FOOT SELF-CARE BEHAVIOUR AMONG TYPE 2 DIABETES MELLITUS PATIENTS IN NAKURU COUNTY, KENYA.

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A THESIS REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF PUBLIC HEALTH (EPIDEMIOLOGY AND DISEASE CONTROL) IN THE SCHOOL OF PUBLIC HEALTH OF KENYATTA UNIVERSITY

DECEMBER, 2016
DECLARATION

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

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DEDICATION

To my loving parents Mr. Joseph Kones and Mrs. Nancy Kones for their priceless moral and financial support, encouragement and guidance
ACKNOWLEDGEMENTS

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OPERATIONAL DEFINITION OF TERMS

**Adherence to medication:** The use of medication as directed by a health care provider.

**Amputation:** This is the surgical removal of all or part of a limb or extremity such as an arm, leg, foot, hand, toe, or finger.

**Callus** This is a build-up of hard skin, usually on the underside of the foot and is caused by an uneven distribution of weight, generally on the bottom of the forefoot or heel

**Charcot’s Foot or Joint:** The constellation of foot deformities that may include cocked up toes, herniated metatarsal fat pads, fractures and rocker bottom sole. The chronic Charcot foot may result from previous acute changes or from longstanding motor neuropathy.

**Claw toe:** Is a toe that is contracted at the middle and end joints in the toe and can lead to severe pressure and pain. Ligaments and tendons that have tightened cause the toe's joints to curl downwards

**Diabetes:** A chronic disease characterized by high blood glucose levels. It can be as a result of deficiency of insulin or a decreased ability of the body to use insulin.

**Diabetic foot:** One or more of infection, ulceration or destruction of deep tissue in the lower limbs.

**Family history of Diabetes Mellitus:** Diabetes in first degree relative

**Foot care:** All aspects of preventative and corrective care of the foot and ankle.

**Foot ulcer:** Is a break in the skin or a deep sore, which can become infected. Foot ulcers can result from minor scrapes, cuts that heal slowly or from the rubbing of shoes that do not fit well.

**Gangrene:** The death of tissue due to a lack of blood

**Hammertoe.** A toe that is bent because of a weakened muscle. The weakened muscle makes the tendons (tissues that connect muscles to bone) shorter, causing the toes to curl under the feet.

**Hyperglycemia:** High blood glucose (blood sugar). High blood glucose happens when the body has too little insulin or when the body can't use insulin properly.
Ingrown toenails. Occur when the edges of the nail grow into the skin causing pressure and pain along the nail edges. The edge of the nail may cut into the skin, causing redness, swelling, pain, drainage, and infection.

Modified diet: Diet that has been changed as directed by a health care provider

Necrosis: The death of most or all of the cells in an organ or tissue due to disease, injury, or failure of the blood supply

Diabetic neuropathy: Damage to the nerves, which carry messages to and from the brain and spinal cord. The symptoms include pins and needles, numbness or pain in the feet or hands.

Peripheral arterial disease (P.A.D.): Is a common circulatory problem in which narrowed arteries reduce blood flow to one’s limbs. When one develops peripheral artery disease (PAD), their extremities (usually legs) don't receive enough blood flow to keep up with demand.

Peripheral Oedema: accumulation of fluid causing swelling in tissues perfused by the peripheral vascular system, usually in the lower limbs.

Peripheral vascular disease: The damage caused to large blood vessels supplying lower limbs and can result in poor circulation, which can result in pain, and also predispose to the development of foot ulcers and ultimately amputation

Self-care: Personal activity to take care and maintain of own self health and illness and prevention of disease related complications.

Skin fissure: A cutaneous condition in which there is a linear-like cleavage of skin, sometimes defined as extending into the dermis.
### LIST OF ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ADA</td>
<td>American Diabetes Association</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
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<tr>
<td>CDC</td>
<td>Centers for Disease Control and Prevention</td>
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<tr>
<td>DFI</td>
<td>Diabetic Foot Infection</td>
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<td>DFU</td>
<td>Diabetic Foot Ulcers</td>
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<tr>
<td>DFCB</td>
<td>Diabetic Foot Care Behaviors</td>
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<td>DKA</td>
<td>Diabetes Kenya Association</td>
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<td>DM</td>
<td>Diabetes Mellitus</td>
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<tr>
<td>DMI</td>
<td>Diabetes Management and Information</td>
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<td>DRFIs</td>
<td>Diabetes Related Foot Infections</td>
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<tr>
<td>DSME</td>
<td>Diabetes self-management education</td>
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<tr>
<td>ESBL</td>
<td>Extended spectrum B-lactamase</td>
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<tr>
<td>GDM</td>
<td>Gestational diabetes mellitus</td>
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<tr>
<td>IDSA</td>
<td>Infectious Diseases Society of America</td>
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<td>IDF</td>
<td>International Diabetes Federation</td>
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<tr>
<td>HCP</td>
<td>Health Care Provider</td>
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<tr>
<td>KNDS</td>
<td>Kenya National Diabetes Strategy</td>
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<tr>
<td>KNH</td>
<td>Kenyatta National Hospital</td>
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<tr>
<td>LEA</td>
<td>Lower-Extremity Amputation</td>
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<td>LEAP</td>
<td>Lower Extremity Amputation Prevention</td>
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<tr>
<td>MDROs</td>
<td>Multidrug-Resistant Organisms</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>MRSA</td>
<td>Methicillin-resistant <em>Staphylococcus aureus</em></td>
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<tr>
<td>NCDs</td>
<td>Non Communicable Diseases</td>
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<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
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<tr>
<td>NIDDM</td>
<td>Non-Insulin Dependent Diabetes Mellitus</td>
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<tr>
<td>PAD</td>
<td>Peripheral Arterial Disease</td>
</tr>
<tr>
<td>PGH</td>
<td>Provincial General Hospital</td>
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<tr>
<td>PVD</td>
<td>Peripheral Vascular Disease</td>
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<tr>
<td>SDSCA</td>
<td>Summary of Diabetes Self-Care Activities</td>
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<td>SIP</td>
<td>Sickness Impact Profile</td>
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<tr>
<td>SSA</td>
<td>sub Saharan Africa</td>
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<tr>
<td>WDF</td>
<td>World Diabetes Foundation</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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Diabetes mellitus is a condition characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, action or both. Type 2 Diabetes mellitus accounts for 85% of all diabetic cases making it a common and growing health problem with significant mortality and morbidity including foot problems such as neuropathy, ulceration, infection and amputation. Prevention and prophylactic foot care have been advocated to decrease patient morbidity, the utilization of expensive resources, as well as the risk for amputations. The prevalence of Diabetes mellitus in Kenya is 3.3% and is a leading cause of amputation in both urban and rural hospitals. In Nakuru County, the prevalence of Diabetes mellitus is 6.6% and foot complications are a major source of morbidity among the diabetic patients. Diabetes is not curable and the success of its long-term maintenance therapy depends largely on the patients’ adherence with self-management practices. In light of the recommendations put forward by Diabetes Associations on foot care and footwear practice for persons with diabetes, this study aimed at assessing foot self-care behaviour among Type 2 diabetes mellitus patients in Nakuru County. It is a descriptive cross-sectional study that systematically sampled 343 Type 2 diabetes mellitus patients above the age of 18 from the registers of 4 simple randomly selected health facilities with diabetic clinics in Nakuru County. Interviewer administered questionnaires, observation check lists and Key Informant Interviews were used to collect data, which was then analyzed using SPSS version 20 and Chi square was used to test for association between variables at p<0.05 significance level. More than half (54.2%) of the respondents were female, 50.1% had primary level of education, 51.6% were self-employed, 64.4% were married and 98.8% were Christians. Most (77%) had co-morbidities, and there was a significant association between length of time one had had diabetes and developing co-morbidity (\( \chi^2 = 28.691, \text{df}=2, p=0.001 \)). The most common foot complication was peripheral neuropathy. There was a strong statistical significant association between knowledge on foot self-care activities and practice of foot self-care among the study respondents (\( \chi^2 = 214.254, \text{df}=4, p=0.001 \)). Ever having a foot complication however had no statistical significant association with foot care practice (\( \chi^2 = 4.758, \text{df}=2, p=0.093 \)). The study concluded that respondents generally had poor foot self-care behaviour. It was therefore recommended that appropriate education on the importance of good foot care practice be given to diabetic patients by health care professionals in order to motivate them to carry out adequate foot self-care.
CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Diabetes mellitus (DM) is a condition characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, action or both (WHO, 2012). It is a very expensive condition to treat and poses a great economic challenge on the individual, national healthcare system and economy as a whole. It was estimated that healthcare expenditures on diabetes were expected to total 11.6% of the total healthcare expenditure in the world in 2010. Some estimates were that preventing and treating diabetes related complications would rise from USD 379 billion to over USD 490 billion in 2010 (International Diabetes Federation, 2006).

