency contexts	1	Management of Malnutrition in all its Forms

Description of Codes: 1 – Primary/Specific/Essential; 2-Secondary/Sensitive/Relevant; 3-Tertiary/Enabling

4.5.2 Stage Two: Focus Group Discussions

The workshop participants suggested and agreed upon the setting up of a dedicated group of individuals to finalise planned activities that were not finalised during the workshop session. This formed the basis for the focus group discussions. The focus group was constituted of seven dedicated individuals with demonstrated expertise in nutrition and dietetics; three (inclusive of the researcher) in academia, two in clinical nutrition practice, and two in community nutrition practice. This group was convened for five working days (from the 14th to 18th of October 2019) in the Department of Human Nutrition and Home Economics of Kyambogo University to discuss the outcomes of the stakeholder validation meeting; develop, and refine competency statements under each identified domain.

Based on the focus group discussions, two competency domains of (1) research and data analysis and (2) nutrition leadership and management were created. Also, three of the eight domains initially suggested in the validation workshop were merged as follows: WASH was made a subdomain under the prevention and management of malnutrition in all its forms domain; post-harvest handling, food quality, and safety management were combined with food security; and entrepreneurship/financial management was merged with the newly created domain of nutrition leadership and management. The output by the group was subjected to further reviews, critique, and input by the study supervisors and amendments made by the researcher. The revised output, named “Draft 1 HN/HND competency-based education model” comprised of seven domains, 24 subdomains, and 190 competency statements (Table 4.18). This output formed the basis for the third stage of consensus development in two modified Delphi study rounds a result of which saw the competency statements reduced to 174.

Table 4.18. *Composition of the Validated HN/HND Competency-Based Education Model for Uganda*

Domain	**Subdomains**	**Number of Competency Statements**		
		In Draft CBE Model	**In Final CBE Model**	**Attained ≥ 80% Set Level of Consensus**
Domain 1: Prevention and Management of Malnutrition in all its Forms	1.1 Nutrition Assessment	12	12	12
	1.2 Nutrition Diagnosis	03	03	03
	1.3 Designing Nutrition Interventions	23**	21	21
	1.4 Monitoring and Evaluation of Nutrition Interventions	06	06	06
	1.5 Emergency Nutrition	06	06	06
	1.6 Technical Support and Capacity Development in the Management of Malnutrition	07	07	07
	1.7 Interprofessional Collaboration in Management of Malnutrition	05	05	05
	1.8 Water, Sanitation, and Hygiene	06	06	06
	1.9 Procurement and Management of Nutrition Supplies	05	05	05
	1.10 Data Management and Record-keeping	09*	08	08
Domain 2: Nutrition in the Lifecycle	None	19**	17	17
Domain 3: Food Security; Agriculture; and Livelihoods Promotion	3.1 Nutrition-sensitive Agriculture, Food Security, and Livelihoods Promotion	13*	12	12
	3.2 Post-harvest Handling and Food Safety Management	03	03	02
Domain 4: Ethics and Professionalism in Nutrition and Dietetics	4.1 Knowledge of Codes of Ethics, Practice Guidelines, and Standard Operating Procedures	05**	03	03
	4.2 Ethical Principles in Practice	05*	04	04
Domain 5: Research and Data Analysis	5.1 Planning & Data Collection	12***	09	09
	5.2 Data Analysis, Report Writing, and Results Dissemination	09**	07	05

HN/HND: Human Nutrition and Dietetics; CBE: Competency-Based Education; * One competency statement was dropped from each of the respective subdomains in the final analysis; ** Two competency statements were dropped from each of the respective subdomains in the final analysis; and *** Three competency statements were dropped from the subdomain in the final analysis

Table 4.18 Continued. *Composition of the Validated HN/HND Competency-Based Education Model for Uganda*

Domain	**Subdomains**	**Number of Competency Statements**		
		In Draft CBE Model	**In Final CBE Model**	**Attained ≥ 80% Set Level of Consensus**
Domain 6: Policy; Advocacy; and Social and Behaviour Change Communication	6.1 Policy	03	03	00
	6.2 Advocacy	07	07	01
	6.3 Social and Behaviour Change Communication	09	09	09
Domain 7: Nutrition Leadership and Management:	7.1 Planning and Budgeting	04*	03	00
	7.2 Human Resource Management	05	05	05
	7.3 Multisectoral Stakeholder Engagement	05	05	03
	7.4 Program/Project Implementation	03	03	02
	7.5 Monitoring and Evaluation	06*	05	02
Total	24	190	174	153

HN/HND: Human Nutrition and Dietetics; CBE: Competency-Based Education; * One competency statement was dropped from each of the respective subdomains in the final analysis; ** Two competency statements were dropped from each of the respective subdomains in the final analysis; and *** Three competency statements were dropped from the subdomain in the final analysis

4.6 Stage Three: Consensus Development using the Modified Delphi Technique

4.6.1 Participant Demographics

The demographic characteristics of the Delphi participants are summarised in Table 4.19. Of the 115 members who expressed willingness to contribute to the Delphi and hence invited to participate in the first Delphi round, 70 (60.9%) provided feedback. Of these, a higher percentage were females (55.7%) and the majority (44.3%) were in the 25-29 years age bracket. Academic-wise, most of the participants (45.7%) had attained training at the master's level of education and 5.7% had doctorate training. All the participants had work experience with the majority (57.1%) having worked for 5-9 years; followed by 22.9% with work experience of 1-4 years and 20% with experience of 10 and or more years. The majority of the participants (38.6%) worked in central Uganda; some (7.1%) worked outside Uganda. Participants worked with a range of employment agencies; the majority (57.1%) being employed by Non-government Organisations, followed by those in academia (15.7%); district local governments (8.6%), and health facilities (5.7%).

As further summarised in Table 4.20, of the 70 members invited to contribute to the second Delphi round, 55 (78.6%) responded. The majority of those who responded were females (58.2%), most (47.3%) were in the 25-29 years age bracket, and over half (50.9%) had attained master's level training. Participants had demonstrated work experience with the majority (58.2%) having 5-9 years; 21.8% had 1-4 years; and 20% had an experience of 10 and or more years. The majority (38.2%) worked in central Uganda; followed by 23.6% who worked in western Uganda; and 20% who worked in northern Uganda. Employment-wise, participants worked with different employers; the majority (56.4%) were employed by Non-government Organisations,

followed by those in academia (16.4%); district local governments (10.9%), and health facilities (5.5%).

Table 4. 19. *Delphi Participants Demographics*

Characteristic	**Category**	**Participants Invited for 1st Round (N=115)**	**1st Round Participants (N=70)**	**2nd Round Participants (N=55)**
		n (%)	**n (%)**	**n (%)**
Gender	Male	53 (46.1%)	31 (44.3 %)	23 (41.8%)
	Female	62 (53.9%)	39 (55.7 %)	32 (58.2%)
Age	25-29	51(44.3%)	31 (44.3 %)	26 (47.3%)
	30-34	33 (28.7%)	19 (27.1 %)	16 (29.1%)
	35-39	19 (16.5%)	12 (17.1 %)	6 (10.9%)
	40-44	9 (7.8%)	8 (11.4 %)	7 (12.7%)
	≥45	3 (2.6%)	-	-
Level of Training	Masters	51 (44.3%)	32 (45.7 %)	28 (50.9%)
	Bachelors	46 (40%)	29 (41.4 %)	19 (34.5%)
	Post graduate diploma/certificate	11 (9.6%)	5 (7.1 %)	5 (9.1%)
	Doctorate	7 (6.1%)	4 (5.7 %)	3 (5.5%)
Years of Working Experience	1-4 years	31 (27%)	16 (22.9%)	12 (21.8%)
	5-9 years	61 (53%)	40 (57.1%)	32 (58.2%)
	≥10 years	23 (20%)	14 (20%)	11 (20%)
Region of Operation	Central Uganda	47 (40.9%)	27 (38.6 %)	21 (38.2%)
	Northern Uganda	28 (24.3%)	14 (20 %)	11 (20%)
	Western Uganda	21 (18.3%)	15 (21.4 %)	13 (23.6%)
	Eastern Uganda	10 (8.7%)	9 (12.9 %)	7 (12.7%)
	Outside Uganda	9 (7.8%)	5 (7.1 %)	3 (5.5%)
Category of present or most recent employer	Non-Government Organization	66 (57.4%)	40 (57.1%)	31(56.4%)
	Health Facility	9 (7.8%)	4 (5.7%)	3 (5.5%)
	Academia/Higher Education Institutions of Learning	15 (13%)	11 (15.7%)	9 (16.4%)
	Government Ministry, Agency, or Department	7 (6.1%)	3 (4.3%)	2 (3.6%)
	Donor/United Nations Agency	2 (1.7%)	-	-
	Hotel and Catering Facility	4 (3.5%)	2 (2.9%)	-
	Food Processing Industry	2 (1.7%)	1 (1.4%)	2 (3.6%)
	District Local Government	7 (6.1%)	6 (8.6%)	6 (10.9%)
	Consultancy/Research	3 (2.6%)	3 (4.3%)	2 (3.6%)

4.6.2 Domain One: Prevention and Management of Malnutrition in all its forms

Of the participants who evaluated this domain, all (100%) scored it relevant for the training and practice of HN/HND in Uganda. Relatedly, all (100%) participants that evaluated the level of training for which this domain was suitable recommended the learning of this domain to occur during undergraduate training (Table 4.20). Based on a review of the participant narratives, being able to prevent and manage malnutrition was considered central to the practice of nutrition and dietetics. As expounded by one of the respondents, *"All nutrition professionals at all levels should be able to demonstrate a high level of knowledge and skill in the prevention and management of malnutrition as this is the core of the nutrition [and dietetics] profession."*

Another respondent reiterated that understanding this domain promotes learning the basic competencies required for practicing nutrition and dietetics, *"This … provides basic knowledge about nutrition [and dietetics] in practice. I believe it is necessary for all students… the depth of knowledge given is what will vary from principles to basic and finally the application of this domain."* As if to sum up the centrality of this domain, another respondent further reiterated that individuals who do not know how to manage malnutrition should never be referred to as nutritionists or dietitians *"If [one is] not able to prevent and manage malnutrition then literally [he/she] can never be fit to be called a nutritionist or dietician."*

Subdomain 1.1: Nutrition Assessment

This subdomain was comprised of 12 competency statements. As summarised in Table 4.20, the ≥80% set level of respondent consensus was achieved in the first Delphi round for the subdomain and for all its competency statements for rating these

as both relevant and suitable to be learned at the undergraduate level. From the participants' explanations, it was expressed that demonstrating competency in nutrition assessment as per subdomain 1.1 was essential for the detection and management of malnutrition, "*Assessments are important for identification and management of malnutrition hence for the implementers and programmers..."* Further reiterated was that *" [assessment] gives a starting point on what approach to use when addressing malnutrition in all forms*…." As for training, it was expressed that understanding the different methods of assessment needed to advance with the level of training, *"As the levels of training increase, the more advanced it gets and exposure to different kinds of technology in screening."* Appendix W provides the selected participants' justifications for each of the competency statements under this subdomain.

Table 4.20. *Participants' Ratings of Competency Statements under the Subdomain of Nutrition Assessment*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
Domain 1: Prevention and management of malnutrition in all its forms: Demonstrates knowledge, skills, and attitudes to prevent and manage undernutrition, vitamin and mineral deficiencies, overweight, obesity, and resulting diet-related non-communicable diseases	56	0	0	0	6	50	100.0	55	100.0	0.0
1.1 Nutrition Assessment: Demonstrates knowledge , skills, and attitudes in the use of different methods of nutrition screening and assessment to evaluate nutrition status at the individual/household and community level	57	0	1	1	17	38	96.5	53	100.0	0.0
1.1.1 Demonstrates knowledge of the nature, origin, progress, and causes of undernutrition, vitamin and mineral deficiencies, overweight, obesity, non-communicable diseases (e.g. diabetes, cancer, cardiovascular diseases) and other disease conditions whose management requires nutrition therapy (e.g. lower and upper gastrointestinal tract disorders; liver disorders; food allergies and intolerances; conditions arising from different nutrient deficiencies; pulmonary diseases; renal disorders; metabolic complications, stress, burns, and trauma; rheumatic diseases; neurologic disorders; psychiatric conditions; genetic metabolic disorders; HIV/AIDs; and developmental related disabilities)	70	0	1	3	20	46	94.3	68	100.0	0.0
1.1.2 Demonstrates knowledge and skills to perform triage (identify clients in need of immediate attention by service providers)	70	0	1	2	12	55	95.7	68	100.0	0.0
1.1.3 Demonstrates knowledge and skills to undertake client clerking and using the emerging information to clearly and correctly fill and update the nutrition register	70	1	1	5	15	48	90.0	68	100.0	0.0
1.1.4 Demonstrates knowledge and skills to identify & use different nutrition assessment screening tools appropriate for different age groups, physical, physiological, and disease statuses to undertake anthropometric assessments	70	0	0	2	14	54	97.1	68	100.0	0.0
1.1.5 Demonstrates knowledge and skills to perform clinical assessments relevant for the identification of undernutrition; vitamin and mineral deficiencies or excesses; diet-related non-communicable diseases; and disease conditions whose management requires nutrition therapy	70	0	1	3	12	54	94.3	68	100.0	0.0
1.1.6 Demonstrates knowledge and skills to perform dietary intake assessments using objective and subjective techniques	70	0	0	2	20	48	97.1	67	100.0	0.0
1.1.7Demonstrates knowledge on the use of different nutrition biochemical tests	70	0	2	3	25	40	92.9	68	94.1	5.9

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Table 4.20 Continued. *Participants' Ratings of Competency Statements under the Subdomain of Nutrition Assessment*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
1.1.8 Demonstrates ability to perform certain tests e.g. glucose, haemoglobin, vital signs (blood pressure, pulse/heart rate, body temperature and respiration rate)	70	0	2	4	23	41	91.4	67	94.0	6.0
1.1.9 Demonstrates knowledge, skills, and attitudes necessary for obtaining client history data as relates to medical treatment, disease, socio-economic status, culture/religious factors, psychological, and physical status	70	0	0	2	17	51	97.1	68	100.0	0.0
1.1.10 Demonstrates knowledge, skills, and attitudes to obtain perceptions/opinions from the client or client's caretakers on the underlying health condition	70	0	1	3	24	42	94.3	68	100.0	0.0
1.1.11 Demonstrates skills necessary for undertaking community screening, identifying, and referring malnourished individuals for health services	70	1	0	3	16	50	94.3	68	100.0	0.0
1.1.12 Demonstrates knowledge and skills to work with other health team members to plan, conduct, and supervise home visits for active case finding of malnourished individuals	70	1	0	3	17	49	94.3	68	100.0	0.0

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Subdomain 1.2: Diagnosis

Subdomain 1.2, on diagnosis, comprised three competency statements. All attained the ≥80% set level of respondent consensus in the first Delphi round in being evaluated as both relevant for HN/HND graduates and suitable for learning at the undergraduate level (Table 4.21). In general, demonstrating competency in nutrition diagnosis was considered essential for all HN/HND graduates for it enables making a judgment of the underlying nutrition conditions and allows professionals to develop the right interventions based on the nutrition assessment results, *"From the assessment data of clients, all nutrition professionals should be able to make a good judgment and come up with interventions to solve the underlying problem."* Diploma graduates were not expected to exhibit many competencies in nutrition diagnosis given the limited level of training they receive, *"This would be advanced for diploma level [training] which has limited [focus of] understanding nutrition complications. However, it is a skill that can be learned progressively."*

As per the participants' justification in evaluating the different competency statements under this subdomain, demonstrating competency in competency statement 1.2.1 was considered to require adequate practice and training undertaken at either the bachelor's or master's level. In evaluating competency statement 1.2.2 it was observed that nutrition was evolving and that learning of this competency needed to occur during undergraduate training. In evaluating competency statement 1.2.3 participants observed that interprofessional collaboration improves the quality of services and hastens patient recovery and overall intervention outcomes. A selection of the participants' justifications given in evaluating this subdomain and all its competency statements is as provided in Appendix W.

Table 4.21. *Participants' Ratings of Competency Statements under the Subdomain of Nutrition Diagnosis*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
1.2 Nutrition Diagnosis: Uses client assessment data and his/her understanding of nutrition and dietetics to identify underlying problems that can be addressed through diet and nutrition-related interventions	56	0	0	2	10	44	96.4	51	100.0	0.0
1.2.1 Demonstrates knowledge on how to interpret results from different nutrition assessments concerning different disease causal pathways, signs, and symptoms	70	0	0	3	17	50	95.7	67	98.5	1.5
1.2.2 Demonstrates knowledge and skills to use assessment findings to identify the form of malnutrition; and or diet-related non-communicable or communicable disease affecting the client	70	0	0	3	17	50	95.7	67	95.5	4.5
1.2.3 Demonstrates knowledge, skills, and attitudes required to work in collaboration with other health team members to make appropriate diagnoses based on assessment findings.	70	0	1	3	13	53	94.3	67	98.5	1.5

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Subdomain 1.3: Designing Nutrition Intervention

This subdomain was comprised of 21 competency statements. The ≥80% set level of respondent consensus was attained in the first Delphi round for the subdomain and for all the competency statements in consideration that these were all for HN/HND graduates and suitable to be learned during undergraduate training (Table 4.22). In general, participants considered it relevant for HN/HND graduates to attain sufficient training to demonstrate the competency required for implementing relevant diet and nutrition-related interventions as per subdomain 1.3.

Recommendations were made that this subdomain be learned and practiced by those with a minimum of the bachelor's level of training in nutrition and dietetics, "*This area requires enough training. It should be done by at least a bachelor's holder especially with the knowledge of dietetics. Bachelors [training] provide the time to learn and practice in the hospital and community settings."* Selected participants' justifications for each of the competency statements under this subdomain are provided in Appendix W.

Table 4.22. *Participants' Ratings of Competency Statements under the Subdomain of Nutrition Intervention*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
1.3 Designing Nutrition Interventions: Demonstrates knowledge , skills, and attitudes to implement relevant diet and nutrition-related interventions depending on the disease condition, the severity of symptoms, availability of supplies, and other prevailing socio-economic and environmental conditions	54	0	0	2	13	39	96.3	49	100.0	0.0
1.3.1 Demonstrates knowledge, skills, and attitudes required to work with an interdisciplinary health team in the management of clients across the different health departments with special emphasis on paediatrics, maternity intensive care unit, dysphagia clinics, HIV/AIDS, cardiovascular unit, burn units, cancer, emergency units, chronic disease treatment units, dentistry, diabetes mellitus, obesity, hypertension, infectious diseases such as malaria, and neurologic disorder management clinics	70	0	1	4	17	48	92.9	68	97.1	2.9
1.3.2 Demonstrates knowledge and skills to design and implement nutrition and dietetic care intervention plans through collaboration with the client, his/her caretakers, and an interdisciplinary health care team	70	0	0	2	22	46	97.1	68	100.0	0.0
1.3.3 Demonstrates knowledge and skills to set measurable and achievable short and long-term recovery goals for the client based on assessment and diagnosis results	70	0	0	2	25	43	97.1	68	100.0	0.0
1.3.4 Demonstrates knowledge, skills, and attitudes to communicate results of assessment, diagnosis, and intervention plans with the client and /or, depending on prevailing circumstances, with the client's caretakers	70	0	0	2	22	46	97.1	68	100.0	0.0
1.3.5 Demonstrates knowledge of determining client nutrition requirements upon interpretation of nutrition assessment results	70	0	0	2	18	50	97.1	68	98.5	1.5
1.3.6 Demonstrates knowledge and skills to design therapeutic diets tailored to particular diseases, health, and lifestyle needs	70	0	1	2	17	50	95.7	68	98.5	1.5
1.3.7 Demonstrates knowledge of tube feeding and skills to insert feeding tubes appropriate for different disease conditions	70	0	4	9	23	34	81.4	67	100.0	0.0
1.3.8 Demonstrates knowledge and skills to administer and monitor enteral therapeutic feeding depending on the client's disease condition	70	0	2	7	24	37	87.1	68	100.0	0.0
1.3.9 Demonstrates knowledge and skills to administer and monitor parenteral feeding as required for different conditions	70	0	4	10	20	36	80.0	67	97.0	3.0

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Table 4.22. Continued. *Participants' Ratings of Competency Statements under the Subdomain of Nutrition Intervention*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
1.3.10 Demonstrates knowledge, skills, and attitudes to offer tailored nutrition and dietetics guidance and counselling services to clients and their caretakers	70	0	0	2	15	53	97.1	67	100.0	0.0
1.3.11 Demonstrates skills and attitudes to sensitize clients and their guardians on the role of care for improved nutrition outcomes	70	0	0	3	18	49	95.7	68	98.5	1.5
1.3.12 Demonstrates knowledge, skills, and attitudes to support clients in managing specific nutrient-drug interactions for optimum drug efficacy	70	0	1	2	28	39	95.7	68	100.0	0.0
1.3.13 Demonstrates knowledge, skills, and attitudes to offer individualized guidance on the use of vitamin and mineral supplements to address different nutrient deficiencies	70	0	0	5	20	45	92.9	68	97.1	2.9
1.3.14 Demonstrates knowledge and skills to design meal plans for clients to meet therapeutic/supplementary purposes	70	0	0	2	19	49	97.1	68	100.0	0.0
1.3.15 Demonstrates knowledge, skills, and attitudes to prescribe exercise and lifestyle strategies that suit the client conditions	70	0	2	4	21	43	91.4	67	100.0	0.0
1.3.16 Demonstrates knowledge and skills to perform cooking demonstrations to clients and caretakers	70	0	0	2	19	49	97.1	67	100.0	0.0
1.3.17 Demonstrates knowledge, skills, and attitudes to plan for and conduct community nutrition outreaches	70	0	0	3	15	52	95.7	67	100.0	0.0
1.3.18 Demonstrates knowledge, skills, and attitudes to manage clients under the different phases of management of acute malnutrition (ITC, OTC, SFP, community outreach)	70	0	0	3	10	57	95.7	67	100.0	0.0
1.3.19 Demonstrates knowledge, skills, and attitudes to manage other cases of malnutrition amongst clients both within the hospital and in the community	70	0	0	3	14	53	95.7	67	100.0	0.0
1.3.20 Demonstrates knowledge of referral processes and their use in ensuring that clients receive other health care interventions beyond the realm/scope of nutrition and dietetics	70	0	1	3	21	45	94.3	66	100.0	0.0
1.3.21 Demonstrates knowledge, skills, and attitudes to adhere to established national and international guidelines and institutional protocols for nutrition assessment, classification, and management (e.g. IMAM guidelines, IYCF guidelines, Diet-related NCD guidelines)	70	0	0	3	12	55	95.7	67	98.5	1.5

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Subdomain 1.4: Monitoring and Evaluation of Nutrition Interventions

This subdomain was comprised of six competency statements all of which attained the ≥80% set level of respondent consensus in the first Delphi round in being evaluated as both relevant to be demonstrated by HN/HND graduates and suitable for undergraduate training (Table 4.23). From the participants' justifications, exhibiting competency in this subdomain was considered essential for all nutrition care providers, *"All nutrition care providers should have knowledge and skills to monitor and evaluate the progress of client's undertaking different nutrition interventions….This should be done at every contact with the client."*

Further, demonstrating competency in monitoring and evaluation was recommended for all HN/HND graduates, *"Knowledge in monitoring clients is required at every level of [nutrition and dietetics] professionalism in line with the different guidelines that are updated from time to time."* A selection of the participants' justifications for each of the competency statements under this subdomain is provided in Appendix W.

Table 4.23. *Participants' Ratings of Competency Statements under the Subdomain of Monitoring and Evaluation of Nutrition Interventions*

Competency domains, subdomains and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
1.4 Monitoring and Evaluation of Nutrition Interventions: Demonstrates knowledge skills, and attitudes to monitor and evaluate client progress through the applied nutrition interventions and set goals	51	0	0	2	13	36	96.1	45	100.0	0.0
1.4.1 Demonstrates knowledge of different reference standards in nutrition care (e.g WHO Growth Standards)	70	0	0	3	17	50	95.7	67	98.5	1.5
1.4.2 Demonstrates knowledge, skills, and abilities to assess client progress on interventions based on review of client medical records vis-à-vis the set goals/desired outcomes	70	0	0	4	19	47	94.3	67	97.0	3.0
1.4.3 Demonstrates knowledge, skills, and abilities to identify and resolve the causes default and relapse amongst clients admitted to nutrition rehabilitation programs	70	0	0	3	23	44	95.7	67	98.5	1.5
1.4.4 Demonstrates knowledge, skills, and abilities to review client adherence to prescribed interventions, identify client challenges, and adjust interventions as may be required	70	0	0	4	22	44	94.3	66	98.5	1.5
1.4.5 Demonstrates knowledge, skills, and abilities to communicate with clients/caretakers the results of the monitoring and evaluation using easy to understand but standard terminology	70	0	0	4	21	45	94.3	67	98.5	1.5
1.4.6 Demonstrates knowledge, skills, and abilities to compile, analyse, and utilize knowledge nutrition therapy to improve both the client and program outcomes.	70	0	0	4	23	43	94.3	66	98.5	1.5

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Subdomain 1.5 Emergency Nutrition

This subdomain consisted of six competency statements all of which attained the ≥80% set level of participant's consensus in the first Delphi round in being rated relevant and recommended for learning at the undergraduate level. As per subdomain 1.5, about 91.7% of the participants evaluated the need for HN/HND graduates to demonstrate competency to offer nutrition services in emergency contexts as relevant. Also, all the participants recommended the learning of this competency to occur during undergraduate training (see Table 4.24).

The participants' evaluations were based on the observations that competency in emergency nutrition was highly expected of HN/HND graduates, "*This subdomain [emergency nutrition], including its components, is a highly required competence by the different stakeholders. But some concepts can also be included at diploma level especially when more human resource is needed"* and that all HN/HND graduates needed to be able to work in different contexts including refugee settings, *"All nutrition care providers should be able to work in all contexts including the refugee setting. The knowledge gained from school should be translated into the refugee setting."* A selection of the participants' justifications as given for each of the competency statements under this subdomain is provided in Appendix W.

Table 4.24. *Participants' Ratings of Competency Statements Related to the Subdomain of Emergency Nutrition*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
1.5 Emergency Nutrition: Demonstrates knowledge, skills, and attitudes to offer nutrition services in differing emergency contexts	48	0	0	4	8	36	91.7	46	100.0	0.0
1.5.1 Demonstrates a general understanding and application of the recommended minimum standards in humanitarian response with emphasis on food security and nutrition as stipulated in the SPHERE handbook and as updated from time to time	70	0	2	6	20	42	88.6	65	95.4	4.6
1.5.2 Demonstrates knowledge, skills, and attitudes to support the functionality of ITC, OTC, IYCFE-services in emergency and refugee settings	70	0	2	6	18	44	88.6	66	97.0	3.0
1.5.3 Demonstrates technical knowhow on how to plan and conduct mass screenings in refugee settlements and emergency contexts	70	0	1	7	16	46	88.6	65	96.9	3.1
1.5.4 Demonstrates knowledge, skills, and attitudes to train nutrition staff, volunteers, and peer counsellors on IYCF-E	70	0	0	5	20	45	92.9	66	95.5	4.5
1.5.5 Demonstrates knowledge and skills to undertake monitoring of emergency activities (Food Distribution, growth monitoring and promotion, childhood nutrition, micronutrient supplementation, and IYCF-E) in refugee settlements and emergency contexts	70	0	3	5	22	40	88.6	66	97.0	3.0
1.5.6 Demonstrates knowledge, skills, and attitudes to develop and maintain humanitarian working relations with all concerned stakeholders	70	0	0	4	22	44	94.3	66	92.4	7.6

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Subdomain 1.6 Technical Support and Capacity Development in the Management of Malnutrition

In general, the ≥80% set level of respondent consensus was attained for this general subdomain for both levels of agreement and recommendation that mastery of the different competency statements occurs during undergraduate training. The same was attained for six of the seven competency statements under this subdomain (see Table 4.26). In evaluating subdomain 1.6 on technical support and capacity development, 93.9% of the participants considered it relevant for HN/HND graduates and 90.9% recommended the learning of this competency to occur during undergraduate training (see Table 4.25).

As a justification for the individual ratings of subdomain 1.6, participants observed that all nutrition professionals needed to exhibit competency in offering technical support and capacity development to different stakeholders, "All nutrition care providers need to offer technical support and capacity building to other health care providers, fellow team members, and other stakeholders to improve service delivery and general outcome of services offered." However, it was noted that nutrition professionals needed to have the requisite knowledge, skills, and abilities, *"Offering technical support to the different stakeholders requires a degree of knowledge, skills, and ability that I believe a person with a bachelor's degree and masters can be able to portray…."*

The selected participants' justifications as given for each of the competency statements under this subdomain are provided in Appendix W. However, of all the competency statements assessed under subdomain 1.6, competency statement 1.6.2

received low ratings in the first round with an initial score of 78.6%. This was below the ≥80% set level of consensus hence causing this statement to be subjected to the second Delphi review. However, 88.9% of the first Delphi round participants, which was above the ≥80% set level of participant's consensus recommended the learning of this competency to occur during undergraduate training (see Table 4.26). Going by the participants' justifications, this particular competency was considered important but mainly in program monitoring and evaluation. Training in QI was also reported to be inadequately received during university training. In practice, it was recommended that QI be done by either the master's or bachelor's degree holders given its perceived complexity.

In the second Delphi round, 96.4% of the participants evaluated competency statement 1.6.2 as relevant for HN/HND graduates hence the ≥80% set level of participant's consensus was attained. However, the ≥80% set level of participants' consensus was instead not attained in regards to recommending the learning of this competency to occur during undergraduate training as this was recommended by only 55.5% of participants (Table 4.25). Participants still acknowledged that QI was relevant in program planning and management but noted that master's graduates were best suited to be trained in undertaking QI.

Table 4.25. *Participants' Ratings of Competency Statements under the Subdomain of Technical Support and Capacity Development in Prevention and Management of Malnutrition*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
1.6 Technical support and capacity development in the management of malnutrition: Uses his/her expertise in nutrition and dietetics to offer technical support and capacity development as may be required by different stakeholders or fellow professionals and health team members	49	0	0	3	15	31	93.9	44	90.9	9.1
1.6.1 Demonstrates knowledge of different approaches applied in undertaking Quality Improvement (QI)	70	0	4	8	20	38	82.9	65	86.2	13.8
1.6.2 Demonstrates skills in using approved QI tools to facilitate the sustainable delivery of quality and equitable nutrition services	70, 55*	0	3	12	20	35	78.6, 96.4*	63, 54*	88.9, 55.5*	11.1, 44.5*
1.6.3 Demonstrates knowledge and skills to plan and conduct on-job mentorship for fellow professionals, other health staff, and Village Health Team members on various nutrition packages used in the country	70	0	0	4	18	48	94.3	66	92.4	7.6
1.6.4 Demonstrates knowledge, skills, and attitudes necessary for supervising nutrition staff and other health cadres offering nutrition services.	70	0	1	4	25	40	92.9	66	87.9	12.1
1.6.5 Demonstrates teamwork skills necessary for undertaking support supervision of health facilities offering nutrition services	70	0	0	7	26	37	90.0	65	92.3	7.7
1.6.6 Demonstrates knowledge, skills, and attitudes to support project needs assessment, monitoring, and evaluation to improve the provision of nutrition and dietetics services	70	0	2	5	26	37	90.0	66	83.3	16.7
1.6.7 Demonstrates knowledge, skills, and attitudes towards professional growth and development	70	0	1	6	20	43	90.0	64	95.3	4.7

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; * Values for the second Delphi round

Subdomain 1.7 Interprofessional Collaboration in Management of Malnutrition

From the evaluation, the overall rating of subdomain 1.7 on interprofessional collaboration in malnutrition management was above the ≥80% set level of respondent consensus for both levels of agreement (88%) and the recommendation that mastery of this competency occurs during the undergraduate level training (100%). Also, all the five competency statements under this domain were above the ≥80% set level of respondent consensus for both the level of agreement and recommendation that mastery of the given competency occurs during undergraduate level training (see Table 4.26).

The rating for the subdomain of interprofessional collaboration was based on different observations. Some participants argued that this competency was required by all HN/HND graduates because nutrition professionals work in collaboration with other teams, *"At all levels, all nutrition professionals should be able to collaborate with all other teams because nutrition is not independent but is integrated with other services."* Others found the competency important to master given the new approach of mainstreaming and implementing nutrition interventions multisectorally, *"Knowledge in this field would be vital at all levels since a lot of interventions are being mainstreamed but also the use of the multisectoral approach is being encouraged."* A selection of the participants' justifications given in evaluating this subdomain and all its competency statements is as provided in Appendix W.

Table 4.26. *Participants' Ratings for Competency Statements under the Subdomain of Interprofessional Collaboration in the Management of Malnutrition*

Competency domains, subdomains and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
1.7 Interprofessional collaboration in management of malnutrition: Demonstrates knowledge, skills, and attitudes necessary to collaborate and work with an interdisciplinary team in the management of malnutrition	50	0	0	6	8	36	88.0	44	100.0	0.0
1.7.1 Demonstrates knowledge, skills, and attitudes in respect for the core values and responsibilities of his/her profession and those of other fellow health professionals	70	1	0	6	16	47	90.0	65	100.0	0.0
1.7.2 Demonstrates knowledge of ethical principles in interprofessional training and practice	70	1	0	6	18	45	90.0	65	98.5	1.5
1.7.3 Demonstrates teamwork and collaborative skills and attitudes required to work with other health professionals for the effective delivery of health and nutrition-related services	70	1	0	6	21	42	90.0	65	100.0	0.0
1.7.4 Demonstrates effective verbal and non-verbal communication skills and attitudes required for interprofessional collaboration	70	1	0	6	17	46	90.0	65	100.0	0.0
1.7.5 Demonstrates knowledge, skills, and attitudes to identify and manage ethical dilemmas and related conflicts that may arise due to interprofessional collaborations	70	1	1	7	22	39	87.1	65	95.4	4.6

Subdomain 1.8: Water, Sanitation, and Hygiene

About 90% of the participant's evaluated this subdomain relevant. Relatedly, all the participants (100%) recommended the learning of the competencies under this subdomain to occur during undergraduate training (see Table 4.27). Six competency statements were evaluated under this subdomain. Overall, the ratings for each were all above the ≥80% set level of respondent consensus in the first Delphi round for both assessments of relevance and suitability for being learned at the undergraduate level.

Based on the narratives, participants observed that WASH was integral to nutrition and health outcomes and hence graduates had to be competent in WASH-related practices, "*WASH affects nutrition and health outcomes and thus needs to be addressed by all nutrition professionals at all levels of education.*" Although all participants (100% respondent consensus) recommended the learning of this competency to occur during undergraduate training, it was noted that some WASH aspects can better be learned during higher-level training, *"WASH is a key area in nutrition and health… some interventions and skills may be required at a higher level."* A selection of the participants' justifications given in evaluating this subdomain and all its competency statements is as provided in Appendix W.

Table 4. 27. *Participants' Ratings of Competency Statements under the Subdomain of Water, Sanitation, and Hygiene*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
1.8 Water, Sanitation, and Hygiene (WASH): Demonstrates knowledge, skills, and attitudes required for promoting WASH at individual, household, community and facility level	50	0	0	5	11	34	90.0	44	100.0	0.0
1.8.1 Demonstrates knowledge of the linkage between WASH and Nutrition	70	0	0	5	19	46	92.9	64	98.4	1.6
1.8.2 Demonstrates knowledge, skills, and attitudes to promote adherence to safe water chain practices (water collection, handling, transportation, storage, treatment, and consumption)	70	0	0	7	25	38	90.0	64	96.9	3.1
1.8.3 Demonstrates knowledge of the different types of sanitation facilities (e.g. latrines or toilets, waste/garbage disposal) and skills to promote their use at different levels	70	0	0	8	27	35	88.6	63	98.4	1.6
1.8.4 Demonstrates knowledge, skills, and attitudes required for the promotion of individual and domestic hygiene practices	70	0	0	7	25	38	90.0	64	98.4	1.6
1.8.5 Demonstrates knowledge and skills relevant for ensuring infection control in health facilities	70	0	2	10	23	35	82.9	63	100.0	0.0
1.8.6 Demonstrates knowledge and skills required to integrate/align WASH in nutrition programming	70	0	0	6	22	42	91.4	63	95.2	4.8

Subdomain 1.9: Procurement and Management of Nutrition Supplies

Based on the evaluation by the different participants, the overall rating of subdomain 1.9 on procurement and management of nutrition supplies attained the ≥80% set level of respondent consensus in the first Delphi round for both levels of agreement (80.9%) with the competency subdomain and recommendation that learning of this competency occurs during undergraduate level training (100%). Relatedly, the ratings for all the five competency statements suggested under this subdomain were also above the ≥80% set level of respondent consensus (see Table 4.28).

In the justifications, some participants felt that demonstrating competency in procurement and management of nutrition supplies was important for all the different levels of nutrition and dietetics graduates, *"All levels must know [procurement and management of nutrition supplies] because a facility or an organization may have … a diploma holder as the solely available nutritionist in charge of procurement requests."* However, some felt that procurement and management was not a key mandate for HN/HND graduates, "*[Procurement and management] is most times done by people with qualifications in supply chain and procurement. It may not necessarily be done by nutrition personnel."* For training purposes, it was expressed that content for each level of training needed to differ and that some elements could as well be learned through on job training, "*This subdomain [procurement and management of nutrition supplies] is important though the difference might come in with how much information is being given at the different levels. I believe some of these systems can be learned during on job training and mentoring."* A selection of the participants' justifications given in evaluating this subdomain and all its competency statements is as provided in Appendix W.

Table 4.28. *Participants' Ratings of Competency Statements under the Subdomain of Procurement and Management of Nutrition Supplies and Equipment*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
1.9 Procurement and Management of Nutrition Supplies: Demonstrates knowledge, skills, and attitudes of the different processes necessary for procurement, storage, distribution, and disposal of nutrition-related supplies and/or equipment	47	0	2	7	17	21	80.9	40	100.0	0.0
1.9.1 Demonstrates knowledge, skills, and attitudes necessary for liaising with different stakeholder's including the UN agencies and donors for the effective provision of nutrition supplies and equipment	70	0	2	10	27	31	82.9	64	95.3	4.7
1.9.2 Demonstrates knowledge of food safety and hygiene as applicable to nutrition supplies	70	0	2	5	18	45	90.0	64	100.0	0.0
1.9.3 Demonstrates skills necessary for maintaining high hygienic standards of hospital/institutional food storage facilities following recommended guidelines	70	0	1	9	19	41	85.7	64	100.0	0.0
1.9.4 Demonstrates knowledge and skills for effective management of nutrition commodities through forecasting, requisition, stocking, and utilization	70	0	1	8	25	36	87.1	64	98.4	1.6
1.9.5 Demonstrates skills in purchasing and stocking of therapeutic feeds and other related food supplies	70	0	2	7	25	36	87.1	64	98.4	1.6

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Subdomain 1.10: Data management and record-keeping

The respondent consensus was attained for this subdomain and for all its six constituent competency statements as the overall ratings were above the ≥80% set level of respondent consensus for both the level of agreement with the statement (89.6% of the participants) and recommendation (97.6% of the participants) that learning of the particular competencies occurs during undergraduate training (see Table 4.29). In evaluating this subdomain, participants observed that demonstrating competency in data management was key, *"Data management is very important … it should be done at all levels because technology keeps changing."*

Participants further observed that nutrition and dietetics graduates needed to demonstrate knowledge in data collection, analysis, and record keeping irrespective of the level of training; *"At all levels, one should demonstrate knowledge in data collection, analysis, use, and above all record-keeping…"* For training purposes, the bachelor level and master's graduates were considered most suited to receive training in data management. Appendix W provides a selection of the participants' justifications given in evaluating this subdomain and all its competency statements.

Table 4. 29. *Participants Evaluation of Competency Statements under the Subdomain of Data Management and Record-Keeping*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
1.10 Data management and record keeping: Demonstrates knowledge, skills, and attitudes for the efficient collection, analysis/processing, dissemination, use, and storage of data as relates to the provided nutrition, dietetics, and related health services	48	0	1	4	13	30	89.6	41	97.6	2.4
1.10.1 Demonstrates knowledge and skills on the use of different formats of patient and healthcare information systems (non-digital or digital e.g., the electronic medical record and electronic health record systems)	70	0	4	7	22	37	84.3	64	96.9	3.1
1.10.2 Demonstrates knowledge and skills of using the different client/medical records documentation styles (e.g. ADIME: Assessment, Diagnosis, Intervention, Monitoring, and Evaluation; DAP: Diagnosis, Assessment, Plan; PES: Problem, Aetiology, Signs, and symptoms; SOAP: Subjective, Objective, Assessment, Plan)	70	0	2	11	24	33	81.4	63	95.2	4.8
1.10.3 Demonstrates knowledge in the use of the Health Management Information System (HMIS) as relates to the collection, processing, storage, retrieval, and dissemination of nutrition and related health information for decision making, planning, monitoring, and evaluation	70	0	4	5	21	40	87.1	64	93.8	6.3
1.10.4 Demonstrates knowledge and skills in using up-to-date HMIS tools (e.g. HMIS form 076, Order Form: HMIS Form 085; Daily dispensing log: HMIS Form 016; Requisition and issue voucher: HMIS Form 017; Stock card: HMIS Form 015) to capture quality HMIS data	70	0	3	7	19	41	85.7	64	95.3	4.7
1.10.5 Demonstrates knowledge, skills, and attitudes to train fellow cadres on the use of HMIS tools to capture nutrition services related data	70	0	4	9	22	35	81.4	64	92.2	7.8
1.10.6 Demonstrates knowledge, skills, and attitudes to analyse, present, and discuss HMIS nutrition data with different stakeholders for advocacy, decision making, and planning	70	0	3	6	19	42	87.1	64	82.8	17.2
1.10.7 Demonstrates knowledge, skills, and attitudes to compile and share monitoring and evaluation reports on the provided services following established organizational guidelines	70	0	3	11	22	34	80.0	64	89.1	10.9
1.10.8 Demonstrates knowledge and skills necessary for proper filing client/medical records and other organizational documents	70	0	2	7	27	34	87.1	63	96.8	3.2

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

4.6.3 Domain Two: Nutrition in the Lifecycle

Unlike all the other competency domains that were developed with subdomains and respective competency statements, this competency domain had no subdomains. The domain had 17 competency statements all of which attained the ≥80% set level of respondent consensus in the first Delphi round. About 92% evaluated domain 2 on the need for HN/HND graduates to demonstrate the competency required for the promotion of optimal nutrition across the different stages of the human life cycle. Also, all the participants (00%) recommended the learning of competencies under this domain to occur during undergraduate training (see Table 4.30).

From the narratives, participants observed that domain two was important given its focus on health promotion, especially during the first 1000 days of an individual's life; "*This domain is very important since it focuses on health promotion in the first 1000 days of life, the window of opportunity, as a way of addressing malnutrition in Uganda."* Participants also further observed that demonstrating competency in this domain was vital for all HN/HND graduates irrespective of their level of training, "*This should be done by all nutrition professionals regardless of the level of academics and nutrition…"* but cautioned that learning packages had to be tailored for different levels of training, "*Basic information in this area [nutrition in the lifecycle] can be provided to the students but packaged depending on the level they are at."*

Appendix W provides a selection of the participants' justifications given in evaluating this subdomain and all its competency statements. The assessed competencies included demonstrating: knowledge of the nutrition requirements through the different

phases of the human lifecycle; skills to undertake NACS in the context of MIYCAN, adults, and elderly nutrition; competency to undertake GMP activities; knowledge of the role of care in nutrition and the skills necessary for its provision across the lifecycle; knowledge and skills on infant and young child feeding as per the national guidelines; competency to support clinical lactation management for the mother-infant pair; skills to guide and counsel HIV infected mothers on feeding recommendations for both the mothers and infants in the HIV/AIDS context; knowledge of different community approaches/models; competency to plan and undertake community outreaches on issues relevant to promoting optimal MIYCAN; adult and geriatric nutrition; knowledge of public health interventions such as food fortification, iodization, bio-fortification, and their application; competency to design and use appropriate and consistent IEC materials for promoting optimal MIYCAN; adult; and geriatric nutrition; knowledge of BFHI and skills necessary for supporting facilities to obtain BFHI status; knowledge of the WHO International Code of Marketing Breast milk Substitutes; knowledge of existing national policies, guidelines, and protocols that support the promotion of MIYCAN; adult and geriatric nutrition; competency to work inter-professionally and in collaboration with other key stakeholders to promote MIYCAN; adult and geriatric nutrition; and competency to provide technical support and guidance to district leadership on strategies to promote optimal MIYCAN; adult and geriatric nutrition.

Table 4. 30. *Participants' Rating of Competency Statements under the Domain of Nutrition in the lifecycle*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
Domain 2: Nutrition in the Lifecycle: Demonstrates knowledge, skills, and attitudes relevant for the promotion of optimal nutrition across the different stages of the human lifecycle: pregnancy and lactation, infancy, childhood, adolescence, adult years, and the elderly	50	0	0	4	7	39	92.0	42	100.0	0.0
2.1 Demonstrates knowledge of the nutrition requirements through the different phases of the human lifecycle	70	0	0	5	19	46	92.9	64	100.0	0.0
2.2 Demonstrate skills to undertake nutrition assessment, counselling, and support (NACS) in the context of MIYCAN, adults, and elderly nutrition	70	0	0	5	21	44	92.9	64	100.0	0.0
2.3 Demonstrates knowledge, skills, and attitudes to identify and manage cases of malnutrition among infants, young children, adolescents, pregnant and lactating women, adults, and the elderly	70	0	0	6	14	50	91.4	64	100.0	0.0
2.4 Demonstrates knowledge, skills, and attitudes to undertake Growth Monitoring and Promotion (GMP) activities.	70	0	0	5	24	41	92.9	63	100.0	0.0
2.5 Demonstrates knowledge of the role of care in nutrition and the skills necessary for its provision across the lifecycle	70	0	0	5	21	44	92.9	64	100.0	0.0
2.6 Demonstrates knowledge and skills on infant and young child feeding as per the national guidelines (feeding infants and young children under normal circumstances; those exposed to HIV; in emergencies; and in other exceptionally difficult circumstances)	70	0	0	5	15	50	92.9	64	100.0	0.0
2.7 Demonstrates knowledge, skills, and attitudes to support clinical lactation management for the mother-infant pair	70	0	0	6	24	40	91.4	65	100.0	0.0
2.8 Demonstrates knowledge, skills, and attitudes to guide and counsel HIV infected mothers on feeding recommendations for both the mothers and infants in the HIV/AIDS context	70	0	0	5	19	46	92.9	64	100.0	0.0
2.9 Demonstrates knowledge of different community approaches/models (e.g. community support groups, mother care support groups, Positive Deviance/Hearth approach) used to promote optimal MIYCAN; adult and geriatric nutrition	70	0	0	6	22	42	91.4	64	100.0	0.0
2.10 Demonstrates knowledge, skills, and attitudes to plan and undertake community outreaches on issues relevant to promoting optimal MIYCAN; adult and geriatric nutrition	70	0	1	6	25	38	90.0	64	100.0	0.0

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

Table 4.30 Continued. *Participants' Rating of Competency Statements under the Domain of Nutrition in the lifecycle*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
2.11 Demonstrates knowledge of public health interventions such as food fortification, iodization, bio-fortification, and their application	70	0	0	7	21	42	90.0	63	96.8	3.2
2.12 Demonstrates knowledge, skills, and attitudes to design and use appropriate and consistent Information, Education and Communication (IEC) materials for promoting optimal MIYCAN; adult; and geriatric nutrition	70	0	2	6	20	42	88.6	63	96.8	3.2
2.13 Demonstrates knowledge of the Baby-Friendly Hospital Initiative (BFHI) and skills necessary for supporting facilities to obtain BFHI status	70	0	1	5	28	36	91.4	64	100.0	0.0
2.14 Demonstrates knowledge of the WHO International Code of Marketing Breast milk Substitutes	70	0	1	5	21	43	91.4	64	100.0	0.0
2.15 Demonstrates knowledge of existing national policies, guidelines, and protocols that support the promotion of MIYCAN; adult and geriatric nutrition (e.g. National Health Policy, National Policy Guidelines and Service Standards for Reproductive Health Services, National Anaemia Policy, BFHI guidelines, Integrated Management of Childhood Illnesses guidelines, Food Fortification guidelines)	70	0	1	7	19	43	88.6	63	95.2	4.8
2.16 Demonstrates knowledge, skills, and attitudes to work inter-professionally and in collaboration with other key stakeholders to promote MIYCAN; adult and geriatric nutrition	70	0	1	8	18	43	87.1	63	92.1	7.9
2.17 Demonstrates knowledge, skills, and attitudes to provide technical support and guidance to district leadership on strategies to promote optimal MIYCAN; adult and geriatric nutrition	70	0	1	6	26	37	90.0	63	85.7	14.3

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

4.6.4 Domain Three: Food Security; Agriculture; and Livelihoods Promotion

In rating the overall domain, 89.5% of the participants' evaluated the need for HN/HND graduates to demonstrate competency in implementing food security and safety; agriculture; and livelihoods interventions as relevant. Relatedly, about 97.8% of the participants recommended the learning of the subdomains and the specific competencies to occur during undergraduate training (see Table 4.32). For the justifications, participants observed that agriculture and general farming practices were evolving hence necessitating HN/HND graduates to be in the know of the different changes, "*This needs to be introduced to all levels of studies for those who desire to venture in the nutrition field because of the changing trends in agricultural and farming practices,"* Some participants also considered it important for HN/HND graduates to understand the linkage between the different nutrition interventions; *"Understanding and being able to link nutrition-specific and nutrition-sensitive interventions is key in nutrition programming."* Participants also observed the learning of competencies under this competency domain relevant for all levels of training but cautioned that training content needed to differ as levels advanced.

Subdomain 3.1: Nutrition sensitive agriculture; food security; and livelihoods promotion

As a subdomain, about 89.1% of the participants evaluated the need for HN/HND graduates to demonstrate competency in designing and implementing nutrition-sensitive agriculture; food security; and livelihoods interventions in different contexts as relevant. Meanwhile, 93.5% of the participants recommended the learning of this competency subdomain to occur during undergraduate training (see Table 4.31). In the justification, participants observed that all nutritionists and dietitians need to

demonstrate the ability in designing interventions that address food insecurity, *"All nutritionists should be able to design interventions to overcome food insecurity in different contexts."* Participants also highlighted a need for one to have a certain level of specialisation and exposure, *"This competency may need some specialization or exposure in the field…levels of education may not be able to have access to"* as well as an understanding of food systems, *"This requires an advanced understanding of the food systems."* Observations for the training in this competency to be made a specialty during master's level training were also made, "*This competency can be created as an area of specialty at master's level."*

As for the evaluation of the different competency statements under this subdomain, except for competency statements 3.1.6 and 3.1.10, consensus was obtained for all the remaining competency statements in regards to being evaluated as both relevant for HN/HND professionals and suitable to be taught at the undergraduate level. A selection of the participants' justifications given in evaluating this subdomain and its underlying competency statements is given in Appendix W.

Subdomain 3.2: Post-harvest handling and food safety management

Individually, subdomain 3.2 on the need for HN/HND graduates to demonstrate the competency required for promoting food safety across the food value chain was evaluated as relevant by 88.2% of the participants. Meanwhile, 95.3% of the participants recommended the learning of this competency subdomain to occur during undergraduate training (see Table 4.31). In the justifications, participants highlighted that it was important for all HN/HND professionals to demonstrate knowledge of food handling given that this reduces food intoxication and wastage; *"All [HN/HND]*

professionals should have the knowledge of handling food as this [poor food handling] can cause more problems especially toxins, mal-absorption, and food wastage ....” In particular, participants also emphasised the need for graduates to demonstrate competency in food safety *“Food safety is a key aspect in preventing malnutrition and other diseases, therefore, all the nutritionists should have the knowledge and skills in ensuring and promoting food safety. They should also be able to incorporate these messages during the health education sessions.”*

As for the ratings of the different competency statements, except for competency statement 3.2.2 for which consensus was not fully attained across the rounds in regards to evaluating the competency relevant for HN/HND graduates, consensus was attained for all the remaining statements. The justifications for the ratings by the participants are as given in Appendix W.