It is the 6th cause of deaths in Kenya and reached 5,831 (1.84%) of the total deaths in 2011 (WHO, 2011). In Kenya, the prevalence of diabetes mellitus is 3.3% and is a leading cause of amputation in both urban and rural hospitals (Obimbo et al., 2010).

There are three main types of diabetes: Type 1 diabetes, which affects 10 – 15% of all people with diabetes, is as a result of the body’s inability to produce insulin due to beta cell destruction in the pancreas and is usually diagnosed in children and young adults (WHO, 2006). Gestational diabetes mellitus (GDM) develops and is diagnosed as a result of pregnancy in 2-10% of pregnant women (Hunt et al., 2007). Type 2 Diabetes mellitus which results from a combination of insufficient insulin production and/or resistance of the cells of the body to the actions of insulin accounts for 85% of diabetic cases and is a common and growing health problem (CDC, 2011).
Type 2 diabetes mellitus is characterized by hyperglycemia and associated with microvascular (retinal, renal, possibly neuropathic), macrovascular (coronary, peripheral vascular), and neuropathic (autonomic, peripheral) complications. Vascular complications can be decreased with proper management including appropriate diabetic foot self-care (Dikeukwu, 2011), which involves all aspects of preventative and corrective care of the foot and ankle.

Adopting good foot care behaviour in individuals with type 2 Diabetes mellitus is one of the most effective strategies in minimizing progression of diabetes and its complications (Kurniawan and Petpichetchian, 2011). Adequate foot care behaviour therefore is important, as foot complications can develop relatively quickly in the absence of good glycaemic control, even in individuals at low risk (Calle-Pascual et al., 2002). Poor foot care behavior plays a major role in increasing the risk of ulcerations, amputations and mortality (Rathur and Boulton, 2007).

Study reports in sub-Saharan Africa (SSA) indicate that majority of diabetic patients lack basic knowledge on diabetes management, use herbal medicine for treating diabetes, and are relatively unable to visit the doctor except when serious manifestations or complications occur (Chinyere et al., 2010).

Improvements in diabetes education with attention given to the application of health psychology, health behavior theories, communication theories, patient empowerment and cultural beliefs may improve knowledge and translate into improved behavior and quality of life (Formosa et al., 2012). Prevention and prophylactic foot care have been advocated to decrease patient morbidity, the utilization of expensive resources, as well as the risk for
amputations (Pinzur et al., 2005). It may take time and effort to build good foot care habits, but self-care is very important. Careful inspection of the diabetic foot on a regular basis along with health education for patients is one of the easiest, least expensive, but most effective measures for preventing future foot complications (Rocha et al., 2009).

The International Working Group on the Diabetic Foot and other professional bodies has put forward recommendations for appropriate foot care and choice of footwear which may reduce the risk of foot ulceration and amputations (American Diabetes Association, 2012 and McInnes et al., 2011). Some features of these recommendations include behaviours such as daily foot examination by patients or caregivers, (including the use of mirrors to examine the sole of the feet where necessary), daily washing and careful drying of feet, use of moisturizing lotion on the feet but not between the toes, avoiding corn removal with chemical agents, wearing well-fitting shoes and avoidance of walking barefoot (Apelqvist et al., 2007). This study therefore used the recommendations put forward by the International Working Group on Diabetic Foot (IWGDF), as a guide to determine how much Type 2 diabetes mellitus patients in Nakuru County take care of their feet.

1.2 Problem statement

Diabetes is not curable and the success of its long-term maintenance therapy depends largely on the patients’ adherence with self-management practices.

With poor management, diabetes results to complications such as foot complications, which constitute an increasing public health problem and cause substantial emotional, physical, productivity, and financial losses (Boulton et al., 2004). In addition, they
become infected frequently, can be expensive to treat and usually are the first step towards a lower extremity amputation (LEA) which results to disability hence lowering one’s productivity (Beckley et al., 2005). Every 30 seconds, a lower limb is lost somewhere in the world as a consequence of diabetes (International Diabetes Federation Time to Act, 2005) making the prevalence of amputation range between 0.24% to 8% worldwide (Singh et al., 2005).

Nakuru County whose main economic activity is agriculture and has 65% of its population occupying the rural areas has the prevalence of diabetes at 6.6%, which is double the national prevalence (Mathenge et al., 2007-2008). Foot complications are a major source of morbidity and leading cause of hospitalization among Type 2 diabetes mellitus patients in this area. Foot complications can be prevented and effectively managed but unfortunately, type 2 diabetes mellitus patients in this area seek medical attention regarding their feet when it’s too late hence risk being amputated. This study therefore sought to fill this gap as understanding the main reasons behind this situation would be a step towards devising ways to alleviate it.

1.3 Justification of the study
Self-care of the foot among Type 2 diabetes mellitus patients is a cost effective way of preventing diabetic foot complications (Edo and Eregie, 2008). With appropriate foot care and choice of footwear, the risk of foot ulceration and amputations can be highly reduced (American Diabetes Association, 2012 and McInnes et al., 2011). Compliance with proper foot care reduces the incidence of foot ulcers, particularly among persons with reduced severity of neuropathy (Calle-Pascual et al., 2002). Eighty five percent of
lower extremity amputations can be avoided by prompt and appropriate treatment of diabetic foot wounds and ulcers by healthcare providers, as well as optimum foot self-care practices by individuals affected by the condition (Strauss, 2005). Patients living with chronic diseases, such as Type 2 diabetes mellitus have to learn to self-monitor, make appropriate decisions, improve relevant skills and change aspects of their lifestyle on a day-to-day basis in order to control and manage their symptoms and complications (Bourbeau, 2008). This study therefore focused on the Type 2 diabetes mellitus patients because a large component of diabetes management rests with the patient. Maintaining and monitoring glycemic control, adherence to diet, exercise, and prescribed medications as well as foot care are all essential daily components of diabetes management that are controlled by the patient (American Diabetes Association, 2005). Many studies worldwide have been done with major focus on foot care interventions and the importance of foot care among diabetic patients. There is however limited information on the extent to which Type 2 diabetes mellitus patients have adopted Foot self-care behaviour, hence the need to conduct this study.

1.4 Research Questions

1.4 (1) What are the medical histories of Type 2 diabetes mellitus patients in Nakuru County?

1.4 (2) What is the prevalence of Diabetic foot complications among Type 2 diabetes mellitus patients in Nakuru County?

1.4 (3) What is the knowledge on foot self-care behaviour among Type 2 diabetes mellitus patients in Nakuru County?
1.4 (4) What is the extent of foot self-care practice among Type 2 diabetes mellitus patients in Nakuru County?

1.5 Null Hypotheses

1.5 (1) There is no association between prevalence of foot complications and foot self-care behaviour among Type 2 Diabetes mellitus patients in Nakuru County.

1.5 (2) There is no association between knowledge on foot self-care and the practice of foot self-care among Type 2 Diabetes mellitus patients in Nakuru County

1.6 Main Objective

To establish foot self-care behaviour among Type 2 diabetes mellitus patients in Nakuru County

1.7 Specific Objectives

1.7(1) To describe the medical histories of Type 2 Diabetes mellitus patients in Nakuru County

1.7(2) To find out the prevalence of Diabetic foot complications among Type 2 Diabetes mellitus patients in Nakuru County.

1.7(3) To determine the knowledge on foot self-care behaviour among Type 2 Diabetes patients in Nakuru County.

1.7(4) To determine the practice of foot self-care among Type 2 Diabetes mellitus patients in Nakuru County
1.8 Significance and Anticipated Output

The results obtained from this study will be used to inform Type 2 diabetes mellitus patients in order to improve their foot self-care activities as well as their families and caretakers who are a part of the diabetic patients’ lives. It will also strengthen the capacity of health care providers, private practitioners and NGOs on the areas that they need to emphasize on, such as health education. This would aid in increasing the number of Type 2 diabetes mellitus patients with knowledge on appropriate foot self-care. The results obtained from the study will also be used to empower the community in general.

1.9 Limitations of the study

The study had limited control over sincerity of the respondents as there was risk of social desirability bias (respondents presenting themselves in a favourable light)
Figure 1.10 Conceptual framework

Independent variables

- Socio-demographic factors: Age, sex, employment status, religion, marital status
- Knowledge on Foot care activities
  - Washing and drying feet appropriately, daily inspection, right shoe, avoiding barefoot gait among others.
- Diabetic foot complications.
- Medical history
  - Duration with DM, Family history of DM, Co-morbidities, diagnosis, time of beginning medication

Mediating factors

- Health care provider factors: Education on footcare and its importance.

Dependent

Diabetic foot care

Adopted from Dikeukwu et al., 2011
CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Diabetes mellitus has been associated with many complications especially diabetic foot infections which are an increasing public health problem and are a leading cause of hospital admission, amputation and mortality in diabetic patients. This review focuses on the status of Type 2 diabetes mellitus and its complications, its burden on the Type 2 diabetes mellitus patients, health care systems and countries’ economies. It also focuses on foot care, which is a measure that is highly recommended for diabetic patients as daily attention to their feet would lead to early detection of any complication.

2.2 Status of diabetes and Diabetic foot complications

2.2.1 Global status of diabetes and diabetic foot complications

Diabetes is recognized as an important cause of premature death and disability. It is one of four priority non communicable diseases (NCDs) targeted by world leaders in the 2011 Political Declaration on the Prevention and Control of NCDs (United Nations, 2011). Higher waist circumference and higher body mass index (BMI) are associated with increased risk of type 2 diabetes. However, the relationship may vary in different populations (Vazquez et al., 2007). Populations in South-East Asia, for example, develop diabetes at a lower level of BMI than populations of European origin (Ramachandran et al., 2010).

WHO estimates that globally, there has been a substantial increase in the number of adults aged over 18 years, living with diabetes from 108 million in 1980 to 422 million in 2014 (NCD Risk Factor Collaboration, 2016). This analysis also indicated that Eastern
Mediterranean Region had the highest prevalence of diabetes mellitus, which was at 13.7% followed by South-East Asia Region which had a prevalence of 8.6% in 2014.

A report by World Health Organization (2016) indicated that Diabetes caused 1.5 million deaths in 2012. Higher-than-optimal blood glucose caused an additional 2.2 million deaths, by increasing the risks of cardiovascular and other diseases. Forty-three percent of these 3.7 million deaths occur before the age of 70 years. The percentage of deaths attributable to high blood glucose or diabetes that occurs prior to age 70 is higher in low- and middle-income countries than in high-income countries (WHO, 2016).

According to International Diabetes Federation (2011), China has approximately 90.0 million people with diabetes with the projection to about 129.7 million by 2030. Diabetic populations in India is 61.3 million, USA is 23.7 million, Russian Federation 12.6 million, Brazil 12.4 million, Mexico 10.3 million, Bangladesh 8.4 million, Egypt 7.3 million and Indonesia 7.2 million.

Over time, diabetes can damage blood vessels, kidneys, the heart, eyes, and nerves, which increases the risk of heart disease and stroke. Such damage can lead to reduced blood flow, which combined with nerve damage (neuropathy) in the feet, increases the chance of foot ulcers, infection and the eventual need for limb amputation (WHO, 2016). It is estimated that approximately 15% of the more than 150 million people with diabetes world-wide will at some stage develop diabetic foot ulceration. This problem is one of the main reasons for hospital admission of diabetic patients and leads to billions of dollars in medical expenses worldwide (Goodridge et al., 2005). Diabetic foot ulcers are therefore a major concern of diabetic patients and those who treat them from quality of life, social and economic point of view (Leung, 2006).
Foot problems are indeed a global problem and there is no area in the world that does not report the development of foot lesions as a consequence mainly of neuropathy and peripheral vascular disease. Globally, among persons diagnosed as having diabetes mellitus, the prevalence of foot ulcers ranges between 4% to 10% (Nalini et al., 2005), the annual population-based incidence ranges from 1.0% to 4.1%, and the lifetime incidence may be as high as 25% (International Working Group on the Diabetic Foot, 2003). Globally also, amputations are twice as common among diabetic persons compared with non-diabetic ones (Gregg et al., 2004).

A study in Barbados reported that five year survival of a diabetic patient after a lower limb amputation was only 44% compared to 82% among those without amputation (Hambleton et al., 2009).

2.2.2 Regional status of diabetes and Diabetic foot complications

Health in sub-Saharan Africa has been traditionally dominated by infectious disease, HIV/AIDS, and poverty. With rapid urbanization, lifestyle changes and changes in socio-economic activities, non-communicable diseases like diabetes are quickly becoming a new priority for health in the region (International Diabetes Federation, 2012). Diabetes mellitus has been on the rise in Africa over the years with the prevalence being 3.1% (n=4 million) in 1980 and 7.1% (n=25 million) in 2014 (NCD Risk Factor Collaboration, 2016).

A study was conducted in Nigeria by Ekpenyong et al., (2012) among 3,500 respondents to determine Gender and age specific prevalence and associated risk factors of Type 2 diabetes mellitus. The results showed that the overall prevalence of diabetes was 10.51%;
9.60% in males and 11.20% in females. Hence, the prevalence was significantly higher in females than males. The prevalence in relation to sex and age was as follows: 2.74%, 8.50%, 16.54% and 23.70% in males of the 18-25, 26-35, 36-45 and 46-60 age groups, respectively. In females of the same age groups, the prevalence was 3.95%, 9.70%, 13.01% and 29.39%, respectively.

In Africa, foot complications are the main cause of prolonged hospital stays for people with diabetes and are associated with substantial mortality, constituting a major public health problem (Abbas and Archibald, 2005). Hospital-based studies demonstrated that the prevalence of limb ulceration were between 11.7% and 19.1% among individuals with diabetes in Nigeria (Unachukwu et al., 2007 and Fard et al., 2007) and 4.6% in Kenya (Nyamu et al., 2003).

An Ethiopian study conducted in 2011 indicated that among Ethiopian diabetic patients, foot ulcers are a major health problem and those associated with sepsis result in 12% of death. Low follow-up and poor glycemic control were major contributing factors. The study therefore concluded that understanding of the influential factors of foot ulcers in diabetics would enable high-risk patients to be recognized early (Amogne et al., 2011).

Research data suggest that peripheral vascular disease is an increasing problem among diabetes populations in various African countries (Abbas and Archibald, 2005), for example, rates of peripheral vascular disease in Tanzania have increased from 2.9% in 1980 to 12.5% in 1997 and reached 21% in 2002. Similarly, rates in Nigeria have increased from 1.7% in 1968 to 4.4% in 1971 and 54% in 1990 (Abbas and Archibald, 2005).
While most reports from Africa suggest that diabetic foot lesions are more likely to be associated with neuropathy rather than vasculopathy, concomitant infections in the foot seem to play a critical role in the pathogenesis of foot ulcer disease, which can progress to systemic infection, necrosis, gangrene, loss of the limb or death (Abbas and Archibald, 2005).

A study by SiéEssoh et al., (2009) from Ivory Coast (Cote D’Ivoire) reported 46.9% below knee diabetes related amputation and 11.2% below elbow diabetes-related amputations as common procedures performed on Type 2 diabetes mellitus patients. However, in Zimbabwe, Sibanda et al., (2009) reported 9% diabetes related lower limb amputation rate among 100 patients evaluated.