Table 4. 31. *Ratings of competency Statements under the Sub-domain of Food Security; Agriculture; and Livelihoods Promotion*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
Domain 3: Food Security; Agriculture; and Livelihoods Promotion: Demonstrates knowledge, skills, and attitudes of implementing food security and safety; agriculture; and livelihoods interventions	57	0	0	6	18	33	89.5	46	97.8	2.2
3.1 Nutrition-sensitive Agriculture; Food Security; and Livelihoods Promotion: Demonstrates knowledge, skills, and attitudes to design and implement nutrition-sensitive agriculture, food security, and livelihoods interventions in different contexts	55	0	0	6	18	31	89.1	46	93.5	6.5
3.1.1 Demonstrates knowledge of the concept of food and nutrition security and the cross-cutting issues between food and nutrition security and gender; climate change; HIV/AIDs; conflicts, crises, and natural disasters, political stability/instability; poverty; and sustainable livelihoods	70	0	0	5	26	39	92.9	64	93.8	6.2
3.1.2 Demonstrates knowledge of the different instruments for preventing and managing food crises (Food aid, Food security reserves, Food security funds, Crisis management plans, Early warning, and market information systems)	70	0	0	7	31	32	90.0	63	90.5	9.5
3.1.3 Demonstrates knowledge of the concept of livelihoods promotion, related strategies, and activities	70	0	0	6	37	27	91.4	64	96.9	3.1
3.1.4 Demonstrates knowledge of indicators of food and nutrition security at different levels (micro, meso, and macro)	70	0	0	5	30	35	92.9	64	93.7	6.3
3.1.5 Demonstrates knowledge, skills, and attitudes necessary for implementing integrated nutrition, food security, and livelihoods projects	70	0	0	5	26	39	92.9	64	92.2	7.8
3.1.6 Demonstrates knowledge and skills to analyse the influence of existing national laws, regulations, policies, and sectoral plans on food security and livelihoods	70, 55*	0	3	7	25	35	85.7, 98.2*	64, 54*	64.1, 24.1*	35.9, 75.9*
3.1.7 Demonstrates knowledge, skills, and attitudes necessary for implementing good agricultural practices (GAPs) in crop production	70	1	2	10	30	27	81.4	63	93.7	6.3

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

Table 4.31 Continued. Ratings of competency Statements under the Subdomain of Food Security; Agriculture; and Livelihoods Promotion

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
3.1.8 Demonstrates knowledge of climate-smart approaches and skills necessary for their application in the agriculture value chain	70	0	3	10	34	23	81.4	62	82.3	17.7
3.1.9 Demonstrates knowledge, skills, and attitudes to select and implement nutrition-sensitive agriculture interventions (e.g. establishing home gardens, cultivation of fruits and vegetables, household domestication of small livestock)	70	0	0	7	24	39	90.0	64	95.3	4.7
3.1.10 Demonstrates knowledge and skills of livestock production	70, 55*	0	5	12	31	22	75.7, 61.2*	63, 46*	96.8, 91.3*	3.2, 8.7*
3.1.11 Demonstrates knowledge, skills, and attitudes necessary for implementing community and school feeding projects	70	0	0	7	28	35	90.0	64	95.3	4.7
3.1.12 Demonstrates knowledge and skills of designing and implementing assessments for food security, agriculture, and livelihoods at different levels	70	0	1	5	23	41	91.4	64	89.1	10.9
3.2 Post-harvest handling and food safety management: Demonstrates knowledge and skills to promote food safety across the food value chain	51	0	1	5	16	29	88.2	43	95.3	4.7
3.2.1 Demonstrates knowledge of post-harvest handling and skills to control food losses (in terms of quantity and quality) along the food value chain using modern and local/traditionally effective techniques	70	1	1	9	20	39	84.3	64	90.6	9.4
3.2.2 Demonstrates knowledge and skills to apply the principles of Hazard Analysis and Critical Control Point (HACCP) in the food industry	70, 54*	0	2	13	25	30	78.6, 59.3*	64, 45*	85.9, 82.2*	14.1, 17.8*
3.2.3 Demonstrates knowledge and skills to apply the CODEX general principles of food hygiene and food safety management	70	0	4	8	30	28	82.9	64	92.2	7.8

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

4.6.5 Domain Four: Ethics and Professionalism in Nutrition and Dietetics

This domain consisted of two subdomains, knowledge of ethics, practice guidelines, and standard operating procedures, and ethical principles in practice. About 94.1% of all participants evaluated the domain as relevant for HN/HND graduates. Also, 97.8% of the participants recommended the learning of this overall competency domain to occur during undergraduate training (see Table 4.32). As per the participants' justifications, the need for HN/HND graduates to demonstrate adherence to ethical principles during practice was observed, *"There are professional and ethical codes of conduct for all professions therefore all nutrition professionals should adhere to the existing codes of ethics and practice guidelines at all times."*

Subdomain 4.1: Codes of Ethics, Practice Guidelines, and Standard Operating Procedures

Of the participants that evaluated subdomain 4.1 on the need for HN/HND graduates to demonstrate knowledge of the professional codes of ethics, practice guidelines, and standard operating procedures,, 94.3% rated it as relevant and 97.9% recommended the learning of the subdomain and its related competencies to occur during undergraduate training (see Table 4.32). During the evaluation, participants observed that codes of ethics, practice guidelines, and standard operating procedures support the understanding of professional limits; *"Important for establishing [professional] practice limits for each level."* Hence the need for all HN/HND graduates to understand and practice within the existing codes of ethics, practice guidelines, and standard operating was recommended; "*All the nutrition professionals should understand and practice the existing code of ethics and practice guidelines irrespective of their level of education and follow the standard operating*

procedures." A recommendation was also made that orientation of students on different codes of ethics, practice guidelines, and standard operating procedures of different professionals and organizations needed to be done during training:

> *Students should start observing these [Codes of Ethics, Practice Guidelines, and Standard Operating Procedures] even at school to instil discipline in them before entering the working environment; samples of different professional codes of conduct and Standard Operating Procedures different of NGOs should be read for familiarity.*

All the competency statements under this subdomain were rated as both relevant and suitable for undergraduate HN/HND but the participant justifications for each statement varied. For competency statement, 4.1.1, participants observed that many HN/HND graduates weren't aware of the national codes of ethics and practice guidelines in nutrition and dietetics; no codes of ethics, practice guidelines, and standard operating procedures specific for the HN/HND professionals in Uganda existed at the time of this study; and that all HN/HND graduates needed to adhere to codes of ethics, guidelines, and standard operating procedures. For competency statement 4.1.2, participants noted the need for (1) all employees to adhere to existing organizational laws and regulations and (2) the need for professionals to work within professional limits and in accordance to organizational policies and guidelines. For competency statement 4.1.3, participants pointed to this competency as being required for team building and leadership, and problem-solving. Appendix W gives the selected justifications for each of these competency statements.

Subdomain 4.2: Demonstrating Ethical principles in Practice

This subdomain consisted of four competency statements the ratings for all of which attained the ≥80% set level of respondent consensus during the first Delphi round. Overall, subdomain 4.2 on the need for HN/HND graduates to demonstrate competency necessary for upholding professionalism, confidentiality, transparency, integrity, and accountability in the delivery of professional related services was evaluated as relevant by 93.9% of the participants. Also, all participants (100%) recommended the learning of the competency subdomain to occur during undergraduate training (see Table 4.32).

Some of the notable observations made by participants in rating subdomain 4.2 included the observation that (1) demonstrating ethical principles and values of the nutrition and dietetics profession was required of all HN/HND graduates, "*All nutritionists [and dietitians] should have ethical principles and values of the profession which set them apart … that bring about effective and efficient service provision"* and (2) whether HN/HND graduates needed to swear the Hippocratic Oath[7] on graduation, "*Ethics is important at all levels… should nutritionists [and dietitians] swear the Hippocratic Oath at graduation since they make important decisions regarding human life?"* The participants' justifications for rating the different competency statements are summarized in Appendix W.

[7] **Doctor's promise to uphold medical standards:** an oath traditionally taken by newly graduated physicians to observe the ethical standards of their profession, specifically to seek to preserve life. **Microsoft® Encarta® 2009. © 1993-2008 Microsoft Corporation. All rights reserved.**

Table 4.32. *Participants' Rating of Competency Statements under the Subdomain of Ethics and Professionalism in Nutrition and Dietetics Practice*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
Domain 4: Ethics and professionalism in Nutrition and Dietetics: Demonstrates knowledge, skills, and attitudes of ethics and professionalism in the practice of nutrition and dietetics	51	0	0	3	9	39	94.1	46	97.8	2.2
4.1 Adherence to Codes of Ethics, Practice Guidelines, and Standard Operating Procedures: Demonstrates knowledge of the existing professional codes of ethics, practice guidelines, and standard operating procedures and the skills and attitudes to adhere to these in the practice of nutrition and dietetics	53	0	0	3	10	40	94.3	47	97.9	2.1
4.1.1 Demonstrates knowledge of the existing national codes of ethics, practice guidelines, and standard operating procedures (e.g. Code of Conduct and Ethics for the Uganda Public Service and the Code of Conduct and Ethics for Health Workers, and the Code of Ethics for Nutrition and Dietetics Professionals when adopted)	70	1	2	2	17	48	92.9	67	98.5	1.5
4.1.2 Demonstrate knowledge, skills, and attitudes necessary to recognise and work within the boundaries of organisational laws, regulations, guidelines, protocols, and standard operating procedures	70	1	1	2	16	50	94.3	67	95.5	4.5
4.1.3 Demonstrates knowledge, skills, and attitudes to identify and resolve work-related conflicts	70	1	2	3	20	44	91.4	66	97.0	3.0
4.2 Ethical principles in practice: Demonstrates knowledge, skills, and attitudes necessary for upholding professionalism, confidentiality, transparency, integrity, and accountability in delivering professional related services	49	0	0	3	8	38	93.9	44	100.0	0.0
4.2.1 Demonstrates knowledge, skills, and attitudes necessary for engaging clients/caretakers in making informed decisions as relates to the interventions to be undertaken	70	0	0	3	19	48	95.7	66	100.0	0.0
4.2.2 Demonstrates knowledge, skills, and attitudes necessary for upholding client privacy and confidentiality	70	0	0	3	18	49	95.7	66	100.0	0.0
4.2.3 Demonstrates knowledge and skills necessary to maintain professional-client boundaries	70	0	0	3	19	48	95.7	66	100.0	0.0
4.2.4 Demonstrates knowledge and skills necessary for upholding human rights principles (Universality and Inalienability; Indivisibility; Interdependence and Interrelatedness; Equality and Non-discrimination; Participation and Inclusion; and Accountability and Rule of Law) in dealing with clients	70	0	1	3	22	44	94.3	66	95.5	4.5

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

4.6.6 Domain Five: Research and Data Analysis

About 94.4% of the participants rated domain five on the need for HN/HND graduates to demonstrate the competency required for coordinating nutrition and health-related research processes as relevant and 94.1% of the participants recommended learning of the competency to occur during undergraduate training (Table 4.33). Based on the participants' observations, demonstrating competency in the domain is important for all HN/HND graduates but caution was made that training content needed to differ according to the level of training, *"This domain is important for the different levels; the only difference is the concepts that would be taught at the different levels. As you advance, more different techniques are introduced ... Thus research work would be more intense as you advance from the bachelor's to the master's level."*

Subdomain 5.1: Planning and Data Collection

About 96.2% of the participants rated this subdomain relevant and 93.9% recommended its learning to occur at the undergraduate level (see Table 4.33). Participants observed that it was important for all HN/HND graduates to understand research methods "*All nutritionists [and dietitians] should have knowledge on how to conduct research"* for them to ably plan and undertake survey research; *Better understanding of research methods ... [enables HN/HND graduates] ... to successfully plan and conduct surveys.*" Recommendation to support student's publish was also made. All competency statements under this subdomain attained the set level of consensus in the first Delphi round in being evaluated as both relevant and suitable for undergraduate HN/HND training. The selected justifications for each competency statement are summarized in Appendix W.

Table 4.33. *Participants' Ratings of Competency Statements under the Domain of Research and Data Analysis subdomain of Planning and Data Collection*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
Domain 5: Research and Data Analysis: Demonstrates knowledge, skills, and attitudes necessary to coordinate nutrition and health-related research processes from planning, data collection, analysis, report writing, and dissemination of findings	54	0	0	3	11	40	94.4	51	94.1	5.9
5.1 Planning & Data Collection: Demonstrates knowledge, skills, and attitudes required for developing research plans and data collection	53	0	0	2	14	37	96.2	49	93.9	6.1
5.1.1 Demonstrates knowledge and skills on the application of different research designs	70	0	0	2	22	46	97.1	67	88.1	11.9
5.1.2 Demonstrates knowledge and skills on the use of different quantitative and qualitative data collection methods and techniques	70	0	0	2	25	43	97.1	67	91.0	9.0
5.1.3 Demonstrates knowledge and skills required to design appropriate nutrition and health-related data collection tools	70	0	0	2	27	41	97.1	67	89.6	10.4
5.1.4 Demonstrates knowledge and skills on the use of different nutrition indicators (nutrition status indicators, indicators for assessing the causes of malnutrition (e.g. food insecurity indicators; care and caring practices; and environmental hygiene and access to the health services), indicators for monitoring and evaluating the performance of nutrition programmes/projects, and related indicators as applied in demographic and health survey studies) in research	70	0	0	3	23	44	95.7	66	93.9	6.1
5.1.5 Demonstrates knowledge and skills to design articulate research proposals	70	0	0	3	26	41	95.7	66	89.4	10.6
5.1.6 Demonstrates knowledge of different academic databases and search engines and their use in identifying relevant nutrition and health-related research	70	0	0	3	24	43	95.7	67	88.1	11.9
5.1.7 Demonstrates knowledge, skills, and attitudes to work with interdisciplinary teams to plan and undertake research at the community, district, regional, and or national level	70	0	0	3	23	44	95.7	67	89.6	10.4
5.1.8 Demonstrates knowledge and skills of ethical principles in research and attitudes to adhere to the established research guidelines by the Uganda National Council of Science and Technology	70	0	0	4	27	39	94.3	67	91.0	9.0
5.1.9 Demonstrates knowledge and skills to identify research opportunities relevant to professional practice	70	0	0	3	27	40	95.7	67	85.1	14.9

Subdomain 5.2: Data Analysis, Report Writing, and Results Dissemination

Of the participants that evaluated subdomain 5.2 on the need for HN/HND graduates to demonstrate competency to undertake data analysis, report writing, and results dissemination, 92.2% rated it relevant. Relatedly, 93.2% of the participants recommended the learning of the domain to occur during undergraduate training (see Table 4.34). Based on the given justifications, some participants observed that research, report writing, and information dissemination were vital for all HN/HND professionals "*Nutrition [Professionals] should be able to use the research results for analysis, make a report and disseminate the information."* It was also highlighted that depth in training and ability to demonstrate skills needed to differ for different levels of training; "*Data collection can be for the diploma graduates, analysis, report writing, and dissemination can be for bachelor and master graduates when it comes to the field."* Further observed was the fact that the duration of training diploma level cadres was inadequate to foster mastery of research skills, "*The timeline for HND diploma course may not allow for such skills to be demonstrated, but also the costs attached during practice may not be affordable for this this level."*

Out of the seven competency statements under this subdomain, two (competency statements 5.2.1 and 5.2.6) were evaluated as relevant for the practice of HN/HND but did not attain the set level of participant consensus in either Delphi round in terms of being recommended for undergraduate HN/HND training. The remaining competency statements were evaluated as both relevant and suitable for undergraduate level HN/HND training. A selection of the participants' justifications is given in Appendix W.

Table 4.34. *Participants Evaluation of Competency Statements under the Subdomain of Data Analysis, Report Writing, and Results Dissemination*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
5.2 Data Analysis, Report Writing, and Results Dissemination: Demonstrates knowledge, skills, and attitudes to undertake data analysis, report writing, and results dissemination	51	0	0	4	9	38	92.2	44	93.2	6.8
5.2.1 Demonstrates knowledge and skills on the application of appropriate statistical tests (both parametric and non-parametric)	70, 54*	0	0	5	25	40	92.9, 100*	66, 53*	78.8, 67.9*	21.2, 32.1*
5.2.2 Demonstrates knowledge and skills on the use of different software programs (e.g. NutriSurvey, ENA for SMART, WHO Anthro, WHO AnthroPlus, EPI/ENA, EPiInfo, SPSS, STATA, ATLAS.ti, and NVivo) applied in the analysis of nutrition-related data	70	0	0	7	18	45	90.0	66	93.9	6.1
5.2.3 Demonstrates knowledge and skills on the use of the Health Management Information Systems to support data analysis and reporting	70	0	0	8	20	42	88.6	66	86.4	13.6
5.2.4 Demonstrates knowledge and skills to consolidate research findings into articulate reports	70	2	0	4	20	44	91.4	66	90.9	9.1
5.2.5 Demonstrates knowledge and skills required to write technical research reports	70	2	0	4	21	43	91.4	66	83.3	16.7
5.2.6 Demonstrates knowledge, skills, and attitudes required for planning and hosting seminars, workshops, and conferences as well as sharing nutrition research with all relevant stakeholders using different fora	70, 54*	0	0	4	29	37	94.3, 90.7*	66, 54*	74.2, 33.3*	25.8, 66.7*
5.2.7 Demonstrates knowledge, skills, and attitudes to undertake personal capacity development initiatives in advanced research in nutrition, health, and other relevant disciplines	70	0	1	3	25	41	94.3	65	80.0	20.0

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

4.6.7 Domain Six: Policy; Advocacy; and Social and Behaviour Change Communication

Overall, 92.3% of the participants considered it relevant for HN/HND graduates to demonstrate competency in the broad domain of policy, advocacy, and social and behaviour change communication and 93.9% of the participants recommended the learning of this competency to occur during undergraduate training (see Table 4.35). According to the given justifications, it was observed that competency in promoting policy, advocacy, and social and behaviour change communication (SBCC) was required of all graduates of nutrition and dietetics graduates, "*All nutritionists should participate and contribute to policy, advocacy, and SBCC [social and behaviour change communication] relevant to nutrition because we all represent nutrition and have to advocate for it at all levels to be recognized and be given importance as they do in other sectors."*

Further noted was that all HN/HND graduates needed to demonstrate competency in nutrition advocacy and policy formulation irrespective of the level of training, *"At whatever level of education, one should be able to advocate for nutrition initiatives and also contribute to policy formulation because it affects all in their profession."* Other observations were also made that learning of this competency needed to be phased with advanced content being trained at the master's level; "*A few concepts under SBCC would be handled at Bachelors level but more so, advanced work at master's level. But it would really be of great use to align it well to nutrition in terms of policy and advocacy."*

Subdomain 6.1: Policy

Separately, subdomain 6.1 on the need for HN/HND graduates to demonstrate competency in matters related to nutrition policy use, formulation, and evaluation/analysis was assessed as relevant by 92.5% of the participants. However, at a score of 78.7% and 41.2% in the first and second rounds respectively (see Table 4.35), the ratings of this subdomain were less than the ≥80% set level of respondent consensus for recommending the learning of this competency to occur during undergraduate training. Based on the participants' justifications for the different ratings in the first Delphi round, it was observed that getting involved in some aspects of nutrition policy was considered essential for all HN/HND graduates irrespective of the level of training; *"At all levels, nutritionists should actively be involved in at least one or all the stages of the policy cycle."* Those in support of the learning of nutrition policy during undergraduate training observed that this could be incrementally done through the use of specific modules; *"Bachelor students should be introduced to Policy, Advocacy and SBCC for Nutrition as specific modules during their training."* On the other side, those in support of this competency being learned during master's training reasoned that master's graduates were usually more involved in decision making; "*For master's training because these cadres are involved in decision making and this requires knowledge of many policies."*

As was in the first Delphi, second round Delphi participants observed that competency in policy was best suited to master's level graduates partly because masters level graduates were considered to be employed in positions of decision making hence requiring knowledge of different policies, "*For master's graduates because these are involved in decision making [which] requires knowledge of many*

policies. However, bachelor students should also be introduced to policy, advocacy, and SBCC [Social and behaviour change communication] as specific modules during their training." Also observed was that master's level graduates were best suited to learn this competency given that masters-level training has more focus on elements of programming and policy formulation, "*This is because at master's level, there is more concentration in programming and policy formulation, however, undergraduates can be introduced to nutrition policies of the country."*

As for the evaluation of the competency statements under subdomain 6.1, all attained the set level of participant consensus in the first Delphi round in being evaluated as relevant for HN/HND practice. However, none attained the set level of participant consensus in being recommended for undergraduate HN/HND training in either Delphi round. A selection of the participant justifications in evaluating each of the competency statements is summarised in Appendix W.

Subdomain 6.2: Advocacy

As a subdomain, 96.2% of the participants rated this subdomain relevant for HN/HND graduates to demonstrate; however, only 78.7% recommended learning of the competencies under this subdomain to occur during undergraduate training (see Table 4.35). In the second Delphi round, 67.9% of the participants, which was still less than the ≥80% set level of respondent consensus recommended the learning of this competency to occur during undergraduate training. In evaluating this subdomain during the first Delphi round, although consensus for learning this competency was not attained, some participants observed that demonstrating such competency was better suited for HN/HND graduates with bachelor's and or master's degrees *"This*

skill may require at least one with a bachelors or master's degree" and that content needed to differ for different levels of training *"The depth of content will differ from Diploma to Masters."*

In the second Delphi round, participants noted that demonstrating competency in planning and managing advocacy events needed divergent skills, some of which develop with experience and exposure, *"Developing an advocacy skills set requires divergent skills and strategically selecting the relevant one. This can be developed with on-job experience in the project environment."* As such, some participants expressed that learning advocacy was best suited for experienced graduates-usually master's level graduates, *"Advocacy roles need to be left for the master's graduates when at least nutritionists have gained experience/knowledge in the field. Brief concepts in nutrition advocacy need to be shared with the nutritionists at Bachelors level…."* This view was seconded by another view that at the master's level, graduates usually develop advanced skills required for planning and managing advocacy events, *"Planning and management of advocacy events are advanced skills which may require advanced knowledge, and advanced analytical and organisation skills developed at the masters level."*

For the evaluation of the competency statements under subdomain 6.2, all attained the ≥80% set level of participant consensus in being considered relevant for HN/HND practice. However, except for competency statement 6.2.5 which attained the set level of competency in being recommended for undergraduate HN/HND training, the rest were not recommended. Selected participants' justifications for the different competency statements are summarised in Appendix W. Demonstrating competency

in undertaking evidence-based policy and budget advocacy was relevant for HN/HND graduates but training in the same was not suited for undergraduate training as it was considered to need a prior understanding of existent policy gaps, expertise, and experience working with decision-makers-attributes better suited for master's level graduates. The need for HN/HND graduates to demonstrate competency in using different techniques to undertake advocacy was evaluated as relevant but also considered to require advanced knowledge and capabilities to deal with different stakeholders; a competency more suited for master's graduates.

Relatedly, demonstrating competency in developing advocacy tools was evaluated as relevant for HN/HND graduates but training in the same was not recommended at the undergraduate level. Although it was recognised that the development of advocacy tools could be done by graduates with different levels of education, some participants maintained that it needed someone with higher-level skills in situation analysis and that this could best be learned at the master's level of training. The need to demonstrate competency in using different advocacy tactics was evaluated as relevant for all HN/HND graduates and also recommended for undergraduate training. While evaluating this competency, participants observed that it was important for all nutritionists and dietitians to have a skill in using at least one or more of the advocacy tactics.

Demonstrating competency in undertaking national and local level nutrition advocacy targeting different decision-makers was also considered relevant for HN/HND graduates but not recommended for undergraduate training. In evaluating this

competency, participants observed that all nutritionists and dietitians engage in some level of advocacy depending on the level they are employed. However, mastering this competency was considered more suitable for the master's level graduates as these were likely to be employed in positions requiring such skills. It was also recommended that if training advocacy was to be undertaken at the undergraduate level it should be offered as an elective.

The need for HN/HND graduates to demonstrate competency in monitoring and evaluating the impact of advocacy initiatives was evaluated as relevant but training in the same was not recommended for undergraduate training. However, some participants expressed that advocacy occurs at all levels hence nutritionists and dietitians needed to be able to monitor and evaluate the impact of advocacy initiatives irrespective of the level of training.

Table 4. 35. *Participants' Ratings of Competency statements under the Subdomains of Policy and Advocacy*

Competency domains, subdomains, and competencies (knowledge,, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
Domain 6: Policy; Advocacy; Social and Behaviour Change Communication (SBCC): Demonstrates knowledge,, skills, and attitudes to contribute to policy, advocacy, and SBCC relevant to nutrition	52	0	0	4	14	34	92.3	49	93.9	6.1
6.1 Policy: Demonstrates knowledge, skills, and attitudes to contribute to the different stages of the policy cycle (Formulation, Implementation, and Evaluation)	53, 54*	0	0	4	18	31	92.5, 100*	47, 51*	78.7, 41.2*	21.3, 58.8*
6.1.1 Demonstrates knowledge of the different national policies; laws; regulations; and sectoral policies and plans relevant to nutrition	70, 53*	0	0	4	26	40	94.3, 98.1*	66, 52*	77.3, 63.4*	22.7, 36.6*
6.1.2 Demonstrates knowledge, skills, and attitudes to contribute to the formulation of nutrition policies and guidelines	70, 53*	0	0	5	26	39	92.9, 92.5*	66, 51*	69.7, 58.8*	30.3, 41.2*
6.1.3 Demonstrates knowledge, skills, and attitudes to contribute to the evaluation/analysis of nutrition policies and guidelines	70, 54*	1	0	5	27	37	91.4, 90.7*	65, 54*	60.0, 46.3*	40.0, 53.7*
6.2 Advocacy: Demonstrates knowledge, skills, and attitudes necessary for planning and managing nutrition-related advocacy campaigns	52, 54*	0	0	2	19	31	96.2, 98.1*	44, 53*	77.3, 67.9*	22.7, 32.1*
6.2.1 Demonstrates knowledge, skills, and attitudes required to undertake evidence-based policy and budget advocacy at different levels to influence change for nutrition	70, 54*	0	1	3	26	40	94.3, 94.4*	67, 52*	55.2, 9.6*	44.8, 90.4*
6.2.2 Demonstrates knowledge of the different phases in developing advocacy strategies/plans (goal development; identification of primary and secondary audiences; identifying potential allies and opponents; selecting effective advocacy approaches; identification/development of advocacy messages; budgeting and identification of resources; and undertaking risk assessments for the developed strategies/plans)	70, 54*	0	1	5	26	38	91.4, 96.3*	67, 52*	59.7, 17.3*	40.3, 82.7*

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

Table 4.35. Continued. *Participants' Ratings of Competency statements under the Subdomains of Policy and Advocacy*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement**							**Level of Education**		
	n	**SD**	**D**	**NAD**	**A**	**SA**	**%A**	**n**	**% Undergrad**	**% Masters**
6.2.3 Demonstrates knowledge, skills, and attitudes to use different advocacy techniques (e.g. policy monitoring and public accountability, policy dialogues, capacity building of stakeholders advocacy)	70, 54*	0	1	5	30	34	91.4, 98.2*	67, 53*	62.7, 11.3*	37.3, 88.7*
6.2.4 Demonstrates knowledge and skills to develop different advocacy tools (e.g. clear and concise audio messages) suitable for use across different channels	70, 53*	0	1	4	32	33	92.9, 94.3*	66, 53*	77.3, 56.6*	22.7, 43.4*
6.2.5 Demonstrates knowledge, skills, and attitudes to use different advocacy tactics (e.g. letter writing, lobbying, use of media and internet, legal actions, campaigns, protests, and demonstrations)	70	1	1	6	30	32	88.6	66	81.8	18.2
6.2.6 Demonstrates knowledge and skills to undertake national and local level nutrition advocacy targeting decision-makers or influencers	70, 54*	0	2	3	30	35	92.9, 100*	67, 52	79.1, 78.9	20.9, 21.1*
6.2.7 Demonstrates knowledge and skills to monitor and evaluate the impact of advocacy initiatives	70, 54*	0	3	6	29	32	87.1, 88.9*	67, 50*	68.7, 50*	31.3, 50*

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

Subdomain 6.3: Social and Behaviour Change Communication

The need for HN/HND graduates to demonstrate competency in planning, undertaking, and managing social and behaviour change communication (SBCC) as per subdomain 6.3 was evaluated as relevant for HN/HND graduates by 92.3% of the participants. Recommendations that this competency is learned during the undergraduate level of HN/HND training were made by 93.9% of the participants (see Table 4.36). As justification for the individual ratings, some participants observed that this competency was important for nutrition and dietetics graduates given that behaviour change is a key element of nutrition programs, *"Nutrition involves a lot of behavioural change. This is an important skill to impart to students. I believe is best learned with practical/ scenarios"* and "*All nutritionists at all levels should have the skill in undertaking and managing SBCC because nutrition largely depends on social behavioural change which is a gradual process."*

Other participants were of the view that having such a competency promotes easier acceptance of interventions by the community *"This is essential in ensuring that the policies sought can easily be implemented and the interventions are well accepted in the communities".* As for the level of training, learning of the competency was mainly recommended for bachelor's and master's level graduates; basic training was also recommended for diploma level graduates.

As for the subdomain, all the competency statements were also rated relevant and suitable for the undergraduate training of HN/HND. A selection of the participant's justifications for the individual competency statements is presented in Appendix W. It was observed that all HN/HND graduates needed to demonstrate competency in

identifying and addressing the undesirable/un-intended culture/religious beliefs, practices, and food taboos existing in communities with some participants pointing out that much emphasis needed to be put on diploma level cadres as these work more in the community as nutrition extension workers. Participants also observed that nutrition interventions thrive on BCC hence the need for all HN/HND graduates to demonstrate competency in using/applying different theories of behaviour change in different contexts and learning the same during undergraduate training.

Demonstrating competency in developing context-specific communication strategies through working with different partners was evaluated as relevant and recommended for undergraduate training on the basis that influencing behaviour change requires working in partnership. Demonstrating competency in developing and promoting the use of appropriate IEC was evaluated as relevant and recommended for undergraduate training based on observations that developing and using appropriate IEC materials plays a big role in promoting behaviour change. Demonstrating the ability to adhere to the ethical and ‘do no harm’ principles in SBCC programming was evaluated as relevant and recommended for undergraduate training given the observations that this was an important skill essential for promoting SBCC. The need for HN/HND graduates to demonstrate the competency necessary for undertaking community mobilization towards influencing positive behaviour change was also evaluated as relevant and recommended for undergraduate training.

Table 4.36. *Participants' Ratings of Competency Statements under the Subdomain of Social and Behaviour Change Communication*

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
6.3 Social and Behaviour Change Communication: Demonstrates knowledge, skills, and attitudes necessary for planning, undertaking, and managing SBCC	51	0	0	4	20	27	92.2	42	97.6	2.4
6.3.1 Demonstrates knowledge and skills to analyse and understand health and nutrition behaviours and the context in which they occur	70	0	0	3	29	38	95.7	67	98.5	1.5
6.3.2 Demonstrates knowledge, skills, and attitudes of identifying and addressing the undesirable/un-intended culture/religious beliefs, practices, and food taboos existing in communities	70	0	0	3	26	41	95.7	67	98.5	1.5
6.3.3 Demonstrates knowledge, skills, and attitudes to use/apply different theories of behaviour change (e.g. Health Belief Model, Theory of Planned Behaviour, Stages of Change/Trans-theoretical Model, Social Learning Theory) in different contexts	70	0	1	4	28	37	92.9	67	91.0	9.0
6.3.4 Demonstrate knowledge, skills, and attitudes to network and work with other partners in the development of context-specific communication strategies for use in influencing positive behaviour change	70	0	0	4	33	33	94.3	67	97.0	3.0
6.3.5 Demonstrates knowledge, skills, and attitudes to develop and promote the use of appropriate IEC materials for influencing positive behaviour change in different settings	70	0	0	3	28	39	95.7	66	95.5	4.5
6.3.6 Demonstrates knowledge, skills, and attitudes to adhere to ethical and 'do no harm' principles (Respect everyone equally; Use acceptable methods for influence; Be conscious about power dynamics and risks of violence; Be transparent; Ensure people's rights to privacy; Do not allow the shaming of individuals or groups; Establish and implement a clear Code of Conduct; Monitor and encourage feedback) in SBCC programming	70	0	0	4	27	39	94.3	67	98.5	1.5
6.3.7 Demonstrates knowledge, skills, and attitudes to mobilize community members, community groups, and existing community organizations towards undertaking sustainable engagements for influencing positive behaviour change	70	0	0	3	29	38	95.7	67	97.0	3.0
6.3.8 Demonstrates knowledge, skills, and attitudes to use different communication channels (e.g. face-to-face, broadcast media, mobile, electronic, and written) in undertaking SBCC	70	0	0	3	28	39	95.7	67	97.0	3.0
6.3.9 Demonstrates knowledge and skills to monitor and evaluate the impact of SBCC initiatives on nutrition-related outcomes	70	0	0	5	31	34	92.9	67	89.6	10.4

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate

4.6.8 Domain Seven: Nutrition Leadership and Management

Domain seven consisted of five subdomains: planning and budgeting; human resource management; multisectoral and multistakeholder engagement; program/project implementation; and monitoring and evaluation. As a domain, 92.2% and 86.4% of the participants respectively evaluated the domain as relevant for HN/HND graduates and suitable for learning during undergraduate training (see Table 4.37) in the first Delphi round. As a justification, the participants argued that leadership and management roles can be delegated to anyone hence making the competency vital for all HN/HND graduates to demonstrate competency in the overall domain of leadership and management, "*This [competency in leadership and management] is required for all levels because work can be delegated at any level so the skill is essential"* Consensus on the learning of this competency at the undergraduate level was also attained in the first Delphi round.

Subdomain 7.1: Planning and Budgeting

As a subdomain, 88.7% of the participants evaluated the need for HN/HND graduates to demonstrate competency in the development and operationalization of nutrition program/project proposals, plans, and budgets relevant. Relatedly, 82.6% of the participants recommended the learning of this competency to occur during undergraduate training (see Table 4.37). As per the given justifications, participants observed that demonstrating competency in planning and budgeting was important for HN/HND graduates as it was required of those working as project managers, assistants, and field nutrition coordinators; "*This is very crucial for the project managers, assistants, and field nutrition coordinators as they are the ones usually involved in developing project proposals, plans and budgets."* Participants also

viewed work relating to this competency as better suited for the bachelor's and master's graduates; "*Project proposal development should be a task for bachelors and masters graduates; however diploma students can provide inputs that are specific to their tasks basing on a day to day experiences during implementation."*

For the three competency statements under subdomain 7.1, all were evaluated as relevant for HN/HND practice having attained the set consensus level; however, none was recommended for learning during undergraduate training. A selection of the participant justifications given in the evaluation are summarised in Appendix W. Demonstrating competency in developing nutrition program/project proposals, work plans, and budgets were considered relevant but not recommended for learning at the undergraduate level in both Delphi rounds. The need for HN/HND graduates to demonstrate competency in resource mobilization was evaluated as relevant but was not recommended for the undergraduate level of training as the ≥80% set level of respondent consensus was not attained. As per the given justifications, the relevancy of this competency was based on the view that it contributes to improved service delivery and accountability. However, this function was observed to be the main reserve for the programme directors who usually hold higher academic credentials above undergraduate level training.

Demonstrating competency to undertake nutrition program/project budget tracking was considered relevant for HN/HND graduates. Still, consensus for the learning of this competency at the undergraduate level was not attained in both Delphi rounds based on observations that this competency was mainly required of graduates employed in project managerial positions; budget tracking was a main function of the

finance department and related professionals but not the nutrition/dietetics professionals; and that budget management was usually assigned to master's level graduates. Nonetheless, some participants also observed that undergraduates are usually engaged in budgeting at some level and hence required basic training in this competency. On this basis, it was recommended that HN/HND graduates interested in improving their competency in budgeting and budget tracking could undertake additional training probably at a post-graduate level. On the whole, all the assessed competency statements under this subdomain were evaluated as relevant but not recommended for undergraduate training

Table 4. 37. *Participants Rating of Competency Statements under the Domain of Nutrition Leadership and Management and the Subdomain of Planning and Budgeting*

Competency domains, subdomains, and competencies	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
Domain 7: Nutrition Leadership and Management: Demonstrates knowledge, skills, and attitudes of leadership and management in nutrition programming	51	0	0	4	15	32	92.2	44	86.4	13.6
7.1 Planning and Budgeting: Demonstrates knowledge, skills, and attitudes to develop and operationalize nutrition program/project proposals, plans and budgets	53	0	0	6	14	33	88.7	46	82.6	17.4
7.1.1 Demonstrates knowledge and skills to develop nutrition program or project proposals, work plans, and budgets	70, 54*	0	4	4	20	42	88.6, 96.3*	66, 52*	77.3, 76.9*	22.7, 23.1*
7.1.2 Demonstrates knowledge, skills, and attitudes to undertake resource mobilization (e.g. through the raising of new resources, maximizing the use of already existing resources, and mapping of potential funders)	70, 54*	0	3	5	23	39	88.6, 94.4*	66, 52*	69.7, 63.5*	30.3, 36.5*
7.1.3 Demonstrates knowledge and skills to undertake nutrition program/project budget tracking	70, 54*	1	2	5	26	36	88.6, 87.1*	65, 50*	78.5, 62*	21.5, 38*

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

Subdomain 7.2: Human Resource Management

As per subdomain 7.2, the need for HN/HND graduates to demonstrate the competency required for undertaking different human resource managerial roles was evaluated as relevant by 91.7% of the participants. Relatedly, 80.9% of the participants recommended the learning of this competency to occur during undergraduate training (see Table 4.38). In evaluating this subdomain, some participants were of the view that demonstrating competency in human resources management ensures that graduates can ably undertake tasks related to selection, training, and coaching of fellow staff, *"It will help to impact every graduate with good managerial skills in regards to selection, training & coaching of staff when put in a position that requires the noted HR skill."*

However, others observed that human resources management was not a core mandate of HN/HND graduates, *"This is not the primary role of a nutritionist and most institutions already have an HR person."* Although respondents' consensus was attained in recommending the training of this competency during undergraduate studies, some participants felt that learning of this competency was most suited for program managers, who usually are master's level graduates; "*Reserved for Program managers with Masters…"*As further summarized in Table 4.38, all the five competency statements under subdomain 7.2 were evaluated as both relevant for HN/HND graduates and suitable for learning during undergraduate level training.

A selection of the participant's justifications for evaluating the individual competency statements under this subdomain is as summarised in Appendix W. In general, the need to demonstrate knowledge of leadership and management principles was

considered to be required by all graduates as any graduate can take up leadership roles irrespective of the level of training. Demonstrating competency in staff recruitment was considered relevant given the reasoning that employed graduates were in one way or another expected to contribute to carrying out this function.

The need for HN/HND graduates to demonstrate competency in supportive supervision was evaluated as relevant but participants observed that HN/HND graduates needed to have prior expertise in project implementation. Participants evaluated the need for HN/HND graduates to demonstrate competency in setting up organisational supportive supervision systems as relevant but more so for graduates in managerial positions. Demonstrating competency in organising, coordinating, and contributing to training and mentorship of program/project was also evaluated as relevant and recommended for training at the undergraduate level based on the observations that the competency was necessary, especially for people in managerial positions and field nutrition coordinators.

Table 4.38. *Participants Ratings of Competency Statements under the Subdomain of Human Resource Management*

Competency domains, subdomains, and competencies	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
7.2 Human Resource Management: Demonstrates knowledge, skills, and attitudes to undertake different human resource managerial roles (staff recruitment, training; motivation; appraisal and employee relations management)	48	0	0	4	20	24	91.7	48	80.9	19.1
7.2.1 Demonstrates knowledge of leadership and management principles	70	0	1	7	26	36	88.6	66	84.8	15.2
7.2.2 Demonstrates knowledge, skills, and attitudes to contribute to the recruitment of program/project staff and related support teams	70	0	2	7	28	33	87.1	66	86.4	13.6
7.2.3 Demonstrates knowledge of the processes and the benefits of supportive supervision	70	1	2	4	30	33	90.0	66	87.9	12.1
7.2.4 Demonstrates skills, and attitudes to set up organizational supportive supervision systems (plan, conduct, and follow up supportive supervision activities)	70	0	2	4	35	29	91.4	66	80.3	19.7
7.2.5 Demonstrates knowledge, skills, and attitudes to organize, coordinate, and contribute to training and mentorships of program/project staff and related stakeholders	70	0	1	5	29	35	91.4	66	83.3	16.7

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate;

Subdomain 7.3: Multisectoral and multistakeholder Engagement

Based on the evaluations for the overall subdomain, 92.2% of the participants evaluated as relevant the need for HN/HND graduates to demonstrate competency in engaging in multisectoral and multistakeholder partnerships (subdomain 7.3) and 82.2% of the participants recommended the learning of such competency to occur during undergraduate training (see Table 4.39). Going by the participants' narratives in justification of the participants' ratings for subdomain 7.3, different observations were made. Some participants were of the view that implementation of nutrition and dietetics services involved the interplay of different stakeholders, *"During implementation of [nutrition and dietetics] activities, there is always an interface with different stakeholders" and* that competency in multisectoral and multistakeholder partnerships was best suited for graduates in managerial positions.

Other participants felt that graduates with a master's level of training were best suited to demonstrate such competency given that a number of these have experience in implementation of nutrition and dietetics services, *"At master's level the student has gained some experience from the field and needs to gain managerial skills."* As for the evaluation of the five competency statements under this subdomain, all attained the ≥80% set level of respondent consensus in being considered relevant for HN/HND practice in the first Delphi round. However, two of the competency statements (7.3.1 and 7.3.4) were not recommended for undergraduate HN/HND training having been scored less than the ≥80% set level of respondent consensus in the two Delphi rounds.

As for the evaluation of the underlying competency statements under this subdomain, a selection of the given narratives is provided in Appendix W. The need for HN/HND

graduates to demonstrate competency in stakeholder mapping was evaluated as relevant but the consensus was not attained in both Delphi rounds in recommending the learning of this competency to occur during undergraduate training. Based on the evaluations, participants viewed this competency as mainly being a function of leadership and management hence core for graduates in managerial positions who are usually master's level graduates. The need for HN/HND graduates to demonstrate knowledge and skills required for working in multisectoral and multistakeholder nutrition partnerships was evaluated as relevant and recommended for undergraduate training with participants observing that different stakeholders implement nutrition interventions through working in partnerships.

The need for HN/HND graduates to demonstrate competency in identifying and managing conflicts of interest that arise in multisectoral and multistakeholder partnerships was evaluated as relevant and recommended for undergraduate training on the basis that conflicts of interest are inevitable at the workplace and hence all graduates needed to demonstrate competency in their identification and resolution. The need to demonstrate knowledge of the composition, governance, and functionality of multisectoral coordination committees at different levels was evaluated to be relevant for HN/HND graduates given observations made that nutrition interventions are currently being implemented multisectorally. Despite recognising that nutritionists and dietitians generally need to understand governance structures in the multisectoral approach; the consensus was not attained in recommending the learning/orientation of graduates on this competency during undergraduate level training. Related to this competency, observation was further

made that master's level graduates stood better to benefit from this competency as they are employed in positions that need such knowledge and skills.

The need to demonstrate competency required for supporting nutrition coordination committees in the development of multisectoral nutrition action plans was evaluated as relevant for HN/HND graduates; learning of this competency was also recommended to occur during undergraduate training. However, some participants also observed that demonstrating competency in this was technical, required experience and maturity which undergraduates usually lack. Some participants also observed that this competency could be learned through experience and exposure hence not requiring formal training.

Table 4. 39. *Participants Ratings of Competency Statements under the Subdomain of Multisectoral and Multistakeholder Partnerships*

Competency domains, subdomains, and competencies	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
7.3 Multisectoral and multistakeholder engagement: Demonstrates knowledge, skills, and attitudes to engage in multisectoral and multistakeholder partnerships to maximize collaboration and ensure proper coordination of joint activities	51	0	1	3	17	30	92.2	45	82.2	17.8
7.3.1 Demonstrates knowledge and skills to map relevant program/project stakeholders at different levels of planning and or implementation	70, 53*	0	1	5	34	30	91.4, 88.7*	66, 52*	77.3, 42.3*	22.7, 57.7*
7.3.2 Demonstrates knowledge, skills, and attitudes to work in multistakeholder nutrition partnerships/engagements	70	0	2	3	31	34	92.9	66	81.9	18.2
7.3.3 Demonstrates knowledge, skills, and attitudes to identify and manage conflicts of interest (whether potential, real, perceived, and divergent, or convergent) that arise in multisectoral and multistakeholder partnerships	70	0	1	7	33	29	88.6	66	83.3	16.7
7.3.4 Demonstrates knowledge on the composition, governance, and functionality of Multisectoral Coordination Committees at different levels	70, 52*	2	1	5	29	33	88.6, 96.2*	66, 51*	77.3, 76.5*	22.7, 23.5*
7.3.5 Demonstrate knowledge, skills, and attitudes to support Nutrition Coordination Committees in developing Multisectoral Nutrition Action Plans	70	0	1	6	26	37	90.0	66	84.8	15.2

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

Subdomain 7.4: Program/project implementation

This subdomain was constituted of three competency statements. As a subdomain, 91.8% and 81.8% of the participants respectively evaluated the domain as relevant for HN/HND graduates and suitable for learning at the undergraduate level (see Table 4.40). As justification for the ratings, one participant observed that competency in program/project implementation was best suited for graduates in related positions, "*Necessary for both project/program officer and manager."* Another observed that albeit this competency being required by all nutrition program managers, there was a need for specialised management training after the bachelors or masters level training, "*All nutrition managers should be able to have this competency [Program/project Implementation] for the success of nutrition projects and programs, with a need to have a special management course after the bachelors or masters."*

For the competency statements under this subdomain, all attained the ≥80% set level of respondent consensus in being evaluated as relevant for HN/HND practice but only two of the statements (competency statements 7.4.1 and 7.4.2) attained the set level of consensus in regards to being recommended for undergraduate training. Some of the given narratives for not recommending competency statement 7.4.3 for undergraduate training were demonstrating competency in analysing technical program/project reports and following up on the implementation of given recommendation was necessary for all graduates although mainly relevant for higher-level positions, "*One should have knowledge and skills of report analysis as it's a necessary competence for bigger positions such as project managers."*

In evaluating the different competency statements, the need for HN/HND graduates to demonstrate competency in implementing programs/projects in line with agreed-upon protocols and planning and leading organisation committee meetings were evaluated as relevant; learning of the same was recommended during undergraduate training. On the other hand, demonstrating competency in analysing technical program/project reports and following up on the implementation of recommendations was also evaluated as relevant for HN/HND graduates but not recommended for undergraduate training. Based on the participants' observations, this competency was in particular considered to be mainly relevant for higher-level positions and graduates engaged in nutrition programming. Appendix W presents selected participant justifications in evaluating this subdomain.

Table 4. 40. *Participants' Ratings for Competency Statements under the Subdomain of Program/Project Implementation*

Competency domains, subdomains, and competencies	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
7.4 Program/project Implementation: Demonstrates knowledge, skills, and attitudes to oversee timely and efficient program/project implementation	49	0	0	4	14	31	91.8	44	81.8	18.2
7.4.1 Demonstrates knowledge and skills necessary for program/project implementation in line with agreed-upon protocols	70	0	1	4	25	40	92.9	66	81.8	18.2
7.4.2 Demonstrates knowledge, skills, and attitudes to plan and lead organizational committee meetings	70	0	2	5	29	34	90.0	66	84.8	15.2
7.4.3 Demonstrates knowledge and skills to analyse technical program/project reports and follow up on the implementation of recommendations	70, 53*	1	2	3	26	38	91.4, 90.6*	66, 51*	72.7, 62.8*	27.3, 37.2*

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

Subdomain 7.5: Monitoring and Evaluation

This subdomain consisted of five competency statements. In general, of the participants that evaluated this subdomain, 92.2% voted it relevant for HN/HND graduates and 88.9% recommended its learning to occur during undergraduate level training (see Table 4.41). From the given justifications, it was noted that undertaking training in monitoring and evaluation as part of the HN/HND curriculum reduces the requirement for HN/HND graduates to pursue separate training in the same, "*This reduces incidences of grandaunts pursuing other course papers in M&E [monitoring and evaluation] after their general studies …"* Also noted was that this competency was best suited for graduates in managerial positions, "*Relevant for nutritionists at management level…this could be an elective for undergraduates."*

As for the evaluation of the competency statements under subdomain 7.5, all attained the ≥80% set level of respondent consensus in the first Delphi round in being evaluated as relevant for HN/HND practice. Only two (7.5.4 and 7.5.5) of the five competency statements attained the set level of consensus in being recommended for learning at the undergraduate level. The rest did not even after having been re-evaluated in the second Delphi round. As for the competency statements under this subdomain, a selection of the given participant's justifications is presented in Appendix W. As for the evaluation of the competency statements under this subdomain, the need for HN/HND graduates to demonstrate competency in undertaking monitoring and evaluation of program/project activities was evaluated as relevant but the consensus in recommending it for training at the undergraduate level was not attained. Participants highlighted that this competency was mainly needed by

HN/HND graduates working as project managers and that if at all training was to be done at the undergraduate level, it needed to be basic. Also noted was that organisations usually employed M&E specialists who have specific training in this area.

The need for HN//HND graduates to demonstrate competency in the use of the Development Assistance Committee (DAC) principles (relevance, effectiveness, efficiency, impact, and sustainability) in program/project evaluation was evaluated as relevant but consensus on recommending the learning of this competency at the undergraduate level was not attained as the competency was considered best suitable for the M&E experts and graduates at the managerial level hence best suited for master's level training.

The need for HN/HND graduates to demonstrate competency in analysing programme/project monitoring and evaluation data was evaluated as relevant but the consensus was not attained in recommending the training in this competency at the undergraduate level in both Delphi rounds. Even then, there was some optimism regarding whether the two years of master's training were also adequate to foster mastering of this competency. Some participants however felt it was relevant for training in this competency to be undertaken at both the undergraduate and the master's levels. The need for HN/HND graduates to demonstrate competency in preparing and presenting timely reports on program/project outcomes, activities, processes, and lessons learned to different stakeholders was evaluated as relevant and also recommended for undergraduate training. In evaluating this competency,

participants observed that reporting of program/project activities was poor amongst many graduates hence needed to be HN/HND improved.

The need for HN/HND graduates to demonstrate competency in undertaking QI of programme/project performance was evaluated as relevant and recommended for undergraduate training. However, it was also observed that QI needed to be learned as part of the CPD courses in HN/HND. The ratings of this competency statement are similar to how it was rated under subdomain 1.6 (technical support and capacity development) under the domain of prevention and management of malnutrition. Based on the Delphi observations, demonstrating competency in the broad subdomain of monitoring was evaluated as relevant for all HN/HND graduates. However, there was variability in recommending learning of the assessed competency statements for undergraduate training.

Table 4. 41. *Participants' Rating of Competency Statements under the Subdomain of Monitoring and Evaluation*

Competency domains, subdomains, and competencies	Level of Agreement							Level of Education		
	n	SD	D	NAD	A	SA	%A	n	% Undergrad	% Masters
7.5 Monitoring and Evaluation: Demonstrates knowledge, skills, and attitudes to plan, collect, and analyse data on program/project implementation schedules, inputs, processes, and outputs/deliverables to enable the undertaking of timely decisions for improving performance and accountability	51	0	1	3	18	29	92.2	45	88.9	11.1
7.5.1 Demonstrates knowledge, and skills in undertaking monitoring and evaluation of program/project activities	70, 54*	0	2	3	23	42	92.9, 96.3*	66, 53*	78.8, 62.3*	21.2, 37.7*
7.5.2 Demonstrates knowledge and skills on the use of the Organization for Economic Cooperation and Development/Development Assistance Committee (OECD/DAC) evaluation criteria/principles (relevance, effectiveness, efficiency, impact, and sustainability) in program/project evaluation	70, 53*	1	2	6	24	37	87.1, 84.9*	66, 48*	62.1, 39.6*	37.9, 60.4*
7.5.3 Demonstrates knowledge and skills to analyse program/project monitoring and evaluation data to make relevant recommendations for performance improvement	70, 53*	1	2	4	22	41	90.0, 86.8*	66, 50*	74.2, 50*	25.8, 50*
7.5.4 Demonstrates knowledge and skills to prepare and present timely reports on program/project outcomes, activities, processes, and lessons learned to different stakeholders	70	0	1	3	22	44	94.3	66	89.4	10.6
7.5.5 Demonstrates knowledge, skills, and attitudes required for undertaking quality improvement (QI) for improving program/project performance	70	1	1	6	24	38	88.6	66	80.3	19.7

SD: Strongly Disagree; D: Disagree; NAD: Neither Agree nor Disagree; A: Agree; SA: Strongly Agree; Undergrad: Undergraduate; *Values for the second Delphi round

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.1 Introduction

This study aimed to identify the competencies required of HN/HND professionals to competently perform in Uganda's health system as well as develop and validate a CBE model suitable for training graduates in these fields at the undergraduate level in the country. The discussion section is presented in two main sections starting with the results from the competency needs assessment phase and then those of the model development and content validation phases of the study.

5.2 Competency Needs Assessment

5.2.1 Demographics, Training, and Occupation Characteristics of Participants

5.2.1.1 HN/HND Graduates

The response rate by HN/HND graduates was 29.3%; higher than that usually obtained for online/email-based surveys (N. Cunningham, Pham, Kennedy, Gillard, & Ibrahim, 2017). Amongst the HN/HND respondents; more females than males responded to the survey. This could be attributed to the social behaviour differences in the way males and females engage in online activities; females are reported to engage more in online information exchange than males (Smith & Smith, 2008). Responding to this study was more of an information exchange.

Over three-quarters of the HN/HND respondents were graduates of Kyambogo University; this was expected given that Kyambogo University started offering the program about seven years before Makerere University. Close to half of the HN/HND respondents (44.7%) had obtained additional training at different levels reflecting the

value of professional growth and development. As for the HN/HND student internships, most of the respondents undertook their first study internships in the regional and national referral hospital(s).

The second internships were reported as mainly having been undertaken in non-governmental organizations. This study did not assess whether the HN/HND study internships were supervised based on a set of nationally accredited HN/HND practicum standards. Nonetheless, these did not exist at the time of undertaking this study as universities were using institutional-specific set guidelines. However, it has been demonstrated that undertaking supervised practice under the guidance of accredited standards provides opportunities for updating the curriculum, has the potential of increasing the employability of graduates, and generally contributes to the improvement of nutrition and dietetics services (Bawadi et al., 2019).

Based on these study findings, a need for post-graduate tailored training programs through which HN/HND graduates can obtain higher academic and professional credentials was observed. The observation that regional and referral hospitals and non-government organizations took on high numbers of student interns highlights the emerging relevancy of non-academic institutions to support HN/HND training in Uganda. In the short and long run, it may be beneficial for higher academic institutions to have formal partnerships with these institutions to foster closer monitoring and supervision of what students are exposed to during internship training. Forming such partnerships may also necessitate the setting up of standards or criteria based upon which non-academic institutions are selected to host HN/HND student interns. The observation that most internships were undertaken in organizations

located mainly in the central region and yet graduates worked across all the different regions of the country calls for initiatives to be undertaken to expose students to the cultural and social welfare conditions prevalent across all regions of the country during training.

The results also showed that HN/HND graduates were working with different actors and in different sectors both government and non-government across the four regions of Uganda with some undergraduates working outside the country. The employment of undergraduates by different categories of employers across the different regions of Uganda and with some working outside the country shows a probable increase in employment opportunities for HN/HND graduates in other sectors beyond health and to an extent confirms the multisectoral nature of nutrition that is increasingly creating demand for the same professionals in different sectors within and outside Uganda.

The fact that most undergraduates were working in the northern region of the country could be due to the increased presence of NGOs operating in that region due to the increased influx of refugees at the time when data collection for this study was undertaken. The northern region of Uganda has different refugee camps including the Bidi bidi refugee settlement which is considered one of the largest refugee settlements in the world (FAO, 2019). Given that most organizations have their headquarters in the central region of Uganda; it was not surprising that the central region had the second-highest number of undergraduates employed. From a training perspective, these findings point to the need to ensure that the training received in HN/HND equips undergraduates with the knowledge and skills necessary to work with multiple actors, in a multisectoral setting, within and outside Uganda.

5.2.1.2 Academic Staff and HN/HND Work/internship Supervisors

Academic staff and immediate work/internship supervisors are well-positioned to provide an evaluation of the knowledge and skills exhibited by the HN/HND graduates. These were hence targeted to obtain additional views that could be triangulated with those from the HN/HND respondents so as have a broader understanding of the knowledge and skills required of the HN/HND graduates in Uganda. As noted in the results, there was an almost equal number of academic staff from Makerere and Kyambogo Universities that participated in the study. The observation that the majority of the staff had doctorate training and that some had over ten years of training experience points to the potential existence of skilled staff in the two universities to undertake HN/HND training. Universities need to support all their academic staff to obtain doctorate training as this improves research, training, and the general credibility of an institution (Dickens Mushemeza, 2016). The recruitment and retention of qualified academic staff have been shown to positively contribute to the functionality of African Universities (Dickens Mushemeza, 2016).

5.2.2 Nutrition/Dietetics Needs and Demands in Uganda

5.2.2.1 Nutrition and Dietetics Challenges Faced by Communities

In general, the trainers' and supervisors' perceptions mirrored those of the graduates as all stakeholders viewed communities to be facing a variety of nutrition-specific and nutrition-sensitive challenges. Although the findings of this study are mainly based on the provider perspectives, this study reaffirms findings in other literature that communities across Uganda face multiple nutrition and dietetic challenges (Government of Uganda, 2011; Pomeroy-Stevens, Amanda, & Agostino, 2014; Uganda Bureau of Statistics & ICF, 2018). These require to be addressed by different

stakeholders, at different levels, through the implementation of both nutrition-specific and nutrition-sensitive interventions (Agaba, Ghosh, & Griffiths, 2017; Government of Uganda, 2011; Pomeroy-Stevens et al., 2016). The multiple nutrition and dietetics challenges facing the different communities of Uganda also call for the need to equip HN/HND graduates with a variety of knowledge and skills to be able to address these different challenges. Further, the findings substantiate the need for HN/HND graduates to be employed by different stakeholders across the different regions of Uganda as was observed in the study.

5.2.2.2 Nutrition and Dietetic Services Requested and Provided to Communities

Based on the views of the different stakeholders, the nutrition interventions requested, provided, and considered a priority to provide to communities included a mixture of both nutrition-specific and nutrition-sensitive interventions. Nutrition interventions in the areas of awareness, education, and counselling; integrated management of acute malnutrition; and food security and livelihoods were perceived to be the main ones demanded by communities, provided by employers, and also considered as a priority to provide.

Using the Lancet series classification of nutrition interventions (Ruel et al., 2013), this study generally highlights the need for HN/HND graduates in Uganda to have competency in the provision of both nutrition-specific and nutrition-sensitive interventions. By highlighting the need for both nutrition-specific and nutrition-sensitive interventions, the stakeholders' perceptions to an extent justify the earlier

observation that communities face multiple nutrition and dietetics challenges that call for a multiplicity of interventions to be addressed (Reinhardt & Fanzo, 2014).

Worth noting also is that Uganda embraced the multisectoral model of implementing nutrition interventions through which different actors and sectors were mobilized to address malnutrition at different levels (Government of Uganda, 2011; Pomeroy-Stevens et al., 2016; Republic of Uganda-Office of the Prime Minister, 2015). Given that awareness, education, and counselling are key in influencing behaviour change, the findings of this study also substantiate earlier findings by Lubogo and Orach (Lubogo & Orach, 2016) that pointed to community and behaviour nutrition research as one of the most desirable options for addressing undernutrition in Uganda.

5.2.3 Competencies Required of HN/HND Graduates in Uganda

5.2.3.1 Nature of Work and Job Roles Performed by Practicing Graduates

According to the results, the nature of work done by HN/HND graduates in Uganda varies, the dominant being work that entails aspects of organizational leadership and management; management of nutrition-related disease conditions both in health facilities and communities; nutrition and health promotion; research and documentation; and advocacy, communication, and awareness. The nature of work and the related job roles performed by HN/HND graduates in Uganda to an extent mirror those in other countries including the developed countries. For instance, Registered Dietitians in the United States work in various sectors including health care settings, community and public health care settings, academia, research, food, and nutrition industry, and the business industry (DiMaria-Ghalili et al., 2014). In the

UK, nutritionists hold jobs in health service, public health, academia, and mass media depending on training and expertise (Landman & Wootton, 2007).

From the findings, observation was also made that some work roles performed by HN/HND graduates were so specific to nutrition and dietetics and hence required specialized training. Other roles, though not requiring specific training in nutrition and dietetics, were core for the HN/HND graduates to exhibit all-round competency in the profession. This observation points to the need to equip HN/HND graduates in Uganda with both profession-specific and interprofessional knowledge and skills. According to Frenk et al. (2010), profession-specific competencies can be attained through CBE. On the other hand, interprofessional competencies can best be attained through interprofessional education which involves students of two or more professions learning together about each other's roles (Frenk et al., 2010; World Health Organization, 2010). The adoption of interprofessional education in nutrition and dietetics training is particularly important given that Nutritionists and Dietitians work in teams with other professionals in implementing the multisectoral nutrition interventions.

5.2.3.2 Knowledge and Skills Required of HN/HND Graduates

About 20 knowledge and skills themes were identified based on the stakeholder responses; all were assessed to generally align with what one would require to implement nutrition-specific and nutrition interventions. We observed similarities in the identified themes to what has been proposed for degree-level training in the regional model nutrition curriculum for health workers based in the East, Central, and Southern Africa Health Community (East Central and Southern Africa-Health

Community, 2017) and the competency framework developed for nutrition in the emergencies sector (Meeker et al., 2013).

Of the identified knowledge and skills, integrated management of acute malnutrition; communication, education, and counselling; medical/clinical nutrition therapy; research, proposal and report writing; nutrition screening and assessment; and leadership and management comprised the top six knowledge and skills areas mentioned as being expected of graduates. Although highlighted amongst the top six knowledge and skills areas required of HN/HND graduates, medical/clinical nutrition therapy; integrated management of acute malnutrition; communication, education, and counselling; leadership and management; and research, data analysis, proposal and report writing also featured amongst the top six knowledge and skills gaps amongst individual HN/HND respondents. From the findings, it was further observed that HN/HND respondents indicated not having adequately attained knowledge and skills in most of the key areas they are expected to be competent. This finding points to a likely mismatch between the knowledge and skills expected of HN/HND graduates to those obtained through training. On the other hand, these findings could also be highlighting the existence of probable inefficiencies in the curricula and inadequacies by higher education institutions to train competent HN/HND graduates in Uganda.

It should be highlighted that the responses were obtained from HN/HND graduates that were trained using earlier versions of the curriculum. Kyambogo University, in particular, adopted a new four-year curriculum in 2016 to replace the three-year curriculum that it had been using. The highlighted inefficiencies could have been corrected in the revised curriculum. Hence, the HN/HND responses on the knowledge

and skills not adequately obtained during training would likely differ if undergraduates trained using the recent curriculum for Kyambogo were interviewed. However, the fact that responses were obtained from practicing graduates gives a clear indication of the nutrition and dietetics related challenges addressed by the graduates; the knowledge and skills gaps amongst the graduates; and the knowledge and skills required of HN/HND graduates to practice in the varied health systems settings in Uganda.

In a broader perspective, the need for competent HN/HND graduates as highlighted in this study aligns with the aspirations by the Government of Uganda to train graduates with the necessary skills and abilities to meet Uganda's development needs (National Planning Authority, 2010; Republic of Uganda, 2015b). It should also be noted that at the global level, the WHO has called upon Member States to consider "strengthening educational institutions to scale up the training of health personnel and developing innovative curricula to address current health needs" (World Health Organisation, 2010, p. 8).

Although the possession of knowledge, skills, and attitudes required for health systems performance is key for all health professionals (Frenk et al., 2010), whether undergraduates can possess all the expected/required competencies by the time they graduate is contested. In the United States of America, the development of skills by HN/HND graduates was envisaged to occur in different phases; from one being a novice, progressing to the level of an advanced beginner, to becoming competent, proficient and in the end an expert (Bruening et al., 2015). Based on this view, it can

be assumed that defining a competent Nutrition and Dietetics graduate depends on what is stipulated in the existent national or institutional training standards/curriculum. At the time of undertaking this research, the curricula used to train HN/HND in Uganda were institutional specific and mainly specified learning outcomes instead of the competencies that students are expected to exhibit upon graduation. Research undertaken in Kenya showed that undertaking a curricula review is critical to improving the quality and relevance of health workforce training (Mumbo & Kinaro, 2015).

The need for competent Nutrition and Dietetics professionals as highlighted in this study aligns with the aspirations of the Government of Uganda to train and equip graduates with the necessary skills and abilities to meet Uganda's development needs (National Planning Authority, 2010; Republic of Uganda, 2015b). It is also in line with the African Union strategy to "Reorient Africa's education and training systems to meet the knowledge, competencies, skills, innovation and creativity required to … promote sustainable development at the national, sub-regional and continental levels" (African Union, 2016).

In line with the recommendation to improve the training of health professionals for the 21st century (Frenk et al., 2010), it is worth noting that countries are increasingly adopting CBE in the training of their Nutrition and Dietetics professionals to equip graduates with the knowledge and skills required for health systems performance (Accreditation Council For Education in Nutrition and Dietetics, 2015; British Dietetic Association, 2018b, 2018a; Dietitians Association of Australia, 2015; Dietitians Board, 2017; European Federation of the Associations of Dietitians

(EFAD), 2016; Partnership for Dietetic Education and Practice, 2013). The adoption of CBE in HN/HND training in Africa is low but has since been embraced by countries like South Africa (Health Professions Council of South Africa, 2016).

5.2.4 Scope of Human Nutrition and Dietetics Training and Practice in Uganda

The participants' perceptions of the work roles, activities performed, and the competencies expected of the HN/HND graduates are described in earlier sections (see results section 4.2 to 4.3 and discussions 5.2 to 5.4). This section discusses the findings under three subheadings; 1) regulation of the training and practice of HN/HND in Uganda, 2) strategies to foster continuous professional development in HN/HND in Uganda, and 3) challenges towards implementing CBE in Uganda.

5.2.4.1 Regulation of the Training and Practice of HN/HND in Uganda

As per the findings of this study, participants expressed mixed views regarding the regulation of the HN/HND profession in Uganda with the majority of the HN/HND graduates and some of the academic staff and work/internship supervisors not considering the training and practice of HN/HND regulated. The view that the training and practice of HN/HND were not regulated was partly attributed to observations that there was no legally recognised professional body solely mandated to undertake this function and the belief that the profession had been infiltrated by members of other professions who had fear of being affected if proper regulation of the HN/HND profession was undertaken. Participants who recognised that regulation of the HN/HND profession existed pointed out the NCHE as being responsible for regulating the training through its mandate of accrediting university HN/HND academic programs. On the other hand, the AHPC, under the ministry of health, was

highlighted as being concerned with regulating the practice of HN/HND, a mandate it had recently assumed.

Mixed views were also expressed in regards to the existence of national minimum training and practice requirements and standards. In the absence of these, it was observed that reliance was mainly put on individual university curricula and other existent sector guidelines/plans and protocols. However, the standards upon which the HN/HND curricula in the different universities were developed, including the curriculum itself, were reportedly unknown to many participants. Participants also highlighted that different legislations, regulations, policies, standards, and guidelines could be relied upon to support HN/HND training and practice. Mentioned examples included the Constitution of the Republic of Uganda (Republic of Uganda, 2006a); the Universities and Other Tertiary Institutions Act (Republic of Uganda, 2006b); the Allied Health Professional Act (Republic of Uganda, 1996b), and the related Code of Conduct for Allied Health Professionals; the Uganda Food and Nutrition Policy (Republic of Uganda, 2003); the National Food and Drug Act (Republic of Uganda, n.d.); the Uganda Nutrition Action Plan (Government of Uganda, 2011); and the National Development Plan II (Republic of Uganda, 2015b).

At the ministerial level, respondents pointed to the existence of different nutrition policies, standards, and guidelines under the Ministries of Health; Agriculture; and Gender Labour and Social Development. Examples included the Health Sector Policy and Strategic Plans, IMAM guidelines for Uganda (Ministry of Health, 2016), IYCF guidelines (MoH, 2009), NACS guidelines under the ministry of health (Uganda

Ministry of Health, 2016); MIYCAN guidelines (MoH, 2021a, 2021b) and the National School Feeding Guidelines. The IMAM guidelines in particular were reported to specify the procedures for the management of malnutrition at different levels but were not broad enough to capture other nutrition problems on the other hand. It was also highlighted that some non-governmental organisations had guidelines and training materials that could be relied upon. Examples under this category included the Nutrition Training Manual Developed for Tea Communities of Uganda by the Uganda Action for Nutrition (Uganda Action for Nutrition & Ethical Tea Partnership, 2014).

Besides the examples of legislation, policies, standards, and guidelines mentioned, reference was also made of the WHO's essential nutrition actions and guidelines (WHO, 2019). Turcan & Bene (2017) provide a review of policies for improving human nutrition under the MoH. As can be noted from the study findings, the mentioned legislations, policies, guidelines, and standards are diverse in scope and exist under different ministries, agencies, and departments, and in different other organisations. Comprehension of all the nutrition and dietetics-related content as stipulated in the diverse legislations, policies, standards, and guidelines during training is challenging, untenable, and unattainable but could be achieved through continuous professional development (CPD) and professional experience/practice.

Participants further observed that it was necessary to develop and adopt a delineated scope of HN/HND training and practice for Uganda as this would contribute to the standardisation of the training, improve services delivery, and promotes general

stakeholder understanding of the HN/HND profession. It was also noted that by not having a defined scope of training practice, HN/HND graduates continuously lost out on some job opportunities. Doobay-Persaud et al. (2019) have demonstrated that performing outside the scope of training and practice is ethically problematic and legally impermissible and that efforts to reduce this from occurring are partly dependent on undertaking prior training based on a defined scope of training and supervision.

Accreditation, as a part of academic program regulation, serves to "verify the quality of academic programs and of institutions to external stakeholders (Lubinescu, Ratcliff, & Gaffney, 2001, p.4). In medical education, accreditation has been shown to improve the quality of training and the competency of the graduates (Rillo, Elina Martínez-Carrillo, & Castillo-Cardiel, 2021). Currently, the role of accrediting all institutions of higher education and their academic and professional programs in Uganda is vested in the NCHE under the Universities and Other Tertiary Institutions (Amendment) Act of 2006. Accordingly, this role is supposed to be undertaken "in consultation with Professional Associations and Regulatory bodies" (Republic of Uganda, 2006b, p.3).

The Universities and Other Tertiary Institutions (Amendment) Act, 2006 stipulates that "no person shall operate a University, Other Degree Awarding Institution or a Tertiary Institution, without the prior accreditation of its academic and professional programmes by the National Council for Higher Education" (Republic of Uganda, 2006, p.1). As per its mandate, the NCHE has set standards for accrediting higher

education institutions and their programmes. Among others, the standards stipulate admission, staffing, minimum standards for courses of study, minimum standards for education and training, and infrastructure requirements required of institutions to undertake training at different levels (Republic of Uganda, 2008). This role of the NCHE was alluded to by the participants as it was highlighted that the HN/HND curriculum used by each university had to confirm to set curriculum guidelines before being accredited by the NCHE.

The study findings on the need for the university curricula to conform to the NCHE standards are similar to those by Kalanda, Likoye, & Otiende (2021) were participants observed the Universities and Other Tertiary Institutions Act as being the main document from which Higher Education Institutions in Uganda derive their policies and related standards. Following the requirements of the NCHE, Universities in Uganda are required to review their academic programmes and seek re-accreditation of the same after every five years.

The regulation of the HN/HND profession in Uganda is recent with the mandate to register HN/HND professionals having been accorded to the AHPC in 2018 as per the Uganda Gazette of 9th March 2018, General Notice No. 184 (Republic of Uganda, 2018). At the time of writing this thesis, the Uganda Gazette of 9th March 2018 General Notice No. 184 and the Allied Health Professionals Act (Republic of Uganda, 1996b) were the main binding instruments on the registration of Nutritionists in the country; no other Statutory Instrument had been adopted specifically for that purpose. As per the Allied Health Professionals Act Cap 268 (Republic of Uganda, 1996b), the

APHC “sets the standards of training and practice and indeed the scope of practice according to their training, together with the parameters of discipline, should they stray from the designated standards” (Allied Health Professional Council, 2018, p.26). Although there were other Universities training HN/HND, the Gazette only recognized graduates of the Bachelor of Science in HN/HND of Makerere University, Kyambogo University, and the Uganda Christian University as Nutritionists. It also recognized graduates of the Diploma in Clinical and Community Nutrition of the Uganda Institute of Allied Health and Management Sciences, Mulago as Assistant Nutritionists.

Further, although university HN/HND programs in Uganda vary in their naming i.e. Human Nutrition, Human Nutrition and Dietetics, and Human Nutrition and Clinical Dietetics; the Uganda Gazette of 9th March 2018 General Notice No. 184 makes no distinction between Nutritionists and Dietitians. In some countries, unless explicitly mentioned, Nutritionists and Dietitians are registered as different professions each needing different credentials for entry into the profession. In East Africa, the Republic of Kenya for instance has a Nutritionists and Dietitians (Amendment) Act that clearly defines who a Nutritionist or Dietitian is in Kenya including the levels of training and practice that one needs to obtain for each of the different credentials (Republic of Kenya, 2017).

Although the Uganda Gazette of 9th March 2018 General Notice No. 184 confers powers of registering Nutritionists to the APHC under Section 19(2) of the Allied Health Professionals Act, Cap. 268 (Republic of Uganda, 1996b), the Act is yet to be

amended to reflect Nutrition as a profession. Still, the registration of Nutritionists as Allied Health Professionals seems to be arbitrary to the ECSA-HC Resolutions of the Health Ministers' Conferences where Nutritionists are referred to as a separate profession from the Allied Health Professionals (East Central and Southern Africa-Health Community, 2018).

Despite the mandate of the AHPC to register/regulate the HN/HND, no standards specific to the scope of training and practice of HN/HND in Uganda had been published by this body by the time of undertaking this study. Participants partly attributed the unavailability of national HN/HND training and practice guidelines/standards for the HN/HND profession to be due to the failure to timely and collectively engage all relevant stakeholders involved in the training and practice of HN/HND; and the prolonged absence of a legally established entity with the mandate to regulate the practice of HN/HND. Recently, the mandate of regulating the HN/HND profession was passed on to the AHPC. In all, elaborate competency standards are essential for defining the scope of practice of a profession and can be used as a basis for developing frameworks for accrediting training programs (Palermo, 2015). However, there were no explicit CBE standards for the HN/HND profession in Uganda at the time of undertaking this study; attempts to develop these shall need to be undertaken.

It is critical to note that depending on the existent national regulations the credentials for the nutrition and dietetics professions of different countries may or may not vary (Accreditation Council For Education in Nutrition and Dietetics, 2015; British

Dietetic Association, 2016; Dietitians Association of Australia, 2015; European Federation of the Associations of Dietitians (EFAD), 2016; Partnership for Dietetic Education and Practice, 2013; Republic of Kenya, 2017; Wentzel, 2016). Besides the training received in HN/HND, the variances in the two professions mainly exist in the form of the required certified supervised dietetic practice that one must undertake before qualifying as a dietitian or registered dietitian. DiMaria-Ghalili et al., (2014) note that registered dietitians receive specialized, in-depth nutrition science, research, and education training at the undergraduate level which distinguishes them from other disciplines, and that although registered dietitians are nutritionists the reverse is not true. They further noted that other health professionals may receive nutrition training embedded in their undergraduate training or during advanced graduate training which qualifies them to undertake roles of nutritionists but this does not make them dietitians.

For the HN/HND profession to be effectively regulated in Uganda, this study observes a need to amend the Allied Health Professionals Act, Cap. 268 to reflect the nutrition and dietetics professions as well distinguish between the two or specify whether the single reference to a Nutritionist includes both Nutritionists and Dietitians. This shall be essential to avoid possible unforeseen future legal and ethical dilemmas in regulating, setting the scope of training and practice as well as developing the required standards for the two related specialties in Uganda. In South Africa for instance, regulators adopted the term “Nutrition Professional” to refer to all Nutritionists and Dietitians trained in the country to avoid future challenges in setting the scope of training and practice and the general regulation of two quite indistinct professions (Wentzel, 2016).

5.2.4.2 Strategies to Foster Continuous Professional Development in HN/HND in Uganda

According to Ramani, McMahon, & Armstrong (2019), CPD offers health professionals opportunities for improving their knowledge and skills to meet the ever-changing health system needs. From this study's assessment, besides undertaking post-graduate training, some participants considered other opportunities for CPD in HN/HND existent in Uganda but some considered them inexistent. Based on the responses, it appeared that formally recognised structured stand-alone CPD programmes for HN/HND did not exist in Uganda at the time of undertaking this study yet graduates wished to have these as it happens in the medical and legal professions; this constrained graduate advances towards CPD. Universities and the Ministry of Education and Sports were viewed as being well-positioned to play a leading role in instituting formal CPD programs for HN/HND through developing Memorandums of Understanding (MoU's) with different organisations and forming partnerships with different organisations.

Undertaking CPD is "fundamental to the development of all health professionals and is the mechanism through which quality health service delivery is identified and provided" (Republic of Kenya, 2014, p.8). CPD programs can be professional-specific or interprofessional and undertaken in different forms of seminars, workshops, and general physical or online training. The strategies that could be undertaken to foster CPD in HN/HND as identified by the different participants included instituting training opportunities; enacting effective legislation; partnerships and collaborations; and funding and resources mobilization. On the other hand, the identified challenges that could impede the adoption of CBE in the training of HN/HND in Uganda

included inadequate institutional staffing/human resources; lack of harmonised HN/HND curriculum; limitations in curriculum and training related legislations and policies; limited financial resources; limitations in time allocation; low stakeholder awareness of CBE; low political will; lack of regulatory & accreditation body; low technical expertise to design and implement CBE curriculum; low stakeholder collaborations; and policy, regulatory, and infrastructural related challenges.

On the whole, besides graduates undertaking post-graduate training, the results of this study pointed to the lack of a formal nationally recognised CPD programme for the HN/HND profession in Uganda. However, isolated CPD opportunities provided by different stakeholders existed. Despite this, the guidelines on Continuing Professional Development Accreditation System for Uganda (Uganda Health Professionals' Council, 2009) stipulate the need for accrediting CPD programmes including the agencies proving these CPDs to ensure that the activities comply with set standards.

5.2.4.3 Challenges towards Implementing HN/HND Competency-based Education in Uganda

Several challenges related to inadequacies in (1) finances; (2) human resources; (3) policy and regulations (4) infrastructure; (5) curriculum and training; (6) political will; (7) stakeholder awareness of CBE; and (8) stakeholder collaborations were mentioned as likely to affect the implementation of CBE for the HN/HND profession in Uganda. Instituting strong supportive institutional and leadership mechanisms; a properly designed curriculum, and paying focus to train university tutors in CBE is noted to have contributed to the success of CBE programs in pharmacy education

(Katoue & Schwinghammer, 2020). Such solutions if undertaken can contribute to undertaking CBE for the HN/HND profession in Uganda.

5.3 Development and Validation of HN/HND Competency-based Education Model

5.3.1 Introduction

The fourth objective of this study sought to develop and validate a competency-based education model suitable for the training of HN/HND at the undergraduate level in Uganda. To achieve this objective, an iterative multiple methods approach (Tanya et al., 2019) that utilised findings of the first three study objectives was undertaken in three main stages of stakeholder needs assessment results validation workshop; focus group discussions; and two stages of modified Delphi assessment. The focus of this discussion is on the CBE framework and its constituent subdomains and competency statements as an outcome of these different processes.

The mastery of professional competencies is important in fostering the impact and sustainability of individual careers (Suhairom, Musta'amal, Hatib, Amin, Mohd, Fadila, Kamin, & Wahid, Abdul, Husna, 2019). DiMaria-Ghalili et al. (2014) consider the identification and evaluation of the nutrition and dietetics health systems performance competencies needed by each type of health professional cadres critical. Some countries have taken strides to identify the competencies required of their nutrition and dietetics professionals and also developed competency frameworks in support of CBE (Accreditation Council For Education in Nutrition and Dietetics, 2015; British Dietetic Association, 2018b, 2018a; Dietitians Association of Australia, 2015; Dietitians Board, 2017; European Federation of the Associations of Dietitians

(EFAD), 2016; Health Professions Council of South Africa, 2016; Partnership for Dietetic Education and Practice, 2013; Save the Children & Jhpiego, 2012).

5.3.4 The HN/HND Competency-Based Education Model Framework

Participant consensus on the contents of the draft HN/HND CBE framework (seven domains, 24 subdomains, and 190 competency statements) was undertaken in two Modified Delphi rounds. After the first round, 16 competency statements were excluded for being duplicates, ambiguous, or broad and impractical to assess hence leaving 174 competency statements that were analysed. Upon completing the two modified Delphi rounds, all the seven domains (100%); 22 (91.7%) of the 24 subdomains; and 153 (87.9%) of the 174 analysed competency statements were evaluated as both relevant and suitable for training HN/HND at the undergraduate level; all these constitute the final developed and validated HN/HND competency-based education model framework.

The model framework as developed and validated communicates the competencies expected of HN/HND graduates for effective health systems performance in Uganda and has the potential to promote increased investments in HN/HND professional education if adapted for HN/HND training in the country. The participants in the Delphi had knowledge and expertise in different areas of nutrition and dietetics practice and showed a willingness to engage in consultative discussions. However, it is argued that being aware of particular topics does not necessarily make one an expert, rather those who may directly or indirectly be affected by the given outcome show more interest to contribute to the Delphi process (Keeney et al., 2011).

In the region, the developed CBE framework to an extent substantiates what has been proposed in the ECSA-HC Regional Model Nutrition Curriculum for Frontline Health Workers (East Central and Southern Africa-Health Community, 2017). Some of the identified competencies also compare to those in the framework of Nutrition Core Competencies for Health Science Cadres and Undergraduate Nutritionists in Ethiopia (Save the Children & Jhpiego, 2012) and the competencies idenfified for the Nutrition profession in South Africa (Wentzel, 2016); however, it is not as explicit in terms of separating the knowledge from the skills and attitudes as was done in these two frameworks. Nonetheless, the need to separate these was recommended by one of the participants during the stakeholder validation workshop. In general, though developed based on the Ugandan context, the competencies in the CBE model framework are broad and could be applicable for HN/HND graduates of other countries with similar nutrition and dietetics challenges.

5.3.4.1 Prevention and Management of Malnutrition in all its forms

Aggregately, the ratings of this domain, all its ten subdomains, and almost all the competency statements attained the ≥80% set level of respondent consensus in the first Delphi round in consideration that they were both relevant for HN/HND graduates and suitable to be learned at the undergraduate level. The only exception was for competency statement 1.6.2 on the need for HN/HND graduates to demonstrate skills in using approved QI tools to facilitate the sustainable delivery of quality and equitable nutrition services for which the relevancy ratings attained the ≥80% set level of respondent consensus in the second Delphi rouns.

As can be noted, the first four subdomains of nutrition assessment, nutrition diagnosis, nutrition intervention, and monitoring and evaluation of nutrition interventions represent key steps of the Nutrition Care Process and Model (NCPM); a global standard followed in providing nutrition and dietetics care services (Hammond et al., 2014; Karen Lacey & Pritchett, 2003; Swan et al., 2019). Nutrition assessment comprises anthropometric, clinical, dietary, and biochemical or laboratory nutrition assessments (Gurinović, Zeković, Milešević, Nikolić, & Glibetić, 2017). The remaining subdomains though not directly represented under the NCPM, support its achievement. Understanding NCPM is critical for it enables nutritionists and dietitians to assess, diagnose, treat, monitor, and evaluate clients under their care.

The developed CBE framework envisions the need for HN/HND graduates trained in Uganda to demonstrate competency in emergency nutrition but participants cautioned that the levels of competency amongst HN/HND graduates ought to defer depending on the level of training received. Demonstrating competency in emergency nutrition necessitates the graduates to be equipped with the requisite competencies in emergency nutrition and the general understanding of the SPHERE standards on food security and nutrition in addition to all other standards (Sphere Association, 2018) during pre-service training. Demonstrating competency in emergency nutrition is also recognised in the Uganda IMAM guidelines (Ministry of Health, 2016).

Verification of the extent to which SPHERE standards especially on food security and nutrition are addressed by existing curricula was beyond this study's scope. In developing a competency framework for nutrition in the emergency sector, Meeker et

al. (2013) highlighted the need for strengthening the capacity of emergency nutritionists and clarifying the knowledge and skills these cadres require. As also noted in the competency needs assessment results of this study, some HN/HND graduates were employed by NGOs working in the humanitarian sector where competency in emergency nutrition is a prerequisite. It is equally important to note that Uganda is one of the countries hosting the highest numbers of refugees globally (WFP, 2021), opportunities exist for HN/HND graduates to work in the humanitarian/emergency sector. This CBE model provides a list of competencies evaluated as relevant and suitable for undergraduate HN/HND for graduates to ably work in the emergency sector. Humanitarian agencies like the WFP have guidelines to guide the management and supply of nutrition supplies (WFP, 2013), these can be further relied upon to broaden the scope of training in this area. The provision of nutrition supplies is central in nutrition services delivery; this makes it critical that HN/HND graduates have the competencies required to plan, procure, and deliver different nutrition supplies.

Demonstrating the competency necessary for offering technical support and capacity development in the management of malnutrition was evaluated as both relevant and suitable for undergraduate HN/HND training. The participants also viewed it necessary for graduates to undertake post-graduate training and CPD to improve their competency in offering technical support. The evaluations generally pointed to the need for HN/HND graduates to demonstrate overall competency in the area of supportive supervision in nutrition. According to the WHO, supportive supervision “is a process of helping staff to improve their own work performance continuously. It is carried out in a respectful and non-authoritarian way with a focus on using

supervisory visits as an opportunity to improve knowledge and skills of health staff" (WHO, 2008, p.1). In low and middle-income countries, supportive supervision has been shown to improve the quality of offered health services and adherence to health guidelines (Avortri, Nabukalu, & Nabyonga-Orem, 2019; Lazzerini et al., 2019). With the three main 'Rs' for an effective supportive supervision system being the Right supervisors, the Right tools, and the Right resources (WHO, 2008) it is not surprising that participants perceived offering technical support and capacity development as complex and requiring advanced technical skills.

The subdomain on interprofessional collaborations in the management of malnutrition and its five assessed competency statements were evaluated as both s relevant for HN/HND graduates and suitable to be learned during undergraduate level training. Interprofessional collaboration, where health workers with different training backgrounds jointly work together in the delivery of health services (DiMaria-Ghalili et al., 2014) is highlighted to be important for improving quality service delivery and has long been recognised and promoted (Landman & Wootton, 2007; WHO, 2010) and a framework for interprofessional education and collaborative practice developed (WHO, 2010). Adopting interprofessional approaches in education is recommended for it helps to equip health professionals with the requisite competencies required for addressing prevailing global health systems challenges (Jogerst Kristen, Callender Brian, Adams Virginia, & Evert Jessica, 2015). The CBE framework as developed in this study provides an evaluation of competencies considered necessary for HN/HND graduates to be able to undertake interprofessional collaborations in the prevention and management of malnutrition in Uganda.

In evaluating the need for HN/HND graduates trained in Uganda to demonstrate competency in WASH, a consensus was attained for the subdomain and all the six assessed competency statements in the first Delphi round in consideration that these were both relevant for HN/HND graduates and suitable undergraduate training. According to the WHO guidelines for drinking-water quality, "Water is essential to sustain life, and a satisfactory (adequate, safe, and accessible) supply must be available to all" (World Health Organisation, 2011, p.1). SDG 6 aims at ensuring the availability and sustainable management of water and sanitation for all (United Nations, 2015). Capacity gaps in WASH promotion have been linked to insufficient soft skills amongst program implementing managers partly due to the training received being unmatched to the community needs and also to the limited capacity of training institutions to offer quality training in WASH (Crocker, Shields, Venkataramanan, Saywell, & Bartram, 2016). Poor WASH has known consequences, Rukundo, Rukooko, Andreassen, & Iversen, (2019) found households with insufficient access to WASH facilities to be food insecure. In this study, six competency areas in WASH and nutrition were evaluated as relevant for inclusion in a CBE model suitable for HN/HND training at the undergraduate level in Uganda.

The need for HN/HND graduates to demonstrate competency in procurement and management of nutrition supplies was evaluated. All the assessed five competency statements attained the ≥80% set level of respondent consensus in the first Delphi round in consideration that they were relevant for the graduates and their learning need to occur during the undergraduate level. Some participants however felt that competency in procurement and management of nutrition supplies was not a necessity for HN/HND graduates as organisations usually employ personnel with training in

procurement and logistics. Nutrition supplies vary (Unicef, 2018) but mainly exist in the form of feeds (therapeutic and non-therapeutic), non-food items, and equipment. The competencies evaluated in this study and included in the CBE framework provide key critical areas for which graduates need to be trained in the management of nutrition supplies. The Sphere Handbook (Sphere Association, 2018) sets out some considerations for supply chain management applicable to nutrition commodities as well.

The subdomain on medical data management and record-keeping and all its competency statements were evaluated as both relevant and suitable for undergraduate HN/HND training in the first Delphi round. During the evaluation, it was observed that: graduates of all levels needed to be grounded in data management as data was needed right from needs assessment, clerking, and monitoring client progress; documentation of nutrition records using different medical styles was uncommon amongst nutrition care services providers and that this needed to be addressed; it was important for all HN/HND graduates to be trained on the basic documentation styles since all do documentation at some stage; it was important for all nutrition care providers to have skills in the use of HMIS; mentoring was crucial for health systems strengthening.

Health/medical records in their different forms of assessments, care plans, progress notes, letters about patients, and other forms of written communication about patients promote the continuum of care and support effective decision making for appropriate patient care and treatment plans (Beach & Oates, 2014). It is thus important that their

writing of these records is “clear, concise, legible, non-judgemental, patient focussed, and standardized, and it should ensure patient confidentiality” (Zierler-Brown, Brown, Chen, & Blackburn, 2007, p.1851). The evaluations as per the subdomain on medical data management and record-keeping support the necessity of this competency and learning of the same during undergraduate HN/HND training in Uganda. With the advent of the NCPM, the HN/HND graduates are expected to master and use standard terminology in the context of medical record documentation (Gutheil, 2004). The ADIME (Assessment, Diagnosis, Intervention, Monitoring, and Evaluation) and SOAP (Objective, Assessment, Plan Common documentation styles include) are commonly used medical records documentation styles applicable in nutrition and dietetics (Cunningham, 2015; Zierler-Brown et al., 2007) but other styles including DAP (Diagnosis, Assessment, Plan) and PES (Problem, Aetiology, Signs, and Symptoms exist (Charney, Escott-Stump, & Mahan, 2008).

The HMIS, as one of the building blocks of the health system, allows the recording, storage, retrieval, and processing of health data for purposes of improving decision-making processes toward better health outcomes (Endriyas et al., 2019). According to Lintern & Motavalli (2018), significant benefits accrue when users of healthcare information systems have cognitive capabilities and skills to use such systems. It is hence essential that the training of HN/HND graduates equips them with knowledge and skills in electronic records, data management, and general use of the different HMIS tools appropriate in nutrition and dietetics care. The developed CBE model provides competency statements evaluated as both relevant and suitable for supporting promoting competency of HN/HND graduates trained in Uganda medical data management and record-keeping.

5.3.4.2 Nutrition in the Lifecycle

The reduction of malnutrition is one of the SDG targets (United Nations, 2015); maternal and child malnutrition are particularly of great concern (UNICEF, 2019). Overall, the ≥80% set level of respondent consensus was obtained for the subdomain and all its 17 competency statements in the first Delphi round in consideration that these were relevant to be demonstrated by HN/HND graduates and suitable for undergraduate level training.

As shown in the results, different observations were made during the evaluation of this domain and its competency statements including the view that: training in this subdomain needed to be made compulsory for all HN/HND trainees given the domain focus on health promotion, especially during the first 1000 days of an individual's life; NACS was applicable at all the different levels of nutrition services delivery; demonstrating competency in management of malnutrition for different age groups was vital for all providers of nutrition case services; and that it was essential for all HN/HND graduates to demonstrate competency in GMP as this was mandatory for all children. Caution was however raised that learning of the different competencies needed to be tailored for different levels of training. Also observed was that competency in public health interventions such as food fortification, iodization, bio-fortification, and their application could be made a specialty for masters level training.

The lifecycle approach to nutrition recognises that "Poor nutrition starts in utero and extends throughout the lifecycle, particularly in girls and women. This amplifies the risks to the individual's health but also increases the likelihood of damage to future

generations, through further foetal growth retardation…" ("Global Nutrition Challenges: A Life-cycle Approach," 2000. p.1). The principle focus areas of the lifecycle approach i.e. poor nutrition in utero; adult undernutrition (maternal morbidity and mortality, food deprivation and emergency shortages, refugees and internally displaced people, physical activity and poor nutrition, AIDs, and nutrition); micronutrient deficiencies (iodine, vitamin A, iron, zinc); changing food consumption patterns; and the prevention of premature adult death and disability (diet-related non-communicable diseases, physical inactivity, healthy ageing) have since been the main reference in informing and guiding nutrition policy, programming, education, research, and many related interventions (ibid).

The use of different community approaches/models like the Positive Deviance Hearth has been found effective and efficient in improving community health and nutrition wellbeing by influencing behavioural change (Baik, 2019; Marsh, Schroeder, Dearden, Sternin, & Sternin, 2004). As seen from the results, demonstrating competency in lactation support and management was also expected of the HN/HND graduates. According to Wambach et al. (2005), much has been learned regarding the cultural, social, and personal factors influencing breastfeeding, however, improvements are required in the pre-service training of health care professionals for the graduates to be able to support breastfeeding. It is imperative that the HN/HND graduates also understand and promote adherence to the WHO International Code of Marketing of Breast milk Substitutes (WHO, 1981); this was equally supported in the Delphi. Growth monitoring and promotion activities are usually integrated with health and nutrition programmes (Feleke, Adole, & Bezabih, 2017). A study in Ghana

however showed that health workers' understanding of child health records affected the effectiveness of growth monitoring and promotion (Sulley et al., 2019).

In this study, the need for HN/HND graduates to demonstrate competency in GMP was evaluated as relevant and recommended for undergraduate training. In general, this domain presents the participants' evaluation of some of the key competencies that HN/HND graduates in Uganda require ought to demonstrate to promote a lifecycle approach in the prevention and management of malnutrition. Implementing nutrition interventions using a life-course approach generally necessitates professionals to understand the key nutrition-sensitive life stages together with inter-related linkages; addressing the different forms of malnutrition concurrently; having a holistic view of the causes and effects of malnutrition; providing health and nutrition services in an integrated manner (WHO, 2019). All the identified competencies evaluated under this domain were found relevant for HN/HND graduates and suitable for undergraduate training in these fields.

5.3.4.3 Food Security, Food Safety, Agriculture, and Livelihoods Promotion

This domain was constituted of two subdomains (1) nutrition-sensitive agriculture, food security, and livelihoods promotion, and (2) post-harvest handling and food safety management. The subdomain on nutrition-sensitive agriculture; food security; and livelihoods promotion consisted of 12 competency statements. The ratings for this subdomain and ten of its competency statements were above the ≥80% set level of respondent consensus in the first Delphi round for both agreements with the relevancy of the competency statements and the recommendation that learning of the given

competencies occurs during the undergraduate level of training. For the competency statements for which consensus was not attained (3.1.6 and 3.1.10), participants noted that although demonstrating competency in analysing the influence of existing national laws, regulations, policies, and sectoral plans on food security and livelihoods was relevant for HN/HND graduates; one requires critical thinking and advanced skills to be able to influence policy and decision making. As such demonstrating this competency was viewed as better suited for the master's level graduates. On the other hand, based on observations that projects with a strong basis in animal production usually employ either veterinary offices or agronomists, participants observed that HN/HND graduates only needed basic training in livestock production.

The Brazilian experience shows that promoting nutrition-sensitive agriculture and food and nutrition sovereignty and security has the added advantage of improving household farming and hence improved diet diversification (Maluf, Burlandy, Santarelli, Schottz, & Speranza, 2015). Such experience supports the views of the participants in this study on the need for HN/HND graduates to learn competency in nutrition-sensitive agriculture; food security; and livelihoods promotion during undergraduate studies. Nutrition-sensitive agriculture is "a food-based approach to agricultural development that puts nutritionally rich foods, dietary diversity, and food fortification at the heart of overcoming malnutrition and micronutrient deficiencies" (FAO, 2014, p.1). Food security "exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 1996).

At the core of food security is the need to promote the consumption of healthy diets that consist of at least 400g of fruits and vegetables need to be consumed per day; less than 10% of total energy is derived from free sugars; less than 30% of total energy should be from fats-preferably unsaturated fats; and consumption of less than 5g of iodised salt (FAO et al., 2020; WHO, 2018). According to the WHO, a healthy diet "helps to protect against malnutrition in all its forms, as well as non-communicable diseases (NCDs) such as diabetes, heart disease, stroke and cancer" (WHO, 2018, p.1). Livelihood promotion refers to "a set of development based interventions that involve improving the resilience of household livelihoods so that food and other basic needs can be met on a sustainable basis" (UNDP-India, n.d. p.8). A livelihood, on the other hand, "comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Chambers & Conway, 1991)" (UNDP-India, n.d. p.2). Clearly, the competency statements as evaluated encompass different dimensions which if mastered can position graduates to promote nutrition-sensitive agriculture; food security; and livelihoods promotion.

The second subdomain on post-harvest handling and food safety management was comprised of three competency statements. The ratings for this subdomain and two of the competency statements i.e. (3.2.1) demonstrating knowledge of post-harvest handling and skills to control food losses along the food value chain using modern and local/traditionally effective techniques and (3.2.3) demonstrating knowledge and skills to apply the CODEX general principles of food hygiene and food safety

management attained the ≥80% set level of respondent consensus in the first Delphi round in consideration that they were both relevant and suitable to be learned at the undergraduate level. In their evaluation, participants observed that demonstrating competency in food handling and food safety management not only reduces food intoxication and wastage but food safety was a key aspect in preventing malnutrition and other diseases. The need for HN/HND graduates to demonstrate competency in post-harvest handling was considered essential for it is based on such competency that graduates can teach and empower communities in post-harvest handling. It was equally observed that all HN/HND graduates needed to demonstrate this competency irrespective of the level of training.

Post-harvest handling entails the stages immediately following the harvest that needs to be well managed to avoid food loss due to degradation in quality and quantity of food from the time to harvesting to consumption (Kiaya, 2014). On the other hand, food safety, the "assurance that food will not cause adverse health effects to the consumer when it is prepared and/or eaten according to its intended use" (FAO & WHO, 2020, p.5) requires adequate good hygiene practices to be undertaken across the food value chain (ibid.). The competency statements as assessed can enable graduates to undertake activities related to the domain if mastered.

5.3.4.4 Ethics and Professionalism in Nutrition and Dietetics

The domain on ethics and professionalism in nutrition and dietetics contained two subdomains; 1) knowledge of codes of ethics, practice, guidelines, and standard operating procedures and 2) ethical principles in practice. Overall, the ratings for the

domain, the subdomains, and all the competency statements under the respective subdomains attained the ≥80% set level of respondent consensus in the first Delphi round in consideration that they were relevant to be demonstrated by the HN/HND graduates and that learning of the same was appropriate for the undergraduate level of HN/HND training. In evaluating the overall domain, it was observed that all HN/HND graduates needed to understand the professional code of ethics, practice guidelines, and standard operating procedures irrespective of their level of training. As further noted, doing so supports knowing professional limits and boundaries. Participants also considered it relevant for HN/HND trainees to be oriented on the different codes of ethics, practice guidelines, and standard operating procedures of different professionals and organizations.

It should be noted ethics and professionalism are sometimes used interchangeably though not the same; understanding what each comprises for a given profession is hence paramount. According to Worthington (2015), ‘‘the task of ethics (moral philosophy) is to answer systematically a range of questions concerning right and wrong conduct’’[4]” (p.176). Professionalism, on the other hand, is “a concept applying to a particular category of persons that includes attitudes and behaviours in and out of the workplace’’, its opposite being unprofessionalism, which is about ‘‘behaviours that fail to conform to normative standards set by an independently regulated profession, such as medicine’’.[6]” (Worthington, 2015, p. 176). Promoting professionalism and ethical values in training and practice is desired of all professionals and was identified as one of the top five competencies required for higher education in Africa by the Tuning Project (Hahn & Teferra, 2013). The

findings of this study affirm the need the need for HN/HND graduates to learn the requisite ethics and professional principles during undergraduate training.

It should be noted that the need for HN/HND graduates to demonstrate professional ethics was lowly ranked in the needs assessment phase and a query as to why this had low rankings raised in the stakeholder needs assessment results validation workshop. As further seen in the results and the discussion on the scope of training and practice of HN/HND in Uganda, the lack of an established Code of Ethics and Practice for HN/HND professionals poses risks to professional practice. The observations made under the domain of ethics and professionalism in nutrition and dietetics during the Delphi evaluations support earlier observations in the competency needs assessment phase where HN/HND graduates were found to work interprofessionally in a multisectoral and multistakeholder context. Interprofessional education models help learners understand their own professionals identity while gaining and understanding of professional's roles on the health care team" (Bridges, Davidson, Odegard, Maki, & Tomkowiak, 2011, p.1) but require an understanding of professional boundaries and strict adherence to the professional codes of ethics, principles, and established standard operating procedures.

Unfortunately, no specific code of ethics and professional practice specific to nutrition and dietetics training and practice had been adopted in Uganda by the time of writing this thesis. In existence were the Code of Conduct and Ethics for Uganda Public Service (Republic of Uganda, 2005a) which stipulates standards of behaviour expected of public officers in Uganda, and the Code of Professional Ethics for

medical and dental health practitioners (Uganda Medical and Dental Practitioners Council, 2013) which stipulates the ethical obligations and standards of professional practice. Besides these, it is anticipated that individual organisational workplaces have codes of conduct and ethical guidelines; however, these were not explored in this study.

Although the CBE framework as developed in this study proposes some ethics and professional competencies that were assessed to be relevant for HN/HND graduates, a code that stipulates the ethical obligations and standards of practice specific to the Nutrition and Dietetics profession in Uganda needs to be developed. This should be done together with the development of the scope of training and practice for the profession as recommended in earlier sections. In general, the Delphi assessment results of this study uphold the need for HN/HND graduates to demonstrate ethics and professionalism in nutrition and dietetics and recommend the mastery of competency in these areas during undergraduate training.

5.3.4.5 Research and Data Analysis

This domain was comprised of two competency subdomains; (1) planning and data collection and (2) data analysis, report writing, and results dissemination. The Uganda policy and research guidelines define research as, “Any type of systematic investigation, testing and evaluation designed to develop or contribute to generalizable knowledge” (Uganda National Council for Science and Technology, 2016, p.2). The ≥80% set level of respondent consensus was attained in the first Delphi round in evaluating the research and data analysis domain as being both

relevant for HN/HND graduates and suitable to be learned at the undergraduate level. In the evaluations, participants observed that it was important for all the HN/HND graduates to demonstrate competency in research and data analysis but cautioned that training content needed to differ according to the level of training. The observations made by the participants are similar to research by Persaud (2020) that found that employers among other factors seek workers with strong competency in data analytics.

In evaluating the first subdomain on planning and data collection, the ≥80% set level of respondent consensus was attained for the subdomain and all the nine competency statements in the first Delphi round. These were evaluated as both relevant for HN/HND graduates and suitable for being learned at the undergraduate level. In the evaluations, participants called for the need to ensure that training equips all HN/HND graduates with knowledge skills, and abilities to: understand both quantitative and qualitative research methods and designs; design nutrition and health-related data collection; understand and use different nutrition indicators; write research proposals; publish research findings; use different databases and search engines to access information on health and nutrition; work with different stakeholders in planning and undertaking research; understand and adhere to established research guidelines and ethical principles; and to be ambitious and self-motivated in identifying research opportunities. In all, it was also noted that comprehending research was challenging for diploma holders given the limited timeframe of diploma training.

The second subdomain on data analysis, report writing, and results dissemination consisted of seven competency statements. All the competency statements were evaluated as relevant for the practice of HN/HND but only five (5.2.2, 5.2.3, 5.2.4, 5.2.5, and 5.2.7) attained the ≥80% set level of respondent consensus was attained for the competency statements in being evaluated as relevant for undergraduate HN/HND training. In the evaluations, participants observed that research, report writing, and information dissemination were vital for all HN/HND professionals. However, the depth of training needed to differ for different levels. Further observed was that although undergraduates needed to demonstrate competency in the use of different nutrition software programs, advanced training needed to be directed to the master's graduates for these are more engaged in research. Being able to undertake research was also identified as a core competency for nutrition undergraduate training in the Australian context (Tanya et al., 2019).

Competency in the use of HMIS was considered relevant for HN/HND graduates as it provides data relevant to nutrition programming. Competencies in writing technical reports and consolidating research findings into articulate reports were equally evaluated as key. Although the need for HN/HND graduates to demonstrate competency in using appropriate statistical tests was evaluated relevant, consensus as to whether undergraduates should demonstrate this competency was not attained on the basis that it required one to have higher-level skills which are better attained through masters' level training. Relatedly, although demonstrating competency in planning and hosting seminars, workshops, and conferences as well as the ability to share nutrition research in different fora was evaluated as relevant to be demonstrated by HN/HND graduates, this competency was considered to be more relevant for

masters-level graduates as one would have acquired most of the requisite skills to demonstrate competency at that level. In general, participants also highlighted that the master's level graduates tended to be employed in positions that required most of the skills under this subdomain and that the Diploma level training was inadequate to foster mastery of many research skills.

Undertaking research also calls for strict adherence to established research principles and ethical guidelines. Although commonalities exist, research principles and ethical guidelines may vary from one country to another. In Uganda, the National Guidelines for Research Involving Humans as Research Participants in Uganda (Uganda National Council for Science and Technology, 2014) stipulate the principles of research ethics; obtaining informed consent; how to care for research participants; the responsibilities of researchers and their sponsors; dealing with vulnerable groups in research; handling of human materials; data ownership, sharing, and dissemination; and aspects of community engagement. The CBE model framework as developed in this research contains generic research and data analysis competencies as was evaluated by the participants; further reference to the existent national guidelines will be important to strengthen the proposed competencies in the national context.

5.3.4.6 Policy, Advocacy, and Social and Behaviour Change Communication

This domain was comprised of three subdomains: (1) policy; (2) advocacy; and (3) social and behaviour change communication. In general, the domain and its subdomains and their underlying competency statements were evaluated as relevant for HN/HND graduates with the ≥80% set level of participants' consensus on the

overall assessment of the domain obtained in the first Delphi round. However, only the competencies for the third subdomain and one of the competencies under the second subdomain attained the ≥80% set level of respondent consensus in being recommended for learning at the undergraduate level. In evaluating the domain, some participants observed that promoting policy, advocacy, and SBCC was required of all HN/HND graduates and that graduates needed to demonstrate competency in this overall domain irrespective of the level of training. Also observed was that training in this competency domain needed to be phased with advanced content being trained at the master's level.

As per the participants' observations in evaluating subdomain one on policy, the masters level graduates were considered to be more engaged in policy-related activities; hence training in policy was considered better suited for this level of training, not the undergraduate level. Although not recommended for learning at the undergraduate level, demonstrating knowledge of the different national policies; laws; regulations; and sectoral policies and plans on nutrition was evaluated as relevant for HN/HND undergraduates and that it was important for all HN/HND graduates to actively be involved in some stages of the policy cycle irrespective of their level of training. The evaluations in the Delphi assessment undertaken in this study support the need for the HN/HND graduates to demonstrate competency in nutrition policy-related matters; however, the learning of this is not recommended at the undergraduate level. Studies by Namugumya et al. (Namugumya, Candel, Talsma, & Termeer, 2020a, 2020b) pointed to the existence of several dynamics in nutrition policy in Uganda which may indeed be better comprehended by individuals with master's or higher-level training.

In evaluating the second subdomain on advocacy, demonstrating competency in planning and managing nutrition-related advocacy events was evaluated to be relevant for HN/HND graduates but developing overall competency in this subdomain was considered to require divergent skills, some of which develop with experience and exposure. Mastering this competency was considered more suitable for the master's level graduates as these were considered more likely to be employed in positions requiring such skills. As further expressed by the participants, if advocacy training is to be undertaken at the undergraduate, it needs to be done as an elective. Contrary to the participants' observations, advocacy training was considered paramount and included as one of the core areas for undergraduate nutrition professionals in the South African context (Health Professions Council of South Africa, 2016).

Subdomain three on social and behaviour change communication consisted of nine competency statements. All the ratings for the subdomain and its respective competency statements attained the ≥80% set level of respondent consensus in the first Delphi round. In rating the subdomain, some participants observed that this competency was important for nutrition and dietetics graduates given that behaviour change is a key element of nutrition programs and that having such a competency promotes easier acceptance of interventions by the community. As for the competency statements under this domain, participants observed that: it was essential for professionals to ably analyse the health and nutrition behaviours of communities in which they operate to ably design solutions meeting the community needs. In general the participants' observations and recommendations that undergraduate HN/HND training integrates the mastery of social behavioural change communication competencies is critical. Studies show SBCC interventions are vital to improving

health and nutritional outcomes (Briscoe & Aboud, 2012; Eileen, Jennifer, Meghan, & Sibhatu, 2018), making it necessary for HN/HND graduates to demonstrate this competency.

5.3.4.7 Nutrition Leadership and Management

The validation workshop and the focus group discussions considered the need to undertake leadership and management training for the HN/HND graduates as essential. Hence a leadership and management domain was developed and evaluated. It comprised of five subdomains: planning and budgeting; human resources management; multisectoral and multistakeholder engagement; program/project implementation; and monitoring and evaluation. The ≥80% set level of respondent consensus was attained in the first Delphi round in evaluating the domain, its subdomains, and all their respective competency statements as being relevant for HN/HND graduates but was variably attained in recommending their training at the undergraduate level.

The ACEND defines leadership as “the ability to inspire and guide others toward building and achieving a shared vision.”[1]” (Boyce, 2014, p.35). It further notes that nutrition and dietetics professionals may sometimes be accorded leadership roles early in their careers and that since one's leadership abilities have an impact on the performance of an organisation, it is essential for dietitians to attain formal training skills in leadership (Boyce, 2014). Related to this observation, the competency needs assessment phase of this study found most of the practicing graduate's work roles as entailing aspects of organisational leadership and management. These study findings

are also similar to the thesis by Patten (2016) in which the majority of registered dietitians indicated leadership as being relevant to their work and a high frequency of leadership behaviours were reportedly performed in daily professional practice. It ought to be noted that the terms leadership and management share similarities and are complimentary but are distinct; “Management skills are used to plan, build, and direct organizational systems to accomplish missions and goals, while leadership skills are used to focus on a potential change by establishing direction, aligning people, and motivating and inspiring (Wajdi, 2017, p.75).

The subdomain on planning and budgeting was comprised of three competency statements all of which attained the ≥80% set level of respondent consensus in being evaluated relevant for HN/HND graduates. However, none of the competency statements attained the ≥80% set level of participant consensus in being recommended to be learned during undergraduate level training. As per the given justifications, participants observed that demonstrating competency in planning and budgeting was more important for HN/HND graduates working as project managers, assistants, and field nutrition coordinators. However, as noted in the competency needs assessment phase, demonstrating competency in planning and budgeting was one of those required of HN/HND graduates and it also featured among those in which graduates were inadequately skilled. Going with the justifications by the participants, the view that graduates can need to undertake additional post-graduate studies or through CPD to develop this competency seems justifiable.

According to the SUN Movement, there is a need to track resources in nutrition as this promotes transparency, accountability, and better advocacy for nutrition (Fracassi et al., 2017). Kung, Huang, & Cheng (2013) also noted that employees develop a better understanding of organisational budget objectives; satisfaction; and better work performance when they are engaged in the budgeting processes. Although consensus on recommending the training in planning and budgeting at the undergraduate level was not attained, given the participants' observations in the Delphi rounds that HN/HND graduates engage in planning and budgeting related activities at different levels, it would still be essential that basic training in planning and budget is undertaken during undergraduate training.