An observational Study of the Infected Diabetic Foot carried out by Lavigne et al., (2010), among 291 patients with a Diabetic Foot Infection (DFI) indicated that almost all of the patients had peripheral neuropathy, more than half had Peripheral Arterial Disease (PAD) and nearly half had evidence of osteomyelitis. In the year prior to hospitalization, 40% had a history of an infected foot ulcer (perhaps implying inadequate outpatient care), most infections involved the toes (45%) or forefoot (34%) and were of moderate severity (by Infectious Diseases Society of America [IDSA] criteria).

Results of an Ethiopian study done by Deribe et al., (2014) showed that out of 216 study subjects, about 32 (14.8%) had diabetic foot ulcers. The factors that were associated with foot ulcers were rural residence; duration of diabetes, presence of co-morbidity; mean arterial blood pressure and occupation. The study concluded that in addition to regular diabetic care, emphasis should be given on enhancing diabetic patient’s knowledge of self-care practice and regular diabetic foot evaluation.
2.2.3 Local status of diabetes and diabetic foot complications

Several studies done in Kenya indicate that foot ulcers are a significant complication at the tertiary facilities such as Kenyatta National Hospital (KNH). Mario et al., (2008) ascertained that the risk factors responsible for the ulcers are modifiable and manageable and includes poor glycemic control, diastolic hypertension, infection, dyslipidemia, and poor self-care.

A study done by Awori et al., (2007) on the causes of amputations at KNH found that 17.5% of all lower limb amputations (LLAs) were as a result of diabetes related gangrene. Two years thereafter in 2009, diabetic vasculopathy accounted for 11.4% of the amputations and 69.6% of the nonvascular cases.

A retrospective study done at the Tenwek Mission Hospital in Bomet County showed that between the years 2001-2008, 150 patients underwent limb amputation, out of which diabetic gangrene constituted 32% of the total and 87% of the dysvascular cases. This study concluded that diabetic vasculopathy complicated by infection is the leading cause of amputations in elderly males in Kenya. It therefore recommended proper control of blood sugar, foot care education and vigilant infection prevention strategies (Obimbo et al., 2010). Addressing the patients’ health behaviors (diet, tobacco use, physical activity, and supervised exercise) and adherence to pharmacological therapies is essential to successful prevention and management of PAD (Lyn et al., 2008).

2.3 Foot abnormalities among diabetic patients

According to WHO (2016) rates of amputation in populations with diagnosed diabetes are typically 10 to 20 times those of non-diabetic populations, and over the past decade
have ranged from 1.5 to 3.5 events per 1000 persons per year in populations with diagnosed diabetes.

A cross sectional study conducted in Basrah in Iraq with the aim of estimating the prevalence of diabetic foot abnormalities among patients with type 2 diabetes mellitus and the predictors of these abnormalities found that diabetic foot abnormalities were reported in 46.7% of patients and that most patients were having more than one foot abnormality (Mansour et al., 2006).

A study in Basrah Iraq reported that foot abnormalities seen in patients with diabetes included prominent metatarsal head which was reported in 36.2% of patients; hammertoes 10.9%; claw toes 3.8%; amputees 2.1%; skin changes including dryness of skin 17%; callosities 14.2%; Tineapedis 13.7%; foot ulcers 13.7% and nail changes 7.1%. The study concluded that variables that predict foot abnormality were higher age, male sex, less school achievements, smoking history, low social class, longer duration of diabetes, insulin use, heart failure and proteinuria (Mansour and Imram, 2006).

2.4 Burden of diabetes mellitus and foot complications

Diabetic foot abnormalities is one of the most important complications of diabetes mellitus and causes substantial morbidity, impairment of quality of life and engender high treatment cost (Mansouret al., 2006).

Of the estimated expenditure on diabetes treatment and prevention, 80% of that expenditure would be from the developed countries while the middle and least developed countries would account for less than 20% even though the latter countries account for 70% of morbidity and mortality of the disease. The estimates further show that the
expenditure would vary according to age and gender. The estimates furthermore revealed that more than three-quarters of the world’s expenditure in 2010 were to be used for persons who were between age group of 50 and 80 years. Also, more money was expected to be spent on diabetes care for women than for men (International Diabetes Federation, 2006).

A study done to evaluate amputations among diabetic patients and to determine the functional levels of these patients with the sickness impact profile (SIP) found that both the physical dimension scores and the total SIP scores were significantly higher for amputees. It concluded that the findings exemplify the detrimental physical and psychosocial health status of patients with diabetic-related lower extremity amputation (Edgar et al., 2011).

A study on the economic cost of diabetes in the US in 2002 found that the direct medical and indirect expenditure attributable to diabetes in 2002 were estimated at 132 billion dollars. It concluded that this figure of 132 billion US dollars cost is likely to underestimate the true burden of diabetes because it omits intangibles such as pain and suffering and care provided by non-paid care givers and in addition, the cost estimate excludes undiagnosed cases of diabetes. It further stated that diabetes imposes a substantial cost burden to the society and in particular to those individuals with diabetes and their families (Hogan et al., 2003).

Kenya has a heavy disease burden with an average life expectancy of 56 years (WHO, 2012).

According to IDF, (2009) diabetes mellitus reduces life expectancy approximately by 5-10 years. The costs of treatment and loss of productivity undermine and stunt economic
growth and negatively impact on realization of vision 2030, Sustainable Development Goals (SDGs) and other national development targets (Kenya National Diabetes Strategy 2010-2015).

Kenya does not have adequate funds for diabetes prevention or care. Kenyans who can, independently fund their care (Ministry of Medical Services, 2009-2010 and Wamai, 2009), leaving many diabetics and their families at risk of poverty and poorer health (WHO, 2010).

According to International Diabetes Federation (2015), the mean healthcare expenditures due to diabetes per person with diabetes is 82.4USD.

2.5 Knowledge and self-care practice among diabetic patients

In developing countries such as Kenya, barefoot gait has been identified as a common practice among rural populations (Abbas and Archibald, 2005) alongside improper footwear and inappropriate foot care practice (Cavanagh, 2004).

A hospital based cross sectional study was conducted by Padma et al., (2010) among 117 type 2 diabetic patients to evaluate the knowledge and self-care practices in diabetic patients and their role in disease management. Almost two thirds of the patients were aware of importance of exercise, diet control and drug compliance. Sixty four per cent of those who followed self-care practices achieved glycaemic control. Thus it was found that patients who were more self-aware of the disease, having knowledge and regularly involved in self-care practices achieved better glycaemic control.

According to a Nigerian study by Desalu et al., (2011) of 352 diabetes patients, 30.1% had good knowledge and 10.2 % had good practice of type 2 diabetes mellitus foot care.
Majority (78.4%) of patients with poor practice had poor knowledge of foot care. With regard to knowledge, 68.8% were unaware of the first thing to do when they found redness/bleeding between their toes and 61.4% were unaware of the importance of inspecting the inside of the footwear for objects. Results on foot care practice showed that 89.2% of type 2 diabetes mellitus patients did not receive advice when they bought footwear and 88.6% failed to get appropriate size footwear. Illiteracy and low socioeconomic status were significantly associated with poor knowledge and practice of foot care. Less than half of the respondents (40.9%) regularly inspect their feet, (46%) regularly wash their feet with warm water and (47.7%) inspect the inside of their footwear.

According to Jamil et al., 2011 in a study to assess diabetic patients taking proper foot care according to International Guidelines and its impact on their foot health, diabetic patients taking proper foot care was only 6%. There were 45 (45%) males and 55 (55%) females. Seventeen percent used to inspect their feet daily, 20% washed their feet daily, while 73% washed their feet more than once. Twenty three percent of the patients dried their feet after every foot wash, 27% applied emollients, 25% checked shoes before wearing, 24% used to wear correct shoes, 8% used to wear cotton socks and 36% used to walk bare feet.

2.6 Prevention and management of foot complications

A 6 year analysis of the effectiveness of preventive foot care has shown that those diabetic patients at high risk for foot problems who complied with a preventive programme had at least a 13 fold decrease in first foot ulcers compared to those patients
who did not comply with the foot care recommendation. In the group who complied, the cumulative incidence of foot ulcer was 3.1% compared to 31.6% among those who did not (Call-Paschal et al., 2001).