The second subdomain on human resource management was comprised of five competency statements all of which attained the ≥80% set level of respondent consensus in the first Delphi round in consideration that they were both relevant for HN/HND graduates and suitable for learning at the undergraduate level. Some of the participants that evaluated this subdomain observed that demonstrating competency in human resources management ensures that graduates can undertake tasks related to the selection, training, and coaching of fellow staff. On the contrary, some participants observed that human resources management was not a core mandate of HN/HND graduates and viewed it better suited for program managers and those holding master's level training.

In health, human resources include all the clinical and non-clinical staff responsible for undertaking health interventions at the public and individual levels; their

competency and motivation influence the effectiveness of health systems (Kabene et al., 2006). According to Alshammari (2020), “Human resource practices include the process of creating a pool of suitable applicants, recruiting individuals, selecting, and training and make them helpful in achieving organizational goals (Theodore 2018; Vera and Crossan 2004; T. Zhou 2018)” (p.716). Similar competency areas were drafted, validated, and included in the developed CBE model framework. In all, demonstrating competency in different areas of human resource management as assessed in this study was evaluated as relevant for HN/HND graduates and learning of the same recommended for the undergraduate level.

The third subdomain on multisectoral and multistakeholder engagement consisted of five competency statements; all attained the ≥80% set level of respondent consensus in the first Delphi round in being evaluated relevant for HN/HND graduates. However, the consensus was only obtained for the subdomain and three of the five competency statements in recommending the learning of these at the undergraduate level. While evaluating the subdomain, participants observed that demonstrating competency in engaging in multisectoral and multistakeholder partnerships was relevant for all HN/HND graduates given that implementation of nutrition and dietetics services involves interplay of different stakeholders. In general, although not all the competency statements assessed under this subdomain were recommended for undergraduate training; these Delphi assessment results support findings of the competency needs assessment phase where the graduates indicated being employed in different sectors and providing a range of nutrition-specific and nutrition-sensitive services in a multistakeholder environment that requires them to have competency in multisectoral and multistakeholder partnerships.

A study by Gillespie & van den Bold (2017) shows that there is increased global attention amongst different sectors to implement nutrition courtesy of the multisectoral nutrition programs that have been adopted by different countries. In Uganda, the adoption of the Uganda Nutrition Action Plan (Government of Uganda, 2011) increased the focus of the multisectoral approach to nutrition which is currently recognised and adopted by almost all of the government sectors and non-government agencies supporting nutrition intervention in the country. Of the many factors responsible for the success of multisectoral programs, having effective collaboration where separate agencies, ministries, or individuals work jointly is considered central (Garrett & Natalicchio, 2011). The CBE as developed in this study considers it essential for HN/HND graduates to demonstrate competency in undertaking multisectoral nutrition interventions and presents evaluated competency statements that can be included in undergraduate HN/HND training to foster the learning of this competency.

The subdomain on program/project implementation had three competency statements. During its evaluation, participants observed that HN/HND graduates, more so those working as program managers needed to demonstrate competency in program/project implementation and that it was important for graduates to undertake specialised management training after their bachelor's or master’s level training. It is worth noting that although the nutrition and dietetics field has a long history, knowledge on implementing policies and programs in nutrition is recent (Warren, Frongillo, & Rawat, 2020) and concerted efforts to develop this knowledge still need to be built especially under the current multisectoral and multistakeholder approach to implementing nutrition interventions.

Inefficiencies in nutrition programme designs and implementation are known to have an effect on programme effectiveness (Tumilowicz, Mcclafferty, Neufeld, Hotz, & Pelto, 2015; Tumilowicz et al., 2019). As such nutrition and dietetics professionals need to understand nutrition programme design and implementation. Limitations to this however exist in the field of implementation science "a body of systematized knowledge about how to improve implementation" (Warren et al., 2020, p.1395) in nutrition is insufficient in academic study programmes. The fields of implementation science and research in nutrition although recent are growing (Tumilowicz et al., 2015, 2019; Warren et al., 2020). Given such developments, advances to re-orient HN/HND curricula in Uganda such that graduates get equipped with the requisite competencies to design and implement multisectoral nutrition programmes/projects must be undertaken. The CBE model framework as developed and evaluated in this study draws attention to this need although only two of the three competency statements were recommended for the undergraduate level of training.

Monitoring is "a continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds (Austrian Development Cooperation, 2009, p.11). Evaluation on the other hand refers to "the systematic and objective assessment of an ongoing or completed project or programme, its design, implementation and results ... to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability" (Austrian Development Cooperation, 2009, p.10).

As for the subdomain on monitoring and evaluation, participants observed that demonstrating competency in this subdomain was relevant and that learning this during undergraduate training reduced the requirements for the graduates to study this afterward. Some participant's however noted that this competency was best suited for graduates in managerial positions. Further noted was that evaluation of nutrition programs was on many occasions left to M&E specialists yet these have limited understanding of nutrition and sometimes provide misleading information. The results as per the participants' justifications support the need for the learning of this competency, albeit some competency statements were not recommended for undergraduate training. The five OECD/DAC criteria of relevance, effectiveness, efficiency, impact, and sustainability are widely used for evaluating development interventions by bilateral and multilateral agencies and have been adopted by many international NGOs (Chianca, 2008) some of which employ HN/HND graduates in Uganda. The developed CBE framework highlights the ratings for the different competency statements evaluated under this subdomain.

CHAPTER SIX: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

6.1 Summary

6.1.1 Competency Needs Assessment

The observations that some graduates had undertaken the initiative to pursue further formal training and that the regional and national referral hospitals and non-government organizations took on high numbers of student interns highlights three major aspects: (1) the need for professional growth and development by way of having tailored training programs through which HN/HND trainees can obtain experiential training to develop their professional competence profiles as well as obtain higher academic credentials; (2) the emerging relevancy of non-academic institutions to support HN/HND training in Uganda by offering experiential attachments to trainees; and (3) the value of interprofessional and inter-institutional collaborations in HN/HND training. The variedness in the employment of HN/HND graduates as found in this study shows a probable increase in employment opportunities for HN/HND professionals in sectors beyond health.

As for the community, nutrition/dietetics needs, stakeholders generally indicated that communities faced a variety of nutrition/dietetic challenges and hence needed to be provided with nutrition-specific and nutrition-sensitive services. The nature of work done by HN/HND graduates varied but shows close resemblance to work done by HN/HND in other country contexts. Based on the graduates work experiences, this study shows the need for equipping HN/HND trainees with profession-specific and interprofessional competencies; undertaking CBE helps meeting this need. At the same time, graduates need be able to work with the multiple actors in a multisectoral setting.

About 20 knowledge and skills areas were identified as being required by HN/HND graduates to implement different nutrition interventions in Uganda, however, graduates were found to have competency gaps even in some of the core areas they are expected to exhibit competency. This points a likely mismatch between the knowledge and skills expected of HN/HND undergraduates to those obtained through training. However, a further review of the identified knowledge and skills themes revealed some similarities in the identified knowledge and skills themes to what has been proposed for degree-level training in the regional model nutrition curriculum for health workers based in the East, Central, and Southern Africa Health Community (East Central and Southern Africa-Health Community, 2017).

Bearing in mind that "Inadequate knowledge, skills, and inappropriate attitudes can all form obstacles to good health care" (Dieleman & Harnmeijer, Willem, 2006), this study highlights a need for undertaking curricula and institutional reforms in the training of HN/HND in Uganda to ensure that graduates get equipped with the knowledge and skills required for the practice of nutrition and dietetics at the national, regional, and global level.

6.1.2 Scope of HN/HND Training and Practice in Uganda

6.1.2.1 Regulations Governing the Training and Practice of HN/HND in Uganda

Overall, study participants observed a lack of a clear HN/HND scope of training and practice, minimum training and practice standards, and code of ethics and practice specifically developed for the HN/HND profession in Uganda. In the absence of these, the teaching of HN/HND had been following university specific curricula. However, variations were reported to exist in the curriculum of the different

Universities in terms of course content, methods of evaluation, and study duration with some universities running three-year undergraduate programs and others running four-year programs.

Participants also considered the existent national, ministerial, and organisational legislation, policies, standards, and guidelines sometimes referred to in HN/HND training and practice as being diverse with some beyond the scope of the training received and others not fully reflective of the competencies expected of HN/HND graduates. Meanwhile, the stakeholders expected graduates from all universities to demonstrate equal competency in providing services in conformity to the existing policies, guidelines, and standards. In view of these observations, the effectiveness of regulating, registration, and certification of the HN/HND profession remains to be seen and evaluated in the country.

Besides the existence of institutional and academic program/curricula accreditation by the NCHE, the training and practice of HN/HND in Uganda were reported as having been occurring without fully instituted formal mechanisms for regulating the profession through licensure/registration and certification since its inception in the early 2000's. Even then, the guidelines and standards for institutional and programme accreditation by the NCHE were said to be generic and mainly focussed on accreditation of universities and university programs, staffing, infrastructure, and course intake requirements.

HN/HND graduates were found to have been practicing as unregulated health professionals up until 2018 when the AHPC was given the mandate to regulate the HN/HND profession in 2018. The APHC Act (Republic of Uganda, 1996b) was also yet to be revised to reflect HN/HND professionals as cadres regulated under this body as well as provide credentials for defining the two quite distinct but related professions under the Act. Nonetheless, it is hoped that with the coming into force of the APHC to regulate the training and practice of HN/HND, strides to develop a defined scope of training and practice of HN/HND, minimum training and practice standards, and a clear code of ethics and practice for Uganda in addition to pursuing the harmonisation of HN/HND training curriculum across the universities shall be undertaken. These should stipulate the different training requirements that one should undertake to qualify as a Nutritionist/Dietitian at different levels in the country. In some country contexts, earning an accredited degree, undertaking a specified period of accredited supervised practice; completing specified CPDs; and sitting a set number of internship hours before qualifying as a dietitian are key considerations.

Additionally, it is hoped that the AHPC Act will be amended to reflect the Nutrition and Dietetics profession as this is currently missing in this Act. Undertaking the aforementioned suggestions has the added benefit of building, solidifying, and protecting HN/HND professional identity and credentials. At the regional level, the need to harmonise health professionals' training is recognised and recommended by the Resolutions of the ECSA-HC Health Ministers' Conferences (East Central and Southern Africa-Health Community, 2018). To this end, a harmonised regional model nutrition curriculum for frontline health workers (East Central and Southern Africa-Health Community, 2017) was developed for the ECSA-HC with the hope that

member states can use this as a reference to harmonise their nutrition curricula. However, at the time of undertaking this research, there were no existent national standard curricula for HN/HND in Uganda. The curricula used to train HN/HND in Uganda are mainly institutional specific, specifying learning outcomes instead of the competencies that students are expected to exhibit upon graduation.

6.1.2.2 Opportunities for Continuous Professional Development in HN/HND

No structured formal CPD programmes from which HN/HND graduates can earn credits as-is for other health professionals existed in Uganda at the time of undertaking this research. However, some on-the-job CPD opportunities were mentioned to exist in some organisations with support from the ministry of health and some donor-funded projects. The prolonged lack of formal mechanisms to regulate the HN/HND profession in Uganda was considered as having curtailed different mechanisms necessary for credentialing of the profession.

Respondents highlighted the need for instituting relevant legislations, putting in place CPD training opportunities, collaborations, and financial support mechanisms as important strategies to promoting CPD in HN/HND. With the AHPC having been mandated to undertake the regulation of the HN/HND profession, it is hoped that structured CPD activities for HN/HND in Uganda would be designed, adopted, and undertaken in coordination with other accredited bodies.

6.1.2.3 Anticipated Challenges to Implementing CBE of HN/HND in Uganda

Different challenges that can curtail implementation of CBE in HN/HND including inadequate institutional staffing; limitations in training policies and legislations;

limitations in finances to implement effective CBE programs; limitations in infrastructure; curriculum related challenges; low political will, low stakeholder awareness of CBE, and limitations in stakeholder collaborations were highlighted. Any plans to undertake CBE in HN/HND need to be cognisant of these and design relevant solutions if CBE in HN/HND is to be undertaken.

6.1.3 Development and Validation of a HN/HND Competency-based Education Model for Uganda

This study undertook an iterative process to develop and validate an undergraduate HN/HND competency-based education model suitable for Uganda. The developed and validated CBE model (Appendix Z) comprised of seven domains of prevention and management of malnutrition in all its forms; nutrition in the lifecycle; food security, agriculture, and livelihoods promotion; ethics and professionalism in nutrition and dietetics; research and data analysis; policy, advocacy, social and behavior change communication; and nutrition leadership and management.

6.1.4.1 Prevention and Management of Malnutrition in all its Forms

Developing competency in the identification, prevention, and management of malnutrition is core for HN/HND professionals and other related professionals According to Jackson & Ashworth (2015), pre-service training ought to be the major focus in building human resources' professional capacity to prevent and manage malnutrition and should be focussed on the core competencies suitable to the prevailing contexts.

The CBE framework as here developed and validated provides 79 competency statements evaluated as both relevant and suitable for undergraduate HN/HND training in Uganda. These are respectively presented under 10 subdomains: nutrition assessment; nutrition diagnosis; designing nutrition interventions; monitoring and evaluation of nutrition interventions; emergency nutrition; technical support and capacity development in the management of malnutrition; interprofessional collaboration in malnutrition management; water, sanitation, and hygiene; procurement and management of nutrition supplies; and data management and record-keeping.

6.1.4.2 Nutrition in the Lifecycle

The lifecycle approach to nutrition recognises that poor nutrition starts in utero and extends throughout an individual's lifecycle ("Global Nutrition Challenges: A Life-cycle Approach," 2000). A total of 17 competency statements were assessed under this subdomain. All attained the ≥80% set level of respondent consensus in consideration they relevant to be demonstrated by HN/HND graduates and suitable for learning at the undergraduate level and were hence were all included in the developed CBE model framework. The different competencies if attained, have the potential to enable the HN/HND graduates to become more conversant and effective in the promotion and delivery of the WHO recommended Essential Nutrition Actions (WHO, 2019) across the life-course. It should be noted that some of the competencies assessed under this subdomain cut across the different domains especially under that of prevention and management of malnutrition.

6.1.4.3 Food Security, Food Safety, Agriculture, and Livelihoods Promotion

The domain of food security; safety; agriculture; and livelihoods promotion was constituted of two subdomains (1) nutrition-sensitive agriculture; food security; and livelihoods promotion and (2) post-harvest handling and food safety management. Overall, the ≥80% set level of respondent consensus was obtained for the domain and the two subdomains in consideration that these were both relevant for HN/HND graduates and suitable to be learned during the undergraduate level of training. In rating the overall domain, participants observed that there was a need for the HN/HND graduates to be knowledgeable of the evolving agriculture and general farming practices and that they needed to be introduced to these during the undergraduate training. Further observed was that the learning of the competency subdomains and their underlying competency statements needed to be phased with advancement in the level of training. These observations were based on the general views that much of the work done by the graduates has roles that cut across these areas. The developed CBE model framework outlines the different competencies evaluated as necessary to enable HN/HND graduates to promote food security, food safety, agriculture, and livelihoods as evaluated by the study participants.

6.1.4. 4 Ethics and Professionalism in Nutrition and Dietetics

In this study, the domain on ethics and professionalism in nutrition and dietetics contained two subdomains; (1) knowledge of codes of ethics, practice, guidelines, and standard operating procedures and (2) ethical principles in practice. Overall, the ratings for the domain, the subdomains, and all the competency statements under the respective subdomains attained the ≥80% set level of respondent consensus in the first Delphi round in consideration that they were relevant to be demonstrated by the

HN/HND graduates and that learning of the same was appropriate for the undergraduate level of HN/HND training.

In the competency needs assessment study and the resulting results validation workshop, it was observed that adherence to professional ethics was low amongst the HN/HND. In the assessment of the scope of HN/HND training and practice in Uganda, it was identified that no established professional code of ethics and practice specifically for the HN/HND profession had been adopted in Uganda and that this poses risks to HN/HND professional practice. Further, observation was also made that HN/HND graduates work interprofessionally under multisectoral and multistakeholder partnerships where observance of professional ethics is critical and recommendation made for the need to re-orient the HN/HND curriculum to equip trainees in Uganda with professional and ethical values. Given these observations, the CBE model framework as developed in this study provides a set of evaluated competencies that can be undertaken during the undergraduate training of HN/HND in Uganda to promote ethics and professionalism amongst the graduates.

6.1.4. 5 Research and Data Analysis

According to the competency needs assessment results, demonstrating competency in research, data analysis, proposal, and report writing was one of the top five expected of HN/HND graduates. It also featured amongst the top five competencies reported by the graduates as having been inadequately attained during training. To foster this competency, the proposed CBE model had a research and data analysis domain comprised of two competency subdomains; (1) planning and data collection and (2)

data analysis, report writing, and results dissemination. Aggregately, the ≥80% set level of respondent consensus was attained for the domain and for both subdomains in the first Delphi round in evaluating them as both relevant for HN/HND graduates and suitable to be learned at the undergraduate level.

As for the competency statements, the ≥80% set level of respondent consensus was attained in the first Delphi round for all the nine statements under the first subdomain in terms of both being evaluated as both relevant for HN/HND graduates and suitable for being learned at the undergraduate level. Under the second subdomain, all the seven competency statements attained the ≥80% set level of respondent consensus in the first Delphi round in terms of being evaluated as relevant for HN/HND graduates. However, only five of these attained consensus in the first Delphi round in being recommended to be learned at the undergraduate level. The ≥80% set level of respondent consensus was still not attained for the remaining two competency statements even after being re-evaluated in the second Delphi round. In general, the research and data analysis related competencies as developed, evaluated, and included in the developed CBE model framework can support the attainment of this competency by HN/HND graduates at the undergraduate level. However, as was for other domains, practical experience is necessary for graduates to become more competent in this area.

6.1.4. 6 Policy, Advocacy, and Social and Behaviour Change Communication

Three subdomains: (1) policy; (2) advocacy; and (3) social and behaviour change communication were assessed under this domain. In evaluating their relevance and

suitability for undergraduate training, the subdomain on social and behaviour change communication together with all its nine competency statements attained the ≥80% set level of respondent consensus in the first Delphi round of each of the assessments. For the subdomain on policy and its three competency statements, the ≥80% set level of respondent consensus was obtained in the first Delphi round in terms of evaluating these as relevant for HN/HND graduates. The same was not obtained in terms of recommending the learning of these competencies at the undergraduate level even after being re-evaluated in the second Delphi round. For the third subdomain on advocacy, all its seven competency statements attained the ≥80% set level of respondent consensus in being evaluated as relevant to be demonstrated by the HN/HND graduates; however, only one of the seven competency statements, competency statement 6.2.5, on the need for HN/HND graduates to demonstrate knowledge and skills on the use of different advocacy tactics was recommended for learning at the undergraduate level.

6.1.4. 7 Nutrition Leadership and Management

Overall, demonstrating competency in the domain of leadership and management and all the underlying subdomains was evaluated as relevant and appropriate for undergraduate training. Under the first subdomain; competency in developing nutrition program/project proposals, work plans and budgets though considered relevant was not recommended for undergraduate training as it was considered a responsibility of project managers and required experience; competency in resource mobilisation was considered to contribute to improvements in services delivery but was viewed as responsibility for program directors hence not recommended for learning at the undergraduate level; competency in nutrition program/project budget

tracking though considered relevant was not recommended for undergraduate training as it was also viewed to be a function of the finance department and related professionals, not Nutritionists and Dietitians.

In evaluating the second subdomain in human resource management; observations were made that demonstrating this competency enables graduates to perform tasks concerning the selection, training, and coaching of fellow staff. Overall, all the competency statements under this domain including demonstrating knowledge and skills in leadership and management; staff recruitment; supportive supervision; setting up organisational supportive systems; and in training and mentorship of fellow cadres were evaluated as relevant for HN/HND graduates and training in the same recommended to occur during the undergraduate level of training. In the participants' justifications, competency under this subdomain was considered to be required by all HN/HND graduates irrespective of their level of training as any graduate could take up a leadership role. Despite the ratings for all the competency statements under this subdomain attaining the ≥80% set level of respondent consensus, some participants observed that human resources management was not usually a mandate of the HN/HND graduates in an organisation.

In evaluating the third competency subdomain on multisectoral and multistakeholder; the subdomain and three of the five competency statements i.e. demonstrating competency to work in multisectoral and multistakeholder nutrition partnerships; being able to identify and manage conflicts of interest that arise in multistakeholder partnerships; and demonstrating competency knowledge and skills required for

supporting Nutrition coordination Committees in developing multisectoral Nutrition Action Plans were evaluated as relevant to be demonstrated by HN/HND graduates and their learning recommended to occur during undergraduate training.

Two competency statements on demonstrating competency in the mapping of relevant program/project stakeholders and demonstrating knowledge of the composition, governance, and functionality of multisectoral coordination committees at different levels were evaluated as relevant to be demonstrated by the HN/HND graduates but the ≥80% set level of consensus was not attained in recommending their learning to occur during the undergraduate level of training. Although the multisectoral approach is documented as being one of the most effective ways in reducing the burden of malnutrition, the narrow training in this approach amongst the nutrition professionals limits them from incorporating the values and insights from other sectors into their operations (Garrett & Natalicchio, 2011). Given that the nutrition interventions are currently being promoted multisectorally and the observations that HN/HND graduates were employed in different sectors; graduates must be introduced to the dynamics of the multisectoral approach during pre-service training. The developed CBE model presents some of the competencies that were considered essential to include in HN/HND undergraduate training programmes for Uganda.

Subdomain four on program/project implementation was constituted of three competency statements. The ≥80% set level of respondent consensus was obtained for the subdomain and all its competency statements in the first Delphi round in evaluating these as relevant for HN/HND graduates. However, even after the second Delphi round, the consensus was only attained for the subdomain and two of the three

competency statements 1) demonstrating knowledge and skills necessary for program/project implementation in line with agreed-upon protocols and 2) demonstrates knowledge and skills to plan and lead organisational committee meetings in recommending their learning during the undergraduate training. The ≥80% set level of respondent consensus on the need for HN/HND graduates to be equipped with knowledge and skills to analyse technical reports about the program/project under implementation and following up on the implementation of recommendations during the undergraduate level of training was not achieved. Taking into consideration the different ratings under this subdomain, the need for promoting competency in nutrition programme design and implementation during undergraduate training is considered essential and there is emerging consensus to this view (Tumilowicz et al., 2015, 2019; Warren et al., 2020).

Subdomain five on monitoring and evaluation consisted of five competency statements. The participants' ratings for the relevancy of the subdomain and all its constituent competency statements attained the ≥80% set level of respondent consensus in the first Delphi round. However, even after being subjected to the second Delphi round, only two competency statements 1) demonstrating knowledge and skills to prepare and present timely reports on program/project outcomes, activities, processes, and lessons learned to different stakeholders and 2) demonstrating knowledge of QI and the skills to undertake and coordinate QI activities for improving program/project performance attained the ≥80% set level of respondent consensus in being recommended for learning during undergraduate training. The fact that all competency statements were evaluated as relevant substantiates the need for graduates to develop the mentioned competencies as they

grow professionally. Being that NGOs were one of the main employers of the HN/HND graduates, having competency in monitoring and evaluating nutrition programs following the OECD/DAC criteria (Chianca, 2008) remains relevant for all graduates.

6.2 Conclusions

Objective one

This study highlights that nutrition/dietetic needs in Uganda are multiple given the multifaceted nature of nutrition challenges communities face. Further highlighted is that communities demand both nutrition-specific and nutrition-sensitive interventions and that these are offered multisectorally. HN/HND graduates hence require competency in designing and implementation nutrition specific and sensitive interventions in multisectoral-multistakeholder settings.

Objective two: HN/HND graduates performed different work roles and were expected to exhibit competency in different areas but majority had knowledge and skills gaps even in some of the major areas they are expected to be competent. This highlights probable curricula and University inadequacies to train competent HN/HND graduates. Adopting CBE for the profession can help to address the competency gaps and contribute to the training of HN/HND graduates equipped with the knowledge and skills required for health systems performance. Doing this however requires stakeholder consensus on the key competencies required of the graduates.

Objective three: This study highlights that HN/HND training in Uganda is undertaken in academic institutions that provide specialised formal training and non-academic institutions that offer experiential attachments. However, mixed views were expressed in regards the regulation of HN/HND training and practice in Uganda as there was no: specific scope of training and practice for the HN/HND profession; uniform training and practice standards; and a code of ethics and practice specific for the HN/HND profession in the country. Additionally, formal structured CPD programmes besides undertaking higher level training at the masters or PhD level did not exist. This highlights the need to institute formal training and practice mechanisms for regulating the profession and CPD opportunities specific to the HN/HND profession. The coming into force of the AHPC to regulate the HN/HND was hoped to improve the regulatory environment for the training and practice of HN/HND in the country.

Objective four: A competency-based education model suitable for teaching HN/HND at the undergraduate level in Uganda was developed and validated. It comprises seven domains; 24 subdomains of which 22 were evaluated as both relevant and suitable for undergraduate HN/HND training; and 174 competency statements of which 153 were evaluated as both relevant and suitable for training HN/HND at the undergraduate level. This has potential to promote increased investments in HN/HND professional education in Uganda if adapted.

Although the CBE model framework as developed and validated contains a broad range of competencies considered relevant and suitable for HN/HND practice and

training at the undergraduate level, no guidelines on how to incorporate these in HN/HND curricula and assessing the learning thereof is given. This study does not justify that the given competencies are fully sufficient for one to demonstrate full competency in HN/HND. The study also acknowledges that foundational knowledge is required to learn the competencies stipulated in the CBE framework. Related observations were made by Dart et al. (2016) that discrete lists of competencies for a given profession usually fall short of interdisciplinary competencies and may hinder expertise development.

6.3 Recommendations

6.3.1 Policy

This study recommends the development and dissemination of policy briefs on the need for undertaking CBE for the HN/HND profession in Uganda and a policy that mandates the AHPC and Universities to (1) form formal partnerships with non-academic institutions for effective regulation of HN/HND training and practice (2) work with the relevant ministries of health, education, and agriculture, and other non-state actors that support nutrition and dietetic services delivery to develop national HN/HND training and practice standards (3) develop standards or criteria based upon which non-academic institutions are qualified and selected to participate in HN/HND training, and (4) formalise internship relations through signing Memorandums of Understanding with organisations meeting set practicum standards is recommended. Forming training partnerships has the advantage of fostering experiential student learning, closer monitoring, and supervision of what students are exposed to during internship training.

The mechanisms towards full credentialing of the HN/HND are yet to be well developed in Uganda. As HN/HND professional regulation takes shape in the country, development of a defined scope of training and practice of HN/HND, minimum training and practice standards, and a clear code of ethics and practice for Uganda in addition to pursuing the harmonisation of HN/HND training curriculum across the universities are recommended.

Further recommended is the need to develop a national regulatory framework on CPD for HN/HND professionals as this will be vital for the standardisation, harmonisation, and general accreditation of the CPDs offered by the different entities. To achieve this, there is need to establish stakeholder partnerships amongst the institutions teaching HN/HND, the professional regulatory bodies, different government ministries especially the MoH and MAAIF, UN agencies, other development partners, NGOs, HN/HND graduates, and all other stakeholders that employer HN/HND graduates for the purposes of agreeing upon the areas required for CPDs in HN/HND.

6.3.2 Education and Practice

The finding that HN/HND professionals were working in different sectors, within and outside the country re-emphasises the multisectorality of nutrition and dietetics and highlights a need for HN/HND graduates to be equipped with the knowledge and skills required for working with multiple actors, in a multisectoral setting, within and outside Uganda. On this basis, this study recommends 1) the need to reorient the current University HN/HND training programs towards the adoption of CBE to ensure that graduates obtain the requisite competencies for health systems performance; 2) creating formal CPD opportunities in HN/HND for graduates to

further obtain and develop professional competencies; and 3) Progressively adapting/adopting the competencies validated in the developed CBE model into HN/HND curricula more so during curricula reviews.

6.3. 4 Recommendations for Further Research

Based on the findings of this study, further research to evaluate (1) the extent to which current HN/HND curricula used in Ugandan Universities addresses the competencies comprised in the developed CBE model, (2) translating the developed CBE model into a standard curriculum that can be taught and evaluated (3) different avenues through which the competencies contained in the developed CBE framework can be included in HN/HND curricula, and (4) higher education institutional capacity readiness to offer CBE in HN/HND in Uganda is recommended.

This study explored the service provider's perspectives of the nutrition/dietetics needs in Uganda and the competencies they expect of the HN/HND graduates. The need to undertake related studies that explores the public/community perspectives on the same is also recommended.

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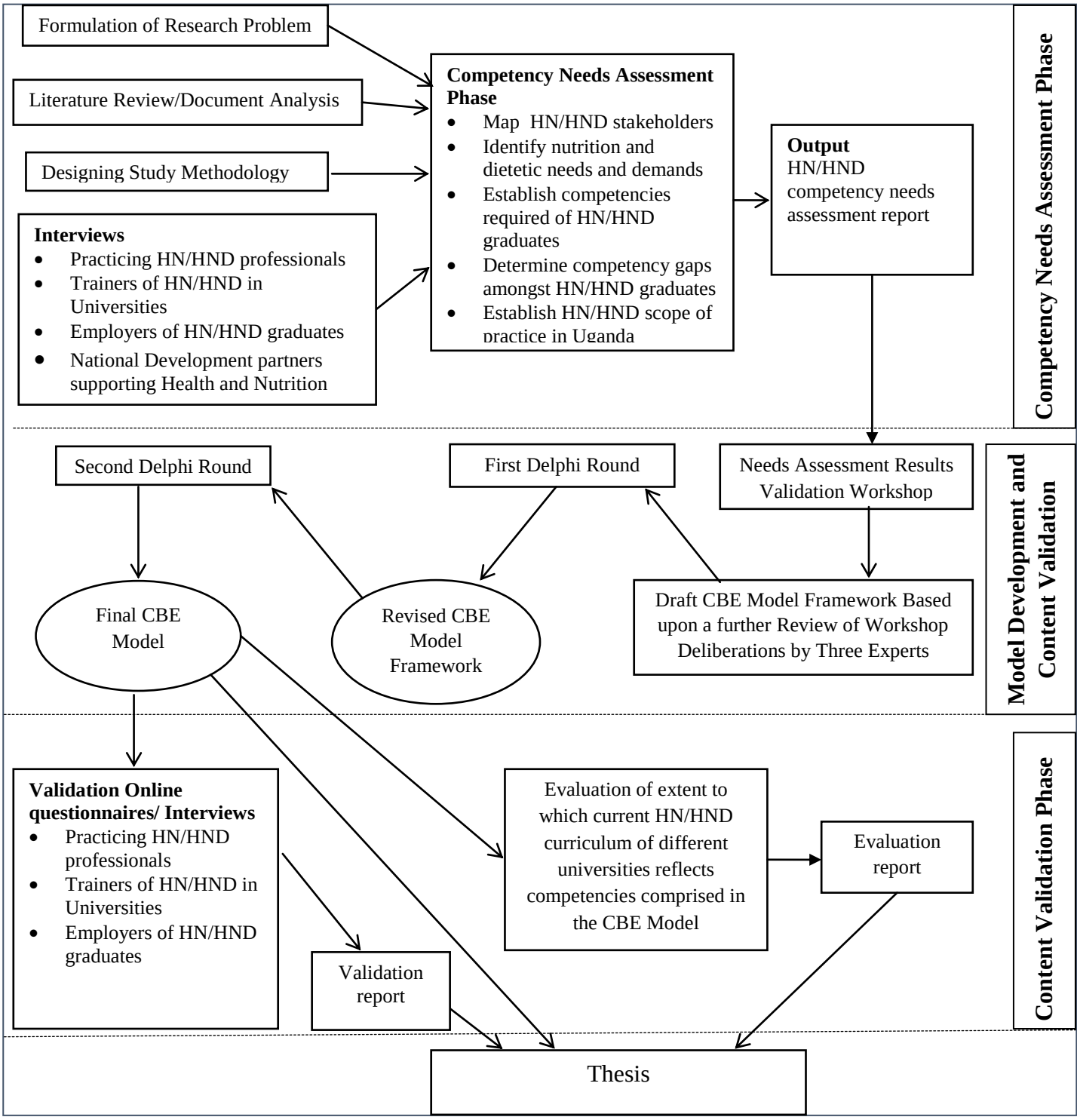
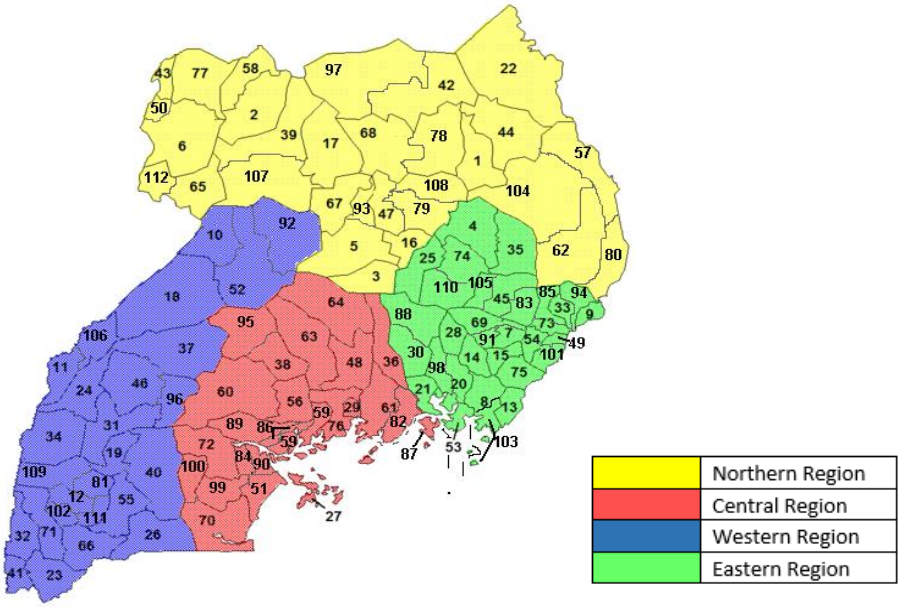
Appendices

Appendix A: Research Flow Processes as Initially Planned



Appendix B: Map of Uganda Showing Regions and Districts



Central Region (red)		Eastern (green)		Northern (yellow)		Western (blue)	
Map	**District**	**Map**	**District**	**Map**	**District**	**Map**	**District**
82	Buikwe	4	Amuria	1	Abim	81	Buhweju
84	Bukomansimbi	7	Budaka	2	Adjumani	10	Buliisa
86	Butambala	49	Bududa	78	Agago	11	Bundibugyo
87	Buvuma	8	Bugiri	79	Alebtong	12	Bushenyi
89	Gomba	83	Bukedea	3	Amolatar	18	Hoima
27	Kalangala	9	Bukwa	80	Amudat	19	Ibanda
90	Kalungu	85	Bulambuli	39	Amuru	26	Isingiro
29	Kampala	13	Busia	5	Apac	23	Kabale
36	Kayunga	15	Butaleja	6	Arua	24	Kabarole
38	Kiboga	88	Buyende	16	Dokolo	31	Kamwenge
95	Kyankwanzi	20	Iganga	17	Gulu	32	Kanungu
48	Luweero	21	Jinja	22	Kaabong	34	Kasese
99	Lwengo	25	Kaberamaido	42	Kitgum	37	Kibaale
100	Lyantonde	28	Kaliro	43	Koboko	40	Kiruhura
51	Masaka	30	Kamuli	93	Kole	92	Kiryandongo
56	Mityana	33	Kapchorwa	44	Kotido	41	Kisoro
59	Mpigi	35	Katakwi	97	Lamwo	96	Kyegegwa
60	Mubende	91	Kibuku	47	Lira	46	Kyenjojo
61	Mukono	45	Kumi	50	Maracha	52	Masindi
63	Nakaseke	94	Kween	57	Moroto	55	Mbarara
64	Nakasongola	98	Luuka	58	Moyo	102	Mitooma
70	Rakai	101	Manafwa	62	Nakapiripirit	106	Ntoroko
72	Sembabule	53	Mayuge	104	Napak	66	Ntungamo
76	Wakiso	54	Mbale	65	Nebbi	109	Rubirizi
		103	Namayingo	107	Nwoya	71	Rukungiri
		14	Namutumba	108	Otuke	111	Sheema
		105	Ngora	67	Oyam		
		69	Pallisa	68	Pader		
		110	Serere	77	Yumbe		
		73	Sironko	112	Zombo		
		74	Soroti				
		75	Tororo				

Source: http://gou.go.ug/content/local-governments (Accessed 28th February, 2018)

Appendix C: List of Different Hospitals in Uganda

District Hospitals	Referral hospitals	Non-government non-profit hospitals	Specialized government hospitals
Abim General Hospital*	**National referral hospitals**	Aga Khan University Hospital, Kampala	Mulago Women's Referral Hospital
Adjumani General Hospital		Angal Hospital	Uganda Cancer Institute
Anaka General Hospital	Butabika National Referral Hospital	Buluba Hospital	**Other government hospitals**
Apac General Hospital	Mulago National Referral Hospital*	Bwindi Community Hospital*	Buwenge General Hospital, Jinja District
Bududa General Hospital		CURE Children's Hospital of Uganda*	Bwera General Hospital
Bugiri General Hospital*	**Regional Referral Hospitals**	St. Charles Lwanga Buikwe Hospital	Entebbe General Hospital*
Bukwo General Hospital		Galilee Community General Jewish Hospital	Kawempe General Hospital - Kawempe
Bundibugyo General Hospital	Arua Regional Referral Hospital*	Holy Innocents Children's Hospital	Kiruddu General Hospital - Makindye Division
Busolwe General Hospital	Fort Portal Regional Referral Hospital*	Ishaka Adventist Hospital	Iran–Uganda Friendship Mini Hospital
Iganga General Hospital*	Gulu Regional Referral Hospital*	Kagando Hospital	
Itojo Hospital	Hoima Regional Referral Hospital*	Kalongo Hospital	**Private for-profit hospitals**
Kalisizo General Hospital*	Jinja Regional Referral Hospital*	Kamuli Mission Hospital	
Kamuli General Hospital*	Kabale Regional Referral Hospital*	Kilembe Mines Hospital	Case Medical Centre
Kapchorwa General Hospital	Lira Regional Referral Hospital*	Kisiizi Hospital	International Hospital Kampala*
Katakwi General Hospital	Masaka Regional Referral Hospital*	Kisubi Hospital	Kadic Hospital – Bukoto*
Kawolo General Hospital		Kitojo Hospital	Kampala Hospital, Kololo, Kampala
Kayunga Hospital*		Kitovu Hospital*	Kampala International University Teaching Hospital, Bushenyi
Kiboga General Hospital		Kiwoko Hospital	Kampala Medical Chambers Hospital
Kitagata General Hospital		Kuluva Hospital	
Kiryandongo General Hospital*		Lacor Hospital*	
Kitgum Hospital*		Matany Hospital*	
Masafu General Hospital		Mengo Hospital*	
Masindi General Hospital*			
Mityana Hospital*			
Mpigi Hospital			
Moyo General Hospital			
Nakaseke General Hospital			

Appendix C Continued: List of Different Hospitals in Uganda

District Hospitals	Referral hospitals	Non-government non-profit hospitals	Specialized government hospitals
Nebbi General Hospital* Tororo General Hospital* Rakai General Hospital	Mbale Regional Referral Hospital* Mbarara Regional Referral Hospital* Moroto Regional Referral Hospital* Mubende Regional Referral Hospital* Soroti Regional Referral Hospital* China-Uganda Friendship Hospital Naguru*	Mutolere Hospital Naggalama Hospital Ngora Hospital Nkokonjeru Hospital Nkozi Hospital Nsambya Hospital* Nyakibale Hospital Rubaga Hospital* St. Francis Hospital Nyenga Rushere Community Hospital St. Joseph's Hospital Kitgum* Villa Maria Hospital Virika Hospital Whisper's Magical Children's Hospital Makerere University Hospital	Kibuli Hospital* Mbarara Community Hospital - Mbarara Nakasero Hospital - Nakasero, Kampala* Old Kampala Hospital, Kampala Paragon Hospital - Bugoloobi, Kampala Women's Hospital International and Fertility Centre – Bukoto

***Represents health facilities with employed HN/HND graduates and or that have hosted HN/HND students while on internship**

Appendix D: Number of HN/HND Professionals Graduating from Ugandan Institution from 2005-2017

Total Number of Human Nutrition and Dietetic Students Graduating in Ugandan Universities from 2006-2016						
Intakes	Kyambogo University	Makerere University	Victoria University	Bugema University	Uganda Christian University	Total
2002-2005	17	0	0	0		17
2003-2006	22	0	0	0		22
2004-2007	20	0	0	0		20
2005-2008	30	0	0	0		30
2006-2009	24	0	0	0		24
2007-2010	55	0	0	0		55
2008-2011	67	0	0	0		67
2009-2012	31	0	0	0		31
2010-2013	41	22	0	0		41
2011-2014	79	24	0	0		103
2012-2015	38	36	0	0		74
2013-2016	69	32	0	0		101
Total	**493**	**114**	**0**	**0**		**607**

Appendix E: Krejcie & Morgan Table for Determining Sample Size from a Given Population

Table for Determining Sample Size of a Known Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Source: (Krejcie & Morgan, 1970)

Note.—*N* is population size. *S* is sample size.

Appendix F: Questionnaire for Human Nutrition/Human Nutrition and Dietetic Graduates in Uganda

Questionnaire for Human Nutrition/Human Nutrition and Dietetic Professionals HN/HND in Uganda		
Date of Interview:		
	Background Information (Probes)	Responses
001	Gender of participant	1. Male 2. Female
002	Age (years)	
003	Training institution attended during undergraduate HN/HND training	1. Kyambogo University 2. Makerere University
004	In which organisations did you undertake HN/HND internships during undergraduate training?(Organisations and respective districts)	
005	Year graduated with undergraduate degree in HN/HND	
006	Year of first entry into professional HN/HND practice (First HN/HND job after school)	
007	Additional formal training obtained since obtaining undergraduate degree in HN/HND (e.g. post graduate studies)	
008	Current employment (Organisation, job title and respective district of employment)	
009	Organisations previously worked for in Uganda (Name of organisation, job titles, and respective districts of work)	
010	What are the job roles of your current position as defined by your organisations work contract? (Specific job roles as per work contract)	
	Assessing for Competencies Required of HN/HND Professionals in Uganda	
	Required Knowledge Amongst HN/HND Graduates for Health System Performance (Probes)	
011	What are the different HN/HND positions available in the organisation where you are employed? (Job positions/ titles for HN/HND graduates)	
012	How many HN/HND professionals are currently employed by your organisation? (Number of HN/HND graduates employed)	
013	In what position are you currently employed by your organisation? (Current positions/job title of HN/HND graduate)	
014	What roles are you assigned/do you perform in your current work? (Job specific roles of HN/HND graduates)	
015	Which specific activities do you perform to fulfil those roles in your current work? (Specific activities done)	
016	What knowledge do HN/HND professionals need to competently perform the given roles and activities? (Knowledge required)	
017	Did you possess the required knowledge to perform the given roles upon graduation? (Underlying reasons)	
018	What strategies have enabled you to acquire your current command of the HN/HND knowledge? (Specific strategies t)	
019	What strategies would you recommend to be undertaken by HN/HND graduates to further develop the professional competency? (recommended strategies)	
020	Does your organisation undertake further on-job training for HN/HND professionals? (Number of training per year and details of last training)	
021	What knowledge does your agency focus on during on-job training of HN/HND professionals? (knowledge, skills/abilities)	

022	What knowledge does your employer expect of HN/HND graduates? (Specific HN/HND Knowledge/skills required by employer)	
023	Do you find the training you received during your HN/HND undergraduate studies correspondent to the knowledge requirements of your employers? (Underlying reasons)	
024	What gaps in nutrition knowledge have hindered you as an individual from effectively delivering nutrition/dietetic services? (Individual gaps in knowledge)	
025	What gaps in knowledge have you observed amongst fellow HN/HND professionals? (Gaps and underlying reasons)	
026	Which of the mentioned gaps in knowledge are specific to fresh HN/HND undergraduates trained in Uganda? (Knowledge gaps specific to fresh HN/HND graduates)	
027	Given your experience, what knowledge in HN/HND do you consider as relevant to attain by students of HN/HND? (Specific knowledge in HN/HND that needs to be attained during training, underlying reasons)	
028	Which of the mentioned knowledge attributes did you not attain while a student? (Specific knowledge attributes, underlying reasons)	
029	Which of the mentioned knowledge attributes have you only attained from the field? (Specific knowledge attributes attained in field?	
030	Given you current expertise, is the time allocated to the study of HN/HND appropriate to allow students gain required knowledge? (underlying reasons)	
031	What other methods would you recommend to be used in the training of HN/HND if students are to acquire the required knowledge?	
	Required Skills and Abilities Amongst HN/HND Graduates for Health System Performance (Probes)	
032	Would you say HN/HND graduates from Uganda Universities possess adequate skills and abilities for national health system performance? (Underlying reasons)	
033	What skills/abilities do you think HN/HND graduates in Uganda should possess for health system performance? (Required skills/abilities, underlying reasons)	
034	What skills/abilities gaps in nutrition and dietetics do you have as an individual? (Individual gaps in nutrition/dietetic skills/abilities)	
035	What gaps in skills/abilities have you observed amongst fellow HN/HND professionals? (Gaps in skills/abilities among HN/HND undergraduates)	
036	What gaps in skills/abilities are specific to fresh HN/HND undergraduates trained in Uganda? (Specific gaps and underlying reasons)	
037	Given your experience, what skills/abilities do you consider as relevant to attain by students of HN/HND during undergraduate training? (Specific skills that need to be attained during training and underlying reasons)	
038	Which of the mentioned skills/abilities did you not attain while a student? (specific knowledge, skills and abilities and underlying reasons)	
039	Which of the mentioned skills/abilities have you only attained from the field? (Specific skills/ abilities attained in field?	
040	What skills does your employer expect of HN/HND graduates? (Specific HN/ skills required by employer)	
041	Do you find the training you received during your HN/HND undergraduate studies correspondent to the skills requirements of your employers? (underlying reasons)	
042	Given you current expertise, do you think the time allocated to the study of HN/HND is appropriate to allow students gain required skills/abilities? (underlying reasons)	
043	What other methods would you recommend to be used in the training of HN/HND if students are to acquire the required skills/abilities?	
	Population Nutrition Needs and Demands in Uganda	

	Addressed Population Nutrition/Dietetic Needs and Demands (Probes)	
044	What are the nutrition and dietetic problems/challenges faced by the community/population you currently serve? (Specific nutrition and dietetic challenges)	
045	What nutrition and dietetic services does the community you serve usually demand? (Specific nutrition services demanded by the community)	
046	Which of the demanded nutrition and dietetic services does your employer provide? (Addressed community nutrition/dietetic needs. Reasons of failure to address other needs)	
047	Which other nutrition/dietetic services are provided to the community/population you serve by other agencies? (Nutrition/dietetic services by other agencies)	
048	What would you consider as the priority nutrition and dietetic services that can address the needs of the community/population served? (priority services)	
	What other resources are needed to contribute to nutrition/dietetic improvements in the community you serve (Financial, physical, political, infrastructural, human)	
049	Would you say HN/HND undergraduates trained in Uganda possess adequate knowledge required to provide community/population nutrition/dietetic needs? Underlying reasons	
050	What knowledge do you think HN/HND graduates should possess for them to effectively address community/population nutrition/dietetic needs in Uganda? (Specific knowledge and underlying reasons)	
	Scope of Training and Practice of HN/HND in Uganda	
051	Are there established minimum training requirements for HN/HND in Uganda? (Examples, availability and accessibility by stakeholders. Or reasons for non-existence)	
052	Is there a need for a general national standard stipulating the minimum training requirements/expectations for HN/HND in Uganda? (Underlying reasons)	
053	Are there national HN/HND training/practice guides/standards besides institutional HND curricula (Examples, availability and accessibility by stakeholders. Or reasons for non-existence)	
054	Do the guides reflect the required HN/HND professional competencies for performance in Uganda's Health System? (Competencies reflected)	
055	Depending on your expertise, what knowledge aspects would you recommend to be considered as a minimum requirement in the training of HN/HND professionals in Uganda? (Aspects, underlying reasons)	
056	What skills/abilities aspects would you recommend to be considered as a minimum requirement in the training of HN/HND professionals in Uganda? (Skills/abilities and underlying reasons)	
057	Is the training and practice of HN/HND regulated in Uganda? (Credentialing and accreditation agencies, underlying reasons)	
058	What other legislation(s) governs/impinges the training and practice of HN/HND in Uganda? (Examples of policy and legal provisions)	
059	What are the mandates of HN/HND professionals in Uganda as according to existent legislation? (Specific mandates of HN/HND professionals as per the legal provisions)	
060	Based on your experience, what mandates do you find appropriate for the practice of HN/HND in Uganda (Specific mandates of HN/HND professionals as per the legal provisions)	

061	Is there a defined scope of training and practice for HN/HND used by all universities in Uganda? (Aspects covered by the scope of practice)	
062	What sets of competences ought to be considered for inclusion in developing a scope of training/practice of HN/HND in Uganda? (Competences that should be reflected)	
063	What methods can be pursued to foster competency based education of HN/HND at undergraduate level in Uganda? (Methods/techniques)	
064	What are the likely challenges that may limit implementation of competency based education for HN/HND in Uganda? (Challenges that can limit CBE of HN/HND)	
065	Do you know of any defined opportunities for continuous profession development in HN/HND graduates in Uganda? (Existing opportunities and parties responsible)	
066	What strategies can be undertaken to institute continuous profession development for HN/HND graduates in Uganda? (Specific strategies)	
END: Thank you so much for the Contribution		

Appendix G: Questionnaire for Academic Staff that Train Human Nutrition/Human Nutrition and Dietetic Professionals in Uganda

Date of interview:		
001	Gender of participant	1. Male 2. Female
002	Name of Training institution	
003	Position of academic staff (i.e. Asst. Lecturer, Lecturer, Dr. Professor)	
004	Units/courses taught by respondent	
005	Highest academic qualification of participant	
	Years of teaching experience	
Assessing for required competencies and existing competency gaps amongst HN/HND professionals		
	Required Knowledge Amongst HN/HND Graduates for Health System Performance (Probes)	
006	What are the different types of jobs/work done by HN/HND professionals in Uganda (specific jobs/domains in which HN/HND graduates are employed)	
007	What are some of the job roles assigned/performed by HN/HND graduates	
008	What knowledge do HN/HND professionals need to competently offer nutrition/dietetic services in Uganda? (Key knowledge attributes/areas required)	
009	What gaps in knowledge have you observed amongst HN/HND professionals? (General gaps in knowledge amongst HN/HND graduates)	
010	Which of the mentioned gaps in knowledge are specific to fresh HN/HND undergraduates trained in Uganda? (Knowledge gaps specific to fresh HN/HND graduates)	
011	Given your experience, what knowledge in HN/HND do you consider as relevant to attain by students of HN/HND? (Specific knowledge in HN/HND that needs to be attained during training, underlying reasons)	
012	Given you current expertise, is the time allocated to the study of HN/HND appropriate to allow students gain required knowledge? (underlying reasons)	
013	What other methods would you recommend to be used in the training of HN/HND if students are to acquire the required knowledge and knowledge?	
014	What strategies can be undertaken by HN/HND graduates to further develop their knowledge for professional competency?	
	Required Skills and Abilities Amongst HN/HND Graduates for Health System Performance (Probes)	
015	Would you say HN/HND graduates in Uganda possess adequate skills and abilities for national health system performance? (Underlying reasons)	
016	What skills/abilities gaps in nutrition and dietetics do you have as an individual? (Individual gaps in nutrition/dietetic skills/abilities)	
017	What gaps in skills/abilities are specific to fresh HN/HND undergraduates trained in Uganda? (Specific gaps and underlying reasons)	

018	Given your experience, what skills/abilities do you consider as relevant to attain by students of HN/HND during undergraduate training? (Specific skills that need to be attained during training and underlying reasons)	
019	Which of the mentioned skills and abilities is currently not a focus of HN/HND training in your institution? (Knowledge, skills and abilities not learnt and underlying reasons)	
020	Which of the mentioned skills and abilities can HN/HND graduates obtain from the field? (Skills/abilities that can be obtained in the field)	
	Population Nutrition Needs and Demands in Uganda	
	Addressed Population Nutrition/Dietetic Needs and Demands (Probes)	
021	What are the nutrition and dietetic problems/challenges faced by the community/population in Uganda? (specific nutrition and dietetic challenges)	
022	What nutrition and dietetic services are provided to communities in Uganda? (Nutrition services provided in different communities of Uganda)	
023	Would you say HN/HND undergraduates trained in Uganda possess adequate knowledge, skills/abilities required to provide community/population nutrition/dietetic needs? (Underlying reasons)	
024	What knowledge should HN/HND graduates possess for them to effectively address community/population nutrition/dietetic needs in Uganda? Specific knowledge and underlying reasons	
025	What skills/abilities should HN/HND graduates possess for them to effectively address community/population nutrition/dietetic needs in Uganda? (Specific skills/abilities and underlying reasons)	
	Scope of Training and Practice of HN/HND in Uganda	
026	In regards to the degree in Human Nutrition/Human Nutrition and Dietetics, what kind of curriculum is used? (Probe Traditional time based curricula versus Competency based curricula)	
027	What would you say are the best things about the Human Nutrition/Human Nutrition and Dietetics curricula currently used by institution?	
028	Are there any observed challenges in implementing the HN/HND curricula that is currently in use by your institution?	
029	Are there established minimum training requirements for HN/HND in Uganda? (Examples, availability and accessibility by stakeholders. Or reasons for non-existence)	
030	Is there a need for a general national standard stipulating the minimum training requirements for HN/HND in Uganda? (Underlying reasons)	
031	Are there national HN/HND training/practice guides/standards besides institutional HND curricula (Examples, availability and accessibility by stakeholders. Or reasons for non-existence)	
032	Do the guides reflect the required HN/HND professional competencies for performance in Uganda's Health System? (Competencies reflected)	
033	Depending on your expertise, what knowledge aspects would you recommend to be considered as a minimum requirement in the training of HN/HND professionals in Uganda? (Aspects, underlying reasons)	
034	What skills/abilities aspects would you recommend to be considered as a minimum requirement in the training of HN/HND professionals in Uganda? (Skills/abilities and underlying reasons)	