The following are some foot care practices put across by America Diabetes Association (2012) for diabetic patients.

i. **Check your feet every day.** Look at your bare feet for red spots, cuts, swelling, and blisters. If you cannot see the bottoms of your feet, use a mirror or ask someone for help.

ii. **Be more active.** Plan your physical activity program with your health team.

iii. **Wash your feet every day.** Dry them carefully, especially between the toes.

iv. **Keep your skin soft and smooth.** Rub a thin coat of skin lotion over the tops and bottoms of your feet, but not between your toes.

v. **If you can see and reach your toenails, trim them when needed.** Trim your toenails straight across and file the edges with an emery board or nail file.

vi. **Wear shoes and socks at all times.** Never walk barefoot. Wear comfortable shoes that fit well and protect your feet. Check inside your shoes before wearing them. Make sure the lining is smooth and there are no objects inside.

vii. **Protect your feet from hot and cold.**

viii. **Keep blood flowing to your feet.** Put your feet up when sitting. Wiggle your toes and move your ankles up and down for 5 minutes, two or three times a day.

ix. **Avoid barefoot gait**

x. **Do not smoke.**
CHAPTER THREE: MATERIALS AND METHODS

3.1 Study Area

This study was conducted in Nakuru County, which covers an area of 2,325.8 km$^2$ and has a population density of 213.9 people per Km$^2$.

It has a population of 1,603,325 with male population being 50.2 % and female population being 49.8 %. According to the 2009 census, the age distribution is as follows; 0-14 years (41.8 %), 15-64 years (55.1 %) and 65+ years (3.0%). It is located in the South Eastern part of the former Rift Valley Province at latitude and longitude of 0°15'S, 36°04'E and has 11 Sub-Counties namely: Nakuru Town East, Nakuru Town West, Bahati, Rongai, Subukia, Kuresoi North, Kuresoi South, Gilgil, Naivasha, Njoro and Molo.

Nakuru County has a total of 278 Health Facilities. Provincial General hospital (1) District Hospitals (3), Sub-District Hospitals (3), Dispensaries (114), Health Centers (43), Medical Clinics (82), Maternity Homes (6), Nursing Homes (8), Others (18) with Doctor to Population Ratio being 1:31,251.

3.2 Study population

This study involved three hundred and forty three Type 2 diabetes mellitus patients sampled from the selected health facilities in Nakuru County as follows: Two hundred and seventy one attending Nakuru PGH hospital, 31 attending Naivasha sub-county hospital, 18 attending Molo sub-county hospital and 23 attending Bahati Sub-county hospital.
3.3 Study Design

This was a descriptive cross-sectional study conducted between November 2014 and January 2015. This was the most appropriate study design as it gives a snapshot of a given health situation at a point in time. It enables one to obtain information about the situation at hand at one specific time.

3.4 Sample size determination

Fisher et al., formula as quoted by Mugenda was used to calculate the sample size, (Mugenda and Mugenda, 2003):

\[ N = \frac{Z^2pq}{d^2} \]

Where:

N is the population sample
Z which is 1.96 is the standard normal deviate which corresponds 95% confidence level
P = 0.5 (the proportion of type 2 diabetic patients who practice foot care) it is unknown, so 0.5 was used.
q (1 - p) = 0.5
d = 0.05 (statistically tolerated error)

\[ N = \frac{1.96^2 \times 0.5 \times 0.5}{0.05^2} = 384 \]

= 384 diabetic patients

The population of Type 2 diabetes mellitus patients in the selected facilities is less than 10,000, so the sample was adjusted as follows:

\[ \text{Adjusted sample (nf)} = \frac{n}{1+n/N} \]
Where \( n = 384 \) (calculated sample size)

\[ N = 3,154 \] (The population of diabetic patients registered to the 4 health facilities)

\[ n_f = \frac{384}{1 + \frac{384}{3,154}} = 343 \]

=343 Type 2 diabetic patients.

### 3.5 Sampling technique

Nakuru County was purposively selected due to its high (6.6%) prevalence of diabetes. There are 7 health facilities in Nakuru County that offer diabetes management services, from which 4 were simple randomly sampled for the study. Proportionate sampling was done to identify the number of respondents to be used per facility as shown in table 3.1 below.

Daily type 2 diabetes mellitus patient registers from the four health facilities namely; Nakuru Provincial General Hospital, Naivasha sub-county hospital, Bahati Sub-County Hospital and Molo Sub-County Hospital were used to identify the respondents for the study.

Systematic sampling as shown below was then used to identify respondents from the daily type 2 diabetes mellitus registers at the health facilities.

\[ K = \frac{N}{n} \]

\( K \) is the sampling interval

\[ N = 3154 \] (population of Type 2 diabetic patients at the selected health facilities)

\[ n = 343 \] (Sample size used in the study)

\[ K = \frac{3154}{343} = 9.1 \]

\( K = 9 \)
iii) Purposive sampling technique was used to select the key informants.

Table 3.1: Sampling frame

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>POPULATION</th>
<th>SAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nakuru Provincial General hospital</td>
<td>2496</td>
<td>271</td>
</tr>
<tr>
<td>Naivasha Sub County hospital</td>
<td>282</td>
<td>31</td>
</tr>
<tr>
<td>Molo Sub County Hospital</td>
<td>167</td>
<td>18</td>
</tr>
<tr>
<td>Bahati Sub County Hospital</td>
<td>209</td>
<td>23</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>3154</strong></td>
<td><strong>343</strong></td>
</tr>
</tbody>
</table>

3.6 Research instruments

A structured interviewer administered questionnaire was used to provide information on the demographic characteristics of the study subjects, their medical history, their knowledge on foot care activities, their practice of foot care as well as the prevalence of foot complications among the study subjects. Observation checklist was also used on the 343 type 2 diabetic patients and Key Informant Interviews were conducted with the County Director of Health, Director in charge of Non Communicable Diseases, 3 Medical Superintendents and 6 health care providers in charge of the diabetic clinics.

3.7 Data Collection Method

When the type 2 diabetes mellitus arrive at the diabetic clinic, they are put on a register dated that day, in the order of their arrival. The k\textsuperscript{th} value of the study was 9, every ninth
patient on the list who met the inclusion criteria was therefore selected for the study. If
the patient had participated in the study on an earlier date or did not meet the inclusion
criteria, they were excluded.

On the day of data collection, researcher administered questionnaires were presented to
the respondents and observation to identify amputations, type and nature of shoe worn
and feet appearance of the type 2 diabetes mellitus patients was done.

Eleven key informants namely County Director of Health, Director in charge of Non-
communicable diseases, 4 medical superintendents and 5 health care providers were
engaged to gather informed opinions regarding diabetes, foot complications and views on
foot care behaviour among type 2 diabetes mellitus in Nakuru County. Notes were
carefully taken and grouped into thematic areas. The information from key informants
was mainly used under interpretation of the study findings.

3.8 Data management

The collected data was checked manually for its completeness. All data collected, which
was in paper form were stored safely in a cabinet, where only the researcher had access
to. After this the data was coded where responses were given codes such as Yes-1, No-2,
and entered to SPSS version 20. Before the actual data analysis the data was explored for
its completeness, outliers and missing values. Following data exploration, descriptive
statistical analysis was done for variables such as socio-demographic characteristics and
knowledge on foot self-care behaviour then frequencies and percentages were calculated
and presented on tables, charts and graphs. Chi square test was done to test for strength of
association between variables at p< 0.05 significance levels.
3.9 Validity and Reliability

To ensure validity and reliability, 10% (n=34) of the research tools were pretested at Gilgil level three hospital. Questionnaires were administered and respondents asked whether they were unsure of how to answer any of the questions. Necessary corrections were then made to ensure that the questions asked provided the required information. Data collection assistants were also thoroughly trained prior to the data collection process. During data collection, the researcher ensured that the questionnaires were correctly filled to avoid rejection of questionnaires during data entry/analysis.

3.10 Variables

3.10.1 Independent Variable

Socio-demographic characteristics, medical history, knowledge on foot self-care activities, and prevalence of foot complications

3.10.2 Mediating factors

Healthcare provider factors such as education on foot care and its importance

3.10.3 Dependent variable

Diabetic foot care

3.11 Inclusion and exclusion criteria

3.11.1 Inclusion criteria

Registered Type 2 Diabetes mellitus patients above the age of 18, and were within Nakuru County.
3.11.2 Exclusion criteria

Registered Type 2 diabetes mellitus patients within Nakuru County but were mentally challenged, Type 2 diabetes mellitus patients who were in critical conditions at the time of study and Type 2 diabetic patients who failed to consent to be part of the study.

3.12 Ethical consideration

3.12.1 Approval to conduct the study was sought from Graduate school and clearance was sought from Kenyatta University Ethics Committee. Permit was obtained from National Commission for Science, Technology and Innovation and the county government health director, to carry out the study in Nakuru County.

3.12.2 Written consent from the diabetes mellitus patients was sought prior to conducting the study. The researcher also worked closely with the medical personnel in charge of the diabetic clinic to ensure that the diabetic patients were comfortable and those identified with critical foot complications were taken care of immediately.

Foot-care counseling was offered to those diabetes mellitus patients identified in the course of study as to have critical foot complications, poor foot care knowledge and practice.

3.12.3 Confidentiality and anonymity was ensured by not using any form of identification of the study participants. No names were used or indicated on the questionnaires; instead, coding was used. The study did not reveal who said what in the questionnaire and data obtained was analyzed in groups.
3.12.4 At the end of the study, barazas were held with the community members in order to communicate to them the results obtained from the study. Community health workers were also used to disseminate information to the community.
CHAPTER 4: RESULTS

4.1 Socio Demographic Characteristics of Respondents

The socio-demographic characteristics covered in this study included attributes of age, sex, marital status, religion, highest level of education attained and employment status of the respondents. The results are presented in table 4.1 below.
Table 4.1 Socio demographic characteristics of the respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-38 years</td>
<td>55</td>
<td>16.0</td>
</tr>
<tr>
<td>38-58 years</td>
<td>147</td>
<td>42.9</td>
</tr>
<tr>
<td>58-78 years</td>
<td>134</td>
<td>39.1</td>
</tr>
<tr>
<td>above 78 years</td>
<td>7</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>343</td>
<td>100.0</td>
</tr>
</tbody>
</table>

| **Sex**                |           |                |
| Male                   | 157       | 45.8           |
| Female                 | 186       | 54.2           |
| **Total**              | 343       | 100.0          |

| **Marital Status**     |           |                |
| Single                 | 33        | 9.6            |
| Married                | 221       | 64.4           |
| Divorced               | 15        | 4.4            |
| Separated              | 14        | 4.1            |
| Widowed                | 60        | 17.5           |
| **Total**              | 343       | 100.0          |

| **Religion**           |           |                |
| Muslim                 | 4         | 1.2            |
| Christian              | 339       | 98.8           |
| **Total**              | 343       | 100.0          |

| **Highest level of education** |           |                |
| Never gone to school      | 41        | 12.0           |
| Primary school            | 172       | 50.1           |
| Secondary school          | 108       | 31.5           |
| Tertiary level            | 22        | 6.4            |
| **Total**                 | 343       | 100.0          |

| **Employment status**    |           |                |
| Employed                 | 35        | 10.2           |
| Unemployed               | 93        | 27.1           |
| Self-employed            | 177       | 51.6           |
| Retired                  | 38        | 11.1           |
| **Total**                | 343       | 100.0          |

The study consisted of 343 respondents with majority being in the age category of 38-58 years (42.9%). Fifty four point two percent (n=186) were female, 64.4% (n=221) were
married and 98.8% (n=339) were Christians. Fifty point one percent (n=142) had attained primary school education and more than half of the respondents 51.6% (n=177) were self-employed engaging mainly in farming.

### 4.1.1 Distribution of age of respondents by sex

The study looked into the age of the respondents in relation to their sex and summarized the results as shown in figure 4.1 below.

![Figure 4.1: Distribution of age of respondents by sex](image)

Amongst the age categories of 38-58, 58-78 and above 78 years, there were more females than males while males were more than females only in the category of 18-38 years.

Of the respondents between the age of 18-38 years, there were 52.7% (n=29) males and 47.3% (n=26) females. In the age category of 38-58, there were 55.8% (n=82) females and 44.2% (n=65) males, while in the age category of 58-78, there were 54.5% (n=73)
females and 45.5% (n=61) males. There were only 7 respondents above the age of 78 years, with 71.4% (n=5) being female and 28.6% (n=2) being male.

4.2 Lifestyle and Medical History of the respondents

The study sought to find out the respondents’ history of smoking, alcohol use, family history of diabetes, duration with diabetes, how they were diagnosed, co-morbidities, how soon they began medication and their diet. The results were presented below.

4.2.1 History of smoking among the respondents.

The results on whether the respondents had never smoked, were past smokers or were current smokers were presented on figure 4.2 below.

![Smoking among the respondents (n=343)](image)

**Figure 4.2: Lifetime smoking of the respondents**

Majority of the respondents, 77.8% (n=267) had never smoked, out of whom 32.96% (n=88) were male and 67.04% (n=179) were female. There was a significant association between sex of the respondents and history of smoking ($\chi^2 = 75.450$, df=1, p<0.001)
implying that gender had an influence on the respondents’ history of smoking. The results from the Key Informant Interviews also showed that more men were more likely to be past or current smokers as compared to women.

4.2.2 Alcohol use among the respondents

The study sought to determine alcohol consumption of the respondents and the results were presented on figure 4.3 below.

![Alcohol consumption among the respondents](image)

**Figure 4.3: Lifetime alcohol use of the respondents**

Most (66.5%) of the respondents had never drank alcohol in their lifetime, out of whom 73.25% (n=167) were female while 26.75% (n=61) were male. One point five percent (n=5) were current alcohol consumers out of whom 80% (n=4) while 20% (n=1) was female. The responses from Key Informant Interviews showed that male respondents were likely to be current or past alcohol consumers and females were more likely to have never consumed alcohol. There was a significant association between sex of the
respondents and alcohol use ($\chi^2 = 96.879$, df=1, p<0.001). This implies that men were more likely to have a history of alcohol use as compared to women.

4.2.3: Family history of diabetes mellitus

Family history of diabetes in first degree relative (parent, sibling and/or child) of the respondents was put into consideration in this study. The results were presented in figure 4.4 below.

Figure 4.4: Family history of diabetes among the respondents

Of all the respondents, 56.3% (n=193) had no history of diabetes mellitus in close relative(s) while 43.7% (n=150) had history of diabetes mellitus in close relative(s).
4.2.4: Length of time since diagnosis with diabetes

The length of time since the respondents were diagnosed with diabetes was considered in this study and categorized into less than one year, between one and five years and more than five years. The results were presented in table 4.2 below.

Table 4.2: Length of time since the respondents were diagnosed with diabetes

<table>
<thead>
<tr>
<th>Length of time</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 1 year</td>
<td>71</td>
<td>20.7</td>
</tr>
<tr>
<td>1-5 years</td>
<td>112</td>
<td>32.7</td>
</tr>
<tr>
<td>More than 5 years</td>
<td>160</td>
<td>46.6</td>
</tr>
<tr>
<td>Total</td>
<td>343</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Most of the respondents 46.6% (n=160) had had diabetes for more than 5 years, 32.7% (n=112) had been diabetic for between 1-5 years while 20.7% (n=70) had been diabetic for less than 1 year.
4.2.5: Diabetes diagnosis

The study sought to establish how the respondents were diagnosed with diabetes mellitus and the results were presented in figure 4.5 below.

**Figure 4.5: How the respondents were diagnosed.**

Fifty one percent (n=175) of the respondents were diagnosed by a health care provider after developing signs and symptoms of diabetes, 25.7% (n=88) were diagnosed with diabetes on a doctor’s visit over a different health problem while 23.3% (n=80) were diagnosed on a normal screening.
4.2.6 Other medical conditions in addition to diabetes

The respondents were asked whether they had other health conditions in addition to diabetes and a clinical card review was done to confirm their response. The results were presented in table 4.3 below.