035	Is the training and practice of HN/HND regulated in Uganda? (Credentialing and accreditation agencies, underlying reasons)	
036	What other legislation(s) governs/impinges the training and practice of HN/HND in Uganda? (Examples of policy and legal provisions)	
037	What are the mandates of HN/HND professionals in Uganda as according to existent legislation? (Specific mandates per the legal provisions)	
038	Based on your experience, what mandates do you find appropriate for the practice of HN/HND in Uganda (Specific mandates per the legal provisions)	
037	Is there a defined scope of training and practice for HN/HND used by all universities in Uganda? (Aspects covered by the scope of practice)	
040	What sets of competences ought to be considered for inclusion in developing a scope of training/practice of HN/HND in Uganda? (Competences reflect)	
041	What methods can be pursued to foster competency based education of HN/HND at undergraduate level in Uganda? (Methods/techniques)	
042	What are the likely challenges that may limit implementation of competency based education for HN/HND in Uganda? (Challenges that can limit CBE of HN/HND)	
043	Do you know of any defined opportunities for continuous profession development in HN/HND graduates in Uganda? (Existing opportunities)	
044	What strategies can be undertaken to institute continuous profession development for HN/HND graduates in Uganda? (Specific strategies)	
END: Thank you so much for the Contribution		

Appendix H: Questionnaire for Supervisors/Employers of Human Nutrition/Human Nutrition and Dietetic Professionals in Uganda

Questionnaire for Employers/Supervisors of Human Nutrition/Human Nutrition and Dietetic Professionals in Uganda		
	Date of Interview	
	Background Information (Probes)	Responses
001	Gender of participant	1. Male 2. Female
002	Name of Organisation/Entity	
003	District of Operation of the Organization/Entity	
004	Position of Person Interviewed	
005	Main sections/areas of work in which HN/HND graduates are employed	
	Assessing for Competencies Required of HN/HND Professionals in Uganda	
	Required Knowledge Amongst HN/HND Graduates for Health System Performance (Probes)	
006	What are the different HN/HND positions available in your organisation? (Job positions/ titles for HN/HND graduates)	
007	How many HN/HND professionals are currently employed by your organisation? (Number of HN/HND graduates employed)	
008	In what position are HN/HND professionals employed by your organisation? (Current positions/job title of HN/HND graduates)	
009	What roles are assigned to the different HN/HND professionals in your organisation? (Job specific roles of HN/HND graduates in different positions)	
010	Which specific activities do HN/HND professionals perform to fulfil those roles in your current work? (Specific activities done)	
011	What knowledge do HN/HND professionals need to competently perform the given roles and activities? (Knowledge required)	
012	Did the HN/HND professionals possess the required knowledge to perform the given roles on recruitment? (Underlying reasons)	
017	What strategies have enabled HN/HND professionals to acquire the current command of the HN/HND knowledge? (Specific strategies t)	
018	What strategies would you recommend to be undertaken by HN/HND graduates to further develop the professional competency? (recommended strategies)	
019	Does your organisation undertake further on-job training for HN/HND professionals? (Number of training per year and details of last training)	
020	What knowledge does your agency focus on during on-job training of HN/HND professionals? (knowledge, skills/abilities)	
021	What knowledge does your organisation expect of HN/HND graduates? (Specific HN/HND Knowledge/skills required by employer)	
022	What gaps in nutrition knowledge have you found to be hindering HN/HND professionals from effectively delivering nutrition/dietetic services? (Individual gaps in knowledge)	
023	Which of the mentioned gaps in knowledge do you find specific to fresh HN/HND undergraduates trained in Uganda? (Knowledge gaps specific to fresh HN/HND graduates)	

024	Given your experience, what knowledge in HN/HND do you consider as relevant to attain by students of HN/HND? (Specific knowledge in HN/HND that needs to be attained during training, underlying reasons)	
024	Which of the mentioned knowledge attributes can HN/HND professionals attain from the field? (Specific knowledge attributes attained in field?	
025	What other methods would you recommend for use in the training of HN/HND if students are to acquire the required knowledge?	
	Required Skills and Abilities Amongst HN/HND Graduates for Health System Performance (Probes)	
026	Would you say HN/HND graduates in Uganda possess adequate skills and abilities for national health system performance? (Underlying reasons)	
027	What skills/abilities do you think HN/HND graduates in Uganda should possess for health system performance? (Required skills/abilities, underlying reasons)	
028	What skills/abilities gaps in nutrition and dietetics have you observed amongst HN/HND graduates of Uganda? (Individual gaps in nutrition/dietetic skills/abilities)	
029	What gaps in skills/abilities are specific to fresh HN/HND undergraduates trained in Uganda? (Specific gaps and underlying reasons)	
030	Given your experience, what skills/abilities do you consider as relevant to attain by students of HN/HND during undergraduate training? (Specific skills that need to be attained during training and underlying reasons)	
031	Which of the mentioned skills/abilities can HN/HND graduates attain from the field? (Specific skills/ abilities attained in field?	
032	What skills does your organisation expect of HN/HND graduates? (Specific HN/ skills required by employer)	
033	Do you find the training received by HN/HND undergraduate correspondent to the skills requirements of your organisation? (underlying reasons)	
034	What other methods would you recommend to be used in the training of HN/HND if students are to acquire the required skills/abilities?	
	Population Nutrition Needs and Demands in Uganda	
	Addressed Population Nutrition/Dietetic Needs and Demands (Probes)	
035	What are the nutrition and dietetic problems/challenges faced by the community/population you currently serve? (Specific nutrition and dietetic challenges)	
036	What nutrition and dietetic services does the community you serve usually demand? (Specific nutrition services demanded by the community)	
037	Which of the demanded nutrition and dietetic services does your organisation provide? (Addressed community nutrition/dietetic needs. Reasons of failure to address other needs)	
038	Which other nutrition/dietetic services are provided to the community/population you serve by other agencies? (Nutrition/dietetic services by other agencies)	
039	What would you consider as the priority nutrition and dietetic services that can address the needs of the community/population served? (priority services)	

040	Would you say HN/HND undergraduates trained in Uganda possess adequate knowledge required to provide community/population nutrition/dietetic needs? Underlying reasons	
041	What knowledge do you think HN/HND graduates should possess for them to effectively address community/population nutrition/dietetic needs in Uganda? (Specific knowledge and underlying reasons)	
	What skills/abilities do you think HN/HND graduates should possess for them to effectively address community/population nutrition/dietetic needs in Uganda? (Specific skills/abilities and underlying reasons)	
	Scope of Training and Practice of HN/HND in Uganda	
043	Are there established minimum training requirements for HN/HND in Uganda? (Examples, availability and accessibility by stakeholders. Or reasons for non-existence)	
044	Is there a need for a general national standard stipulating the minimum training requirements/expectations for HN/HND in Uganda? (Underlying reasons)	
045	Are there national HN/HND training/practice guides/standards besides institutional HND curricula (Examples, availability and accessibility by stakeholders. Or reasons for non-existence)	
046	Do the guides reflect the required HN/HND professional competencies for performance in Uganda's Health System? (Competencies reflected)	
047	Depending on your expertise, what knowledge aspects would you recommend to be considered as a minimum requirement in the training of HN/HND professionals in Uganda? (Aspects, underlying reasons)	
048	What skills/abilities aspects would you recommend to be considered as a minimum requirement in the training of HN/HND professionals in Uganda? (Skills/abilities and underlying reasons)	
049	Is the training and practice of HN/HND regulated in Uganda? (Credentialing and accreditation agencies, underlying reasons)	
050	What other legislation(s) governs/impinges the training and practice of HN/HND in Uganda? (Examples of policy and legal provisions)	
051	What are the mandates of HN/HND professionals in Uganda as according to existent legislation? (Specific mandates of HN/HND professionals as per the legal provisions)	
052	Based on your experience, what mandates do you find appropriate for the practice of HN/HND in Uganda (Specific mandates of HN/HND professionals as per the legal provisions)	
053	Is there a defined scope of training and practice for HN/HND used by all universities in Uganda? (Aspects covered by the scope of practice)	
054	What sets of competences ought to be considered for inclusion in developing a scope of training/practice of HN/HND in Uganda? (Competences that should be reflected)	
055	What methods can be pursued to foster competency based education of HN/HND at undergraduate level in Uganda? (Methods/techniques)	
056	What are the likely challenges that may limit implementation of competency based education for HN/HND in Uganda? (Challenges that can limit CBE of HN/HND)	
057	Do you know of any defined opportunities for continuous profession development in HN/HND graduates in Uganda? (Existing opportunities and parties responsible)	
058	What strategies can be undertaken to institute continuous profession	

	development for HN/HND graduates in Uganda? (Specific strategies)	
END: Thank you so much for the Contribution		

Appendix I: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
Domain 1: Prevention and management of malnutrition in all its forms: Demonstrates knowledge and skills to prevent and manage undernutrition (wasting, stunting, underweight), vitamin and mineral deficiencies, overweight, obesity, and resulting diet-related non-communicable diseases			
1.1 Assessment: Demonstrates knowledge and skills in the use of different methods of nutrition screening and assessment to evaluate nutrition status at the individual/household, and community level			
1.1.1 Demonstrates knowledge of the nature, origin, progress, and causes of undernutrition, vitamin and mineral deficiencies, overweight, obesity, non-communicable diseases (e.g. diabetes, cancer, cardiovascular diseases) and other disease conditions whose management requires nutrition therapy (e.g. lower and upper gastrointestinal tract disorders; liver disorders; food allergies and intolerances; conditions arising from different nutrient deficiencies; pulmonary diseases; renal disorders; metabolic complications, stress, burns, and trauma; rheumatic diseases; neurologic disorders; psychiatric conditions; genetic metabolic disorders; HIV/AIDs; and developmental related disabilities)			
1.1.2 Demonstrates knowledge and skills to perform triage (identify clients in need of immediate attention by service providers)			
1.1.3 Demonstrates knowledge and skills to undertake client clerking and using the emerging information to clearly and correctly fill and update the nutrition register			

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Appendix I Continued: Tool used in the First Modified Delphi Round

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1.1.4 Demonstrates knowledge and skills to identify and use different nutrition assessment screening tools appropriate for different age groups, physical status, physiological status, and disease state			
1.1.5 Demonstrates knowledge and skills to perform clinical assessments relevant for identification of undernutrition; vitamin and mineral deficiencies or excesses; diet-related non-communicable diseases; and disease conditions whose management requires nutrition therapy			
1.1.6 Demonstrates knowledge and skills to perform dietary intake assessments using objective and subjective techniques			
1.1.7 Demonstrates knowledge on the use of different nutrition biochemical tests			
1.1.8 Demonstrates ability to perform certain tests e.g. glucose, haemoglobin, vital signs (blood pressure, pulse/heart rate, body temperature and respiration rate)			
1.1.9 Demonstrates knowledge and skills necessary for obtaining client history data as relates to medical treatment, disease, socio-economic status, culture/religious factors, psychological, and physical status			
1.1.10 Demonstrates knowledge and skills to obtain perceptions/opinions from the client or client's caretakers on underlying health condition			
1.1.11 Demonstrates skills necessary for undertaking community screening, identifying, and referring malnourished individuals for health services			

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Appendix I Continued: Tool used in the First Modified Delphi Round

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1.1.12 Demonstrates knowledge and skills to work with other health team members to plan, conduct, and supervise home visits for active case finding of malnourished individuals			
1.2 Nutrition Diagnosis: Uses client assessment data and his/her understanding of nutrition and dietetics to identify underlying problems that can be addressed through diet and nutrition-related interventions			
1.2.1 Demonstrates knowledge on how to interpret results from different nutrition assessments in relation to different disease causal pathways, signs, and symptoms			
1.2.2 Demonstrates knowledge and skills to use assessment findings to identify the form of malnutrition; and or diet related non-communicable or communicable disease affecting the client			
1.2.3 Demonstrates knowledge and skills required to work in collaboration with other health team members to make appropriate diagnoses based on assessment findings.			
1.3 Intervention: Demonstrates knowledge and skills to implement relevant diet and nutrition-related interventions depending on the disease condition, the severity of symptoms, availability of supplies, and other prevailing socio economic and environmental conditions			

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1.3.1 Demonstrates knowledge and skills required to work with an interdisciplinary health team in the management of clients across the different health departments with special emphasis on paediatrics, maternity intensive care unit, dysphagia clinics, HIV/AIDS, cardiovascular unit, burn units, cancer, emergency units, chronic disease treatment units, dentistry, diabetes mellitus, obesity, hypertension, infectious diseases such as malaria, and neurologic disorder management clinics			
1.3.2 Demonstrates knowledge and skills to design and implement nutrition and dietetic care intervention plans through collaboration with the client, his/her caretakers, and an interdisciplinary health care team			
1.3.3 Demonstrates knowledge and skills to set measurable and achievable short and long-term recovery goals for the client based on assessment and diagnosis results			
1.3.4 Demonstrates knowledge and skills to communicate results of assessment, diagnosis and intervention plans with the client and /or, depending on prevailing circumstances, with the client's caretakers			
1.3.5 Demonstrates knowledge of determining client nutrition requirements upon interpretation of nutrition assessment results			
1.3.6 Demonstrates knowledge and skills to design therapeutic diets tailored to particular diseases, health, and lifestyle needs			
1.3.7 Demonstrates knowledge of tube feeding and skills to insert feeding tubes appropriate for different disease conditions			

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Appendix I Continued: Tool used in the First Modified Delphi Round

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1.3.8* Demonstrates knowledge and skills to prepare and administer therapeutic diets and feeds (e.g. F75, F 100, RUTF)			
1.3.9 Demonstrates knowledge and skills to monitor enteral therapeutic feeding depending on the client's disease condition			
1.3.10 Demonstrates knowledge and skills to administer and monitor parenteral feeding as required for different conditions			
1.3.11 Demonstrates knowledge and skills to offer tailored nutrition and dietetics guidance and counselling services to clients and their caretakers			
1.3.12 Demonstrates skills to sensitize clients and their guardians on the role of care for improved nutrition outcomes			
1.3.13 Demonstrates knowledge and skills to support clients in managing specific nutrient-drug interactions for optimum drug efficacy			
1.3.14 Demonstrates knowledge and skills to offer individualized guidance on the use of vitamin and mineral supplements to address different nutrient deficiencies			
1.3.15 Demonstrates knowledge and skills to design meal plans for clients to meet therapeutic/supplementary purposes			
1.3.16 Demonstrates knowledge and skills to prescribe exercise/ lifestyle strategies that suit the client conditions			
1.3.17 Demonstrates knowledge and skills to perform cooking demonstrations to clients and caretakers			

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1.3.18 Demonstrates knowledge and skills to plan for and conduct community nutrition outreaches			
1.3.19 Demonstrates knowledge and skills to undertake community awareness and sensitization on nutrition and health*			
1.3.20 Demonstrates knowledge and skills to manage clients under the different phases of acute management of malnutrition (ITC, OTC, SFP, community outreach)			
1.3.21 Demonstrates knowledge and skills to manage other cases of malnutrition amongst clients both within the hospital and in the community			
1.3.22 Demonstrates knowledge of referral processes and their use in referring clients for other health care interventions beyond the realm/scope of nutrition and dietetics			
1.3.23 Demonstrates knowledge and adheres to established national and international guidelines and institutional protocols for nutrition assessment, classification and management (e.g. IMAM guidelines, IYCF guidelines, Diet-related NCD guidelines)			
1.4 Monitoring and Evaluation of Nutrition Interventions: Demonstrates knowledge and skills to monitor client progress through the care interventions in relation to the applied nutrition intervention and set goals/desired outcomes			
1.4.1 Demonstrates knowledge of different reference standards (WHO Growth Standards, Admission and Discharge Criteria) in nutrition care			
1.4.2 Demonstrates knowledge and skills to assess client progress on interventions based on review of client medical records vis-à-vis the set goals/desired outcomes			

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1.4.3 Demonstrates knowledge and skills to identify the causes of relapse and defaulting amongst clients admitted to a nutrition program			
1.4.4 Demonstrates knowledge and skills to review adherence to prescribed interventions, identify client challenges, and adjust interventions as may be required			
1.4.5 Demonstrates knowledge and skills to communicate with clients/caretakers the results of the monitoring and evaluation using easy to understand but standard terminology			
1.4.6 Demonstrates knowledge and skills to compile, analyse, and utilize data from nutrition therapy to improve both the client and program outcomes.			
1.5 Emergency Nutrition: Demonstrates knowledge of and skills to offer nutrition services in differing emergency contexts			
1.5.1 Demonstrates general understanding of the recommended minimum standards in humanitarian response with emphasis on food security and nutrition as stipulated in the SPHERE handbook and as updated from time to time			
1.5.2 Demonstrates knowledge and skills to support the functionality of ITC, OTC, IYCF-E services in emergency and refugee settings			
1.5.3 Demonstrates technical knowhow on how to plan and conduct mass screenings in refugee settlements and emergency contexts			
1.5.4 Demonstrates knowledge and skills to train nutrition staff, volunteers and peer counsellors on IYCF-E			

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1.5.5 Demonstrates knowledge and skills to undertake monitoring of emergency activities (Food Distribution, growth monitoring and promotion, childhood nutrition, micronutrient supplementation, and IYCF-E) in refugee settlements and emergency contexts			
1.5.6 Demonstrates knowledge and skills to develop and maintain humanitarian working relations with all concerned stakeholders			
1.6 Technical support and capacity development in the management of malnutrition: Uses his/her expertise in nutrition and dietetics to offer technical support and capacity development as may be required by different stakeholders or fellow professionals and health team members			
1.6.1 Demonstrates knowledge of different approaches in undertaking Quality Improvement (QI)			
1.6.2 Demonstrates skills on using approved QI tools to facilitate the sustainable delivery of quality and equitable nutrition services			
1.6.3 Demonstrates knowledge and skills to plan and conduct on job mentorship and continuous medical education (CME) for fellow professionals, other health staff, and Village Health Team members on various nutrition packages used in the country (e.g. IMAM, IYCF, MIYCAN, NACS, Nutrition in emergency, Nutrition and HIV/AIDs, Positive Deviance, Nutrition screening and case detection, and WASH)			

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1.6.4 Demonstrates knowledge and skills necessary for supervising nutrition staff and other health cadres offering nutrition services.			
1.6.5 Demonstrates team work skills necessary for undertaking support supervision of health facilities offering nutrition services			
1.6.6 Demonstrates knowledge and skills to support project needs assessment, monitoring and evaluation to improve the provision of nutrition and dietetics services			
1.6.7 Demonstrates ability to undertake personal initiative towards professional growth and development			
1.7 Interprofessional collaboration in management of malnutrition: Demonstrates knowledge and skills necessary to collaborate and work with an interdisciplinary team			
1.7.1 Demonstrates knowledge and respect for the core values and responsibilities of his/her profession and those of other fellow health professionals			
1.7.2 Demonstrates knowledge of ethical principles in interprofessional training and practice			
1.7.3 Demonstrates team work and collaborative skills required to work with other health professionals for the effective delivery of health and nutrition related services			
1.7.4 Demonstrates effective verbal and non-verbal communication skills required for interprofessional collaboration			

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1.7.5 Demonstrates knowledge and skills to identify and manage ethical dilemmas and related conflicts that may arise due to interprofessional collaborations			
1.8 Water, Sanitation, and Hygiene (WASH): Demonstrates knowledge and skills required for promoting WASH at individual, household, community and facility level			
1.8.1 Demonstrates knowledge of the linkage between WASH and Nutrition			
1.8.2 Demonstrates knowledge and skills to promote adherence to safe water chain practices (water collection, handling, transportation, storage, treatment, and consumption)			
1.8.3 Demonstrates knowledge on the different types of sanitation facilities (e.g. latrines or toilets, waste/garbage disposal) and skills to promote their use at different levels			
1.8.4 Demonstrates knowledge and skills required for the promotion of individual and domestic hygiene practices			
1.8.5 Demonstrates knowledge and skills relevant for ensuring infection control in health facilities			
1.8.6 Demonstrates knowledge and skills required to align WASH in Nutrition programming			

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1.9 Procurement/Management of nutrition supplies: Demonstrates knowledge of the different processes and skills necessary for procurement, storage, distribution, and disposal of nutrition related supplies and/or equipment			
1.9.1 Demonstrates knowledge and skills necessary for liaising with different stakeholder's including the UN agencies and donors for the effective provision of nutrition supplies and equipment			
1.9.2 Demonstrates knowledge of food safety and hygiene			
1.9.3 Demonstrates skills necessary for maintaining high hygienic standards of hospital/institutional food storage facilities following recommended guidelines			
1.9.4 Demonstrates knowledge and skills for effective management of nutrition commodities through forecasting, requisition, stocking and utilization			
1.9.5 Demonstrates skills to provide guidance on the purchasing and stocking of therapeutic feeds and other related food supplies			
1.10 Data management and record keeping: Demonstrates knowledge and skills for the efficient collection, analysis/processing, dissemination, use, and storage of data as relates to the provided nutrition, dietetics, and related health services			
1.10.1 Demonstrates knowledge and skills on the use of different formats of patient and healthcare information systems (non-digital or digital e.g., the electronic medical record and electronic health record systems)			

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1.10.2 Demonstrates knowledge and skills of using the different client/medical records documentation styles (e.g. ADIME: Assessment, Diagnosis, Intervention, Monitoring and Evaluation; DAP: Diagnosis, Assessment, Plan; PES: Problem, Aetiology, Signs and symptoms; SOAP: Subjective, Objective, Assessment, Plan)			
1.10.3 Demonstrates knowledge in the use of the Health Management Information System (HMIS) as relates to the collection, processing, storage, retrieval, and dissemination of nutrition and related health information for decision making, planning, monitoring and evaluation			
1.10.4 Demonstrates knowledge and skills in using up-to-date HMIS tools (e.g. HMIS form 076, Order Form: HMIS Form 085; Daily dispensing log: HMIS Form 016; Requisition and issue voucher: HMIS Form 017; Stock card: HMIS Form 015) to capture quality HMIS data			
1.10.5 Demonstrates knowledge and skills to train fellow cadres on the use of HMIS tools to capture nutrition services related data			
1.10.6 Demonstrates skills to collaborate with the district bio-statistician to consolidate and enter nutrition data into routine HMIS system*			
1.10.7 Demonstrates knowledge and skills to analyse, present, and discuss HMIS nutrition data with different stakeholders for advocacy, decision making, and planning			

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1.10.8 Demonstrates knowledge and skills to compile and share monitoring and evaluation reports on the provided services following established organisational guidelines			
1.10.9 Demonstrates knowledge and skills necessary for proper filing client/medical records and other organisational documents			
Domain 2: Nutrition in the Lifecycle: Demonstrates knowledge and skills relevant for the promotion of optimal nutrition across the different stages of the human lifecycle: pregnancy and lactation, infancy, childhood, adolescence, adult years, and the elderly			
2.1 Demonstrates knowledge of the nutrition requirements through the different phases of the human lifecycle			
2.2 Demonstrate skills to undertake nutrition assessment, counselling, and support (NACS) in the context of MIYCAN, adults and elderly nutrition			
2.3 Demonstrates knowledge and skills to identify and manage cases of malnutrition among infants, young children, adolescents, pregnant and lactating women, adults and the elderly			
2.4 Demonstrates knowledge and skills to undertake Growth Monitoring and Promotion (GMP) activities.			
2.5 Demonstrates knowledge of the role of care in nutrition and the skills necessary for its provision across the lifecycle			

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2.6 Demonstrates skills on feeding infants and young children under normal circumstances; those exposed to HIV; those in emergencies; and in other exceptionally difficult circumstances			
2.7 Demonstrates knowledge and skills to support clinical lactation management for the mother-infant pair			
2.8 Demonstrates skills to guide and counsel HIV infected mothers on feeding recommendations for both the mothers and infants in the HIV/AIDS context			
2.9 Demonstrates knowledge of different community approaches/models (e.g. community support groups, mother care support groups, Positive Deviance/Hearth approach) used to promote optimal MIYCAN; adult and geriatric nutrition			
2.10 Demonstrates skills to plan and undertake community outreaches on issues relevant to promoting optimal MIYCAN; adult and geriatric nutrition			
2.11 Demonstrates skills necessary for undertaking community sensitization aimed at reducing vitamin and mineral deficiencies of public health concern (e.g. Vitamin A and the minerals iron, iodine, zinc)*			
2.12 Demonstrates knowledge and skills to plan and conduct food demonstrations for purposes of promoting MIYCAN; adult and geriatric nutrition*			
2.13 Demonstrates knowledge of public health interventions such as food fortification, iodization, bio-fortification and their application			

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2.14 Demonstrates knowledge and skills to design and use appropriate and consistent Information, Education and Communication (IEC) materials for promoting optimal MIYCAN; adult and geriatric nutrition			
2.15 Demonstrates knowledge of the Baby Friendly Hospital Initiative (BFHI) and skills necessary for supporting facilities to obtain BFHI status			
2.16 Demonstrates knowledge of the WHO International Code of Marketing Breastmilk Substitutes			
2.17 Demonstrates knowledge of existing national policies, guidelines, and protocols that support the promotion of MIYCAN; adult and geriatric nutrition (e.g. National Health Policy, National Policy Guidelines and Service Standards for Reproductive Health Services, National Anaemia Policy, BFHI guidelines, Integrated Management of Childhood Illnesses guidelines, Food Fortification guidelines)			
2.18 Demonstrates knowledge and skills to work inter-professionally and in collaboration with other key stakeholders to promote MIYCAN; adult and geriatric nutrition			
2.19 Demonstrates knowledge and skills to provide technical support and guidance to district leadership on strategies to promote optimal MIYCAN; adult and geriatric nutrition			

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Domain 3: Food Security; Agriculture; and Livelihoods Promotion: Demonstrates knowledge of food security and safety; agriculture; and livelihoods and skills necessary for their implementation			
3.1 Nutrition Sensitive Agriculture, Food Security and Livelihoods Promotion: Demonstrates knowledge and skills to design and implement nutrition-sensitive agriculture, food security, and livelihoods interventions in different contexts (e.g. emergency situations, community settings)			
3.1.1 Demonstrates knowledge of the concept of food and nutrition security and the cross-cutting issues between food and nutrition security and gender; climate change; HIV/AIDs; conflicts, crises, and natural disasters, political stability/instability; poverty; and sustainable livelihoods			
3.1.2 Demonstrates knowledge of the different instruments for preventing and managing food crises (Food aid, Food security reserves, Food security funds, Crisis management plans, Early warning, and market information systems)			
3.1.3 Demonstrates knowledge of the concept of livelihoods promotion, related strategies, and activities			
3.1.4 Demonstrates knowledge of indicators of food and nutrition security at different levels (micro, meso, and macro)			
3.1.5 Demonstrates knowledge and skills necessary for implementing integrated nutrition, food security, and livelihoods projects			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
3.1.6 Demonstrates knowledge and skills to analyse the influence of existing national laws, regulations, policies, and sectoral plans on food security and livelihoods			
3.1.7 Demonstrates knowledge and skills necessary for implementing good agricultural practices (GAPs) in crop production			
3.1.8 Demonstrates knowledge of climate-smart approaches and skills necessary for their application in the agriculture value chain			
3.1.9 Demonstrates knowledge and skills to select and implement nutrition-sensitive agriculture interventions (e.g. establishing home gardens, cultivation of fruits and vegetables, household domestication of small livestock)			
3.1.10 Demonstrates knowledge and skills of livestock production			
3.1.11 Demonstrates knowledge and skills necessary for implementing community and school feeding projects			
3.1.12 Demonstrates knowledge and skills to conduct community level sensitization meetings on food security, nutrition, and livelihoods promotion*			
3.1.13 Demonstrates knowledge and skills of designing and implementing assessments for food security, agriculture, and livelihoods at different levels			

*Represents questions that were excluded from the analysis

Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
3.2 Post-harvest handling and food safety management: Demonstrates knowledge and skills to promote food safety across the food value chain			
3.2.1 Demonstrates knowledge of post-harvest handling and skills to control food losses (in terms of quantity and quality) along the food value chain using modern and local/traditionally effective techniques			
3.2.2 Demonstrates knowledge and skills to apply the principles of Hazard Analysis and Critical Control Point (HACCP) in the food industry			
3.2.3 Demonstrates knowledge and skills to apply the CODEX general principles of food hygiene and food safety management			
Domain 4: Ethics and professionalism: Understands and adheres to the existing professional code of ethics and practice guidelines			
4.1 Knowledge of Codes of Ethics, Practice Guidelines, and Standard Operating Procedures: Understands the existing professional code of ethics and practice guidelines			
4.1.1 Demonstrates knowledge of the existing national codes of ethics, practice guidelines, and standard operating procedures (e.g. Code of Conduct and Ethics for the Uganda Public Service and the Code of Conduct and Ethics for Health Workers)			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
4.1.2 Demonstrates knowledge to undertake personal initiative to update him/herself with changes in the professional and organisational code of ethics, practice guidelines, and standard operating procedures*			
4.1.3 Demonstrates knowledge and skills to recognize and seek redress for unethical practices and behaviours*			
4.1.4 Demonstrate knowledge and skills necessary to recognise and work within the boundaries of organisational laws, regulations, guidelines, protocols, and standard operating procedures			
4.1.5 Demonstrates knowledge and skills to identify and resolve work-related conflicts			
4.2 Ethical principles in practice: Demonstrates skills necessary for upholding professionalism, confidentiality, transparency, integrity, and accountability at all times to ensure the provision of quality services			
4.2.1 Demonstrates skills necessary for engaging clients/caretakers in making informed decisions as relates to the interventions to be undertaken			
4.2.2 Demonstrates skills necessary for upholding client privacy and confidentiality			
4.2.3 Demonstrates knowledge and skills necessary to maintain professional-client boundaries			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
4.2.4 Demonstrates skills necessary for upholding human rights principles (Universality and Inalienability; Indivisibility; Interdependence and Interrelatedness; Equality and Non-discrimination; Participation and Inclusion; and Accountability and Rule of Law) in dealing with clients			
4.2.5 Demonstrates skills to identify individual professional limitations and seeks expert guidance on tasks beyond his/her understanding*			
Domain 5: Research and Data Analysis: Demonstrates knowledge and skills necessary to coordinate nutrition and health related research processes from planning, data collection, analysis, report writing, and dissemination of findings			
5.1 Planning & Data Collection: Demonstrates knowledge and skills required for developing research plans and data collection			
5.1.1 Demonstrates knowledge and skills on the application of different research designs			
5.1.2 Demonstrates knowledge and skills on the use of different quantitative and qualitative data collection methods and techniques			
5.1.3 Demonstrates knowledge and skills required to design appropriate nutrition and health related data collection tools			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
5.1.4 Demonstrates knowledge and skills on the use of different nutrition indicators (nutrition status indicators, indicators for assessing the causes of malnutrition (e.g. food insecurity indicators; care and caring practices; and environmental hygiene and access to the health services), indicators for monitoring and evaluating performance of nutrition programmes/projects, and related indicators as applied in demographic and health survey studies) in research			
5.1.5 Demonstrates knowledge and skills to design articulate research proposals			
5.1.6 Demonstrates knowledge of different academic databases and search engines and their use in identifying relevant nutrition and health related research			
5.1.7 Demonstrates knowledge and skills to work with interdisciplinary teams to plan and undertake research at the community, district, regional, and or national level			
5.1.8 Demonstrates knowledge and skills on the use of different nutrition screening and assessment tools and techniques*			
5.1.9 Demonstrates skills to perform and document assessments of client history as relates to medical treatment, disease, social-economic status, culture/religious factors, psychological, and physical status*			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
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5.1.10 Demonstrates knowledge and skills to perform and interpret findings from anthropometric, dietary, clinical, and biochemical assessments appropriate for different age groups, physical status, physiological status, and disease state*			
5.1.11 Demonstrates knowledge of ethical principles in research and adheres to the established research guidelines by the Uganda National Council of Science and Technology			
5.1.12 Demonstrates knowledge and skills to identify research opportunities relevant to professional practice			
5.2 Data Analysis, Report Writing and Results Dissemination: Demonstrates knowledge and skills to ably undertake data analysis, report writing and results dissemination			
5.2.1 Demonstrates knowledge and skills on the application of appropriate statistical tests (both parametric and non-parametric)			
5.2.2 Demonstrates knowledge and skills on the use of different software programs (e.g. NutriSurvey, ENA for SMART, WHO Anthro, WHO AnthroPlus, EPI/ENA, EPiInfo, SPSS, STATA, ATLAS.ti, and NVivo) applied in the analysis of nutrition-related data			
5.2.3 Demonstrates knowledge and skills to synthesise findings from available data sets*			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
5.2.4 Demonstrates knowledge and skills on use of the Health Information Management Systems to support data analysis and reporting			
5.2.5 Demonstrates knowledge and skills to consolidate research findings into articulate reports			
5.2.6 Demonstrates knowledge and skills required to write technical research reports			
5.2.7 Demonstrates knowledge and skills necessary for reviewing, analysing, and writing synopses on relevant national and global level performance nutrition and health related data*			
5.2.8 Demonstrates knowledge and skills of planning and hosting seminars, workshops and conferences as well as sharing nutrition research with all relevant stakeholders using different fora			
5.2.9 Demonstrates ability to undertake personal capacity development in advanced research in nutrition, health, and other relevant disciplines			
Domain 6: Policy; Advocacy; and Social and Behavioural Change Communication (SBCC) : Demonstrates knowledge and skills to contribute policy, advocacy and SBCC relevant to nutrition			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
6.1 Policy: Demonstrates knowledge and skills to contribute to the different stages of the policy cycle (Formulation, Implementation and Evaluation)			
6.1.1 Demonstrates knowledge of the different national policies; laws; regulations; and sectoral policies and plans relevant to nutrition			
6.1.2 Demonstrates knowledge and skills to contribute to the formulation of nutrition policies and guidelines			
6.1.3 Demonstrates knowledge and skills to contribute to the evaluation/analysis of nutrition policies and guidelines			
6.2 Advocacy: Demonstrates knowledge and skills necessary for planning and managing nutrition related advocacy campaigns			
6.2.1 Demonstrates knowledge and skills required to undertake evidence-based policy and budget advocacy at different levels to influence change for nutrition			
6.2.2 Demonstrates knowledge of the different phases in developing advocacy strategies/plans (goal development; identification of primary and secondary audiences; identifying potential allies and opponents; selecting effective advocacy approaches; identification/development of advocacy messages; budgeting and identification of resources; and undertaking risk assessments for the developed strategies/plans)			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
6.2.3 Demonstrates knowledge and skills to use advocacy techniques (e.g. policy monitoring and public accountability, policy dialogues, capacity building of stakeholders advocacy)			
6.2.4 Demonstrates knowledge and skills to develop different advocacy tools (e.g. clear and concise audio messages) suitable for use across different channels			
6.2.5 Demonstrates knowledge and skills to use different advocacy tactics (e.g. letter writing, lobbying, use of media and internet, legal actions, campaigns, protests, and public demonstrations)			
6.2.6 Demonstrates knowledge and skills to undertake national and local level nutrition advocacy targeting decision-makers or influencers (politicians, government officials, public servants, privates sector leaders, local authority leaders, Development agencies, other INGO's, humanitarian actors, religious, and cultural leaders)			
6.2.7 Demonstrates knowledge and skills to implement, monitor and evaluate the impact of advocacy initiatives			
6.3 Social and Behavioural Change Communication: Demonstrates knowledge and skills necessary for planning, undertaking, and managing SBCC			
6.3.1 Demonstrates knowledge and skills to analyse and understand health and nutrition behaviours and the context in which they occur			

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Appendix I Continued: Tool used in the First Modified Delphi Round

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6.3.2 Demonstrates knowledge and skills of identifying the undesirable/un-intended culture/religious beliefs, practices, and food taboos existing in communities			
6.3.3 Demonstrates knowledge and skills to use different theories of behaviour change (e.g. Health Belief Model, Theory of Planned Behaviour, Stages of Change/Transtheoretical Model, Social Learning Theory, Diffusion of Innovation Theory) in different contexts			
6.3.4 Demonstrate knowledge and skills to network and work with other partners in the development of context-specific communication strategies for use in influencing positive behaviour change			
6.3.5 Demonstrates knowledge and skills to develop and promote the use of appropriate IEC materials for influencing positive behaviour change in different settings			
6.3.6 Demonstrates knowledge of and adheres to ethical and 'do no harm' principles (Respect everyone equally; Use acceptable methods for influence; Be conscious about power dynamics and risks of violence; Be transparent; Ensure people's rights to privacy; Do not allow the shaming of individuals or groups; Establish and implement a clear Code of Conduct; Monitor and encourage feedback) in SBCC programming			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
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6.3.7 Demonstrates knowledge and skills to mobilize community members, community groups, and existing community organizations towards undertaking sustainable engagements for influencing positive behaviour change			
6.3.8 Demonstrates knowledge and skills to use different communication channels (e.g. face-to-face, broadcast media, mobile, electronic, and written) in undertaking SBCC			
6.3.9 Demonstrates knowledge and skills to monitor and evaluate the impact of SBCC initiatives on nutrition-related outcomes			
Domain 7: Nutrition Leadership and Management: Demonstrates knowledge of leadership and management skills necessary for nutrition programming			
7.1 Planning and Budgeting: Demonstrates knowledge and skills to develop and operationalise nutrition program/project proposals, plans and budgets			
7.1.1 Demonstrates knowledge and skills to develop nutrition program/project proposals with clearly defined goals and objectives*			
7.1.2 Demonstrates knowledge and skills to develop nutrition program or project work plans and budgets			
7.1.3 Demonstrates knowledge and skills to undertake resource mobilization (e.g. through raising of new resources, maximizing the use of already existing resources, and mapping of potential funders)			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
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7.1.4 Demonstrates knowledge and skills to undertake nutrition program/project budget tracking			
7.2 Human Resource Management: Demonstrates knowledge of and skills to undertake different human resource managerial roles (staff recruitment, training; motivation; appraisal and employee relations management)			
7.2.1 Demonstrates knowledge of leadership and management principles			
7.2.2 Demonstrates knowledge and skills to contribute to the recruitment of program/project staff and related support teams			
7.2.3 Demonstrates knowledge of the processes and the benefits of supportive supervision			
7.2.4 Demonstrates skills to set up organizational supportive supervision systems (plan, conduct, and follow up supportive supervision activities)			
7.2.5 Demonstrates knowledge and skills to organize, coordinate, and contribute to training and mentorships of program/project staff and related stakeholders			
7.3 Multi-sectoral and multi-stakeholder engagement: Demonstrates knowledge and skills to engage in multi-sectoral and multi-stakeholder partnerships to maximize collaboration and ensure proper coordination of joint activities			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
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7.3.1 Demonstrates knowledge and skills to map relevant program/project stakeholders at different levels of planning and or implementation			
7.3.2 Demonstrates knowledge and skills to work in multi-sectoral and multi-stakeholder nutrition partnerships/engagements			
7.3.3 Demonstrates knowledge and skills to identify and manage conflicts of interest (whether potential, real, perceived, and divergent or convergent) that arise in multi-sectoral and multi-stakeholder partnerships			
7.3.4 Demonstrates knowledge on the composition, governance, and functionality of Multi Sectoral Coordination Committees at different levels			
7.3.5 Demonstrate knowledge and skills to support Nutrition Coordination Committees in developing Multi Sectoral Nutrition Action Plans			
7.4 Program/project Implementation: Demonstrates knowledge and skills to oversee timely and efficient program/project implementation			
7.4.1 Demonstrates knowledge and skills necessary for program/project implementation in line with agreed-upon protocols			
7.4.2 Demonstrates knowledge and skills to plan and lead organizational committee meetings			
7.4.3 Demonstrates knowledge and skills to analyse technical reports about the program/project and follow up on the implementation of recommendations			

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Appendix I Continued: Tool used in the First Modified Delphi Round

Tool for First Delphi: Draft Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model Framework			
Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Level of Agreement (Select one)** (1. Strongly Agree **(2.** Agree **(3.** Neither Agree Nor Disagree **(4.** Disagree (5. Strongly Disagree	**Academic Level (Select one)** (1. All Levels **(2.** Diploma Only **(3.** Diploma & Bachelors **(4.** Bachelors Only **(5.** Bachelors & Masters **(6.** Masters only	**Provide Justification for Response**
7.5 Monitoring and Evaluation: Demonstrates knowledge and skills to plan, collect, and analyse data in regards to program/project implementation schedules, inputs, processes, and outputs/deliverables so as to enable the undertaking of timely decisions for improving performance and accountability			
7.5.1 Demonstrates knowledge of the relevance of undertaking program/project monitoring and evaluation			
7.5.2 Demonstrates knowledge and skills on the use of the Development Assistance Committee (DAC) principles (relevance, effectiveness, efficiency, impact, and sustainability) for program/project evaluation			
7.5.3 Demonstrates knowledge and skills to analyse program/project monitoring and evaluation data to make relevant recommendations for improving program/project performance			
7.5.4 Demonstrates knowledge and skills to prepare and present timely reports on program/project outcomes, activities, processes, and lessons learned to different stakeholders			
7.5.5 Demonstrates knowledge of quality improvement (QI) and the skills to undertake and coordinate QI activities for improving program/project performance			
7.5.6 Demonstrates knowledge and skills to undertake program/project quality assurance to ensure that implemented programs/projects conform to expected requirements*			

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APPENDIX J: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
1.6.2 Demonstrates skills on using approved QI tools to facilitate the sustainable delivery of quality and equitable nutrition services	**78.6**	"Important for programme monitoring" "QI should generally be facilitated and monitored by MSC and BSC students because of its complexity in assessment, analysis, evaluation, engagement of multi-disciplinary health teams etc." "Quality improvement methods and the tools are not covered during the university training. E.g. PDSA institutes skills in all personnel and promotes full utilization of skills" "Because this is a more important area and thus should be limited at Bachelors & Masters level" 'An M&E officer can be employed to do this thus it is an optional skill"			
3.1.6 Demonstrates knowledge and skills to analyse the influence of existing national laws, regulations, policies, and sectoral plans on food security and livelihoods	**64.1**	"Not covered in depth by students at university" "Issues to do with policy analysis require a lot of critical thinking, a skill usually developed at the master's level" "Because bachelor's and master's graduates are the ones involved in planning and thus better suited to study this" "One may have the knowledge of the impact of the existing national laws, regulations, policies but may not be in position to influence changes in the analysis made" "May need basic information only."			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
3.1.10 Demonstrates knowledge and skills of livestock production	**75.7**	"Not strongly needed in the nutrition workspace. Normally done by agricultural officers. A nutritionist can pursue this as a separate course because the skill set under an HND program would not be sufficient to enable them compete with specialised agricultural officers" "Livestock production is a good practice but may not necessarily result in good nutrition outcomes. It can however be very crucial in improving household income/livelihoods" "Needs basic knowledge and skills. More can be contributed by a person with training in that field e.g. Agricultural Extension officer" "Only if it is basic information" "This is a technical topic that can be left to agronomists" "This can partly be done by a nutritionist or an agricultural personnel" "This is pre-empting all other profession. Building a self-contained nutrition professional fails multi-sectoral programming" "Still this can be implemented by the agricultural sector, however, the nutritionist may require the basics"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
3.2.2 Demonstrates knowledge and skills to apply the principles of Hazard Analysis and Critical Control Point (HACCP) in the food industry	**78.6**	"This can be left for food Technologists" "Irrelevant to nutrition work" "It may or may not be a necessary skill unless if one works in a food industry" "Such skills are more required of a food scientist, however, a nutritionist may need to work with them to ensure quality food reach the final consumer" "Good for risk identification, but not necessary for nutritionists. Can be learnt on job"			
5.2.1 Demonstrates knowledge and skills on the application of appropriate statistical tests (both parametric and non-parametric)	**78.8**	"Anyone doing research should have skills in applying the appropriate statistical tests depending on the nature of study and to make decisions about that particular sample" "Different tests give different indicators/results, therefore, a nutritionist requires skills of choosing appropriate tests depending on the subject being investigated about"			
5.2.7 Demonstrates knowledge and skills necessary for reviewing, analysing, and writing synopses on relevant national and global level performance nutrition and health related data*	**54.5**	"Diploma students don't undertake internship during their training to cover all these" "Improves program service delivery and M&E" "This requires at least a masters or bachelor's degree holder"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
5.2.8 Demonstrates knowledge and skills of planning and hosting seminars, workshops and conferences as well as sharing nutrition research with all relevant stakeholders using different fora	**74.2**	"Improves program service delivery and M&E" "Someone with a master's degree is at least in position to organise and host big workshops and seminars with different stakeholders" "It is important to conduct and share research to inform policy. Important for communication"			
6.1 Policy: Demonstrates knowledge and skills to contribute to the different stages of the policy cycle (Formulation, Implementation and Evaluation)	**78.7**	"Improves program service delivery and M&E" "At all levels, nutritionists should actively be involved in at least one or all the stages of the policy cycle" "For masters because these cadres are involved in decision making and this requires knowledge of many policies" "Bachelor students should be introduced to Policy , Advocacy and SBCC for Nutrition as specific modules during their training and proper acquaintance on the existing policies at bachelors should be ensured" "This could be an elective for undergraduates"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
6.1.1 Demonstrates knowledge of the different national policies; laws; regulations; and sectoral policies and plans relevant to nutrition	**77.3**	"All nutritionists should keep updated with relevant information such as policies, laws, regulations relevant to nutrition. These should be the basis of our day to day work" "This informs programing activities and should be taught because students have to learn about the different policies and how they are integrated into normal programming at community levels" "Advanced content" "Whatever is done should be in the limits of law governing a given profession, this protects you from public prosecutions"			
6.1.2 Demonstrates knowledge and skills to contribute to the formulation of nutrition policies and guidelines	**69.7**	"Diploma students don't undertake internship during their training to cover all these" "All nutritionists at all levels should have the capability to contribute to the formulation of nutrition policies and guidelines given the opportunity to do so" "Every nutritionists needs to be a resourceful person in nutrition"			
6.1.3 Demonstrates knowledge and skills to contribute to the evaluation/analysis of nutrition policies and guidelines	**60.0**	"Improves service delivery, accountability and workforce management"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**% Participants that Agreed with the Statement in the 1st Delphi Round**	**Comments by Participants to Justify their Ratings in the First Round**	**Level of Agreement 1. Disagree 2. Agree**	**Level of Training 1. Undergraduate 2. Masters**	**Please Provide Comment or Justification**
6.2 Advocacy: Demonstrates knowledge and skills necessary for planning and managing nutrition related advocacy campaigns	**77.3**	"Planning and management skills are core in ensuring success of any campaigns" "A speciality in management of nutrition programmes can be created" "The depth of content will differ from Diploma to Masters" "Improve service delivery, accountability and workforce management" "Integration of capacity building and awareness creation as key components of advocacy" "This skill may require at least one with a bachelors or master's degree"			
6.2.1 Demonstrates knowledge and skills required to undertake evidence-based policy and budget advocacy at different levels to influence change for nutrition	**55.2**	"I suggest this be MSC role. At MSC level I assume that a student has amassed some experience in practice at field level hence able to advocate for better policy basing on trends, current affairs and lessons learnt" "This may require one with a master's degree and experience. Requires high level synthesis"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**% Participants that Agreed with the Statement in the 1st Delphi Round**	**Comments by Participants to Justify their Ratings in the First Round**	**Level of Agreement 1. Disagree 2. Agree**	**Level of Training 1. Undergraduate 2. Masters**	**Please Provide Comment or Justification**
6.2.2 Demonstrates knowledge of the different phases in developing advocacy strategies/plans (goal development; identification of primary and secondary audiences; identifying potential allies and opponents; selecting effective advocacy approaches; identification/development of advocacy messages; budgeting and identification of resources; and undertaking risk assessments for the developed strategies/plans)	**59.7**	"This may require one with a master's degree and experience" "For master's and bachelor's because these are involved in donor engagements and thus knowledge of advocacy is key to them At bachelors, this would be a learned experience"			
6.2.3 Demonstrates knowledge and skills to use advocacy techniques (e.g. policy monitoring and public accountability, policy dialogues, capacity building of stakeholders advocacy)	**62.7**	"I suggest this be MSC role. At MSC level I assume that a student has amassed some experience in practice at field level thence able to advocate for better policy basing on trends, current affairs and lessons learnt" "This may require one with a master's degree and experience"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
6.2.4 Demonstrates knowledge and skills to develop different advocacy tools (e.g. clear and concise audio messages) suitable for use across different channels	**77.3**	"I suggest that MSC students should at least have one year experience to build on their understanding of policy, what happens in the field, what works and what doesn't" "Advocacy tools can at least be developed by nutritionists at all levels for example the audio and visual messages as long as one has knowledge of what is being advocated for" "May require experience for bachelors and high level synthesis for masters"			
6.2.6 Demonstrates knowledge and skills to undertake national and local level nutrition advocacy targeting decision-makers or influencers (politicians, government officials, public servants, privates sector leaders, local authority leaders, Development agencies, other INGO's, humanitarian actors, religious, and cultural leaders)	**79.1**	"At each level, at least nutritionists should be able to involve in nutrition advocacy, either at national or local level depending on the nature of work and where they work"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
6.2.7 Demonstrates knowledge and skills to implement, monitor and evaluate the impact of advocacy initiatives	**68.7**	"At whichever level one is involved in advocacy, one should be able to implement, monitor and evaluate the impact their advocacy had created"			
7.1.2 Demonstrates knowledge and skills to develop nutrition program or project work plans and budgets	**77.3**	"Work plans should be prepared by anyone at this level. Budgets are usually done by project managers but all nutritionists at this level should be empowered with this skill" "Comes with experience" "All project work within a specific time frame and budget limits, and also for appropriate monitoring and evaluation"			
7.1.3 Demonstrates knowledge and skills to undertake resource mobilization (e.g. through raising of new resources, maximizing the use of already existing resources, and mapping of potential funders)	**69.7**	"Improves service delivery, accountability and workforce management" "For managers" "I wish this part was given ample time say a whole semester. It is a very practical area. Does not make much sense in a class room setting" "Advocacy is important at all levels"			
7.1.4 Demonstrates knowledge and skills to undertake nutrition program/project budget tracking	**78.5**	"This is a necessary requirement for someone aspiring to become a project manager" "An advanced skill" "To ensure all activities are done in the projected time frame and within budget limits"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**% Participants that Agreed with the Statement in the 1st Delphi Round**	**Comments by Participants to Justify their Ratings in the First Round**	**Level of Agreement 1. Disagree 2. Agree**	**Level of Training 1. Undergraduate 2. Masters**	**Please Provide Comment or Justification**
7.3.1 Demonstrates knowledge and skills to map relevant program/project stakeholders at different levels of planning and or implementation	**77.3**	"This is very important for people in managerial positions" "This is only a transitional approach, science is bound to change and so will thinking. An option" "Improve service delivery, accountability and workforce management" "Requires a certain degree of expertise"			
7.3.4 Demonstrates knowledge on the composition, governance, and functionality of Multi Sectoral Coordination Committees at different levels	**77.3**	"Nutrition coordination committees are very important in improving service delivery thus at this level one should have the knowledge of the different committees …and make use of them to improve service delivery." "It is the least a nutritionist at the bachelor's and master's level may know about the governance structure of nutrition" "Should be optional"			
7.4.3 Demonstrates knowledge and skills to analyse technical reports about the program/project and follow up on the implementation of recommendations	**72.7**	"Improves service delivery, accountability and workforce management"			
7.5.1 Demonstrates knowledge of the relevance of undertaking program/project monitoring and evaluation	**78.8**	"At the bachelor's and master's level, one should have knowledge and skills of report analysis as it's a necessary competence for bigger positions such as project managers" "Great in management" "Improves program service delivery and M&E"			

APPENDIX J Continued: Study Instrument for the Second Modified Delphi Round

Competency domains, sub-domains and competencies (knowledge and skills) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	% Participants that Agreed with the Statement in the 1st Delphi Round	Comments by Participants to Justify their Ratings in the First Round	Level of Agreement 1. Disagree 2. Agree	Level of Training 1. Undergraduate 2. Masters	Please Provide Comment or Justification
7.5.2 Demonstrates knowledge and skills on the use of the Development Assistance Committee (DAC) principles (relevance, effectiveness, efficiency, impact, and sustainability) for program/project evaluation	**62.1**	"This can best be done by the project monitoring and evaluation experts" "At the bachelor's and master's level of education, one may have these principles at hand to ensure project success" "Never heard of DAC, thank you for informing me. M and E was an elective when I pursued my MPH. However I learnt the basics of indicators, goal setting, and M & E Frame work." "Important for training in emergencies" "Improves program service delivery and M&E"			
7.5.3 Demonstrates knowledge and skills to analyse program/project monitoring and evaluation data to make relevant recommendations for improving program/project performance	**74.2**	"This can done best by the project monitoring and evaluation experts" "At the bachelor's and master's level one should be able to do data analysis for the project and M&E to improve the project implementation" "I am not sure whether 2 years of a Masters course can teach data analysis of all software. Perhaps the basics only." "Improves program service delivery and M&E"			

*Represent questions removed from final analysis

APPENDIX K: Consent Form for HN/HND Graduates for the Competency Needs Assessment Phase of the Study

A. **Introduction:** Thank you for taking time to talk to me. My name is (**name of person requesting for consent**). I am one of the members on the team that is collecting data for a research study titled "Development and Validation of a Competency-Based Education Model for Strengthening Undergraduate Training of Human Nutrition and Dietetics in Uganda" This study is being undertaken as a PhD research project by Peterson Kato Kikomeko, a student at the department of Food, Nutrition and Dietetics, of the Kenyatta University Kenya and staff member of Kyambogo University . The researcher is being supervised by Dr. Sophie Ochola and Dr. Irene Ogada all from Kenyatta University and Professor Archileo Kaaya of Makerere University. Funding for undertaking this study has been received from the African Development Bank (through Kyambogo University, Uganda), Kyambogo University and the Pears Grant Run by the Hebrew University of Jerusalem, Israel.

B. **Purpose:** The purpose of this study is to develop and validate a competency-based education model that can be used for training of Human nutrition/Human nutrition and dietetics at the undergraduate level in Uganda. The objectives of the study are to:
    1. To determine the population nutrition/dietetic needs in Uganda.
    2. To assess the current HN/HND scope of training in Uganda.
    3. To establish the competencies required of HN/HND undergraduates for health systems performance in Uganda.
    4. To develop and validate a competency-based education model for the training of HN/HND at the undergraduate level in Uganda.

C. **Study Procedures:** This research will be conducted in three phases: competency needs assessment, development of competency-based model, and validation of the competency-based model. The competency needs assessment phase will involve collecting information from different stakeholders in the field of Human Nutrition/Human Nutrition and Dietetics in Uganda including practicing Human Nutrition/Human Nutrition and Dietetics graduates, their employers (both Government and Non-government), Institutions in Uganda that offer Human Nutrition/Human Nutrition and Dietetics training at the undergraduate level, and members that sit on Sub-county Nutrition Coordination Committees in selected districts. The Model development phase will engage a few selected members representing the diversity of stakeholders engaged in the competency needs assessment phase to reflect at responses provided in the competency needs assessment phase and develop a competency framework. The Competency-based framework will highlight the key competencies agreed upon by stakeholders as being important for the training of Human Nutrition/Human Nutrition and Dietetics at the Undergraduate level in Uganda. The Model content validation phase will involve asking the different participants to rate the expected usefulness of aspects of the Competency Model developed. You may be requested to participate in one or more than one phase of the research process.

D. **Participation in the Study**: You have been identified and requested to contribute to the different phases of this study because you are a key stakeholder in health and nutrition in Uganda**.**

E. Possible Risks of Study Participation: This study involves very minimal possibilities for risk, stress and discomfort. There will be no collection of blood or any other biological samples from any study participant. During the competency needs assessment and content validation phases of the study, information will be collected through emailed questionnaires, in-depth interviews, key informant interviews, Phone interviews, focus group discussions, and review of documents. The questions and observations in the assessment relate to your routine daily activities in the field of Human nutrition/Human nutrition and dietetics in Uganda. Responding through either technique may take **45 minutes to one hour**.

Participation in the model development phase of the research will involve being engaged in two workshops and the Delphi technique. The workshops will each last two days and be held at a place with convenient facilities in Kampala. The Delphi technique will involve 3 rounds of soliciting responses from participants in a period of 3-6 months.

F. Benefits and Compensations: You will not receive any compensation for participating in the competency needs assessment phase of this study. Participants that will participate in the model development workshop will receive a modest transportation allowance to cater for transportation costs to and from the workshop venue. Depending on availability of funding, accommodation may also be provided to participants travelling from away from Kampala and Wakiso districts. This will be communicated when and invitation for participation is sent out to participants residing out of Kampala and Wakiso districts.

G. Confidentiality

If you agree to participate in this study, your participation and any information you provide to us is completely confidential, and will only be used for purposes of this research. If you decide to participate, you are free to withdraw at any time. You will also be free not to answer certain questions, discuss certain topics, and or even put an end to the interview.

H. Voluntary Participation

Participation in the study is voluntary, one is free to accept or not to participate in the study, or to curtail his contribution at any step of the study process.

I. Contacts and Questions: If you have any questions you may contact the research supervisors Dr. Sophie Ochola on +254721449803and or Dr. Irene Oganda on +254723955466 or Prof. Archileo Kaaya on +256772440046. The researcher Peterson Kato Kikomeko can be contacted on +256 752 425 296 or email pkikomeko@kyu.ac.ug.

If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the International Health Sciences University –Research Ethical Committee Chairperson Dr. Samuel Kabwigu on (+256 779610100) & the executive secretary of UNCST on (+256 414 - 705500) respectively.

J. Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely

voluntary. I understand that my records will be kept private and that I can leave the study at any time**.** A copy of this consent form will be given to you if you wish. The consent form has been explained to me and I agree to take part in the study. I am free to choose for myself to be in this study, and by signing this consent form I do not waive any of my legal rights. Signing this consent form does not relieve the investigators of responsibility for adverse events as a result of my participation in this study. Signing this consent form indicates that I have been informed about the research study in which I am voluntarily agreeing to participate.

To participate in this study, please sign below:

Name of Participant ----------
Signature of Participant……
Date: ……..

Person Administering the consent
form……

Signature ……..

Date ……

APPENDIX L: Development and Validation of a Competency-Based Education Model: Consent Form for Academic Staff and Work/Internship Supervisors for the Competency Needs Assessment Phase of the Study

A. Introduction: Thank you for taking time to talk to me. My name is (**name of person requesting for consent**). I am one of the members on the team that is collecting data for a research study titled "Development and Validation of a Competency-Based Education Model for Strengthening Undergraduate Training of Human Nutrition and Dietetics in Uganda" This study is being undertaken as a PhD research project by Peterson Kato Kikomeko, a student at the department of Food, Nutrition and Dietetics, of the Kenyatta University Kenya and staff member of Kyambogo University. The researcher is being supervised by Dr. Sophie Ochola and Dr. Irene Ogada all from Kenyatta University and Professor Archileo Kaaya of Makerere University. Funding for undertaking this study has been received from the African Development Bank (through Kyambogo University, Uganda), Kyambogo University and the Pears Grant Run by the Hebrew University of Jerusalem, Israel. This research study has been reviewed and approved by the International Health Sciences University Ethical review board.

B. Purpose: The purpose of this study is to identify the competencies required of Human Nutrition/Human Nutrition and Dietetics professionals to competently perform in Uganda's health system as well as develop and validate a Undergraduate competency-based education model suitable for use in Uganda. The objectives of the study are to:

1. To determine the population nutrition/dietetic needs in Uganda.
2. To assess the current HN/HND scope of training in Uganda.
3. To establish the competencies required of HN/HND undergraduates for health systems performance in Uganda.
4. To develop and validate a competency-based education model for the training of HN/HND at the undergraduate level in Uganda.

C. Study Procedures: This research will be conducted in three phases: competency needs assessment, development of competency-based model, and validation of the competency-based model. The competency needs assessment phase will involve collecting information from different stakeholders in the field of Human Nutrition/Human Nutrition and Dietetics in Uganda including practicing Human Nutrition/Human Nutrition and Dietetics graduates, their employers (both Government and Non-government), Institutions in Uganda that offer Human Nutrition/Human Nutrition and Dietetics training at the undergraduate level, and members that sit on Sub-county Nutrition Coordination Committees in selected districts. The Model development phase will engage a few selected members representing the diversity of stakeholders engaged in the competency needs assessment phase to reflect at responses provided in the competency needs assessment phase and develop a competency framework. The Competency-based framework will highlight the key competencies agreed upon by stakeholders as being important for the training of Human Nutrition/Human Nutrition and Dietetics at the

Undergraduate level in Uganda. The Model content validation phase will involve asking the different participants to rate the expected usefulness of aspects of the Competency Model developed. You may be requested to participate in one or more than one phase of the research process.

D. **Participation in the Study**: You have been identified and requested to contribute to the different phases of this study because you are a key stakeholder in health and nutrition in Uganda**.**

E. **Possible Risks of Study Participation:** This study involves very minimal possibilities for risk, stress and discomfort. There will be no collection of blood or any other biological samples from any study participant. During the competency needs assessment and content validation phases of the study, information will be collected through emailed questionnaires, in-depth interviews, key informant interviews, Phone interviews, focus group discussions, and review of documents. The questions and observations in the assessment relate to your routine daily activities in the field of Human nutrition/Human nutrition and dietetics in Uganda. Responding through either technique may take **45 minutes to one hour**.

   Participation in the model development phase of the research will involve being engaged in two workshops and the Delphi technique. The workshops will each last two days and be held at a place with convenient facilities in Kampala. The Delphi technique will involve 3 rounds of soliciting responses from participants in a period of 3-6 months.

F. **Benefits and Compensations:** You will not receive any compensation for participating in the competency needs assessment phase of this study. Participants that will participate in the model development workshop will receive a modest transportation allowance to cater for transportation costs to and from the workshop venue. Depending on availability of funding, accommodation may also be provided to participants travelling from away from Kampala and Wakiso districts. This will be communicated when and invitation for participation is sent out to participants residing out of Kampala and Wakiso districts.

G. **Confidentiality**

   If you agree to participate in this study, your participation and any information you provide to us is completely confidential, and will only be used for purposes of this research. If you decide to participate, you are free to withdraw at any time. You will also be free not to answer certain questions, discuss certain topics, and or even put an end to the interview.

H. **Voluntary Participation**

   Participation in the study is voluntary, one is free to accept or not to participate in the study, or to curtail his contribution at any step of the study process.

I. **Contacts and Questions:** If you have any questions you may contact the research supervisors Dr. Sophie Ochola on +254721449803and or Dr. Irene Oganda on +254723955466 or Prof. Archileo Kaaya on +256772440046. The researcher Peterson Kato Kikomeko can be contacted on +256 752 425 296 or email pkikomeko@kyu.ac.ug.

   If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the International Health Sciences

University –Research Ethical Committee Chairperson Dr. Samuel Kabwigu on (+256 779610100) & the executive secretary of UNCST on (+256 414 - 705500) respectively.

J. Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time**.** A copy of this consent form will be given to you if you wish. The consent form has been explained to me and I agree to take part in the study. I am free to choose for myself to be in this study, and by signing this consent form I do not waive any of my legal rights. Signing this consent form does not relieve the investigators of responsibility for adverse events as a result of my participation in this study. Signing this consent form indicates that I have been informed about the research study in which I am voluntarily agreeing to participate.

To participate in this study, please sign below:

Name of Participant ----------
Signature of Participant……
Date: ……..

Person Administering the consent form……

Signature ……..

Date ……

Appendix M: Agenda for the Stakeholder Workshop to Validate Results of the Competency Needs Assessment at the Grand Global Hotel Kampala-Uganda on 03-October-2019

Sessions	**Time**	**Item**	**Person Concerned**
Background and results validation	8:00-9:00am	Arrival and Registration	All
	9:00-9:20am	Welcome remarks and self-introduction	(Details Removed)
	9:20-9:30am		
	9:30am-10:30am	1. Presentation of study background & key results of the Needs assessment phase	All
		2. Plenary reactions	
HEALTH BREAK			
First Group Activity	11:00am-01:00pm	Prioritize nutrition and dietetics problems and needs for which undergraduate training in nutrition and dietetics should be focused.	(Details Removed)
Second Group Activity		Developing consensus on competence domains/themes	
LUNCH BREAK			
Third Group Activity	02:00-04:00pm	Brainstorming on competencies that HND professionals must be able to possess under each identified competence domain	(Details Removed)
EVENING TEA AND DEPARTURE			

Appendix N: First Workshop Group Activity

Activity Procedure:

1. Review the results of the needs assessment summarizing the **"nutrition and dietetics related challenges"** as highlighted by graduates and other stakeholders. Reflecting upon your expertise:
    - **a.** Do you agree with the findings?
    - **b.** If not, why?
    - **c.** Identify the other nutrition and dietetics related challenges that exist in Uganda and update the **"Nutrition and Dietetics Challenges Results Table"**
    - d. From the updated list, prioritize the nutrition and dietetics related challenges/needs that HND professionals should be trained to address. Group these into three tiers as follows
        i. Primary (Those that HND professionals **"Must be"** trained/able to address)
        ii. Secondary (Those that HND professionals **"May be"** trained/able to address
        iii. Tertiary (Others that HND professionals could address/be trained to address)

        Note: In coming up with the groupings, also make reference to the Needs Assessment outputs on **"Nutrition and Dietetics Services Demanded and Provided to Communities"**

        iv. Summarize outputs on a manila/flip chat
        v. Generate consensus on the **"Priority"** groupings by each group in plenary by having the groups pin up their outputs close to each so that one session can be held to discuss the outputs
    - **vi.** Have as a final output from the first group activity "**An Agreed upon Prioritized List of Nutrition and Dietetics Related Challenges/Needs that HND Professionals Should be Trained to Address in Uganda".**

Appendix O: Second Workshop Group Activity

Activity Procedure:

1. Using the output of the first activity, the hand-out of the Needs Assessment Results on "Nature of Work and Related Roles Performed by Practicing HND. Graduates"
    a. Come up with different competence domains under which the identified nutrition and dietetics related challenges can be addressed
    b. Group the different nutrition and dietetic challenges under the domains they best belong/can best be addressed
        i. Rewrite the different nutrition and dietetic challenges in the form of competence areas that HND must possess. E.g. if chronic diseases were identified as one of the problems, you may re-write this as "Chronic Disease(s) Management", meaning that you want HND graduates to have competence/be able to manage chronic diseases
    c. Prepare and present your output in plenary as was done for the first exercise
    d. Have as an output of the second activity **"A framework that depicts competence domains and sub-competences agreed upon by participants as being required for the training and practice of HND in Uganda"**

APPENDIX P: Consent Form to Participate in the Model Development Phase of the Study

J. **Introduction:** Thank you for taking time to talk to me. My name is (**name of person requesting for consent**). I am one of the members on the team that is collecting data for a research study titled "Development and Validation of a Competency-Based Education Model for Strengthening Undergraduate Training of Human Nutrition and Dietetics in Uganda" This study is being undertaken as a PhD research project by Peterson Kato Kikomeko, a student at the department of Food, Nutrition and Dietetics, of the Kenyatta University Kenya and staff member of Kyambogo University. The researcher is being supervised by Dr. Sophie Ochola and Dr. Irene Ogada all from Kenyatta University and Professor Archileo Kaaya of Makerere University. Funding for undertaking this study has been received from the African Development Bank (through Kyambogo University, Uganda), Kyambogo University and the Pears Grant Run by the Hebrew University of Jerusalem, Israel. This research study has been reviewed and approved by the International Health Sciences University Ethical review board.

K. **Purpose:** The purpose of this study is to identify the competencies required of Human Nutrition/Human Nutrition and Dietetics professionals to competently perform in Uganda's health system as well as develop and validate a Undergraduate competency-based education model suitable for use in Uganda. The objectives of the study are to:

1. To determine the population nutrition/dietetic needs in Uganda.
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4. To develop and validate a competency-based education model for the training of HN/HND at the undergraduate level in Uganda.

L. **Study Procedures:** This research will be conducted in three phases: competency needs assessment, development of competency-based model, and validation of the competency-based model. The competency needs assessment phase will involve collecting information from different stakeholders in the field of Human Nutrition/Human Nutrition and Dietetics in Uganda including practicing Human Nutrition/Human Nutrition and Dietetics graduates, their employers (both Government and Non-government), Institutions in Uganda that offer Human Nutrition/Human Nutrition and Dietetics training at the undergraduate level, and members that sit on Sub-county Nutrition Coordination Committees in selected districts. The Model development phase will engage a few selected members representing the diversity of stakeholders engaged in the competency needs assessment phase to reflect at responses provided in the competency needs assessment phase and develop a competency framework. The Competency-based framework will highlight the key competencies agreed upon by stakeholders as being important for the training of Human Nutrition/Human Nutrition and Dietetics at the Undergraduate level in Uganda. The Model content validation phase will involve asking the different participants to rate the expected usefulness of aspects of the Competency Model developed. You may be requested to

participate in one or more than one phase of the research process.

M. Participation in the Study: You have been identified and requested to contribute to the different phases of this study because you are a key stakeholder in health and nutrition in Uganda**.**

N. Possible Risks of Study Participation: This study involves very minimal possibilities for risk, stress and discomfort. There will be no collection of blood or any other biological samples from any study participant. During the competency needs assessment and content validation phases of the study, information will be collected through emailed questionnaires, in-depth interviews, key informant interviews, Phone interviews, focus group discussions, and review of documents. The questions and observations in the assessment relate to your routine daily activities in the field of Human nutrition/Human nutrition and dietetics in Uganda. Responding through either technique may take **45 minutes to one hour**.

Participation in the model development phase of the research will involve being engaged in two workshops and the Delphi technique. The workshops will each last two days and be held at a place with convenient facilities in Kampala. The Delphi technique will involve 3 rounds of soliciting responses from participants in a period of 3-6 months.

O. Benefits and Compensations: You will not receive any compensation for participating in the competency needs assessment phase of this study. Participants that will participate in the model development workshop will receive a modest transportation allowance to cater for transportation costs to and from the workshop venue. Depending on availability of funding, accommodation may also be provided to participants travelling from away from Kampala and Wakiso districts. This will be communicated when and invitation for participation is sent out to participants residing out of Kampala and Wakiso districts.

P. Confidentiality

If you agree to participate in this study, your participation and any information you provide to us is completely confidential, and will only be used for purposes of this research. If you decide to participate, you are free to withdraw at any time. You will also be free not to answer certain questions, discuss certain topics, and or even put an end to the interview.

Q. Voluntary Participation

Participation in the study is voluntary; one is free to accept or not to participate in the study, or to curtail his contribution at any step of the study process.

R. Contacts and Questions: If you have any questions you may contact the research supervisors Dr. Sophie Ochola on +254721449803and or Dr. Irene Oganda on +254723955466 or Prof. Archileo Kaaya on +256772440046. The researcher Peterson Kato Kikomeko can be contacted on +256 752 425 296 or email pkikomeko@kyu.ac.ug.

If you have questions about your rights as a participant in this study, general questions, or have complaints, concerns or issues you want to discuss with someone outside the research, call the International Health Sciences University –Research Ethical Committee Chairperson Dr. Samuel Kabwigu on (+256 779610100) & the executive secretary of UNCST on (+256 414 - 705500) respectively.

J. Participant's statement

The above information regarding my participation in the study is clear to me. I have been given a chance to ask questions and my questions have been answered to my satisfaction. My participation in this study is entirely voluntary. I understand that my records will be kept private and that I can leave the study at any time**.** A copy of this consent form will be given to you if you wish. The consent form has been explained to me and I agree to take part in the study. I am free to choose for myself to be in this study, and by signing this consent form I do not waive any of my legal rights. Signing this consent form does not relieve the investigators of responsibility for adverse events as a result of my participation in this study. Signing this consent form indicates that I have been informed about the research study in which I am voluntarily agreeing to participate.

To participate in this study, please sign below:

Name of Participant ----------
Signature of Participant……
Date: ……..

Person Administering the consent form……

Signature ……..

Date ……

Appendix Q: Copy of Research Study Approval Letter from the Kenyatta University Graduate School

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

Internal Memo

FROM: Dean, Graduate School

DATE: 16th January, 2018

TO: Mr. Peterson K. Kikomeko
C/o Foods, Nutrition & Dietetics Dept.
Kenyatta University

REF: H87EA/28411/14

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that Graduate School Board at its meeting of 10th January, 2018 approved your Research Proposal for the Ph.D. Degree, entitled "Development and Validation of a Competency-Based Education Model for Strengthening Undergraduate Training in Human Nutrition and Dietetics in Uganda".

You may now proceed with your Data collection, subject to clearance with the Director General, National commission for Science & Technology.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision Tracking Forms per semester. The form has been developed to replace the progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

By copy of this letter, the Registrar (Academic) is hereby requested to grant you substantive registration for your Ph.D. studies.

Thank you.

JACKSON LUVUSI
FOR: DEAN, GRADUATE SCHOOL

c.c. Registrar (Academic) Att. Mr. Likam
Chairman, Department of Foods, Nutrition & Dietetics

Supervisors:

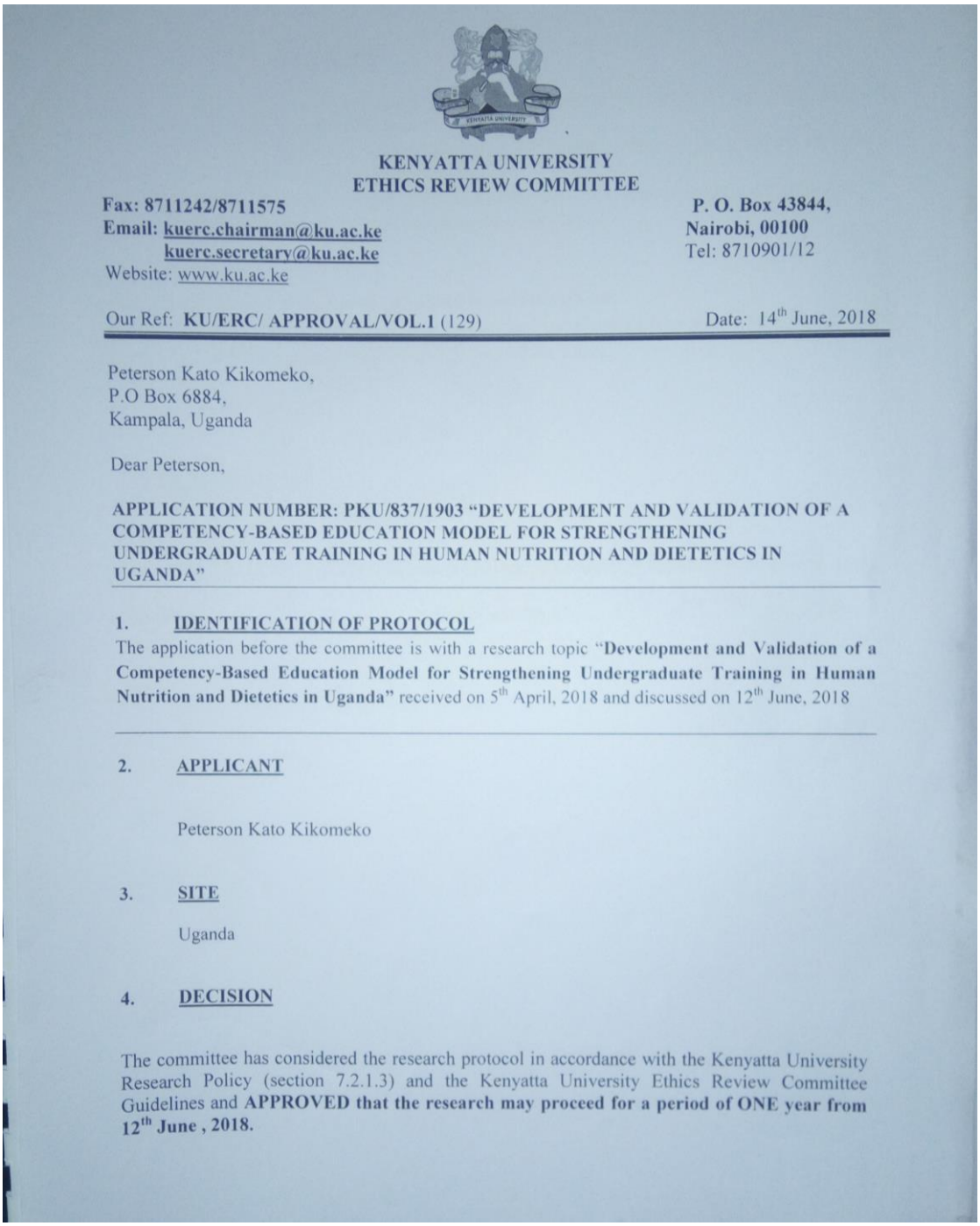
1. Dr. Sophie Ochola
C/o Dept. Foods, Nutrition & Dietetics
KENYATTA UNIVERSITY

2. Dr. Irene Ogada
C/o Dept. Foods, Nutrition & Dietetics
KENYATTA UNIVERSITY

3. Dr. Archileo Kaaya
Department of Food Technology & Nutrition
C/o Dept. Foods, Nutrition & Dietetics
KENYATTA UNIVERSITY

JL/cao

Appendix R: Copy of Ethical Approval Form from the Kenyatta University Ethical Review Board



KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke
kuerc.secretary@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844,
Nairobi, 00100
Tel: 8710901/12

Our Ref: KU/ERC/ APPROVAL/VOL.1 (129) Date: 14th June, 2018

Peterson Kato Kikomeko,
P.O Box 6884,
Kampala, Uganda

Dear Peterson,

APPLICATION NUMBER: PKU/837/1903 "DEVELOPMENT AND VALIDATION OF A COMPETENCY-BASED EDUCATION MODEL FOR STRENGTHENING UNDERGRADUATE TRAINING IN HUMAN NUTRITION AND DIETETICS IN UGANDA"

1. **IDENTIFICATION OF PROTOCOL**

The application before the committee is with a research topic "**Development and Validation of a Competency-Based Education Model for Strengthening Undergraduate Training in Human Nutrition and Dietetics in Uganda"** received on 5th April, 2018 and discussed on 12th June, 2018

2. **APPLICANT**

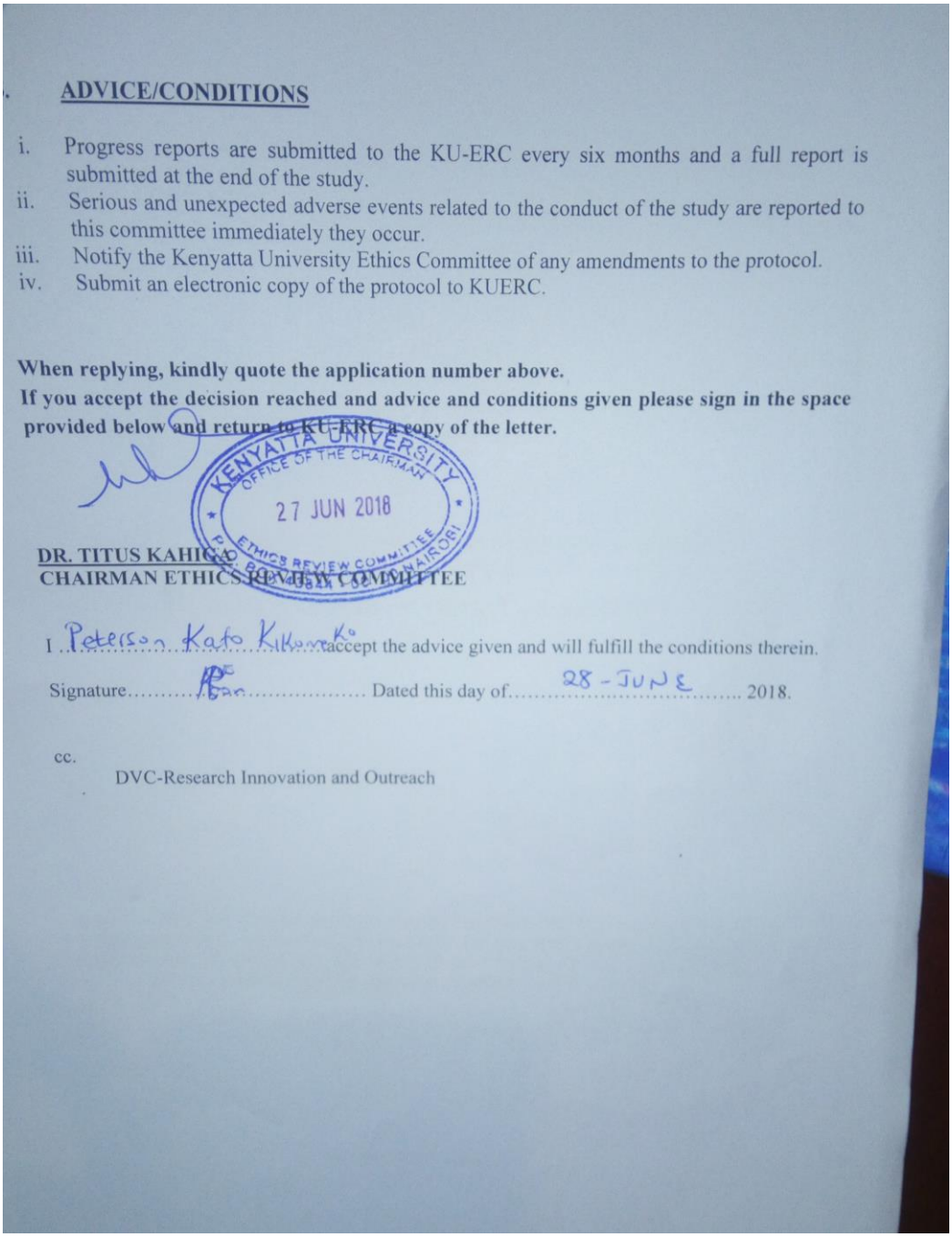
Peterson Kato Kikomeko

3. **SITE**

Uganda

4. **DECISION**

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines and **APPROVED that the research may proceed for a period of ONE year from 12th June , 2018.**



ADVICE/CONDITIONS

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this committee immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

KENYATTA UNIVERSITY
OFFICE OF THE CHAIRMAN
27 JUN 2018
ETHICS REVIEW COMMITTEE
P. O. Box 43844 - 00100 NAIROBI

DR. TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE

I Peterson Kato Kilonzo accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of 28 - JUNE 2018.

cc.
DVC-Research Innovation and Outreach

Appendix S: Copy of First Ethical Approval Letter from the International Health Sciences University-Uganda Ethical Review Board

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY
sanitas per scientiam

making a difference to health care

Research Ethics Committee

20th April, 2018

UG-REC-015

IHSU-REC/0077

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY sanitas per scientiam
20 APR 2018
APPROVED / VALID UNTIL
RESEARCH ETHICS COMMITTEE
P. O. Box 7782, Kampala - Uganda

Mr. Peterson Kato Kikomeko
Principal Investigator
Kyambogo University
P.O Box 1, Kyambogo
Kampala, Uganda

Category of review
[x] Initial review
[ ] Continuing review
[ ] Amendment
[ ] Reactivation
[ ] SAEs

RE: "DEVELOPMENT AND VALIDATION OF A COMPETENCY-BASED EDUCATION MODEL FOR STRENGTHENING UNDERGRADUATE TRAINING IN HUMAN NUTRITION AND DIETETICS IN UGANDA."

Reference is made to the above mentioned protocol which was submitted to the International Health Sciences University-Research Ethics Committee (IHSU-REC) for initial review and approval.

You have addressed all the issues earlier raised, and the committee is satisfied with the responses submitted in version 2.0 dated 03rd April, 2018.

l am glad to inform you that your study has been approved for a period of one year from 20th April, 2018 to 20th April, 2019.

The documents approved include the following;

Document	Language	Version	Submission Date
Protocol	English	Version 2.0	03rd April, 2018
Consent forms			
Informed consent form	English	Version 2.0	03rd April, 2018
Data collection tools			
Focus group guide for sub-county coordination committee members	English	Version 2.0	03rd April, 2018
Key informant interview guide	English	Version 2.0	03rd April, 2018
Questionnaire for human	English	Version 2.0	03rd April, 2018

The International Health Sciences University
P.O. Box 7782 Kampala - Uganda
(+256) 0312 307400 email: info@ihsu.ac.ug
web: www.ihsu.ac.ug

1

nutrition and dietetic graduates			
Questionnaire for staffs who train human nutrition and dietetic professionals	English	Version 1.0	29th January, 2018
Questionnaire for supervisors/employers/human nutrition and dietetic professionals	English	Version 1.0	29th January, 2018

Please note that any problem of a serious nature as a result of this study to the participants should be reported to IHSU-REC and Uganda National Council of Science and Technology (UNCST) immediately.

Also note that annual report and request for renewal where applicable should be submitted at least one month before the expiry date of approval. In addition, you are also required to submit copies of the stamped approved documents to the Uganda National Council for Science and Technology (UNCST) before the study can commence.

We would like to congratulate you and wish you a successful conduct of the study.

Yours Sincerely,

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY

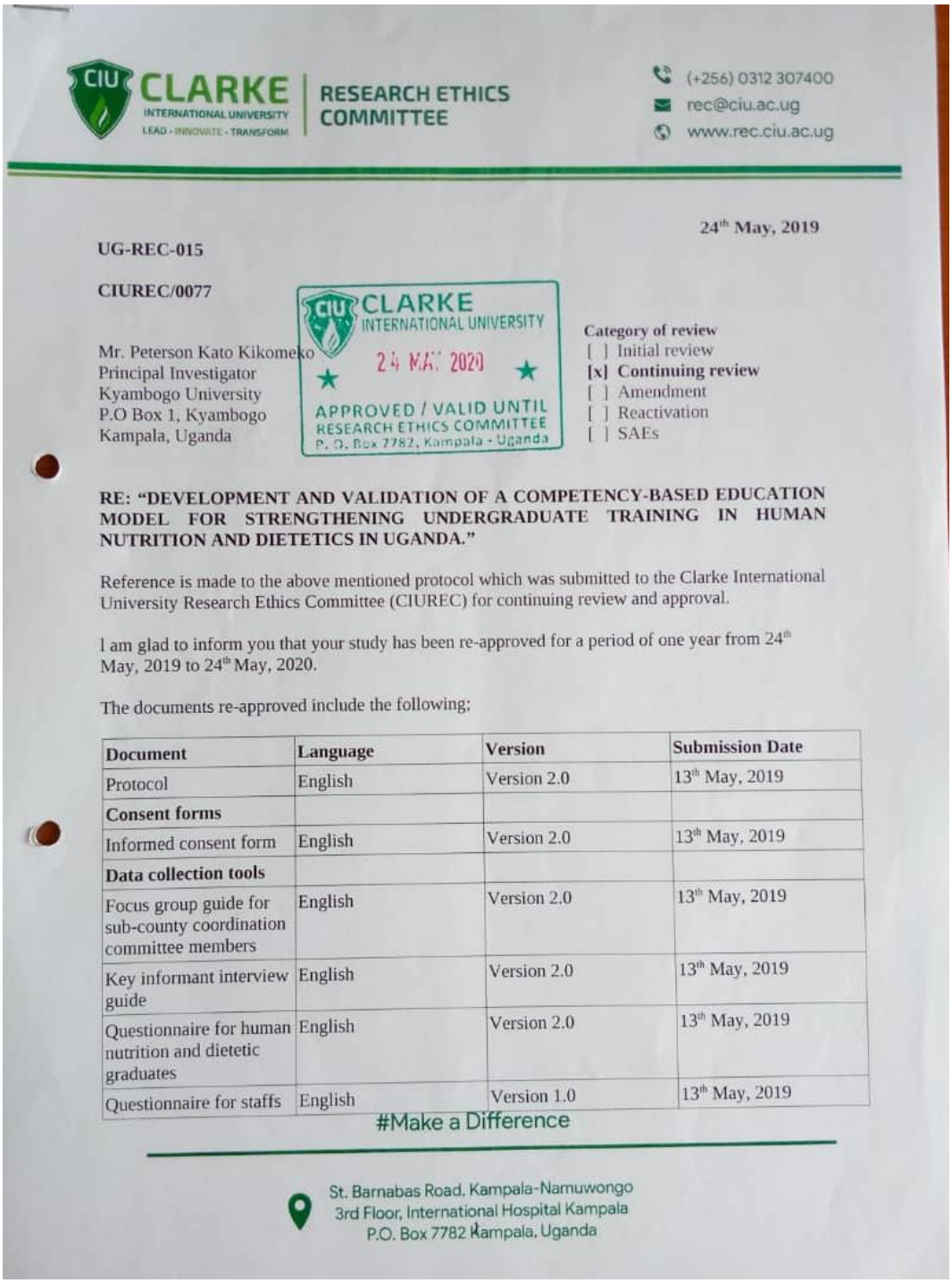
★ 20 APR 2018 ★ 20 APR 18

APPROVED / VALID UNTIL
RESEARCH ETHICS COMMITTEE
P. O. Box 7782, Kampala - Uganda

Dr. Samuel Kabwigu
IHSU-REC Chairperson

Date

Appendix T: Copy of Second Ethical Approval Letter from the Clarke International University, Uganda Ethical Review Board



CLARKE INTERNATIONAL UNIVERSITY
LEAD - INNOVATE - TRANSFORM

RESEARCH ETHICS COMMITTEE

(+256) 0312 307400
rec@ciu.ac.ug
www.rec.ciu.ac.ug

24th May, 2019

UG-REC-015

CIUREC/0077

CLARKE INTERNATIONAL UNIVERSITY
24 MAY 2020
APPROVED / VALID UNTIL
RESEARCH ETHICS COMMITTEE
P. O. Box 7782, Kampala - Uganda

Mr. Peterson Kato Kikomeko
Principal Investigator
Kyambogo University
P.O Box 1, Kyambogo
Kampala, Uganda

Category of review
[ ] Initial review
[x] Continuing review
[ ] Amendment
[ ] Reactivation
[ ] SAEs

RE: "DEVELOPMENT AND VALIDATION OF A COMPETENCY-BASED EDUCATION MODEL FOR STRENGTHENING UNDERGRADUATE TRAINING IN HUMAN NUTRITION AND DIETETICS IN UGANDA."

Reference is made to the above mentioned protocol which was submitted to the Clarke International University Research Ethics Committee (CIUREC) for continuing review and approval.

I am glad to inform you that your study has been re-approved for a period of one year from 24th May, 2019 to 24th May, 2020.

The documents re-approved include the following;

Document	Language	Version	Submission Date
Protocol	English	Version 2.0	13th May, 2019
Consent forms			
Informed consent form	English	Version 2.0	13th May, 2019
Data collection tools			
Focus group guide for sub-county coordination committee members	English	Version 2.0	13th May, 2019
Key informant interview guide	English	Version 2.0	13th May, 2019
Questionnaire for human nutrition and dietetic graduates	English	Version 2.0	13th May, 2019
Questionnaire for staffs	English	Version 1.0	13th May, 2019

#Make a Difference

St. Barnabas Road, Kampala-Namuwongo
3rd Floor, International Hospital Kampala
P.O. Box 7782 Kampala, Uganda

who train human nutrition and dietetic professionals			
Questionnaire for supervisors/employers/human nutrition and dietetic professionals	English	Version 1.0	13th May, 2019

Please note that any problem of a serious nature as a result of this study to the participants should be reported to CIUREC and Uganda National Council of Science and Technology (UNCST) immediately.

Also note that annual report and request for renewal where applicable should be submitted at least one month before the expiry date of approval. In addition, you are also required to submit copies of the stamped approved documents to the Uganda National Council for Science and Technology (UNCST) before the study can commence.

We would like to congratulate you and wish you a successful conduct of the study.

Yours Sincerely,

Dr. Samuel Kabwigu
CIUREC Chairperson

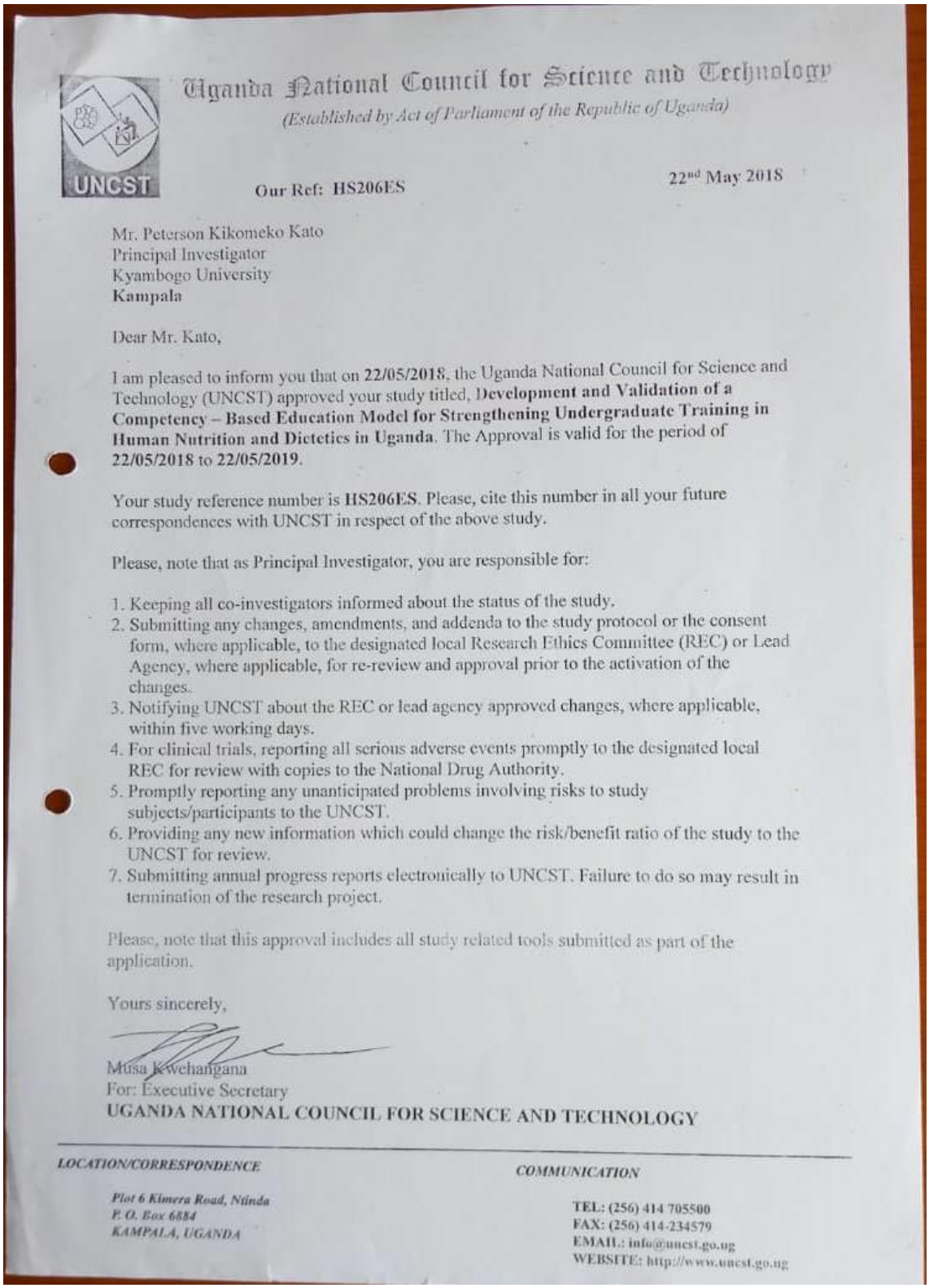
CLARKE INTERNATIONAL UNIVERSITY
24 MAY 2019
APPROVED / VALID UNTIL
RESEARCH ETHICS COMMITTEE
P. O. Box 7782, Kampala - Uganda

Date

#Make a Difference

St. Barnabas Road, Kampala-Namuwongo
3rd Floor, International Hospital Kampala
P.O. Box 7782 Kampala, Uganda

Appendix U: Copy of Research Permit Obtained from the Uganda National Council of Science and Technology



Uganda National Council for Science and Technology
(Established by Act of Parliament of the Republic of Uganda)

UNCST

Our Ref: HS206ES

22nd May 2018

Mr. Peterson Kikomeko Kato
Principal Investigator
Kyambogo University
Kampala

Dear Mr. Kato,

I am pleased to inform you that on **22/05/2018**, the Uganda National Council for Science and Technology (UNCST) approved your study titled, **Development and Validation of a Competency – Based Education Model for Strengthening Undergraduate Training in Human Nutrition and Dietetics in Uganda**. The Approval is valid for the period of **22/05/2018** to **22/05/2019**.

Your study reference number is **HS206ES**. Please, cite this number in all your future correspondences with UNCST in respect of the above study.

Please, note that as Principal Investigator, you are responsible for:

1. Keeping all co-investigators informed about the status of the study.
2. Submitting any changes, amendments, and addenda to the study protocol or the consent form, where applicable, to the designated local Research Ethics Committee (REC) or Lead Agency, where applicable, for re-review and approval prior to the activation of the changes.
3. Notifying UNCST about the REC or lead agency approved changes, where applicable, within five working days.
4. For clinical trials, reporting all serious adverse events promptly to the designated local REC for review with copies to the National Drug Authority.
5. Promptly reporting any unanticipated problems involving risks to study subjects/participants to the UNCST.
6. Providing any new information which could change the risk/benefit ratio of the study to the UNCST for review.
7. Submitting annual progress reports electronically to UNCST. Failure to do so may result in termination of the research project.

Please, note that this approval includes all study related tools submitted as part of the application.

Yours sincerely,

Musa Kwehangana
For: Executive Secretary
UGANDA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

LOCATION/CORRESPONDENCE

Plot 6 Kimera Road, Ntinda
P. O. Box 6884
KAMPALA, UGANDA

COMMUNICATION

TEL: (256) 414 705500
FAX: (256) 414-234579
EMAIL: info@uncst.go.ug
WEBSITE: http://www.uncst.go.ug

Appendix V: Participants' Observations and Reactions to the Results of the Nutrition Competency Needs Assessment During the Validation Workshop

"The study is critical and timely for it focuses on a critical issue of HN/HND training in Uganda …"
"Study results will be critical for informing HN/HND curriculum review and design in the country…"
"At what point does the study link with the current higher education institution curriculum reforms? The new curriculum being used in Kyambogo University has been modified to cater to some of the raised issues and is addressing some of the gaps".
"At what point do the study findings link with the curriculum; is it the issue of competencies not being in the curriculum or is it due to how the teaching is done? How do we link these?"
"I am part of the supervisors; is there a difference between Human nutrition and Human nutrition and dietetics? Is it the curriculum design that differentiates between HN and HND? Is it possible to differentiate the skill set for the two?"
"The research avoided other undergraduate study programs. It would be important to have levels of competency for different undergraduate programs including certificates, diplomas, and bachelors. Focusing on all undergraduate courses is critical given that the Uganda Allied Health Professionals council has proposed nutrition assistant positions".
"Competence in clinical nutrition is expected highly of nutrition and dietetics undergraduates; however, the results presented do not clearly show the particular clinical skills that are required".
"The results combined knowledge and skills; these need to be unbundled to know what particular knowledge and skills are required by the undergraduates. The theoretical knowledge should be differentiated from the skills because undergraduates have knowledge but lack practical skills in clinical dietetics".
"Conditions like human anatomy were lowly ranked yet they fall under medical/clinical nutrition; these need to be merged".
"Nutrition in emergency was rated low by undergraduates and yet integrated management of malnutrition was rated highly; these should be merged".
"Nutrition in emergencies is not well taught in Uganda to Bachelor's students of nutrition yet many undergraduates work in emergency contexts and or with humanitarian agencies whose work entails aspects of emergency nutrition…"
"Patient clerking was missed out in the results yet it is an important competency that has to be mastered by nutritionists and dietitians…"
"The undergraduates we have can generate statistics but not use the information yet professionals should be able to interact with the information, generate evidence to guide programming … statistics are basic at the undergraduate level but undergraduates need more than is stipulated for this level. Some levels of training in statistics can be covered at the undergraduate level, but not all. Students don't appreciate the use of statistics to guide programming, this is reflected when they start working".
'There is a need to improve utilization of HMIS [Health Information Management Systems] data collected from the community by nutritionists".
"Why was the response rate on professional ethics low? Is it because adherence to ethics is low in professional nutrition and dietetics practice or is it because nutrition and dietetics professionals do not value ethics? The curriculum needs to fully equip trainees with professional ethics because there is still a challenge on which ethics guide nutrition and dietetics practice in Uganda".

“Uganda has no National standard stipulating the training and practice requirements for nutrition and dietetics, however, the Allied Health Professionals Council is in the process of developing such a standard. Having such a standard will help in harmonizing HN/HND. We hope this research can be used to inform such process”.

“Many of the challenges presented are in the services sector but not in policy yet challenges exist in the implementation of nutrition-related policies. Nutrition and dietetics-related challenges presented have limited focus on policies being implemented yet the government, in terms of systems capacity, under the Ministries of Health and Agriculture focuses on implementing what is stipulated in the policies. I suggest for the need to undertake further reflection on nutrition-related policies in the country and the capacity of concerned ministries to implement nutrition as stipulated in the existing policies and sectoral strategies…”

“Knowledge and skills need to be tailored to the environment in which the undergraduates operate. What challenges are undergraduates facing in the environments they are operating? We should consider the policy and planning environment because these affect professional work”

“We need to look at the management of nutrition in a multisectoral approach. Issues like water, sanitation, and hygiene; food security; and livelihood support as reported in the findings are very key as they introduce an element of multisectorality. However, caution needs to be undertaken in regards to the nutrition and dietetics training needs under the multisectoral approach. We must be cautious about the knowledge and skills required under the multisectoral setting”.

“Is there a way of getting a community perspective of the services required from nutritionists and dietitians? It would be great to have a community perspective on the demanded and the provided services. The demands here presented may not be representative”

“We should appreciate that other professions providing services that are supportive of nutrition and dietetics services do exist. We need to know how to link with them to implement multisectoral nutrition and dietetics services”.

“We need to know how other professionals perceive of our profession, and the knowledge and competencies they expect of us. Is it possible to get additional input from other professionals with whom nutritionists work? Coming from a clinical and research setting, I sense others don’t know what to expect of nutritionists. Can we collect additional data on this? Getting the perceptions of other professionals that work with nutritionists and dietitians on what they expect of nutritionists and dietitians can enable us to make better curriculum reforms in nutrition and dietetics training”.

“The current transmission of knowledge is insufficient… fresh undergraduates severely lack practical clinical skills…”

“It may be important to consider including family planning, strengthening training in procurement and logistics of nutrition materials and supplies, and adding nutrition leadership and management as these are lacking in the HN/HND Bachelors training curriculum”.

“Consider using the terminology of nutrition-specific, sensitive, and enabling factors in categorizing the key thematic areas of focus in the training of HN/HND”.

“Have you considered looking at the capacity of the different institutions training nutrition undergraduates in Uganda in terms of research, equipment, and human resources…?”

Appendix W: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
Domain 1: Prevention and management of malnutrition in all its forms: Demonstrates knowledge, skills, and attitudes to prevent and manage undernutrition, vitamin and mineral deficiencies, overweight, obesity, and resulting diet-related non-communicable diseases	*"All nutrition professionals at all levels should be able to demonstrate a high level of knowledge and skill in the prevention and management of malnutrition as this is the core of the nutrition [and dietetics] profession."* *"If [one is] not able to prevent and manage malnutrition then literally [he/she] can never be fit to be called a nutritionist or dietician."*
1.1 Nutrition Assessment: Demonstrates knowledge, skills, and attitudes in the use of different methods of nutrition screening and assessment to evaluate nutrition status at the individual/household and community level	"*Assessments are important for identification and management of malnutrition hence for the implementers and programmers..."* Further reiterated was that *" [assessment] gives a starting point on what approach to use when addressing malnutrition in all forms…*." *"As the levels of training increase, the more advanced it gets and exposure to different kinds of technology in screening."*
1.1.1 Demonstrates knowledge of the nature, origin, progress, and causes of undernutrition, vitamin and mineral deficiencies, overweight, obesity, non-communicable diseases (e.g. diabetes, cancer, cardiovascular diseases) and other disease conditions whose management requires nutrition therapy (e.g. lower and upper gastrointestinal tract disorders; liver disorders; food allergies and intolerances; conditions arising from different nutrient deficiencies; pulmonary diseases; renal disorders; metabolic complications, stress, burns, and trauma; rheumatic diseases; neurologic disorders; psychiatric conditions; genetic metabolic disorders; HIV/AIDs; and developmental related disabilities)	*"I strongly believe that at the bachelor and masters level, one should have the core knowledge of malnutrition and the links between different communicable and non-communicable diseases because it's the foundation that must be master[ed]."*
1.1.2 Demonstrates knowledge and skills to perform triage (identify clients in need of immediate attention by service providers)	*"If a nutritionist cannot triage his/her clients, preventable deaths and complications such as shock, hypoglycaemia will occur."*
1.1.3 Demonstrates knowledge and skills to undertake client clerking and using the emerging information to clearly and correctly fill and update the nutrition register	*"This is because such information is essential in designing interventions and directs the nature and appropriateness of the decisions to be taken. And at all academic levels, this should be put in consideration."*
1.1.4 Demonstrates knowledge and skills to identify & use different nutrition assessment screening tools appropriate for different age groups, physical, physiological, and disease statuses to undertake anthropometric assessments	*"All cadres at all levels require knowledge and skills on identifying and use of different tools for assessments of malnutrition because they can all be involved in case detection and identification both in the community and at health facilities".*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
1.1.5 Demonstrates knowledge and skills to perform clinical assessments relevant for the identification of undernutrition; vitamin and mineral deficiencies or excesses; diet-related non-communicable diseases; and disease conditions whose management requires nutrition therapy	*"This area is sensitive. It can be taught at all levels but perhaps only those with bachelors will have obtained practical skills for each condition over a long period. Diploma holders may only assist."*
1.1.6 Demonstrates knowledge and skills to perform dietary intake assessments using objective and subjective techniques	*"A nutrition [and dietetics] professional might not understand the causes of malnutrition if they cannot assess the diet history. This means that the nutrition therapy given might not be effective if the dietary practices are not [assessed and] tackled."*
1.1.7Demonstrates knowledge on the use of different nutrition biochemical tests	*"These skills may not be required. However, the nutritionist should demonstrate knowledge in interpreting the biochemical results."*
1.1.8 Demonstrates ability to perform certain tests e.g. glucose, haemoglobin, vital signs (blood pressure, pulse/heart rate, body temperature and respiration rate)	*"All nutrition [and dietetics] professionals, especially those working in hospital settings should be able to conduct these tests."*
1.1.9 Demonstrates knowledge, skills, and attitudes necessary for obtaining client history data as relates to medical treatment, disease, socio-economic status, culture/religious factors, psychological, and physical status	*"Enables the nutritionist to know his/her patient better in terms of medical, socio-economical, cultural and disease background which helps him/her to design an effective nutrition intervention by setting goals that can be easily achievable by the client without defaulting."*
1.1.10 Demonstrates knowledge, skills, and attitudes to obtain perceptions/opinions from the client or client's caretakers on the underlying health condition	*"This is important at all levels as it will help to increase the utilization of the nutrition service/intervention by clients and reduce on defaulter rate as it helps build the confidence of clients or/and their caretakers."*
1.1.11 Demonstrates skills necessary for undertaking community screening, identifying, and referring malnourished individuals for health services	*"Positions the nutritionist [or dietitian] to ably prevent community nutrition-related problems when risks are identified early and interventions provided ... is cost-effective, improves health and quality of life for public health importance."*
1.1.12 Demonstrates knowledge and skills to work with other health team members to plan, conduct, and supervise home visits for active case finding of malnourished individuals	*"At all levels, it is important to understand the rationale of integration and working as a team in combating malnutrition."*
1.2 Nutrition Diagnosis: Uses client assessment data and his/her understanding of nutrition and dietetics to identify underlying problems that can be addressed through diet and nutrition-related interventions	*"From the assessment data of clients, all nutrition professionals should be able to make a good judgement and come up with interventions to solve the underlying problem."* *"This would be advanced for diploma level [training] which has limited [focus of] understanding nutrition complications. However, it is a skill that can be learned progressively."*
1.2.1 Demonstrates knowledge on how to interpret results from different nutrition assessments concerning different disease causal pathways, signs, and symptoms	*"Requires enough practice which will probably mainly be at Bachelor level. However, it can be introduced at the Master's level.*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
1.2.2 Demonstrates knowledge and skills to use assessment findings to identify the form of malnutrition; and or diet-related non-communicable or communicable disease affecting the client	*"Nutrition is always evolving due to different studies that are being taken. This area, which is more in clinical nutrition, may require a minimum of a bachelor's level training for one to be able to catch up with the changing needs and approaches."*
1.2.3 Demonstrates knowledge, skills, and attitudes required to work in collaboration with other health team members to make appropriate diagnoses based on assessment findings.	*"Leads to improved health outcomes for the patient as each team member brings on board his/her skill, resources and experiences which reduces patient costs …. During team interactions, the nutritionist [or dietitian] acquires more knowledge and skills from other health disciplines which improve on his/her own experience."*
1.3 Designing Nutrition Interventions: Demonstrates knowledge , skills, and attitudes to implement relevant diet and nutrition-related interventions depending on the disease condition, the severity of symptoms, availability of supplies, and other prevailing socio-economic and environmental conditions	*"This area requires enough training. It should be done by at least a bachelor's holder especially with the knowledge of dietetics. Bachelors [training] provide the time to learn and practice in the hospital and community settings."*
1.3.1 Demonstrates knowledge, skills, and attitudes required to work with an interdisciplinary health team in the management of clients across the different health departments with special emphasis on paediatrics, maternity intensive care unit, dysphagia clinics, HIV/AIDS, cardiovascular unit, burn units, cancer, emergency units, chronic disease treatment units, dentistry, diabetes mellitus, obesity, hypertension, infectious diseases such as malaria, and neurologic disorder management clinics	*"The efficient communication that exists between the nutritionist and other health teams creates a conducive environment for easy work, saves time, is cost-effective for the patient in terms of consultation, and supports the general wellbeing of the patient …"*
1.3.2 Demonstrates knowledge and skills to design and implement nutrition and dietetic care intervention plans through collaboration with the client, his/her caretakers, and an interdisciplinary health care team	*"Very crucial since the nutritionist [or dietitian] should be able to come up with the most effective meal plan, nutrition education or advice to the patient based on factual social and medical history gathered through interdisciplinary, client and caretaker interactions thus in a position to resolve or improve the client's nutrition problem."*
1.3.3 Demonstrates knowledge and skills to set measurable and achievable short and long-term recovery goals for the client based on assessment and diagnosis results	*"Please provide enough practice time for the students for better practice. The biggest gap amongst practicing nutrition and dietetics graduates right now …is the dietetic skill which [graduates] did not gain enough training in, except IMAM [Integrated Management of Acute Malnutrition] for those who practiced."*
1.3.4 Demonstrates knowledge, skills, and attitudes to communicate results of assessment, diagnosis, and intervention plans with the client and /or, depending on prevailing circumstances, with the client's caretakers	*"All nutrition [and dietetics] professionals should be able to communicate assessment results with their clients … to facilitate behaviour change within the means of the client without forcing or imposing interventions on them. This improves adherence to the treatment plans."*
1.3.5 Demonstrates knowledge of determining client nutrition requirements upon	*"How else will a nutritionist choose an appropriate response plan unless they accurately*

interpretation of nutrition assessment results	*interpret nutrition assessment results and identify the client's needs? Every nutrition professional should be able to do this."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
1.3.6 Demonstrates knowledge and skills to design therapeutic diets tailored to particular diseases, health, and lifestyle needs	*"At the bachelors and masters academic level, the practitioners should be in a position to demonstrate knowledge in planning diets and making therapeutic feeds for different disease conditions … unlike at a diploma level where emphasis is put mainly on undernutrition."*
1.3.7 Demonstrates knowledge of tube feeding and skills to insert feeding tubes appropriate for different disease conditions	*"All nutrition [and dietetics] professionals should have skills in inserting feeding tubes as its part of the treatment of malnutrition especially in hospital settings. A nutritionist [and or dietitian] should be able to manage clients in a ward in case he/she is the one present without depending so much on nurses or doctors."*
1.3.8 Demonstrates knowledge and skills to administer and monitor enteral therapeutic feeding depending on the client's disease condition	*"Enteral feeding and monitoring of the client progress may occur during the management of some disease conditions… At the bachelor's level of education, one should be able to administer this type of feeding."*
1.3.9 Demonstrates knowledge and skills to administer and monitor parenteral feeding as required for different conditions	*"Monitoring of clients on parenteral feeding is highly required… a nutritionist [dietitian] can formulate and prescribe the dosage; however, he/she is ethically not authorised to administer."*
1.3.10 Demonstrates knowledge, skills, and attitudes to offer tailored nutrition and dietetics guidance and counselling services to clients and their caretakers	*"Counselling is an important skill in nutrition management when clients are helped to understand their situation they can make informed decisions.* *"This skill should be demonstrated by all nutrition specialists regardless of their level of education because all clients require individual tailored dietetic and nutrition counselling."*
1.3.11 Demonstrates skills and attitudes to sensitize clients and their guardians on the role of care for improved nutrition outcomes	*"Care practices affect the nutrition status of people and thus all nutrition care providers at all levels of education should have knowledge of counselling clients of the different care practices and how they affect the outcomes of their nutrition status."*
1.3.12 Demonstrates knowledge, skills, and attitudes to support clients in managing specific nutrient-drug interactions for optimum drug efficacy	*"Interdisciplinary collaboration of Nutritionists [and dietitians] with other medical teams is highly needed for clarity about various drugs being administered to the client for effective management of nutrient drug interactions…"*
1.3.13 Demonstrates knowledge, skills, and attitudes to offer individualized guidance on the use of vitamin and mineral supplements to address different nutrient deficiencies	*"Nutrition service providers should have knowledge about the different nutrient/food-drug interactions and should be able to provide this information to other health service providers as well as the clients and their caretakers to enhance the drug efficacy."* *"Training in nutrient drug interactions can be made a specialty at master's level."*
1.3.14 Demonstrates knowledge and skills to design meal plans for clients to meet therapeutic/supplementary purposes	*"At the bachelor's level, one should be able to design meal plans for therapeutic or supplementary management on an individual basis as clients' nutrition needs vary from*

	one person to another."