Table 4.3: Distribution of co-morbidities among the respondents

<table>
<thead>
<tr>
<th>Condition</th>
<th>Response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Hypertension</td>
<td>238 (90.15%)</td>
<td>26 (9.85%)</td>
</tr>
<tr>
<td>Eye problems</td>
<td>217 (82.20%)</td>
<td>47 (17.80%)</td>
</tr>
<tr>
<td>Kidney problems</td>
<td>14 (5.30%)</td>
<td>250 (94.70%)</td>
</tr>
<tr>
<td>Heart problems</td>
<td>12 (4.55%)</td>
<td>252 (95.45%)</td>
</tr>
<tr>
<td>Stroke</td>
<td>8 (3.03%)</td>
<td>256 (96.97%)</td>
</tr>
</tbody>
</table>

Seventy seven percent (n=264) of the respondents had at least one other health condition in addition to diabetes, while 23.0% (n=79) did not. Of the 264 respondents who had at least one other health condition in addition to diabetes, 90.15% (n=238) had hypertension, making it the most common health condition among the respondents. It was followed by eye problems which affected 82.20% (n=217) of the respondents. Stroke was the least common, affecting 3.03% (n=8) of the respondents.
4.2.7 Association between having co-morbidity and duration since diagnosis with type 2 diabetes mellitus

The study sought to determine whether the length of time since diagnosis with type 2 diabetes mellitus had an influence on developing co-morbidities, and summarized the results in table 4.4 below.

Table 4.4: Association between having co-morbidity and duration since diagnosis with type 2 diabetes mellitus

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Length of time since diagnosis with T2DM</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>&lt;1 year</td>
<td>1-5 Years</td>
</tr>
<tr>
<td>Heart problems</td>
<td>Yes</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>68</td>
<td>109</td>
</tr>
<tr>
<td>Eye problems</td>
<td>Yes</td>
<td>32</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>39</td>
<td>45</td>
</tr>
<tr>
<td>Kidney problems</td>
<td>Yes</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>69</td>
<td>111</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Yes</td>
<td>37</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>34</td>
<td>42</td>
</tr>
<tr>
<td>Stroke</td>
<td>Yes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>70</td>
<td>111</td>
</tr>
</tbody>
</table>
The results of the study showed that with increase in the length of time since the respondents were diagnosed with type 2 diabetes mellitus, there was an increase in the number of those with co-morbidities. Co-morbidities were most common among the respondents who were diagnosed with type 2 diabetes mellitus more than 5 years ago as they affected 88.8% of the respondents. The results from Key Informant Interviews also showed that those who had had diabetes for a longer period of time were at a higher risk of developing co-morbidities as compared to those who had had diabetes for a shorter period of time.

There was a statistically significant association between length of time since diagnosis with type 2 diabetes mellitus and developing another medical condition ($\chi^2 = 28.691$, df=2, $p<0.001$). This is an indication that the longer one has diabetes, the higher the chances of developing co-morbidity.

Among those who were diagnosed with type 2 diabetes mellitus less than one year ago, 25.0% had heart problems, among those who were diagnosed between 1-5 years ago, 25.0 % had heart problems and among those who were diagnosed more than 5 years ago 50.0% had heart problems. There was however no statistically significant association between length of time with diabetes and developing heart problems ($\chi^2 = 0.376$, df= 2, $p=0.829$).

Prevalence of eye problems was highest among the respondents who were diagnosed with type 2 diabetes mellitus more than 5 years ago as it affected 54.4% of all those who had at least 1 co-morbidity. There was a significant association between length of time one had diabetes and development of eye problems ($\chi^2 = 18.254$, df=2, $p<0.001$).
Seventy eight point six percent of those who were diagnosed with type 2 diabetes mellitus more than 5 years ago had kidney problems. There was a statistical significant association between length of time one had had diabetes and developing kidney problems ($\chi^2=7.208$, df=2, p=0.027).

Hypertension affected most (55.0%) of those respondents who were diagnosed with type 2 diabetes mellitus more than 5 years ago. There was a statistically significant association between length of time since diagnosis with diabetes and development of hypertension ($\chi^2=24.222$, df=2, p<0.001).

There was however no significant association between length of time since diagnosis with diabetes and having stroke ($\chi^2=2.832$, df=2, p=0.243).

There was therefore a significant association between developing eye problems, kidney problems and hypertension and length of time since diagnosis with type 2 diabetes mellitus, implying that the longer one had diabetes the higher the risk of developing eye problems, kidney problems and hypertension.

4.2.8 The period between diagnosis and beginning of treatment

When the respondents began medication was categorized into immediately, weeks later or more than a month later. The results were then presented in table 4.5 below.
Table 4.5: The period between diabetes mellitus diagnosis and treatment of the respondents

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Alternative response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of beginning medication after diagnosis</td>
<td>Immediately</td>
<td>324</td>
<td>94.5</td>
</tr>
<tr>
<td></td>
<td>Weeks later</td>
<td>16</td>
<td>4.7</td>
</tr>
<tr>
<td></td>
<td>More than a month later</td>
<td>3</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>343</td>
<td>100</td>
</tr>
</tbody>
</table>

Majority of the respondents, 94.5% (n=324) began using diabetes medication immediately after diagnosis, 4.7% (n=16) began weeks later and 0.9% (n=3) began more than a month later. The results from key Informant Interviews also showed that majority of diabetic patients begin their medication immediately after diagnosis.

4.2.9 Diet of the respondents

The study sought to find out whether or not the respondents modified their diet as directed by their health care provider on being diagnosed with diabetes.

Sixty three point three percent (n=217) of the respondents reported modifying their diet as directed by the healthcare provider while 36.7% (n=126) ate the same food as the rest of their family members. Of the respondents who modified their diet as directed by the healthcare provider, 56.22% (n=122) began taking the diet immediately, 27.65% (n=60) began taking the diet weeks later while 16.13% (n=35) began taking the diet more than three months later.
The study showed that there was a statistically significant association between diet modification by the respondents and their employment status ($\chi^2=11.768$, df=3, p=0.008). Seventy four point three percent (74.3%) of those who were employed modified their diet as advised by a health care provider, 55.9% of those who were unemployed modified their diet, 60.5% of those who were self-employed modified their diet and 84.2% of those who were retired modified their diet as advised by a health care provider. This was an indication that those who were retired were more likely to modify their diet as advised by a health care provider as compared to those who were unemployed, self-employed and employed.

4.3 Prevalence of foot complications

In order to determine what foot complications the respondents had, those who reported having a problem with their foot/feet were asked to describe how they felt. Their responses were interpreted according to the signs and symptoms of diabetic foot complications as outlined in the American Diabetes Association guideline. Loss of sensation to one’s legs and feet was classified as peripheral neuropathy, painful cramping in the hip, thigh or calf muscles after activity, such as walking or climbing stairs (intermittent claudication) was classified as Peripheral Arterial Disease, those who experienced severe pain followed by a feeling of numbness and had skin discoloration with a clear line between healthy and damaged skin were classified as having gangrene, open sores were classified as foot ulcers, heavy feeling in one’s leg with the leg looking swollen and on pressing the swelling left dent was defined as peripheral oedema.
Observation was done to identify amputations among the respondents. The results were then presented in Table 4.6 below.