Appendix W: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
1.3.15 Demonstrates knowledge, skills, and attitudes to prescribe exercise and lifestyle strategies that suit the client conditions	*"At all education levels, all nutrition professionals should be able to design individual exercises/workouts and lifestyle plans in accordance to the needs and nutrition status of the client."* *"Nutrition and dietetics professionals need to work with other health team members on this, for instances an orthopaedist to assess the level of physical exercise for a client who might have a bone illness."*
1.3.16 Demonstrates knowledge and skills to perform cooking demonstrations to clients and caretakers	*"This is a practical form of nutrition education that all nutrition professionals should be able to conduct to broaden the mind of caretakers on food handling and preparation and the value of various food groups."*
1.3.17 Demonstrates knowledge, skills, and attitudes to plan for and conduct community nutrition outreaches	*"All nutrition [and dietetics] specialists should be able to plan and conduct community outreaches and integrate them into the other on-going health services such as immunization, antenatal care, and post-natal care".* *"Community outreach interventions involve social mobilization; nutrition cadres at the bachelor's level must master the skills and knowledge about it."*
1.3.18 Demonstrates knowledge, skills, and attitudes to manage clients under the different phases of management of acute malnutrition (ITC, OTC, SFP, community outreach)	*"Management of clients in ITC requires technical expertise which bachelor's graduates have to be familiar with."*
1.3.19 Demonstrates knowledge, skills, and attitudes to manage other cases of malnutrition amongst clients both within the hospital and in the community	*"Simpler conditions [of malnutrition] may be managed by Diploma holders. More complex conditions may be managed by Bachelors and Masters."*
1.3.20 Demonstrates knowledge of referral processes and their use in ensuring that clients receive other health care interventions beyond the realm/scope of nutrition and dietetics	*"All nutrition care providers should know the different referral pathways, know when to refer a client, and to the right program or services. There should always be a linkage between nutrition and all the other health care services…"*
1.3.21 Demonstrates knowledge, skills, and attitudes to adhere to established national and international guidelines and institutional protocols for nutrition assessment, classification, and management (e.g. IMAM guidelines, IYCF guidelines, Diet-related NCD guidelines)	*"All nutrition care providers should know and follow the globally recognised and standard guidelines for the management of malnutrition and other non-communicable diseases. These guidelines should also be used as the basis of education at all institutions of learning."*
1.4 Monitoring and Evaluation of Nutrition Interventions: Demonstrates knowledge skills, and attitudes to monitor and evaluate client progress through the applied nutrition interventions and set goals	*"All nutrition care providers should have knowledge and skills to monitor and evaluate the progress of client's undertaking different nutrition interventions….This should be done at every contact with the client."*
1.4.1 Demonstrates knowledge of different reference standards in nutrition care (e.g WHO Growth Standards)	*"All nutrition care providers should have knowledge of the different reference standards and cut-offs… regardless of their level of education."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
1.4.2 Demonstrates knowledge, skills, and abilities to assess client progress on interventions based on review of client medical records vis-à-vis the set goals/desired outcomes	*"All nutrition care providers should be able to assess whether the client is progressing towards the set goals by referring to their medical outcomes."* *"At all levels, nutrition cadres are involved in assessing client progress on interventions based on a review of client medical records vis-à-vis the set goals/desired outcomes"*
1.4.3 Demonstrates knowledge, skills, and abilities to identify and resolve the causes default and relapse amongst clients admitted to nutrition rehabilitation programs	*"All nutrition care providers should be able to identify the challenges faced by the clients enrolled on nutrition programs, the likely causes of defaulting and relapses… to prevent relapsing and putting strategies to reduce defaulting."* *"This requires enough training and practice to obtain true reasons for relapse and default. So bachelor and master [graduates] may be better placed [to demonstrate this competency]."*
1.4.4 Demonstrates knowledge, skills, and abilities to review client adherence to prescribed interventions, identify client challenges, and adjust interventions as may be required	*"I imagine the bachelors and masters [degree] holders would be the ones managing the clients; so [they] should be better placed to prescribe and or review interventions. The Diploma holders should be able to implement what has been recommended e.g. Give RUTF, or increase F75 to 100mls from 60mls."*
1.4.5 Demonstrates knowledge, skills, and abilities to communicate with clients/caretakers the results of the monitoring and evaluation using easy to understand but standard terminology	*"All nutrition care providers should be in position to give feedback to the clients on the results from monitoring and evaluation, and this should be in a simple, precise and straight to the point manner."* *"Bachelor and masters graduates are the managers, so they are better placed to communicate results to clients/caretakers and audiences…"*
1.4.6 Demonstrates knowledge, skills, and abilities to compile, analyse, and utilize knowledge nutrition therapy to improve both the client and program outcomes	*"All the nutrition graduates should have skills in compiling, analysing, and using the clients' data to determine the client progress with intervention."* *"The nutritionists at diploma level can handle the data collection and the more technical bit of interpreting and using the data left to the seniors."*
1.5 Emergency Nutrition: Demonstrates knowledge, skills, and attitudes to offer nutrition services in differing emergency contexts	*"This subdomain [emergency nutrition], including its components, is a highly required competence by the different stakeholders. But some concepts can also be included at diploma level especially when more human resource is needed"* *"All nutrition care providers should be able to work in all contexts including the refugee setting. The knowledge gained from school should be translated into the refugee setting."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
1.5.1 Demonstrates a general understanding and application of the recommended minimum standards in humanitarian response with emphasis on food security and nutrition as stipulated in the SPHERE handbook and as updated from time to time	*"All nutrition care providers should keep up to date with the recommended sphere humanitarian principles and should be able to fit in in all environment."* *"Bachelors and masters students should be able to contribute to humanitarian response following global nutrition programming guidance."*
1.5.2 Demonstrates knowledge, skills, and attitudes to support the functionality of ITC, OTC, IYCFE-services in emergency and refugee settings	*"All nutrition care providers should know about ITC [inpatient therapeutic care], OTC [outpatient therapeutic care], and IYCF-E [infant and young child feeding in emergencies]. These are key requirements of any nutrition professional."* *"Different roles for different levels depending on the quality of care required. E.g. Diploma [holders] may handle OTC [out-patient therapeutic care\ and some IYCF [infant and young child feeding], Bachelors graduates ITC [Inpatient therapeutic care] and all IYCF-E [infant and young child feeding in emergencies]; Masters [graduates] do management but because they are managers they need to be grounded in all."*
1.5.3 Demonstrates technical knowhow on how to plan and conduct mass screenings in refugee settlements and emergency contexts	*"Nutrition screening is the basis for determining the nutrition status of individuals thus each person in the nutrition profession should know about carrying nutrition assessment and use this knowledge in conducting mass screening."* *"Mass screening is a bit technical as it requires proper planning and more knowledge in programming which may be majorly at Masters level only."*
1.5.4 Demonstrates knowledge, skills, and attitudes to train nutrition staff, volunteers, and peer counsellors on IYCF-E	*"IYCF-E [Infant and young child feeding in emergencies] should be integrated into the syllabus used for nutrition and dietetics training and in all health and nutrition services. This will enable the nutrition care providers to translate their knowledge on IYCF-E to other health care providers, nutrition volunteers…."* *"Diploma students might not be well equipped to train different cadres unless they have gained a lot of experience in the field."*
1.5.5 Demonstrates knowledge and skills to undertake monitoring of emergency activities (Food Distribution, growth monitoring and promotion, childhood nutrition, micronutrient supplementation, and IYCF-E) in refugee settlements and emergency contexts	*"Monitoring should be done by all nutrition care providers at all stages of project implementation and one should monitor clients' progress, project activities and the project impact. This should be a continuous process".* *"This should be taught at all levels but implemented by Bachelor and Masters due to the complex nature of refugee settlements, donors, partners, need maturity and experience."*
1.5.6 Demonstrates knowledge, skills, and attitudes to develop and maintain humanitarian working relations with all concerned stakeholders	*"Coordination and partnerships at all levels are very important to avoid duplication of activities and enhances referral of clients between different projects or organizations."* *"Masters will be better at this due to the context in settlements given that development partners are better coordinated by a mature and experienced staff."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and	Justifications for the rating of the different competency domains, subdomains, and

attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	statements
1.6 Technical support and capacity development in the management of malnutrition: Uses his/her expertise in nutrition and dietetics to offer technical support and capacity development as may be required by different stakeholders or fellow professionals and health team members	*"Offering technical support to the different stakeholders requires a degree of knowledge, skills, and ability that I believe a person with a bachelor's degree and masters can be able to portray…."*
1.6.1 Demonstrates knowledge of different approaches applied in undertaking Quality Improvement (QI)	*"Quality improvement approaches are needed to improve nutrition service delivery."* *"On-the-job training may be necessary…"*
1.6.2 Demonstrates skills in using approved QI tools to facilitate the sustainable delivery of quality and equitable nutrition services	*"[Important mainly for] programme monitoring [and evaluation]."* *"Quality improvement methods and the tools are not [adequately] covered during the university training…"* *"QI should generally be facilitated and monitored by master's and bachelor's students because of its complexity in assessment, analysis, evaluation, [and] engagement of multi-disciplinary health teams."* *"QI is key in program planning and management… Since the Masters level is more engaged in the programming and planning phases then they stand to be more qualified for the kind of training."*
1.6.3 Demonstrates knowledge and skills to plan and conduct on-job mentorship for fellow professionals, other health staff, and Village Health Team members on various nutrition packages used in the country	*"Because nutrition cadres at all levels are involved in mentorships or building different capacities and capabilities."*
1.6.4 Demonstrates knowledge, skills, and attitudes necessary for supervising nutrition staff and other health cadres offering nutrition services.	*"It improves efficiency and promotes skills at all levels reducing the shortage of manpower."* *"Because these nutrition cadres at the bachelor's and master's level are involved in supervisory roles …."*
1.6.5 Demonstrates teamwork skills necessary for undertaking support supervision of health facilities offering nutrition services	*"Teamwork is very important for proper supervision".* *"Because only the bachelor's and master's level nutrition cadres are involved in supervisory roles, they need the skills [for undertaking support supervision".* *"This is a good quality for a graduate to have but does not need to be included as part of the curriculum."*
1.6.6 Demonstrates knowledge, skills, and attitudes to support project needs assessment, monitoring, and evaluation to improve the provision of nutrition and dietetics services	*"Advanced skill, may also be acquired with experience."* *"Someone who has undertaken post-graduate courses in such a field would be more qualified to perform the tasks. A master's holder should be able to do the task as well if they have undertaken similar courses/course units."* *"A master's holder should be able to do [support project needs assessment, monitoring, and evaluation] … as well if they have undertaken similar courses/course units."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and	Justifications for the rating of the different competency domains, subdomains, and

attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	statements
1.6.7 Demonstrates knowledge, skills, and attitudes towards professional growth and development	*"Professional growth and development is important to all Nutritionists but is individually driven to a greater extent…"* *"At all levels, one should have personal initiative towards professional growth and development … you need to be competitive enough by demonstrating the ability to perform better than others and also pursue further education ….".* *"Should be a prerequisite for CPD."*
1.7 Interprofessional collaboration in management of malnutrition: Demonstrates knowledge, skills, and attitudes necessary to collaborate and work with an interdisciplinary team in the management of malnutrition	*"At all levels, all nutrition professionals should be able to collaborate with all other teams because nutrition is not independent but is integrated with other services."* *"Knowledge in this field would be vital at all levels since a lot of interventions are being mainstreamed but also the use of the multisectoral approach is being encouraged."*
1.7.1 Demonstrates knowledge, skills, and attitudes in respect for the core values and responsibilities of his/her profession and those of other fellow health professionals	*"All students need to know the ethical codes of conduct that govern nutrition care professionals and how best they can relate with colleagues in other sectors."* *"At all levels, one should respect and follow the code of conduct, core values, and job descriptions as strictly as possible."*
1.7.2 Demonstrates knowledge of ethical principles in interprofessional training and practice	*"Since [nutrition and dietetics is] a profession, all ethical values should be upheld by everyone and at all levels."*
1.7.3 Demonstrates teamwork and collaborative skills and attitudes required to work with other health professionals for the effective delivery of health and nutrition-related services	*"Nutrition being a cross-cutting issue is interdependent on many other factors. It is important that nutrition professionals are able to collaborate [with] other teams to provide holistic and sustainable care."* *"I got to learn that Nurses, Pharmacists, and Doctors learn the first 3 years of their course together. Perhaps this helps them appreciate the role of each profession. Don't know if Nutritionists could join the team during lectures to have contact time with real-time patients in a ward round and not just during the internship."*
1.7.4 Demonstrates effective verbal and non-verbal communication skills and attitudes required for interprofessional collaboration	*"Good communication skills will enable client-nutritionist interaction and also facilitate collaboration and correspondence with other health workers."* *"These skills should be demonstrated by all nutrition professionals. All people need to be able to communicate, listen and give feedback effectively."*
1.7.5 Demonstrates knowledge, skills, and attitudes to identify and manage ethical dilemmas and related conflicts that may arise due to interprofessional collaborations	*"At all levels [of training], all nutrition professionals should have conflict management skills and be able to provide solutions when problems arise"* *"Ethical dilemmas require a comprehensive skill set, values, critical thinking vis-à-vis protocols and set procedures. This can be left for master's students as they have amassed a wealth of experience through practice."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements

1.8 Water, Sanitation, and Hygiene (WASH): Demonstrates knowledge, skills, and attitudes required for promoting WASH at individual, household, community and facility level	*"WASH affects nutrition and health outcomes and thus needs to be addressed by all nutrition professionals at all levels of education."* *"WASH is a key area in nutrition and health… some interventions and skills may be required at a higher level."*
1.8.1 Demonstrates knowledge of the linkage between WASH and Nutrition	*"All the students need a deeper understanding of the WASH [water, sanitation, and hygiene] component since it is integrated with most nutrition programming activities."*
1.8.2 Demonstrates knowledge, skills, and attitudes to promote adherence to safe water chain practices (water collection, handling, transportation, storage, treatment, and consumption)	*"At all levels of education, one should be able to sensitize the communities and promote adherence to safe water chain practices."*
1.8.3 Demonstrates knowledge of the different types of sanitation facilities (e.g. latrines or toilets, waste/garbage disposal) and skills to promote their use at different levels	*"They [sanitation facilities] are key elements of WASH"* *"Important for community nutrition."* *"Community sensitisation about the different types of sanitation facilities and promotion of their use at community and facility level is done at all levels by all nutrition professionals."*
1.8.4 Demonstrates knowledge, skills, and attitudes required for the promotion of individual and domestic hygiene practices	*"At all levels, all the nutrition professionals should be in position to carry out door to door or home visits in the community and sensitize people about individual and domestic hygiene practices."* *"Emphasis [should be] at diploma level so that they can do community activities better."*
1.8.5 Demonstrates knowledge and skills relevant for ensuring infection control in health facilities	*"This may not necessarily be done by nutrition professionals. It can be done by other health service providers."* *"This [infection control] is more of a public health team concern; … a nutritionist [and or dietitian] needs to understand the protocols of infection control in a facility."*
1.8.6 Demonstrates knowledge and skills required to integrate/align WASH in nutrition programming	
1.9 Procurement and Management of Nutrition Supplies: Demonstrates knowledge, skills, and attitudes of the different processes necessary for procurement, storage, distribution, and disposal of nutrition-related supplies and/or equipment	*"All levels must know [procurement and management of nutrition supplies] because a facility or an organization may have … a diploma holder as the solely available nutritionist in charge of procurement requests."* "*[Procurement and management] is most times done by people with qualifications in supply chain and procurement. It may not necessarily be done by nutrition personnel."* "*This subdomain is important though the difference might come in with how much information is being given at the different levels. I believe some of these systems can be learned during on job training and mentoring."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
1.9.1 Demonstrates knowledge, skills, and attitudes necessary for liaising with different stakeholder's including the UN agencies and donors for the effective	*"All students need to develop skills on how to effectively liaise with different Donors/funders or partner."*

provision of nutrition supplies and equipment	*At least at bachelor's level, one should demonstrate this skill and it's very necessary if one aspires to be a project manager or field nutrition coordinator."* *"Basics important, wouldn't they [employers] rather employ a procurement officer with experience in Nutrition programming. Not good to be a jack of all trades … quality may be compromised."*
1.9.2 Demonstrates knowledge of food safety and hygiene as applicable to nutrition supplies	"*Food safety and hygiene directly affects nutrition hence it should be a mandate for all Nutrition [and Dietetics] specialists."* *"Since nutrition management requires food commodities and also to sensitise the community about food safety and hygiene practices."*
1.9.3 Demonstrates skills necessary for maintaining high hygienic standards of hospital/institutional food storage facilities following recommended guidelines	"*Hygienic practices greatly affect the nutrition and health outcomes of people thus should be monitored by all nutrition specialists."*
1.9.4 Demonstrates knowledge and skills for effective management of nutrition commodities through forecasting, requisition, stocking, and utilization	*"All nutrition specialists should be able to effectively manage nutrition commodities…"* "*Curriculum should include modules on financial accountability and procurement of nutrition supplies."*
1.9.5 Demonstrates skills in purchasing and stocking of therapeutic feeds and other related food supplies	"*Purchasing of therapeutic feeds is usually not done by the nutrition care providers. They just put in a requisition …and supplies are delivered."* *"Through forecasting and requisition, they nutritionist guide the procurement team on the purchase of supplies."*
1.10 Data management and record keeping: Demonstrates knowledge, skills, and attitudes for the efficient collection, analysis/processing, dissemination, use, and storage of data as relates to the provided nutrition, dietetics, and related health services	*"Data management is very important … it should be done at all levels because technology keeps changing."* *"At all levels, one should demonstrate knowledge in data collection, analysis, use, and above all record-keeping…"* *"All nutrition professionals should be able to collect, use and store data appropriately. However, it is very more likely that bachelors and master's students will be appointed to such roles in their careers. It is therefore more important to have data management topics tailored to them."*
1.10.1 Demonstrates knowledge and skills on the use of different formats of patient and healthcare information systems (non-digital or digital e.g., the electronic medical record and electronic health record systems)	*"Everyone in charge of data and recording must learn and have skills in this area. Data is needed right from needs assessments, clerking, monitoring progress, etc. Hence all levels need this skill especially bachelor and masters."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
1.10.2 Demonstrates knowledge and skills of using the different client/medical records documentation styles (e.g. ADIME: Assessment, Diagnosis, Intervention, Monitoring, and Evaluation; DAP: Diagnosis, Assessment, Plan; PES: Problem, Aetiology, Signs, and symptoms; SOAP: Subjective, Objective, Assessment, Plan)	*"These are rarely or not used by the nutrition care providers; mostly used by other health workers"* *"Basics are important so that they can easily use whatever system in their environment with simple training."*

1.10.3 Demonstrates knowledge in the use of the Health Management Information System (HMIS) as relates to the collection, processing, storage, retrieval, and dissemination of nutrition and related health information for decision making, planning, monitoring, and evaluation	*"All nutrition care providers should have a skill in the use of HMIS because all nutrition information is recorded in the different HMIS registers."* *"This can be done by the data clerk, however, the nutritionist may routinely check with the data clerk to ensure the right data is being entered to avoid discrepancies."*
1.10.4 Demonstrates knowledge and skills in using up-to-date HMIS tools (e.g. HMIS form 076, Order Form: HMIS Form 085; Daily dispensing log: HMIS Form 016; Requisition and issue voucher: HMIS Form 017; Stock card: HMIS Form 015) to capture quality HMIS data	"*This is important to know regardless of the academic levels as the tools are primary sources of nutrition data at any one point."* *"These [HMIS] tools from experience are never given attention by the primary users especially the nutritionists because they are never given the capacity in understanding them. Instead, the data clerks are the ones that get training. This should be revised such that nutrition professionals … get capacity training in nutrition HMIS data tools."*
1.10.5 Demonstrates knowledge, skills, and attitudes to train fellow cadres on the use of HMIS tools to capture nutrition services related data	"*Mentoring is crucial for health systems strengthening hence should be a prerequisite for all."* *"All nutrition care providers should be able to train other health workers, nutrition volunteers on the use of HMIS tools through CMEs and other training."* "*The data clerk or biostatistician through routine CME may train other health care professionals including the nutritionist."*
1.10.6 Demonstrates knowledge, skills, and attitudes to analyse, present, and discuss HMIS nutrition data with different stakeholders for advocacy, decision making, and planning	*"All nutrition data should clearly be recorded in the HMIS tools and the nutrition [and dietetics] specialists should have knowledge and skills to present and discuss this data with the different stakeholders."*
1.10.7 Demonstrates knowledge, skills, and attitudes to compile and share monitoring and evaluation reports on the provided services following established organizational guidelines	"This *may not necessarily be done by a nutritionist. An M&E [monitoring and evaluation] officer is responsible for that."*
1.10.8 Demonstrates knowledge and skills necessary for proper filing client/medical records and other organizational documents	*"Proper documentation and record-keeping is a must for all nutrition care providers."* "*Data clerking skills and knowledge should be limited to Diploma and Bachelors."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
Domain 2: Nutrition in the Lifecycle: Demonstrates (knowledge, skills, and attitudes)relevant for the promotion of optimal nutrition across the different stages of the human lifecycle: pregnancy and lactation, infancy, childhood, adolescence, adult years, and the elderly	"*This domain is very important since it focuses on health promotion in the first 1000 days of life, the window of opportunity, as a way of addressing malnutrition in Uganda."* "*This should be done by all nutrition professionals regardless of the level of academics and nutrition…"* "*Basic information in this area [nutrition in the lifecycle] can be provided to the students but packaged depending on the level they are at."*
2.1 Demonstrates knowledge of the nutrition requirements through the different phases of the human lifecycle	"*All the nutrition care providers should have this knowledge since it's one of the course units at the higher institutions of learning."*
2.2 Demonstrate skills to undertake nutrition assessment, counselling, and support (NACS) in the context of MIYCAN, adults, and elderly nutrition	"*Skills in nutrition assessment and counselling should be compulsory for all nutritionists at all levels."* *"Nutrition assessment, counselling, and support skills can be applied by all these cadres at all levels."*
2.3 Demonstrates knowledge, skills, and attitudes to identify and manage cases of malnutrition among infants, young children, adolescents, pregnant and lactating women, adults, and the elderly	"*Nutritionists [and dietitians] should know the management of malnutrition right from the community through referrals to the health facility where severe cases are handled."* *"All nutrition care providers should have the knowledge and skills in the management of malnutrition among people at all different stages of life."*
2.4 Demonstrates knowledge, skills, and attitudes to undertake Growth Monitoring and Promotion (GMP) activities	"*Growth monitoring and promotion is mandatory for all children thus all nutrition [and dietetics] specialists at all levels should have skill in doing it."* *"Emphasis should be for diploma [graduates] as they might have to do a lot of GMP [Growth Monitoring and Promotion] compared to other cadres supervising them."*
2.5 Demonstrates knowledge of the role of care in nutrition and the skills necessary for its provision across the lifecycle	"*Care is an important aspect which greatly affects the nutrition and health outcomes of an individual…. Therefore all nutrition care providers should have this knowledge at all levels of education.*
2.6 Demonstrates knowledge and skills on infant and young child feeding as per the national guidelines (feeding infants and young children under normal circumstances; those exposed to HIV; in emergencies; and in other exceptionally difficult circumstances)	*"[This is an] important aspect in the field of nutrition and dietetics."* "*At all levels, one should know the IYCF [Infant and Young Child Feeding] policies as a mandate since IYCF practices affect nutrition outcomes."*
2.7 Demonstrates knowledge, skills, and attitudes to support clinical lactation management for the mother-infant pair	"*Some mothers have breastfeeding problems and may require nutritionist [/dietitians] to help them breastfeed."* *"All nutrition care providers should know about counselling mothers with breastfeeding challenges, support mothers initiate and continue breastfeeding while still in a ward."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
2.8 Demonstrates knowledge, skills, and attitudes to guide and counsel HIV infected mothers on feeding recommendations for both the mothers and infants in the HIV/AIDS context	"*All nutrition care providers regardless of academic level should have the knowledge about the feeding options for children born to HIV infected mothers; have skills in counselling; and guiding these mothers."*
2.9 Demonstrates knowledge of different community approaches/models (e.g. community support groups, mother care support groups, Positive Deviance/Hearth approach) used to promote optimal MIYCAN; adult and geriatric nutrition	
2.10 Demonstrates knowledge, skills, and attitudes to plan and undertake community outreaches on issues relevant to promoting optimal MIYCAN; adult and geriatric nutrition	*"This skill should be demonstrated by all nutrition specialists regardless of their level of education, with optimal MIYCAN, the levels of malnutrition are reduced or completely phased out..."*
2.11 Demonstrates knowledge of public health interventions such as food fortification, iodization, bio-fortification, and their application	*"The nutrition practitioners may have this knowledge but may not be able to apply it because food fortification and iodization are not done by them …"*
2.12 Demonstrates knowledge, skills, and attitudes to design and use appropriate and consistent Information, Education and Communication (IEC) materials for promoting optimal MIYCAN; adult; and geriatric nutrition	*"This area requires more information on health promotion which makes more sense at these two levels [bachelors and masters]."* *"Designing IEC [Information Education Communication] materials is suitable for the Bachelors and Masters graduates but their use is for all."* *"All the nutrition care providers should use appropriate and consistent IEC [Education and Information Communication] materials in their day to day activities. One should know about designing and using them."*
2.13 Demonstrates knowledge of the Baby-Friendly Hospital Initiative (BFHI) and skills necessary for supporting facilities to obtain BFHI status	*"All the nutrition care providers should have the knowledge of the BFHI and pass on the knowledge to other health care providers especially the midwives and nurses and have these messages well displayed at the health facilities."*
2.14 Demonstrates knowledge of the WHO International Code of Marketing Breast milk Substitutes	*"[HN/HND graduates] should demonstrate a clear understanding of the code, [WHO International Code of Marketing Breast milk Substitutes] to facilitate the promotion of exclusive breastfeeding for all mothers."*
2.15 Demonstrates knowledge of existing national policies, guidelines, and protocols that support the promotion of MIYCAN; adult and geriatric nutrition (e.g. National Health Policy, National Policy Guidelines and Service Standards for Reproductive Health Services, National Anaemia Policy, BFHI guidelines, Integrated Management of Childhood Illnesses guidelines, Food Fortification guidelines)	*"All the nutrition care providers should know all these policies and these should be the guidelines and standards of practice in day to day activities."* *"All levels should understand these as they all have to understand and abide by and implement the guidelines and policies."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
2.16 Demonstrates knowledge, skills, and attitudes to work inter-professionally and in collaboration with other key stakeholders to promote MIYCAN; adult and geriatric nutrition	*"Nutrition care providers cannot work alone to achieve the goal of optimal nutrition for all, therefore all the care providers should work in collaboration with other stakeholders to promote MIYCAN [maternal, infant, young child, and adolescent nutrition], adult and geriatric nutrition. Collaboration helps to fill up the gaps that may be identified within other existing systems."*
2.17 Demonstrates knowledge, skills, and attitudes to provide technical support and guidance to district leadership on strategies to promote optimal MIYCAN; adult and geriatric nutrition	*"Coordination is a key area in supporting nutrition activities at the district level. Skills need to be polished well right from the start of the [academic] programme; including how to handle politics in the district".* *"[HN/HND graduates] at all levels, one should have the knowledge and skills to provide technical through trainings and workshops to support and guide the district leaders by providing the necessary information."*
Domain 3: Food Security; Agriculture; and Livelihoods Promotion: Demonstrates knowledge, skills, and attitudes of implementing food security and safety; agriculture; and livelihoods interventions	*"This needs to be introduced to all levels ... for those who desire to venture in the nutrition field because of the changing trends in agricultural and farming practices,"* *"Understanding and being able to link nutrition-specific and nutrition-sensitive interventions is key in nutrition programming."* *"This domain is important for the different levels of study, different content [should] be shared as the levels advance."*
3.1 Nutrition-sensitive Agriculture; Food Security; and Livelihoods Promotion: Demonstrates knowledge, skills, and attitudes to design and implement nutrition-sensitive agriculture, food security, and livelihoods interventions in different contexts	*"All nutritionists should be able to design interventions to overcome food insecurity in different contexts."* *"This competency may need some specialization or exposure in the field…levels of education may not be able to have access to"* *"This requires an advanced understanding of the food systems."* *"This competency can be created as an area of specialty at master's level."*
3.1.1 Demonstrates knowledge of the concept of food and nutrition security and the cross-cutting issues between food and nutrition security and gender; climate change; HIV/AIDs; conflicts, crises, and natural disasters, political stability/instability; poverty; and sustainable livelihoods	*"Graduates should have the knowledge of how food and nutrition security is affected or influenced by different aspects such as gender, climate changes, HIV/AIDS, political stability, etc. This also forms part of the syllabus at the higher institutions of learning."* *"Should be basic information for all levels with in-depth insights at master's level."*
3.1.2 Demonstrates knowledge of the different instruments for preventing and managing food crises (Food aid, Food security reserves, Food security funds, Crisis management plans, Early warning, and market information systems)	*"This is part of the syllabus at the higher institutions of learning therefore at this level one should have the practical knowledge of these instruments for preventing and managing food crises."* *"The time frame given to diploma students may not be enough to cover this domain. Bachelors and masters [level] students are more likely to be employed by projects implementing Nutrition sensitive agriculture than diploma holders."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
3.1.3 Demonstrates knowledge of the concept of livelihoods promotion, related strategies, and activities	*"There is need to have knowledge at all levels to enhance enactment of practices that fulfill the needs of the society while protecting our basis for survival; our environment-we cannot have secure livelihoods unless our food supply is sustainable."* *"At all levels, one should have this knowledge and put up livelihood activities where possible or refer the clients to the different livelihood programs which are available."*
3.1.4 Demonstrates knowledge of indicators of food and nutrition security at different levels (micro, meso, and macro)	*"Since food security affects nutrition, all nutritionists [and dietitians] should have the knowledge of the indicators of food and nutrition security at all levels and design interventions as soon as possible."*
3.1.5 Demonstrates knowledge, skills, and attitudes necessary for implementing integrated nutrition, food security, and livelihoods projects	*"There should be a link between nutrition programs being implemented and food security and livelihood projects to prevent relapses…"* *"All these are policy and advocacy level integration that suit bachelors and masters training."*
3.1.6 Demonstrates knowledge and skills to analyse the influence of existing national laws, regulations, policies, and sectoral plans on food security and livelihoods	**First Delphi round** *"Issues to do with policy analysis require a lot of critical thinking, a skill usually developed at master's level."* **Second Delphi round** *"Policy analysis is a crucial driver in advocating for improvement of the nutrition sector. This, therefore, calls for critical thinkers with advanced research skills, able to influence decisions based on facts. Masters level trains individuals to be critical thinkers; this is an exception for the undergraduate which is a bit relaxed*."
3.1.7 Demonstrates knowledge, skills, and attitudes necessary for implementing good agricultural practices (GAPs) in crop production	*"Though it's their [HN/HND graduates] mandate to have a wide knowledge of food quality and safety, most nutritionists are lacking in this aspect."* *"[HN/HND graduates] need basic knowledge and skills. More can be contributed by a person with training in that field e.g. Agriculture Extension officer";* *"Crop production is wide… jobs related to this require individuals who have learned agricultural extension as such it may be a waste of the nutrition student's time."*
3.1.8 Demonstrates knowledge of climate-smart approaches and skills necessary for their application in the agriculture value chain	*"All the nutrition care providers should be able to empower the community to grow crops/ plants which are suitable for their type of climate."* *"Climate-smart agricultural practices are normally not an area that nutritionists [and dietitians] are hired for unless someone has gained experience on job."* *"This is a much technical topic that can be left to agronomists."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
3.1.9 Demonstrates knowledge, skills, and attitudes to select and implement nutrition-sensitive agriculture interventions (e.g. establishing home gardens, cultivation of fruits and vegetables, household domestication of small livestock)	*"For all levels because they [HN/HND graduates] should understand all types of interventions designed to avert malnutrition and this is good for all cadres."* *"At all levels, all the nutrition care providers should have the skills in empowering the community in establishing kitchen or back yard garden and keeping domestic livestock's in order to supplement on their diets and eaten small incomes from the sale of the extra food."* *"[HN/HND graduates] need basic knowledge and skills. More can be contributed by a person with training in that field e.g. Agriculture Extension officer."*
3.1.10 Demonstrates knowledge and skills of livestock production	**First Delphi round** "*[HN/HND graduates] need basic knowledge and skills. More can be contributed by a person with training in that field e.g. agricultural extension officer."* *"[Competency in livestock production] is not strongly needed in the nutrition workspace. … A nutritionist can pursue this as separate courses because the skills set under an HND program would not be sufficient to enable them to compete with specialized agricultural officers."* **Second Delphi round** *"Livestock production should be something encouraged by nutritionists both as a source of animal protein and income but it is not necessary for nutritionist to know much about it. Every project that has a strong component in animal production will either hire a Veterinary Officer or at least an agronomist to handle the production part, the nutritionist then brings the knowledge on utilization of both the income and other animal products for nutrition benefits."* *"Nutritionists need to have basic knowledge on Livestock production as is the case for crop production. Many nutritionists are working with smallholder farmers promoting backyard gardening and rearing of small animals like goats for milk, heifers for milk, poultry for eggs, rabbits for meat. We need nutritionists to work with MAAIF [Ministry of Agriculture, Animal Industry and Fisheries]."*
3.1.11 Demonstrates knowledge, skills, and attitudes necessary for implementing community and school feeding projects	*"Even though the program is currently not running in Uganda, but skills in implementing it are necessary to a nutritionist."* *"This skill should be possessed at least at the bachelor's level and one should have knowledge of food supplementation."*
3.1.12 Demonstrates knowledge and skills of designing and implementing assessments for food security, agriculture, and livelihoods at different levels	*"At Bachelors & Masters level, one should be able to design assessments for food security, agriculture and livelihood at all levels and thereafter implement them."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
3.2 Post-harvest handling and food safety management: Demonstrates knowledge and skills to promote food safety across the food value chain	*"All [HN/HND] professionals should have the knowledge of handling food as this [poor food handling] can cause more problems especially toxins, mal-absorption, and food wastage …."* *"Food safety is a key aspect in preventing malnutrition and other diseases, therefore, all the nutritionists should have the knowledge and skills in ensuring and promoting food safety. They should also be able to incorporate these messages during the health education sessions."*
3.2.1 Demonstrates knowledge of post-harvest handling and skills to control food losses (in terms of quantity and quality) along the food value chain using modern and local/traditionally effective techniques	*"All the nutritionists should have this knowledge irrespective of the level of education and teach the community and empower them with these skills."* *"[HN/HND graduates] need basic knowledge and skills. More can be contributed by a person with training in that field e.g. Agricultural Extension officer."* *"Knowledge of post-harvest handling and skills to control food losses] is necessary for extension workers in agriculture. The Nutrition workforce can learn and solicit this information from this group with good multisectoral efforts."*
3.2.2 Demonstrates knowledge and skills to apply the principles of Hazard Analysis and Critical Control Point (HACCP) in the food industry	**First Delphi Round** *"Such skills are more required of a food scientist, however, a nutritionist may need to work with them to ensure quality food reaches the final consumer" and "It [knowledge and skills to apply HACCP principles] may or may not be a necessary skill unless if one works in a food industry."* **Second Delphi Round** *"Basic knowledge and skills to apply HACCP [Hazard Analysis and Critical Control Point] principles on food safety should be taught to undergraduates [of nutrition and dietetics] … since as maintaining food safety is also relevant nutritionists."*
3.2.3 Demonstrates knowledge and skills to apply the CODEX general principles of food hygiene and food safety management	*"Poor food hygiene and safety leads to mal-absorption and toxicity. This, in turn, may cause other diseases like diarrhoea, liver problems among others."* *"All nutritionists should have the knowledge of food hygiene and food safety management and apply it in their daily activities and also include it during the nutrition and health education sessions."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
Domain 4: Ethics and professionalism in Nutrition and Dietetics: Demonstrates knowledge, skills, and attitudes of ethics and professionalism in the practice of nutrition and dietetics	*"There are professional and ethical codes of conduct for all professions therefore all nutrition professionals should adhere to the existing codes of ethics and practice guidelines at all times."*
4.1 Adherence to Codes of Ethics, Practice Guidelines, and Standard Operating Procedures: Demonstrates knowledge of the existing professional codes of ethics, practice guidelines, and standard operating procedures and the skills and attitudes to adhere to these in the practice of nutrition and dietetics	*"Important for establishing [professional] practice limits for each level."* *"All the nutrition professionals should understand and practice the existing code of ethics and practice guidelines irrespective of their level of education and follow the standard operating procedures."* *"Students should start observing these [Codes of Ethics, Practice Guidelines, and Standard Operating Procedures] even at school to instil discipline in them before entering the working environment; samples of different professional codes of conduct and Standard Operating Procedures different of NGOs should be read for familiarity."*
4.1.1 Demonstrates knowledge of the existing national codes of ethics, practice guidelines, and standard operating procedures (e.g. Code of Conduct and Ethics for the Uganda Public Service and the Code of Conduct and Ethics for Health Workers, and the Code of Ethics for Nutrition and Dietetics Professionals when adopted)	*"Many [HN/HND] professionals are not aware of the national code of conduct and practice guidelines in nutrition and dietetics, they should be taught at all levels."* *"Ethics and professionalism cannot be debated on. Every individual [HN/HND professionals] regardless of what they do must portray a high level of ethics and professionalism."* *"All the nutritionists at all levels of education should know, respect and practice strictly the existing national codes of ethics, practice guidelines, and standard procedures because no one is above the law and no one is exceptional."*
4.1.2 Demonstrate knowledge, skills, and attitudes necessary to recognise and work within the boundaries of organisational laws, regulations, guidelines, protocols, and standard operating procedures	*"All organizations have laws and regulations governing them and all employees at all levels should follow them strictly as stipulated."* *"Because at all levels, they need to work within limits of their profession with regard to organizational guidelines and policies."*
4.1.3 Demonstrates knowledge, skills, and attitudes to identify and resolve work-related conflicts	*"All [HN/HND Graduates] should possess good conflict management skills and be able to provide solutions when problems arise within the team."*
4.2 Ethical principles in practice: Demonstrates knowledge, skills, and attitudes necessary for upholding professionalism, confidentiality, transparency, integrity, and accountability in delivering professional related services	"*All nutritionists [and dietitians] should have ethical principles and values of the profession which set them apart … that bring about effective and efficient service provision"* "*Ethics is important at all levels… should nutritionists [and dietitians] swear the Hippocratic Oath at graduation since they make important decisions regarding human life?"*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
4.2.1 Demonstrates knowledge, skills, and attitudes necessary for engaging clients/caretakers in making informed decisions as relates to the interventions to be undertaken	*"A major component of counselling"* "*it ensures the provision of quality services and good conduct during work and outside work environment"* "*All nutrition care providers should have the knowledge and skills in information sharing, counselling and listening skills and empowering the clients with all the necessary information for decision making about interventions to be undertaken."*
4.2.2 Demonstrates knowledge, skills, and attitudes necessary for upholding client privacy and confidentiality	*"Clients' information should be treated with confidentiality and even not all caretakers should be disclosed to certain information regarding the client"* "*Because all these cadres [HN/HND graduates] are involved in contact with beneficiaries and clients and they must learn skills and knowledge of confidentiality."*
4.2.3 Demonstrates knowledge and skills necessary to maintain professional-client boundaries	*"All nutrition care providers should display a professional relationship with their clients"* *"Rudeness is common in health settings. Knowledge of this [maintaining professionals-client boundaries] would foster good patient-health worker relationships."*
4.2.4 Demonstrates knowledge and skills necessary for upholding human rights principles (Universality and Inalienability; Indivisibility; Interdependence and Interrelatedness; Equality and Non-discrimination; Participation and Inclusion; and Accountability and Rule of Law) in dealing with clients	*"At all levels, all nutritionists should possess human rights principles and should not be discriminative while dealing with clients regardless of one' sex, age, cultural background, religion, race or economic background. All clients should be treated equally."*
Domain 5: Research and Data Analysis: Demonstrates knowledge, skills, and attitudes necessary to coordinate nutrition and health-related research processes from planning, data collection, analysis, report writing, and dissemination of findings	*"This domain is important for the different levels; the only difference is the concepts that would be taught at the different levels. As you advance, more different techniques are introduced in terms of data collection, analysis, and writing an articulate report. Thus research work would be more intense as you advance from the bachelor's to the master's level.*
5.1 Planning & Data Collection: Demonstrates knowledge, skills, and attitudes required for developing research plans and data collection	"*All nutritionists [and dietitians] should have knowledge on how to conduct research"* *Better understanding of research methods … [enables HN/HND graduates] … to successfully plan and conduct surveys.*" *"Bachelor's students should be supported in publishing their undergraduate thesis. Diploma students may not find it easy to comprehend the subject matter given the little time frame allocated for their level."*
5.1.1 Demonstrates knowledge and skills on the application of different research designs	*"For a nutritionist as a researcher it's very important to know all the different research designs if they are to achieve the best out of it [research]."* "*Bachelors and master's students need this because it's part of nutrition programming especially when working with NGOs."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
5.1.2 Demonstrates knowledge and skills on the use of different quantitative and qualitative data collection methods and techniques	"*All nutritionists [and dietitians] should have the knowledge and skills to use these methods and techniques…"*
5.1.3 Demonstrates knowledge and skills required to design appropriate nutrition and health-related data collection tools	"*All nutritionists at all levels should be familiar with the different data collection tools related to nutrition and health."*
5.1.4 Demonstrates knowledge and skills on the use of different nutrition indicators (nutrition status indicators, indicators for assessing the causes of malnutrition (e.g. food insecurity indicators; care and caring practices; and environmental hygiene and access to the health services), indicators for monitoring and evaluating the performance of nutrition programmes/projects, and related indicators as applied in demographic and health survey studies) in research	"*All nutritionists should have knowledge of all nutrition indicators in research"* "*Designing program indicators is important for community interventions."*
5.1.5 Demonstrates knowledge and skills to design articulate research proposals	"*At least at bachelors' level, one should have the skill to make a good research proposal."*
5.1.6 Demonstrates knowledge of different academic databases and search engines and their use in identifying relevant nutrition and health-related research	*[Knowledge] of databases and search engines is important and essential for getting information about health and nutrition research."* *"This area would be suitable for Masters only because of its relevance."*
5.1.7 Demonstrates knowledge, skills, and attitudes to work with interdisciplinary teams to plan and undertake research at the community, district, regional, and or national level	"*Research needs an input of different people thus one needs to work with others on a team at the community, district, regional or national level"* "*Collaborations are the future for multistakeholder programming."*
5.1.8 Demonstrates knowledge and skills of ethical principles in research and attitudes to adhere to the established research guidelines by the Uganda National Council of Science and Technology	*"Anyone conducting research should be mandated to have knowledge of and follow ethical principles of research."*
5.1.9 Demonstrates knowledge and skills to identify research opportunities relevant to professional practice	"*All nutritionists should be ambitious and self-motivated to identify research opportunities relevant to professional practice."*
5.2 Data Analysis, Report Writing, and Results Dissemination: Demonstrates knowledge, skills, and attitudes to undertake data analysis, report writing, and results dissemination	"*Nutrition [Professionals] should be able to use the research results for analysis, make a report and disseminate the information."* "*Data collection can be for the diploma graduates, analysis, report writing, and dissemination can be for bachelor and master graduates when it comes to the field."* "*The timeline for HND diploma course may not allow for such skills to be demonstrated, but also the costs attached during practice may not be affordable for this this level."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
5.2.1 Demonstrates knowledge and skills on the application of appropriate statistical tests (both parametric and non-parametric)	**First Delphi Round** "*Anyone doing research should have skills in applying the appropriate statistical tests depending on the nature of the study and to make decisions about that particular sample.*" "*Different tests give different indicators/results, therefore, a nutritionist require skills higher-level skills for choosing appropriate tests depending on the subject being investigated about."* **Second Delphi Round** *"[Understanding of statistical tests is] highly recommended because it's a relevant skill required by all Nutrition professionals...It is very important to train students in research skills because nutrition implementation at all levels depends on research …"* "*Both undergraduate and master's students need this knowledge, however, it may be more relevant for masters students than undergraduate students …"*
5.2.2 Demonstrates knowledge and skills on the use of different software programs (e.g. NutriSurvey, ENA for SMART, WHO Anthro, WHO AnthroPlus, EPI/ENA, EPiInfo, SPSS, STATA, ATLAS.ti, and NVivo) applied in the analysis of nutrition-related data	*"[Recommended] for bachelor's and master's [graduates] because they are the ones involved in undertaking research and thus they need knowledge and skills on different software used in data analysis. Bachelor's students can be limited to two software programs but master's students should learn as many as possible as their roles require them to know different programs."* *"With technology growing quite fast, the use of computers in practice everywhere including in nutrition has become eminent. I have come to appreciate this over the years in NGO [Non-governmental organisation] work. Research; monitoring and evaluation tasks; surveys; budget management; and presentation of reports all require demonstration of basic technical skills and usability of computers."*
5.2.3 Demonstrates knowledge and skills on the use of the Health Management Information Systems to support data analysis and reporting	"*This HMIS [Health Management Information System] is a good source of secondary data that students should acquaint themselves with… for health system monitoring and strengthening."*
5.2.4 Demonstrates knowledge and skills to consolidate research findings into articulate reports	"*Report compilation should be a skill for all nutrition care providers."*
5.2.5 Demonstrates knowledge and skills required to write technical research reports	"*At the bachelor's and master's level, one should have skills in technical research report making because one qualifies to be a project manager or any other big post which requires this skill and knowledge."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
5.2.6 Demonstrates knowledge, skills, and attitudes required for planning and hosting seminars, workshops, and conferences as well as sharing nutrition research with all relevant stakeholders using different fora	**First Delphi Round** "*It is important to conduct and share research to inform policy"* "*Someone with a master's degree [should be] in position to organize and host big workshops and seminars with different stakeholders."* *"At the master's level, one has acquired the research skills and has the ability to share the research findings in seminars and workshops to influence policies."* **Second Delphi Round** *"This requires a master's degree especially those involved in research and policy advocacy";* leadership and management, *"More applicable at master's level where leadership and management are strengthened …."*
5.2.7 Demonstrates knowledge, skills, and attitudes to undertake personal capacity development initiatives in advanced research in nutrition, health, and other relevant disciplines	*"This is a personal initiative for all nutrition care providers to advance in nutrition research and other relevant disciplines."*
Domain 6: Policy; Advocacy; Social and Behaviour Change Communication (SBCC): Demonstrates knowledge,, skills, and attitudes to contribute to policy, advocacy, and SBCC relevant to nutrition	"*All nutritionists should participate and contribute to policy, advocacy and SBCC [social and behaviour change communication] relevant to nutrition because we all represent nutrition and have to advocate for it at all levels to be recognized and be given importance as they do in other sectors"* *"At whatever level of education, one should be able to advocate for nutrition initiatives and also contribute to policy formulation because it affects all in their profession."* "*A few concepts under SBCC would be handled at Bachelors level but more so But it would really be of great use to align it … policy and advocacy."*
6.1 Policy: Demonstrates knowledge,, skills, and attitudes to contribute to the different stages of the policy cycle (Formulation, Implementation, and Evaluation)	**First Delphi Round** *"Bachelor students should be introduced to Policy, Advocacy and SBCC for Nutrition as specific modules during their training."* "*For master's training because these cadres are involved in decision making and this requires knowledge of many policies."* **Second Delphi Round** "*For master's graduates because these are involved in decision making [which] requires knowledge of many policies. However, bachelor students should also be introduced to policy, advocacy, and SBCC [Social and behaviour change communication] as specific modules during their training."* "*This is because at master's level, there is more concentration in programming and policy formulation…."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
6.1.1 Demonstrates knowledge of the different national policies; laws; regulations; and sectoral policies and plans relevant to nutrition	**First Delphi Round** "*This informs programing activities and should be taught because students have to learn about the different policies and how they are integrated into normal programming at community levels"* *"All nutritionists [and dietitians] should keep updated with relevant information such as policies, laws, regulations relevant to nutrition. These should be the basis of our day-to-day work."* "*More practical at master's level."* **Second Delphi Round** "*Knowledge on policies is important for all levels of education because how would they operate in the field with no knowledge of policies and regulations surrounding health practice or nutrition…"* "*At master's level, one is most likely employed in a position where he/she can make use of these skills and knowledge."* "*Every practicing nutritionist must be knowledgeable about national policies in line with nutrition, because these guide day to day nutrition activities."*
6.1.2 Demonstrates knowledge, skills, and attitudes to contribute to the formulation of nutrition policies and guidelines	**First Delphi Round** "*All nutritionists [and dietitians] at all levels should have the capability to contribute to the formulation of nutrition policies and guidelines given the opportunity to do so. Every nutritionist [and dietitian] needs to be a resourceful person in nutrition."* **Second Delphi Round** *"Much as knowledge on policies may be introduced to students at all levels, it's at masters level where the skill of formulation and analysis should be developed"* "*Policy formulation requires someone with a master's degree or more, however, since undergraduates are directly involved in the implementation of these policies, they can also guide in the process because they know better what works and what doesn't work."* "*All nutritionists at all levels should have the capability to contribute to the formulation of nutrition policies and guidelines given the opportunity to do so. Every nutritionist needs to be a resourceful person in nutrition."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
6.1.3 Demonstrates knowledge, skills, and attitudes to contribute to the evaluation/analysis of nutrition policies and guidelines	**First Delphi Round** "*They [nutrition and dietetics graduates] are key players in the formulation of nutrition policies because they understand the context in which nutrition is being implemented in the country as well as the challenges that the nation may be facing."* **Second Delphi Round** "*Diploma and bachelor's levels have not yet developed critical thinking required for this task. It should be left for master's level."* "*Unless BSc students have vast experience in the nutrition program implementation, it is unlikely that they will contribute gainfully to guideline/policy analysis."* "*At master's level, one is most likely employed in a position where he/she can make use of these skills and knowledge"* and "*Policy formulation can better be used by MSc students, mostly these have work experience and have some understanding of existing policies and how they are performing."*
6.2 Advocacy: Demonstrates knowledge, skills, and attitudes necessary for planning and managing nutrition-related advocacy campaigns	**First Delphi Round** *"This skill may require at least one with a bachelors or master's degree"* *"The depth of content will differ from Diploma to Masters."* **Second Delphi Round** *"Developing an advocacy skills set requires divergent skills and strategically selecting the relevant one. This can be developed with on-job experience in the project environment."* *"Advocacy roles need to be left for the master's graduates when at least nutritionists have gained experience/knowledge in the field. Brief concepts in nutrition advocacy need to be shared with the nutritionists at Bachelors level…."* *"Planning and management of advocacy events are advanced skills which may require advanced knowledge, and advanced analytical and organisation skills developed at the master's level."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
6.2.1 Demonstrates knowledge, skills, and attitudes required to undertake evidence-based policy and budget advocacy at different levels to influence change for nutrition	**First Delphi Round** "*I suggest this be MSC [Master of Science] role. At MSC level I assume that a student has amassed some experience in practice at field level hence able to advocate for better policy based on trends, current affairs and lessons learned."* "*Needs a good understanding of existing policies, gaps, well-built expertise and experience working with authorities, institutions and key actors."* **Second Delphi Round** "*MSc level can better utilize this skill as they have work experience and can better engage into advocacy."* "*It's probably better as a specialized skill at the master's level since many nutrition jobs that require only an undergraduate degree or lower do not require this skill."*
6.2.2 Demonstrates knowledge of the different phases in developing advocacy strategies/plans (goal development; identification of primary and secondary audiences; identifying potential allies and opponents; selecting effective advocacy approaches; identification/development of advocacy messages; budgeting and identification of resources; and undertaking risk assessments for the developed strategies/plans	**First Delphi Round** "*For Masters and Bachelors because these are involved in donor engagements and thus knowledge of advocacy is key to them."* **Second Delphi Round** *"This is more achievable at master's level, although through experience one at bachelor's level could learn this skill especially if one is in a managerial position involving lobbying funds from donors."* "*This isn't a core for nutritionists so can be done by project managers …"*
6.2.3 Demonstrates knowledge, skills, and attitudes to use different advocacy techniques (e.g. policy monitoring and public accountability, policy dialogues, capacity building of stakeholders advocacy)	**First Delphi Round** "*Both undergraduates and masters students need this information but it is most useful for the master's students."* **Second Delphi Round** *"This requires more advanced knowledge in public health cycle and practice. Dealing with the different stakeholders and policymakers requires master's knowledge and field experience."* "*Things like policy dialogues, policy monitoring, and accountability require an individual with a master's degree."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
6.2.4 Demonstrates knowledge and skills to develop different advocacy tools (e.g. clear and concise audio messages) suitable for use across different channels	***First Delphi Round*** *"Advocacy tools can at least be developed by nutritionists [and dietitians] at all levels … as long as one has knowledge of what is being advocated for. In addition I suggest that MSC [Master of Science] students should at-least have one year of experience to build on their understanding of policy, what happens in the field, what works, and what doesn't."* **Second Delphi Round** *"Development of advocacy tools needs someone who can do situation analysis and hence able to identify issues that can be addressed by advocacy."* *"This complexity is best handled at master's level; however, undergraduates can relevantly contribute to this."* *"I agree that this would be better as a learned experience being reinforced in the master course as an elective."*
6.2.5 Demonstrates knowledge, skills, and attitudes to use different advocacy tactics (e.g. letter writing, lobbying, use of media and internet, legal actions, campaigns, protests, and demonstrations)	"*All nutritionists [and dietitians] should have a skill in using at least one or more of the advocacy tactics.*
6.2.6 Demonstrates knowledge and skills to undertake national and local level nutrition advocacy targeting decision-makers or influencers	**First Delphi Round** "*At each level, at least nutritionists [and dietitians] should be able to involve in nutrition advocacy, either at a national or local level depending on the nature of work and where they work."* **Second Delphi Round** "*At each level of operation, a nutritionist is involved in advocacy e.g. at masters you may be more at the national level. At district level, an undergraduate may work with fewer policy formulations involved at this level."* "*At master's level, one is most likely employed in a position where he/she can make use of these skills and knowledge."* "*Local-level nutrition advocacy could be a useful skill for all nutritionists but it should be an elective at the undergraduate level since it's not a requirement for most employment positions."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
6.2.7 Demonstrates knowledge and skills to monitor and evaluate the impact of advocacy initiatives	**First Delphi Round** "*[Nutrition/Dietetics graduates] involved in advocacy should be able to monitor and evaluate the impact their advocacy has created."* "*Since advocacy activities are at all levels, a nutritionist should be able to assess the impact of the activities as they implement them.* **Second Delphi Round** "*Masters students will be better equipped for this as they will have a deeper understanding of SBCC [Social and behaviour change and communication…"* "*Could be a useful skill for all nutritionists but it should be an elective at the undergraduate level since it's not a requirement for most employment positions."*
6.3 Social and Behaviour Change Communication: Demonstrates knowledge, skills, and attitudes necessary for planning, undertaking, and managing SBCC	*"Nutrition involves a lot of behavioural change. This is an important skill to impart to students. I believe is best learned with practical/ scenarios"* and "*All nutritionists at all levels should have the skill in undertaking and managing SBCC because nutrition largely depends on social behavioural change which is a gradual process."* *"This is essential in ensuring that the policies sought can easily be implemented and the interventions are well accepted in the communities".*
6.3.1 Demonstrates knowledge and skills to analyse and understand health and nutrition behaviours and the context in which they occur	"*One should be able to analyse the health and nutrition behaviours of the communities in which they live or work and why people behave that way."* "*Understanding contexts enables practitioners to tailor solutions to particular populations."* *"For Bachelors and Masters because they are involved in designing and identification of suitable community interventions based on the different communities setups …"* "*Should be practical. Students should learn how to draft an SBCC [social and behaviour change communication] strategy, design IEC materials, and advocacy campaigns. They should know the entire SBCC development procedure."*
6.3.2 Demonstrates knowledge, skills, and attitudes of identifying and addressing the undesirable/un-intended culture/religious beliefs, practices, and food taboos existing in communities	"*All nutritionists at all levels should understand the food taboos, undesirable practices, and religious beliefs which affect the uptake of nutrition interventions and available services …."* "*Emphasize at diploma level the pathways for poor nutrition outcome in relation to culture. As the diploma holders are likely to work as extension workers interfacing with many people in the community."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Justifications for the rating of the different competency domains, subdomains, and statements**
6.3.3 Demonstrates knowledge, skills, and attitudes to use/apply different theories of behaviour change (e.g. Health Belief Model, Theory of Planned Behaviour, Stages of Change/Trans-theoretical Model, Social Learning Theory) in different contexts	"*Nutrition interventions thrive on BCC [behaviour change communication], a clear understanding of how change happens in humans would enhance outcomes"* "*All nutritionists [and dietitians] should have skills in the use of different theories of behaviour change because communities differ and thus what may work for one community or individual may not work for another..."*
6.3.4 Demonstrate knowledge, skills, and attitudes to network and work with other partners in the development of context-specific communication strategies for use in influencing positive behaviour change	"*Behaviour change usually requires joint efforts, working in partnership with other organisations or sectors and thus at all levels; there should also be coordination."*
6.3.5 Demonstrates knowledge, skills, and attitudes to develop and promote the use of appropriate IEC materials for influencing positive behaviour change in different settings	*"Appropriate IEC [information education communication] materials play a big role in influencing positive behaviour change because they communicate to all categories of people especially if they are both pictorial and verbal as also the illiterate can get the information. Therefore all nutritionists should have the skills and knowledge to develop and promote their use."*
6.3.6 Demonstrates knowledge, skills, and attitudes to adhere to ethical and 'do no harm' principles (Respect everyone equally; Use acceptable methods for influence; Be conscious about power dynamics and risks of violence; Be transparent; Ensure people's rights to privacy; Do not allow the shaming of individuals or groups; Establish and implement a clear Code of Conduct; Monitor and encourage feedback) in SBCC programming	*"This is a life skill; important at all levels, especially if you want to promote change."* *"The process of SBCC [Social and behaviour change] should not cause any harm to anyone and should not violent anyone's human rights."*
6.3.7 Demonstrates knowledge, skills, and attitudes to mobilize community members, community groups, and existing community organizations towards undertaking sustainable engagements for influencing positive behaviour change	*"All nutritionists should be able to mobilize and engage communities in positive behaviour change because it cannot to imposed on people thus needs dialogue."*
6.3.8 Demonstrates knowledge, skills, and attitudes to use different communication channels (e.g. face-to-face, broadcast media, mobile, electronic, and written) in undertaking SBCC	*"All the nutritionists regardless of level of education should be able to know the different communication channels that are effective in a given community and use them."*
6.3.9 Demonstrates knowledge and skills to monitor and evaluate the impact of SBCC initiatives on nutrition-related outcomes	*"Requires clear understanding of project outcomes"* *"This is a bit technical, needs a higher level of learning to be appreciated."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
Domain 7: Nutrition Leadership and Management: Demonstrates knowledge, skills, and attitudes of leadership and management in nutrition programming	"*This [competency in leadership and management] is required for all levels because work can be delegated at any level so the skill is essential"*
7.1 Planning and Budgeting: Demonstrates knowledge, skills, and attitudes to develop and operationalize nutrition program/project proposals, plans and budgets	"*This is very crucial for the project managers, assistants, and field nutrition coordinators as they are the ones usually involved in developing project proposals, plans and budgets."* "*Project proposal development should be a task for bachelors and masters graduates; however diploma students can provide inputs that are specific to their tasks basing on day to day experiences during implementation."*
7.1.1 Demonstrates knowledge and skills to develop nutrition program or project proposals, work plans, and budgets	**First Delphi Round** *"Project proposals, work plans, and budgets are usually done by project managers but all nutritionists [and dietitians] should be empowered with knowledge and skills in this area."* "Developing this competency develops based on individual experience and exposure*."* *"Work plans are developed at all levels, even at local levels of implementation hence the need to learn how to develop them early …"* **Second Delphi Round** *"[Demonstrating this competency] needs experience as developing work plans and budgets is a robust process …"* *"In a multisectoral project, I have seen almost all nutrition activities being under-budgeted and not properly planned for because a nutritionist was not involved in the planning phase of the projects. Nutritionists are only employed to implement what [was] planned. I think it is relevant for nutritionists to be involved in planning and budgeting for project activities. They should have this skill regardless of their level of graduation."* *"Both bachelor and masters level graduates need this skill as planning and budgeting is done at all levels although it is more relevant at masters when one is in managerial positions and has attained experience"*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
7.1.2 Demonstrates knowledge, skills, and attitudes to undertake resource mobilization (e.g. through the raising of new resources, maximizing the use of already existing resources, and mapping of potential funders)	**First Delphi Round** "*Improves service delivery, accountability and workforce management"* "*I wish this part is given ample time say a whole semester; it is a very practical area and it does not make much sense to be learned in a classroom setting."* **Second Delphi Round** "*The changing environment creates changing needs; all nutrition project managers must have skills in resource mobilization. However, in larger organisations, it is the role of the programme directors to secure donor funding."* *"Resource mobilisation is a tricky and sensitive area that needs skill and experience and it is best to be limited to master students"* *"[This is an] advanced competence that may require high level analytical and interpersonal skills. It may best be developed during masters training but will mostly be perfected with field/work experience."*
7.1.3 Demonstrates knowledge and skills to undertake nutrition program/project budget tracking	**First Delphi Round** "*This is a necessary requirement for someone aspiring to become a project manager."* *"Matters on utilization of resources should be appreciated by nutritionists at Bachelors level and higher"* "*Could be a useful skill for all nutritionists but it should be an elective at the undergraduate level since it's not a requirement for most employment positions."* **Second Delphi Round** "*Budget tracking may be primarily the function of the finance team on the project however basic comprehension of tools will be necessary for the nutritionist technical for purposes of harmonious reporting."* "*Budget management is usually a role given to masters or students with a post-graduate diploma in project planning."* "*Key highlights in nutrition budget formulation and or tracking need to be taught at the undergraduate level. Nutritionists at this level tend to be faced with such tasks of budget tracking and development."*
7.2 Human Resource Management: Demonstrates knowledge, skills, and attitudes to undertake different human resource managerial roles (staff recruitment, training; motivation; appraisal and employee relations management)	*"It will help to impact every graduate with good managerial skills in regards to selection, training & coaching of staff when put in a position that requires HR skill[s]."* *"This is not the primary role of a nutritionist and most institutions already have an HR person."* "*Reserved for Program managers with Masters…"*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements
7.2.1 Demonstrates knowledge of leadership and management principles	"*Anyone can take up a leadership position even at diploma level.* "*All nutrition professionals should demonstrate leadership and management skills because work is usually done in a team and one should be able to lead others."*
7.2.2 Demonstrates knowledge, skills, and attitudes to contribute to the recruitment of program/project staff and related support teams	, "This [recruitment of program/project staff] applies to all because at all levels you have some people you supervise such as nutrition volunteers, nutritionists, etc. thus should have skills to contribute to the recruitment process."
7.2.3 Demonstrates knowledge of the processes and the benefits of supportive supervision	*"One needs to be knowledgeable enough about project implementation to be able to conduct support supervision and also needs to know the importance of support supervision."* "*I am wondering how this will be assessed."*
7.2.4 Demonstrates skills, and attitudes to set up organizational supportive supervision systems (plan, conduct, and follow up supportive supervision activities)	"*At bachelors and masters level, one should have the capacity to plan, conduct and follow up support supervision activities. This is however more important for people in managerial positions."*
7.2.5 Demonstrates knowledge, skills, and attitudes to organize, coordinate, and contribute to training and mentorships of program/project staff and related stakeholders	"*This [organizing, coordinating, and contributing to training and mentorships of program/project staff] is a very necessary skill especially for people in managerial positions such as project managers and field nutrition coordinators."*
7.3 Multisectoral and multistakeholder engagement: Demonstrates knowledge, skills, and attitudes to engage in multisectoral and multistakeholder partnerships to maximize collaboration and ensure proper coordination of joint activities	*"During implementation of [nutrition and dietetics] activities, there is always an interface with different stakeholders."* *"This [competency] is very important for people in managerial positions as well as other nutrition officers because nutrition does not stand alone but needs integration with other sectors or partners in order to provide a continuum of care and improve service delivery."* *"At Masters level the student has gained some experience from the field and needs to gain managerial skills."*
7.3.1 Demonstrates knowledge and skills to map relevant program/project stakeholders at different levels of planning and or implementation	**First Delphi Round** *"This is very important for people in managerial positions"* and that its masterly required experience, "*Requires a certain degree of expertise [to master]."* **Second Delphi Round** "*This is a function of leadership and management, the skills of which are best developed at MSc level."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and	Justifications for the rating of the different competency domains, subdomains, and

attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	statements
7.3.2 Demonstrates knowledge, skills, and attitudes to work in multistakeholder nutrition partnerships/engagements	*"Partnerships are very important and thus at all levels one should have a skill in working together with other partners and stakeholders in order to improve general service delivery and provide a continuum of care."*
7.3.3 Demonstrates knowledge, skills, and attitudes to identify and manage conflicts of interest (whether potential, real, perceived, and divergent, or convergent) that arise in multisectoral and multistakeholder partnerships	*"In every workplace, conflicts of interests are inevitable such all nutrition and dietetics graduates should be able to understand aspects of conflict resolution."* *"Understanding conflict resolution skills important at all levels of management."*
7.3.4 Demonstrates knowledge on the composition, governance, and functionality of Multisectoral Coordination Committees at different levels	**First Delphi Round** "*It is the least a nutritionist at the bachelors and masters level may know about the governance structure of nutrition."* *"Multisectoral approaches are the way to go; therefore nutrition professionals are required to possess the knowledge on the governance of the approach"* **Second Delphi Round** *"Understanding of the functions of multisectoral coordination and nutrition in governance is a skill set that is considered desirable at project implementation levels …"* *"Nutrition is multisectoral in nature hence nutritionists [and dietitians] need to be [trained in this] at early stages of learning" if graduates were to fully comprehend this approach … so that it is much appreciated."* *"At master's level, one is most likely employed in a position where he/she can make use of these skills and knowledge."*
7.3.5 Demonstrate knowledge, skills, and attitudes to support Nutrition Coordination Committees in developing Multisectoral Nutrition Action Plans	"*Not all students end up at district level. [It is] important to know how [to support nutrition coordination committees] but it is not vital as it can be learned with experience."*
7.4 Program/project Implementation: Demonstrates knowledge, skills, and attitudes to oversee timely and efficient program/project implementation	"*Necessary for both project/program officer and manager."* "*All nutrition managers should be able to have this competency [Program/project Implementation] for the success of nutrition projects and programs, with a need to have a special management course after the bachelors or masters."*
7.4.1 Demonstrates knowledge and skills necessary for program/project implementation in line with agreed-upon protocols	"*All nutrition professionals on any project should have the necessary knowledge and skills as indicated in their job descriptions and should be competent enough to achieve the project goals."*
7.4.2 Demonstrates knowledge, skills, and attitudes to plan and lead organizational committee meetings	"*All should have skills in planning and leading meetings. One should be able to demonstrate good leadership skills and be able to take lead in different activities."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and	Justifications for the rating of the different competency domains, subdomains, and

attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	statements
7.4.3 Demonstrates knowledge and skills to analyse technical program/project reports and follow up on the implementation of recommendations	**First Delphi Round** "*One should have knowledge and skills of report analysis as it's a necessary competence for bigger positions such as project managers."* **Second Delphi Round** "*Nutritionists [and dietitians] should be in a position to technically understand the findings reported in all nutrition-related reports and what measures to adopt. This is a key skill relevant in nutrition programming …"*
7.5 Monitoring and Evaluation: Demonstrates knowledge, skills, and attitudes to plan, collect, and analyse data on program/project implementation schedules, inputs, processes, and outputs/deliverables to enable the undertaking of timely decisions for improving performance and accountability	"*This reduces incidences of grandaunts pursuing other course papers in M&E [monitoring and evaluation] after their general studies …"* "*Relevant for nutritionists at management level…could be an elective for undergraduates."*
7.5.1 Demonstrates knowledge, and skills in undertaking monitoring and evaluation of program/project activities	**First Delphi Round** "*All nutrition professionals … should know the importance of monitoring and evaluation and should do it continuously to improve project or program success."* "*It is important for [nutrition and dietetics] professionals to have knowledge on M&E [monitoring and evaluation] as many programmes and projects do not necessarily recruit M&E experts …"* **Second Delphi Round** "*Most projects may employ independent M&E [monitoring and evaluation] department/ personnel. In a typical nutrition project, the nutritionist may need to specialise in the technical implementation. Though project managers may need to have the knowledge and be involved in M&E processes.* "*At the undergraduate level, preliminaries like the introduction to M&E [monitoring and evaluation] and setting SMART (specific, measurable, attainable, realistic, and time-bound) indicators can be studied…at master's level, students can be taken through knowledge on various M&E tools…"*
7.5.2 Demonstrates knowledge and skills on the use of the Organization for Economic Cooperation and Development/Development Assistance Committee (OECD/DAC) evaluation criteria/principles (relevance, effectiveness, efficiency, impact, and sustainability) in program/project evaluation	**First Delphi Round** *"This can be done best by the project monitoring and evaluation experts."* **Second Delphi Round** "*DAC [Development Assistance Committee] principles streamline the evaluation process …. suited for project managers to be well equipped with this knowledge…."* "*To be limited to master students since it requires high-level synthesis."*

Appendix W Continued: Selected Participants' Justifications in Evaluating Competency Domains, Sub-domains, and Competency Statements in the Modified Delphi Process

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Justifications for the rating of the different competency domains, subdomains, and statements

7.5.3 Demonstrates knowledge and skills to analyse program/project monitoring and evaluation data to make relevant recommendations for performance improvement	**First Delphi Round** *"At bachelors and masters level, one should be able to do data analysis for the project M&E to improve the project implementation."* *"I am not sure whether two years of a masters course can teach data analysis using all software; perhaps the basics only."* **Second Delphi Round** *"I think this is a very relevant skill for nutrition graduates at both levels [bachelors and masters]. I would love to see it tailored more to the analysis of nutrition-specific indicators…Many times evaluation is left to M&Es [monitoring and evaluation specialists] who have no idea how to analyse nutrition-specific indicators and end up providing misleading or shallow information…. In most of the multisectoral projects I have implemented, baseline surveys are done without nutrition indicators measured, which makes it very hard to track progress and may necessitate a nutrition-specific baseline survey to be done at a later stage when a nutritionist is brought on-board which is time-consuming and also costly."* "*Basics can be taught at undergraduate, more comprehensive and complex data analysis programs can be taught at master's level."*
7.5.4 Demonstrates knowledge and skills to prepare and present timely reports on program/project outcomes, activities, processes, and lessons learned to different stakeholders	*"Reporting is poor at all levels of programming and emphasis should be drawn at different methods of reporting outcome/incidents"* "*Very important in dissemination."* "*All nutrition care providers should have a skill in timely and accurate report writing and submission to the respective departments."*
7.5.5 Demonstrates knowledge, skills, and attitudes required for undertaking quality improvement (QI) for improving program/project performance	"*It is important to integrate QI in CPD [continuous professional development] programmes as it allows for in-service professional growth and development.*

Appendix X: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND Practice	Suitability for Undergraduate HN/HND Training
Domain 1: Prevention and management of malnutrition in all its forms: Demonstrates knowledge, skills, and attitudes to prevent and manage undernutrition, vitamin and mineral deficiencies, overweight, obesity, and resulting diet-related non-communicable diseases	X	X
1.1 Nutrition Assessment: Demonstrates knowledge, skills, and attitudes in the use of different methods of nutrition screening and assessment to evaluate nutrition status at the individual/household and community level	X	X
1.1.1 Demonstrates knowledge of the nature, origin, progress, and causes of undernutrition, vitamin and mineral deficiencies, overweight, obesity, non-communicable diseases (e.g. diabetes, cancer, cardiovascular diseases) and other disease conditions whose management requires nutrition therapy (e.g. lower and upper gastrointestinal tract disorders; liver disorders; food allergies and intolerances; conditions arising from different nutrient deficiencies; pulmonary diseases; renal disorders; metabolic complications, stress, burns, and trauma; rheumatic diseases; neurologic disorders; psychiatric conditions; genetic metabolic disorders; HIV/AIDs; and developmental related disabilities)	X	X
1.1.2 Demonstrates knowledge and skills to perform triage (identify clients in need of immediate attention by service providers)	X	X
1.1.3 Demonstrates knowledge and skills to undertake client clerking and using the emerging information to clearly and correctly fill and update the nutrition register	X	X
1.1.4 Demonstrates knowledge and skills to identify & use different nutrition assessment screening tools appropriate for different age groups, physical, physiological, and disease statuses	X	X
1.1.5 Demonstrates knowledge and skills to perform clinical assessments relevant for the identification of undernutrition; vitamin and mineral deficiencies or excesses; diet-related non-communicable diseases; and disease conditions whose management requires nutrition therapy	X	X
1.1.6 Demonstrates knowledge and skills to perform dietary intake assessments using objective and subjective techniques	X	X
1.1.7Demonstrates knowledge on the use of different nutrition biochemical tests	X	X
1.1.8 Demonstrates ability to perform certain tests e.g. glucose, haemoglobin, vital signs (blood pressure, pulse/heart rate, body temperature, and respiration rate)	X	X
1.1.9 Demonstrates knowledge, skills, and attitudes necessary for obtaining client history data as relates to medical treatment, disease, socio-economic status, culture/religious factors, psychological, and physical status	X	X

X: All statements for which the ≥80% set level of participant consensus was attained for both levels of assessment (i.e. relevancy and suitability for undergraduate training) in the first modified Delphi round; N: Statements for which the ≥80% set level of participant consensus was not attained in either round; X^1 :Statements for whom the ≥80% set level of participant consensus was attained on only one of the levels of assessment in the first round; X^2: Statements for whom the ≥80% set level of participant consensus was attained for only one of the levels of assessment but in the second round

Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Relevancy to HN/HND Practice**	**Suitability for Undergraduate HN/HND Training**
1.1.10 Demonstrates knowledge, skills, and attitudes to obtain perceptions/opinions from the client or client's caretakers on the underlying health condition	X	X
1.1.11 Demonstrates skills necessary for undertaking community screening, identifying, and referring malnourished individuals for health services	X	X
1.1.12 Demonstrates knowledge and skills to work with other health team members to plan, conduct, and supervise home visits for active case finding of malnourished individuals	X	X
1.2 Nutrition Diagnosis: Uses client assessment data and his/her understanding of nutrition and dietetics to identify underlying problems that can be addressed through diet and nutrition-related interventions	X	X
1.2.1 Demonstrates knowledge on how to interpret results from different nutrition assessments concerning different disease causal pathways, signs, and symptoms	X	X
1.2.2 Demonstrates knowledge and skills to use assessment findings to identify the form of malnutrition; and or diet-related non-communicable or communicable disease affecting the client	X	X
1.2.3 Demonstrates knowledge, skills, and attitudes required to work in collaboration with other health team members to make appropriate diagnoses based on assessment findings.	X	X
1.3 Designing Nutrition Interventions: Demonstrates knowledge, skills, and attitudes to implement relevant diet and nutrition-related interventions depending on the disease condition, the severity of symptoms, availability of supplies, and other prevailing socio-economic and environmental conditions	X	X
1.3.1 Demonstrates knowledge, skills, and attitudes required to work with an interdisciplinary health team in the management of clients across the different health departments with special emphasis on paediatrics, maternity intensive care unit, dysphagia clinics, HIV/AIDS, cardiovascular unit, burn units, cancer, emergency units, chronic disease treatment units, dentistry, diabetes mellitus, obesity, hypertension, infectious diseases such as malaria, and neurologic disorder management clinics	X	X
1.3.2 Demonstrates knowledge and skills to design and implement nutrition and dietetic care intervention plans through collaboration with the client, his/her caretakers, and an interdisciplinary health care team	X	X
1.3.3 Demonstrates knowledge and skills to set measurable and achievable short and long-term recovery goals for the client based on assessment and diagnosis results	X	X
1.3.4 Demonstrates knowledge, skills, and attitudes to communicate results of assessment, diagnosis, and intervention plans with the client and /or, depending on prevailing circumstances, with the client's caretakers	X	X

X: All statements for which the ≥80% set level of participant consensus was attained for both levels of assessment (i.e. relevancy and suitability for undergraduate training) in the first modified Delphi round; N: Statements for which the ≥80% set level of participant consensus was not attained in either round; X^1 :Statements for which the ≥80% set level of participant consensus was attained on only one of the levels of assessment in the first round; X^2: Statements for which the ≥80% set level of participant consensus was attained for only one of the levels of assessment but in the second round

Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND Practice	Suitability for Undergraduate HN/HND Training
1.3.5 Demonstrates knowledge of determining client nutrition requirements upon interpretation of nutrition assessment results	X	X
1.3.6 Demonstrates knowledge and skills to design therapeutic diets tailored to particular diseases, health, and lifestyle needs	X	X
1.3.7 Demonstrates knowledge of tube feeding and skills to insert feeding tubes appropriate for different disease conditions	X	X
1.3.8 Demonstrates knowledge and skills to administer and monitor enteral therapeutic feeding depending on the client's disease condition	X	X
1.3.9 Demonstrates knowledge and skills to administer and monitor parenteral feeding as required for different conditions	X	X
1.3.10 Demonstrates knowledge, skills, and attitudes to offer tailored nutrition and dietetics guidance and counselling services to clients and their caretakers	X	X
1.3.11 Demonstrates skills, and attitudes to sensitize clients and their guardians on the role of care for improved nutrition outcomes	X	X
1.3.12 Demonstrates knowledge, skills, and attitudes to support clients in managing specific nutrient-drug interactions for optimum drug efficacy	X	X
1.3.13 Demonstrates knowledge, skills, and attitudes to offer individualized guidance on the use of vitamin and mineral supplements to address different nutrient deficiencies	X	X
1.3.14 Demonstrates knowledge and skills to design meal plans for clients to meet therapeutic/supplementary purposes	X	X
1.3.15 Demonstrates knowledge, skills, and attitudes to prescribe exercise and lifestyle strategies that suit the client conditions	X	X
1.3.16 Demonstrates knowledge and skills to perform cooking demonstrations to clients and caretakers	X	X
1.3.17 Demonstrates knowledge, skills, and attitudes to plan for and conduct community nutrition outreaches	X	X
1.3.18 Demonstrates knowledge, skills, and attitudes to manage clients under the different phases of management of acute malnutrition (ITC, OTC, SFP, community outreach)	X	X
1.3.19 Demonstrates knowledge, skills, and attitudes to manage other cases of malnutrition amongst clients both within the hospital and in the community	X	X
1.3.20 Demonstrates knowledge of referral processes and their use in ensuring that clients receive other health care interventions beyond the realm/scope of nutrition and dietetics	X	X
1.3.21 Demonstrates knowledge, skills, and attitudes to adhere to established national and international guidelines and institutional protocols for nutrition assessment, classification, and management (e.g. IMAM guidelines, IYCF guidelines, Diet-related NCD guidelines)	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND Practice	Suitability for Undergraduate HN/HND Training
1.4 Monitoring and Evaluation of Nutrition Interventions: Demonstrates knowledge skills, and attitudes to monitor and evaluate client progress through the applied nutrition interventions and set goals	X	X
1.4.1 Demonstrates knowledge of different reference standards in nutrition care (e.g WHO Growth Standards)	X	X
1.4.2 Demonstrates knowledge, skills, and abilities to assess client progress on interventions based on review of client medical records vis-à-vis the set goals/desired outcomes	X	X
1.4.3 Demonstrates knowledge and skills to identify and resolve the causes default and relapse amongst clients admitted to nutrition rehabilitation programs	X	X
1.4.4 Demonstrates knowledge, skills, and abilities to review client adherence to prescribed interventions, identify client challenges, and adjust interventions as may be required	X	X
1.4.5 Demonstrates knowledge, skills, and abilities to communicate with clients/caretakers the results of the monitoring and evaluation using easy to understand but standard terminology	X	X
1.4.6 Demonstrates knowledge, skills, and abilities to compile, analyse, and utilize knowledge nutrition therapy to improve both the client and program outcomes.	X	X
1.5 Emergency Nutrition: Demonstrates knowledge, skills, and attitudes to offer nutrition services in differing emergency contexts	X	X
1.5.1 Demonstrates a general understanding and application of the recommended minimum standards in humanitarian response with emphasis on food security and nutrition as stipulated in the SPHERE handbook and as updated from time to time	X	X
1.5.2 Demonstrates knowledge, skills, and attitudes to support the functionality of ITC, OTC, IYCFE-services in emergency and refugee settings	X	X
1.5.3 Demonstrates technical knowhow on how to plan and conduct mass screenings in refugee settlements and emergency contexts	X	X
1.5.4 Demonstrates knowledge, skills, and attitudes to train nutrition staff, volunteers, and peer counsellors on IYCF-E	X	X
1.5.5 Demonstrates knowledge and skills to undertake monitoring of emergency activities (Food Distribution, growth monitoring and promotion, childhood nutrition, micronutrient supplementation, and IYCF-E) in refugee settlements and emergency contexts	X	X
1.5.6 Demonstrates knowledge, skills, and attitudes to develop and maintain humanitarian working relations with all concerned stakeholders	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Relevancy to HN/HND Practice**	**Suitability for Undergraduate HN/HND Training**
1.6 Technical support and capacity development in the management of malnutrition: Uses his/her expertise in nutrition and dietetics to offer technical support and capacity development as may be required by different stakeholders or fellow professionals and health team members	X	X
1.6.1 Demonstrates knowledge of different approaches applied in undertaking Quality Improvement (QI)	X	X
1.6.2 Demonstrates skills in using approved QI tools to facilitate the sustainable delivery of quality and equitable nutrition services	X^2	X^1
1.6.3 Demonstrates knowledge and skills to plan and conduct on-job mentorship for fellow professionals, other health staff, and Village Health Team members on various nutrition packages used in the country	X	X
1.6.4 Demonstrates knowledge, skills, and attitudes necessary for supervising nutrition staff and other health cadres offering nutrition services.	X	X
1.6.5 Demonstrates teamwork skills necessary for undertaking support supervision of health facilities offering nutrition services	X	X
1.6.6 Demonstrates knowledge, skills, and attitudes to support project needs assessment, monitoring, and evaluation to improve the provision of nutrition and dietetics services	X	X
1.6.7 Demonstrates knowledge, skills, and attitudes towards professional growth and development	X	X
1.7 Interprofessional collaboration in management of malnutrition: Demonstrates knowledge, skills, and attitudes necessary to collaborate and work with an interdisciplinary team in the management of malnutrition	X	X
1.7.1 Demonstrates knowledge, skills, and attitudes in respect for the core values and responsibilities of his/her profession and those of other fellow health professionals	X	X
1.7.2 Demonstrates knowledge of ethical principles in interprofessional training and practice	X	X
1.7.3 Demonstrates teamwork and collaborative skills and attitudes required to work with other health professionals for the effective delivery of health and nutrition-related services	X	X
1.7.4 Demonstrates effective verbal and non-verbal communication skills and attitudes required for interprofessional collaboration	X	X
1.7.5 Demonstrates knowledge, skills, and attitudes to identify and manage ethical dilemmas and related conflicts that may arise due to interprofessional collaborations	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND Practice	Suitability for Undergraduate HN/HND Training
1.8 Water, Sanitation, and Hygiene (WASH): Demonstrates knowledge, skills, and attitudes required for promoting WASH at individual, household, community and facility level	X	X
1.8.1 Demonstrates knowledge of the linkage between WASH and Nutrition	X	X
1.8.2 Demonstrates knowledge, skills, and attitudes to promote adherence to safe water chain practices (water collection, handling, transportation, storage, treatment, and consumption)	X	X
1.8.3 Demonstrates knowledge of the different types of sanitation facilities (e.g. latrines or toilets, waste/garbage disposal) and skills to promote their use at different levels	X	X
1.8.4 Demonstrates knowledge, skills, and attitudes required for the promotion of individual and domestic hygiene practices	X	X
1.8.5 Demonstrates knowledge and skills relevant for ensuring infection control in health facilities	X	X
1.8.6 Demonstrates knowledge and skills required to integrate/align WASH in nutrition programming	X	X
1.9 Procurement and Management of Nutrition Supplies: Demonstrates knowledge, skills, and attitudes of the different processes necessary for procurement, storage, distribution, and disposal of nutrition-related supplies and/or equipment	X	X
1.9.1 Demonstrates knowledge, skills, and attitudes necessary for liaising with different stakeholder's including the UN agencies and donors for the effective provision of nutrition supplies and equipment	X	X
1.9.2 Demonstrates knowledge of food safety and hygiene as applicable to nutrition supplies	X	X
1.9.3 Demonstrates skills necessary for maintaining high hygienic standards of hospital/institutional food storage facilities following recommended guidelines	X	X
1.9.4 Demonstrates knowledge and skills for effective management of nutrition commodities through forecasting, requisition, stocking, and utilization	X	X
1.9.5 Demonstrates skills in purchasing and stocking of therapeutic feeds and other related food supplies	X	X
1.10 Data management and record keeping: Demonstrates knowledge, skills, and attitudes for the efficient collection, analysis/processing, dissemination, use, and storage of data as relates to the provided nutrition, dietetics, and related health services	X	X
1.10.1 Demonstrates knowledge and skills on the use of different formats of patient and healthcare information systems (non-digital or digital e.g., the electronic medical record and electronic health record systems)	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Relevancy to HN/HND Practice**	**Suitability for Undergraduate HN/HND Training**
1.10.2 Demonstrates knowledge and skills of using the different client/medical records documentation styles (e.g. ADIME: Assessment, Diagnosis, Intervention, Monitoring, and Evaluation; DAP: Diagnosis, Assessment, Plan; PES: Problem, Aetiology, Signs, and symptoms; SOAP: Subjective, Objective, Assessment, Plan)	X	X
1.10.3 Demonstrates knowledge in the use of the Health Management Information System (HMIS) as relates to the collection, processing, storage, retrieval, and dissemination of nutrition and related health information for decision making, planning, monitoring, and evaluation	X	X
1.10.4 Demonstrates knowledge and skills in using up-to-date HMIS tools (e.g. HMIS form 076, Order Form: HMIS Form 085; Daily dispensing log: HMIS Form 016; Requisition and issue voucher: HMIS Form 017; Stock card: HMIS Form 015) to capture quality HMIS data	X	X
1.10.5 Demonstrates knowledge, skills, and attitudes to train fellow cadres on the use of HMIS tools to capture nutrition services related data	X	X
1.10.6 Demonstrates knowledge, skills, and attitudes to analyse, present, and discuss HMIS nutrition data with different stakeholders for advocacy, decision making, and planning	X	X
1.10.7 Demonstrates knowledge, skills, and attitudes to compile and share monitoring and evaluation reports on the provided services following established organizational guidelines	X	X
1.10.8 Demonstrates knowledge and skills necessary for proper filing client/medical records and other organizational documents	X	X
Domain 2: Nutrition in the Lifecycle: Demonstrates (knowledge, skills, and attitudes)relevant for the promotion of optimal nutrition across the different stages of the human lifecycle: pregnancy and lactation, infancy, childhood, adolescence, adult years, and the elderly	X	X
2.1 Demonstrates knowledge of the nutrition requirements through the different phases of the human lifecycle	X	X
2.2 Demonstrate skills to undertake nutrition assessment, counselling, and support (NACS) in the context of MIYCAN, adults, and elderly nutrition	X	X
2.3 Demonstrates knowledge, skills, and attitudes to identify and manage cases of malnutrition among infants, young children, adolescents, pregnant and lactating women, adults, and the elderly	X	X
2.4 Demonstrates knowledge, skills, and attitudes to undertake Growth Monitoring and Promotion (GMP) activities	X	X
2.5 Demonstrates knowledge of the role of care in nutrition and the skills necessary for its provision across the lifecycle	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND Practice	Suitability for Undergraduate HN/HND Training
2.6 Demonstrates knowledge and skills on infant and young child feeding as per the national guidelines (feeding infants and young children under normal circumstances; those exposed to HIV; in emergencies; and in other exceptionally difficult circumstances)	X	X
2.7 Demonstrates knowledge, skills, and attitudes to support clinical lactation management for the mother-infant pair	X	X
2.8 Demonstrates knowledge, skills, and attitudes to guide and counsel HIV infected mothers on feeding recommendations for both the mothers and infants in the HIV/AIDS context	X	X
2.9 Demonstrates knowledge of different community approaches/models (e.g. community support groups, mother care support groups, Positive Deviance/Hearth approach) used to promote optimal MIYCAN; adult and geriatric nutrition	X	X
2.10 Demonstrates knowledge, skills, and attitudes to plan and undertake community outreaches on issues relevant to promoting optimal MIYCAN; adult and geriatric nutrition	X	X
2.11 Demonstrates knowledge of public health interventions such as food fortification, iodization, bio-fortification, and their application	X	X
2.12 Demonstrates knowledge, skills, and attitudes to design and use appropriate and consistent Information, Education and Communication (IEC) materials for promoting optimal MIYCAN; adult; and geriatric nutrition	X	X
2.13 Demonstrates knowledge of the Baby-Friendly Hospital Initiative (BFHI) and skills necessary for supporting facilities to obtain BFHI status	X	X
2.14 Demonstrates knowledge of the WHO International Code of Marketing Breast milk Substitutes	X	X
2.15 Demonstrates knowledge of existing national policies, guidelines, and protocols that support the promotion of MIYCAN; adult and geriatric nutrition (e.g. National Health Policy, National Policy Guidelines and Service Standards for Reproductive Health Services, National Anaemia Policy, BFHI guidelines, Integrated Management of Childhood Illnesses guidelines, Food Fortification guidelines)	X	X
2.16 Demonstrates knowledge, skills, and attitudes to work inter-professionally and in collaboration with other key stakeholders to promote MIYCAN; adult and geriatric nutrition	X	X
2.17 Demonstrates knowledge, skills, and attitudes to provide technical support and guidance to district leadership on strategies to promote optimal MIYCAN; adult and geriatric nutrition	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND Practice	Suitability for Undergraduate HN/HND Training
Domain 3: Food Security; Agriculture; and Livelihoods Promotion: Demonstrates knowledge, skills, and attitudes) of implementing food security and safety; agriculture; and livelihoods interventions	X	X
3.1 Nutrition-sensitive Agriculture; Food Security; and Livelihoods Promotion: Demonstrates knowledge, skills, and attitudes) to design and implement nutrition-sensitive agriculture, food security, and livelihoods interventions in different contexts	X	X
3.1.1 Demonstrates knowledge of the concept of food and nutrition security and the cross-cutting issues between food and nutrition security and gender; climate change; HIV/AIDs; conflicts, crises, and natural disasters, political stability/instability; poverty; and sustainable livelihoods	X	X
3.1.2 Demonstrates knowledge of the different instruments for preventing and managing food crises (Food aid, Food security reserves, Food security funds, Crisis management plans, Early warning, and market information systems)	X	X
3.1.3 Demonstrates knowledge of the concept of livelihoods promotion, related strategies, and activities	X	X
3.1.4 Demonstrates knowledge of indicators of food and nutrition security at different levels (micro, meso, and macro)	X	X
3.1.5 Demonstrates knowledge, skills, and attitudes necessary for implementing integrated nutrition, food security, and livelihoods projects	X	X
3.1.6 Demonstrates knowledge and skills to analyse the influence of existing national laws, regulations, policies, and sectoral plans on food security and livelihoods	X^1	N
3.1.7 Demonstrates knowledge, skills, and attitudes necessary for implementing good agricultural practices (GAPs) in crop production	X	X
3.1.8 Demonstrates knowledge of climate-smart approaches and skills necessary for their application in the agriculture value chain	X	X
3.1.9 Demonstrates knowledge, skills, and attitudes to select and implement nutrition-sensitive agriculture interventions (e.g. establishing home gardens, cultivation of fruits and vegetables, household domestication of small livestock)	X	X
3.1.10 Demonstrates knowledge and skills of livestock production	N	X^1
3.1.11 Demonstrates knowledge, skills, and attitudes necessary for implementing community and school feeding projects	X	X
3.1.12 Demonstrates knowledge and skills of designing and implementing assessments for food security, agriculture, and livelihoods at different levels	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND Practice	Suitability for Undergraduate HN/HND Training
3.2 Post-harvest handling and food safety management: Demonstrates knowledge and skills to promote food safety across the food value chain	X	X
3.2.1 Demonstrates knowledge of post-harvest handling and skills to control food losses (in terms of quantity and quality) along the food value chain using modern and local/traditionally effective techniques	X	X
3.2.2 Demonstrates knowledge and skills to apply the principles of Hazard Analysis and Critical Control Point (HACCP) in the food industry	N	X^1
3.2.3 Demonstrates knowledge and skills to apply the CODEX general principles of food hygiene and food safety management	X	X
Domain 4: Ethics and professionalism in Nutrition and Dietetics: Demonstrates knowledge, skills, and attitudes of ethics and professionalism in the practice of nutrition and dietetics	X	X
4.1 Adherence to Codes of Ethics, Practice Guidelines, and Standard Operating Procedures: Demonstrates knowledge of the existing professional codes of ethics, practice guidelines, and standard operating procedures and the skills and attitudes to adhere to these in the practice of nutrition and dietetics	X	X
4.1.1 Demonstrates knowledge of the existing national codes of ethics, practice guidelines, and standard operating procedures (e.g. Code of Conduct and Ethics for the Uganda Public Service and the Code of Conduct and Ethics for Health Workers)	X	X
4.1.2 Demonstrate knowledge, skills, and attitudes necessary to recognise and work within the boundaries of organisational laws, regulations, guidelines, protocols, and standard operating procedures	X	X
4.1.3 Demonstrates knowledge, skills, and attitudes to identify and resolve work-related conflicts	X	X
4.2 Ethical principles in practice: Demonstrates knowledge, skills, and attitudes necessary for upholding professionalism, confidentiality, transparency, integrity, and accountability in delivering professional related services	X	X
4.2.1 Demonstrates **knowledge, skills, and attitudes** necessary for engaging clients/caretakers in making informed decisions as relates to the interventions to be undertaken	X	X
4.2.2 Demonstrates **knowledge, skills, and attitudes** necessary for upholding client privacy and confidentiality	X	X
4.2.3 Demonstrates knowledge and skills necessary to maintain professional-client boundaries	X	X
4.2.4 Demonstrates knowledge and skills necessary for upholding human rights principles (Universality and Inalienability; Indivisibility; Interdependence and Interrelatedness; Equality and Non-discrimination; Participation and Inclusion; and Accountability and Rule of Law) in dealing with clients	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	Relevancy to HN/HND	Suitability for Undergraduate

	Practice	HN/HND Training
Domain 5: Research and Data Analysis: Demonstrates knowledge, skills, and attitudes necessary to coordinate nutrition and health-related research processes from planning, data collection, analysis, report writing, and dissemination of findings	X	X
5.1 Planning & Data Collection: Demonstrates knowledge, skills, and attitudes **required for developing research plans and data collection**	X	X
5.1.1 Demonstrates knowledge and skills on the application of different research designs	X	X
5.1.2 Demonstrates knowledge and skills on the use of different quantitative and qualitative data collection methods and techniques	X	X
5.1.3 Demonstrates knowledge and skills required to design appropriate nutrition and health-related data collection tools	X	X
5.1.4 Demonstrates knowledge and skills on the use of different nutrition indicators (nutrition status indicators, indicators for assessing the causes of malnutrition (e.g. food insecurity indicators; care and caring practices; and environmental hygiene and access to the health services), indicators for monitoring and evaluating the performance of nutrition programmes/projects, and related indicators as applied in demographic and health survey studies) in research	X	X
5.1.5 Demonstrates knowledge and skills to design articulate research proposals	X	X
5.1.6 Demonstrates knowledge of different academic databases and search engines and their use in identifying relevant nutrition and health-related research	X	X
5.1.7 Demonstrates knowledge, skills, and attitudes to work with interdisciplinary teams to plan and undertake research at the community, district, regional, and or national level	X	X
5.1.8 Demonstrates knowledge and skills of ethical principles in research and and attitudes to adhere to the established research guidelines by the Uganda National Council of Science and Technology	X	X
5.1.9 Demonstrates knowledge and skills to identify research opportunities relevant to professional practice	X	X
5.2 Data Analysis, Report Writing, and Results Dissemination: Demonstrates knowledge, skills, and attitudes to undertake data analysis, report writing, and results dissemination	X	X
5.2.1 Demonstrates knowledge and skills on the application of appropriate statistical tests (both parametric and non-parametric)	X^1	N
5.2.2 Demonstrates knowledge and skills on the use of different software programs (e.g. NutriSurvey, ENA for SMART, WHO Anthro, WHO AnthroPlus, EPI/ENA, EPiInfo, SPSS, STATA, ATLAS.ti, and NVivo) applied in the analysis of nutrition-related data	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Relevancy to HN/HND Practice**	**Suitability for Undergraduate HN/HND Training**
5.2.3 Demonstrates knowledge and skills on the use of the Health Management Information Systems to support data analysis and reporting	X	X
5.2.4 Demonstrates knowledge and skills to consolidate research findings into articulate reports	X	X
5.2.5 Demonstrates knowledge and skills required to write technical research reports	X	X
5.2.6 Demonstrates knowledge, skills, and attitudes required for of planning and hosting seminars, workshops, and conferences as well as sharing nutrition research with all relevant stakeholders using different fora	X^1	N
5.2.7 Demonstrates knowledge, skills, and attitudes to undertake personal capacity development initiatives in advanced research in nutrition, health, and other relevant disciplines	X	X
Domain 6: Policy; Advocacy; Social and Behaviour Change Communication (SBCC): Demonstrates knowledge,, skills, and attitudes) to contribute to policy, advocacy, and SBCC relevant to nutrition	X	X
6.1 Policy: Demonstrates knowledge,, skills, and attitudes) to contribute to the different stages of the policy cycle (Formulation, Implementation, and Evaluation)	X^1	N
6.1.1 Demonstrates knowledge, skills, and attitudes e of the different national policies; laws; regulations; and sectoral policies and plans relevant to nutrition	X^1	N
6.1.2 Demonstrates knowledge and skills to contribute to the formulation of nutrition policies and guidelines	X^1	N
6.1.3 Demonstrates knowledge, skills, and attitudes to contribute to the evaluation/analysis of nutrition policies and guidelines	X^1	N
6.2 Advocacy: Demonstrates knowledge, skills, and attitudes necessary for planning and managing nutrition-related advocacy campaigns	X^1	N
6.2.1 Demonstrates knowledge, skills, and attitudes required to undertake evidence-based policy and budget advocacy at different levels to influence change for nutrition	X^1	N
6.2.2 Demonstrates knowledge of the different phases in developing advocacy strategies/plans (goal development; identification of primary and secondary audiences; identifying potential allies and opponents; selecting effective advocacy approaches; identification/development of advocacy messages; budgeting and identification of resources; and undertaking risk assessments for the developed strategies/plans)	X^1	N
6.2.3 Demonstrates knowledge, skills, and attitudes to use different advocacy techniques (e.g. policy monitoring and public accountability, policy dialogues, capacity building of stakeholders advocacy)	X^1	N

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Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Relevancy to HN/HND Practice**	**Suitability for Undergraduate HN/HND Training**
6.2.4 Demonstrates knowledge and skills to develop different advocacy tools (e.g. clear and concise audio messages) suitable for use across different channels	X^1	N
6.2.5 Demonstrates knowledge and skills to use different advocacy tactics (e.g. letter writing, lobbying, use of media and internet, legal actions, campaigns, protests, and demonstrations)	X	X
6.2.6 Demonstrates knowledge and skills to undertake national and local level nutrition advocacy targeting decision-makers or influencers	X^1	N
6.2.7 Demonstrates knowledge and skills to monitor and evaluate the impact of advocacy initiatives	X^1	N
6.3 Social and Behaviour Change Communication: Demonstrates knowledge, skills, and attitudes necessary for planning, undertaking, and managing SBCC	X	X
6.3.1 Demonstrates knowledge and skills to analyse and understand health and nutrition behaviours and the context in which they occur	X	X
6.3.2 Demonstrates knowledge, skills, and attitudes of identifying and addressing the undesirable/un-intended culture/religious beliefs, practices, and food taboos existing in communities	X	X
6.3.3 Demonstrates knowledge, skills, and attitudes to use/apply different theories of behaviour change (e.g. Health Belief Model, Theory of Planned Behaviour, Stages of Change/Trans-theoretical Model, Social Learning Theory) in different contexts	X	X
6.3.4 Demonstrate knowledge, skills, and attitudes to network and work with other partners in the development of context-specific communication strategies for use in influencing positive behaviour change	X	X
6.3.5 Demonstrates knowledge, skills, and attitudes to develop and promote the use of appropriate IEC materials for influencing positive behaviour change in different settings	X	X
6.3.6 Demonstrates knowledge, skills, and attitudes to adhere to ethical and 'do no harm' principles (Respect everyone equally; Use acceptable methods for influence; Be conscious about power dynamics and risks of violence; Be transparent; Ensure people's rights to privacy; Do not allow the shaming of individuals or groups; Establish and implement a clear Code of Conduct; Monitor and encourage feedback) in SBCC programming	X	X
6.3.7 Demonstrates knowledge, skills, and attitudes to to mobilize community members, community groups, and existing community organizations towards undertaking sustainable engagements for influencing positive behaviour change	X	X
6.3.8 Demonstrates knowledge, skills, and attitudes to to use different communication channels (e.g. face-to-face, broadcast media, mobile, electronic, and written) in undertaking SBCC	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Relevancy to HN/HND Practice**	**Suitability for Undergraduate HN/HND Training**
6.3.9 Demonstrates knowledge and skills to monitor and evaluate the impact of SBCC initiatives on nutrition-related outcomes	X	X
Domain 7: Nutrition Leadership and Management: Demonstrates knowledge of leadership and management skills necessary for nutrition programming	X	X
7.1 Planning and Budgeting: Planning and Budgeting: Demonstrates knowledge, skills, and attitudes to develop and operationalize nutrition program/project proposals, plans and budgets	X	X
7.1.1 Demonstrates knowledge and skills to develop nutrition program or project proposals, work plans, and budgets	X^1	N
7.1.2 Demonstrates knowledge, skills, and attitudes to undertake resource mobilization (e.g. through the raising of new resources, maximizing the use of already existing resources, and mapping of potential funders)	X^1	N
7.1.3 Demonstrates knowledge and skills to undertake nutrition program/project budget tracking	X^1	N
7.2 Human Resource Management: Demonstrates knowledge, skills, and attitudes to undertake different human resource managerial roles (staff recruitment, training; motivation; appraisal and employee relations management)	X	X
7.2.1 Demonstrates knowledge of leadership and management principles	X	X
7.2.2 Demonstrates knowledge, skills, and attitudes to contribute to the recruitment of program/project staff and related support teams	X	X
7.2.3 Demonstrates knowledge of the processes and the benefits of supportive supervision	X	X
7.2.4 Demonstrates skills, and attitudes to set up organizational supportive supervision systems (plan, conduct, and follow up supportive supervision activities)	X	X
7.2.5 Demonstrates knowledge, skills, and attitudes to organize, coordinate, and contribute to training and mentorships of program/project staff and related stakeholders	X	X
7.3 Multi-sectoral and multi-stakeholder engagement: Demonstrates knowledge, skills, and attitudes to engage in multi-sectoral and multi-stakeholder partnerships to maximize collaboration and ensure proper coordination of joint activities	X	X
7.3.1 Demonstrates knowledge and skills to map relevant program/project stakeholders at different levels of planning and or implementation	X^1	N
7.3.2 Demonstrates knowledge, skills, and attitudes to work in multistakeholder nutrition partnerships/engagements	X	X
7.3.3 Demonstrates knowledge, skills, and attitudes to identify and manage conflicts of interest (whether potential, real, perceived, and divergent, or convergent) that arise in multi-sectoral and multi-stakeholder partnerships	X	X

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Appendix X Continued: Developed Undergraduate Human Nutrition/Human Nutrition and Dietetics Competency-Based Education Model

Competency domains, subdomains, and competencies (knowledge, skills, and attitudes) required for the practice of Human Nutrition/Human Nutrition and Dietetics in Uganda	**Relevancy to HN/HND Practice**	**Suitability for Undergraduate HN/HND Training**
7.3.4 Demonstrates knowledge on the composition, governance, and functionality of Multi-sectoral Coordination Committees at different levels	X^1	N
7.3.5 Demonstrate knowledge, skills, and attitudes to support Nutrition Coordination Committees in developing Multi-sectoral Nutrition Action Plans	X	X
7.4 Program/project Implementation: Demonstrates knowledge, skills, and attitudes to oversee timely and efficient program/project implementation	X	X
7.4.1 Demonstrates knowledge and skills necessary for program/project implementation in line with agreed-upon protocols	X	X
7.4.2 Demonstrates knowledge, skills, and attitudes to plan and lead organizational committee meetings	X	X
7.4.3 Demonstrates knowledge and skills to analyse technical program/project reports and follow up on the implementation of recommendations	X^1	N
7.5 Monitoring and Evaluation: Demonstrates knowledge, skills, and attitudes to plan, collect, and analyse data in regards to program/project implementation schedules, inputs, processes, and outputs/deliverables to enable the undertaking of timely decisions for improving performance and accountability	X	X
7.5.1 Demonstrates knowledge, and skills in undertaking monitoring and evaluation of program/project activities	X^1	N
7.5.2 Demonstrates knowledge and skills on the use of the Development Assistance Committee principles (relevance, effectiveness, efficiency, impact, and sustainability) in program/project evaluation	X^1	N
7.5.3 Demonstrates knowledge and skills to analyse program/project monitoring and evaluation data to make relevant recommendations for performance improvement	X^1	N
7.5.4 Demonstrates knowledge and skills to prepare and present timely reports on program/project outcomes, activities, processes, and lessons learned to different stakeholders	X	X
7.5.5 Demonstrates knowledge, skills, and attitudes required for undertaking quality improvement (QI) for improving program/project performance	X	X

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