**Table 4.6: Prevalence of foot complications among the respondents**

<table>
<thead>
<tr>
<th>Foot complication</th>
<th>Response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td>53.9% (n=117)</td>
<td>46.1% (n=100)</td>
</tr>
<tr>
<td>Foot ulcers</td>
<td>18.9% (n=41)</td>
<td>81.2% (n=176)</td>
</tr>
<tr>
<td>Peripheral Edema</td>
<td>18.4% (n=40)</td>
<td>81.6% (n=177)</td>
</tr>
<tr>
<td>P.A.D</td>
<td>31.3% (n=68)</td>
<td>149 (68.7%)</td>
</tr>
<tr>
<td>Diabetic foot lesions</td>
<td>23.5% (n=51)</td>
<td>76.5% (n=166)</td>
</tr>
<tr>
<td>Gangrene</td>
<td>6.9% (n=15)</td>
<td>293.1% (n=202)</td>
</tr>
<tr>
<td>Amputation</td>
<td>12% (n=26)</td>
<td>88% (n=191)</td>
</tr>
</tbody>
</table>

Sixty three point three percent (n=217) of the respondents either had a foot complication during the time of study or had had at least one foot complication in their lifetime, while 36.7% (n=126) had never had a foot complication. Of those who had had a foot complication, 53.9% (n=117) had peripheral neuropathy making it the most common foot complication among the diabetic patients. The second one was peripheral arterial disease which affected 31.3% (n=68) of the respondents. The least common foot complication was gangrene, which affected 6.9% (n=15) of the respondents.
4.3.1 Distribution of foot complications by sex

The study sought to determine how the foot complications were distributed among the male and female respondents and the results were shown in table 4.7 below.

Table 4.7: Distribution of foot complications by sex of the respondents

<table>
<thead>
<tr>
<th>Foot complication</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral Neuropathy</td>
<td>53 (45.3%)</td>
<td>64 (54.7%)</td>
<td>117</td>
<td>$\chi^2 =0.478, df=1, p=0.489 $</td>
</tr>
<tr>
<td>Foot Ulcers</td>
<td>17 (41.5%)</td>
<td>24 (58.5%)</td>
<td>41</td>
<td>$\chi^2 =0.730, df=1, p=0.393 $</td>
</tr>
<tr>
<td>Peripheral edema</td>
<td>17 (42.5%)</td>
<td>23 (57.5%)</td>
<td>40</td>
<td>$\chi^2 =0.485, df=1, p=0.486 $</td>
</tr>
<tr>
<td>PAD</td>
<td>37 (54.4%)</td>
<td>31 (45.6%)</td>
<td>68</td>
<td>$\chi^2 =1.916, df=1, p=0.166 $</td>
</tr>
<tr>
<td>Diabetic foot lesions</td>
<td>30 (58.8%)</td>
<td>21 (41.2%)</td>
<td>51</td>
<td>$\chi^2 =3.449, df=1, p=0.063 $</td>
</tr>
<tr>
<td>Gangrene</td>
<td>7 (46.7%)</td>
<td>8 (53.3%)</td>
<td>15</td>
<td>$\chi^2 =0.004, df=1, p=0.949 $</td>
</tr>
<tr>
<td>Amputation</td>
<td>11 (42.3%)</td>
<td>15 (57.7%)</td>
<td>26</td>
<td>$\chi^2 =0.315, df=1, p=0.575 $</td>
</tr>
</tbody>
</table>

There was a higher prevalence of peripheral neuropathy, foot ulcers, peripheral edema, gangrene and amputation among the female respondents as compared to the male. PAD and diabetic foot lesions on the other hand were more prevalent among the male diabetic patients. About 55% of the female respondents and 45.3% of the male respondents had
Peripheral neuropathy, foot ulcers affected 58.5% female respondents and 41.5% male respondents. Of those who had peripheral edema, 57.5% were female while 42.5% were male, among those with PAD, 54.4% were male while 45.6% were female, of those with diabetic foot lesions, 58.8% were male while 41.2% were female. Among the respondents with gangrene, 53.3% were female while 46.7% were male and of those who had been amputated, 57.7% were female while 42.3% were male. The results of observation showed that 13.1% of the respondents had foot ulcerations, 21.9% had skin fissures, 9.6% had an infected toe nail, 51.9% had callus/corns, 32.4% had blisters, 17.2% had abrasions/cuts and 13.7% had foot deformity. About 30% had moist legs between the toes, 59.2% had trimmed toe nails, 49.9% had toe nails cut to shape, 47.8% had toe nails with rough edges, only 4.1% had pedicured toe nails and 8.2% has ingrown toe nails.

### 4.3.2 Association between prevalence of foot complications and medical history factors

Whether or not medical history factors influenced occurrence of foot complications among the respondents was also considered in this study. The results were shown in table 4.8 below.
Table 4.8 prevalence of foot complications in relation to medical history of the respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration with DM</td>
<td>&lt;1 year</td>
<td>25 (35.2%)</td>
<td>46 (64.8%)</td>
<td>71</td>
<td>$\chi^2 = 68.124$, df=2, $p&lt;0.001$</td>
</tr>
<tr>
<td></td>
<td>1-5years</td>
<td>55 (49.1%)</td>
<td>57 (50.9%)</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than 5 years</td>
<td>137 (85.6%)</td>
<td>23 (14.4%)</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Co-morbidities</td>
<td>Yes</td>
<td>182 (68.9%)</td>
<td>82 (31.1%)</td>
<td>264</td>
<td>$\chi^2 = 15.879$, df=1, $p&lt;0.001$</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>35 (44.3%)</td>
<td>44 (55.7%)</td>
<td>79</td>
<td></td>
</tr>
<tr>
<td>Time of beginning medication</td>
<td>Immediately</td>
<td>204 (63.0%)</td>
<td>120 (37.0%)</td>
<td>324</td>
<td>$\chi^2 = 0.235$, df=2, $p=0.889$</td>
</tr>
<tr>
<td></td>
<td>Weeks later</td>
<td>11 (68.8%)</td>
<td>5 (31.2%)</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;1month later</td>
<td>2 (66.7%)</td>
<td>1 (33.3%)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

The length of time one had had diabetes was considered in relation to having/ever developed a foot complication(s). The study showed that 85.6% of those who had had diabetes for more than 5 years had foot complications as compared to those who had had diabetes for less than 5 years. Forty nine point one percent (49.1%) of those who had had diabetes for between 1-5 years had foot complications and 33.8% of those who had had diabetes for less than one year had foot complications. The results from key informants showed that many diabetic patients develop foot complications several years after diagnosed with diabetes. They also showed that many diabetic patients go for several years before they are diagnosed, and by the time of diagnosis, they already have foot complications.
There was a statistical significant association between length of time with diabetes and development of foot complications ($\chi^2 = 68.124$, df= 2, p<0.001). This is an indication that the longer one has diabetes the higher the risk of developing a foot complication.

Sixty eight point nine percent (68.9%) of those respondents who had another medical condition besides diabetes had complication while 44.3% of those who did not have any other medical condition besides diabetes had a foot complication(s). The study revealed that there was a statistical significant association between having another medical condition and developing a foot complication ($\chi^2 = 15.879$, df=1, p<0.001). This is an indication that having another medical condition besides diabetes increased one’s risk of developing foot complications.

Sixty three percent (63%) of those respondents who begun taking diabetes medication immediately had foot complications, 68.8% of those who begun the diabetes medication weeks later had foot complications and 66.7% of those who begun diabetes medication more than a month later had foot complications. How soon the respondents began taking diabetes medication had no statistical significant association with development of foot complication(s) ($\chi^2 = 0.235$, df=2, p=0.889). This indicates that the time that one begins taking diabetes medication has no influence on their development of foot complications.
4.3.3 The use of treatment in relation to foot complications among the respondents

The respondents were asked as to whether or not they used the diabetes treatment as directed by the health care provider. The results of the study showed that 78.2% (n=268) of the respondents reported using the treatment as directed by a health care provider while 21.8% (n=75) did not. Among those who used the medication as directed by a health care provider, 59.3% (n=159) had foot complications while 40.7% (n=109) did not. Among those who did not use treatment as directed by a health care provider, 77.3% (n=58) had foot complications while 22.7% (n=17) did not.

The results showed that there was a significant association between utilization of treatment as directed by a health care provider and having foot complications ($\chi^2=8.174$, df=1, p=0.004). This was an indication that those who did not use treatment as directed by a health care provider were more likely to develop foot complications.
4.3.4 When the respondents developed foot complication(s)

The time that the respondents developed foot complications was studied and results were presented in figure 4.6 below.

![Figure 4.6: Development of foot complications among the respondents.](image)

About 32% (n=70) of the respondents reported having foot complications before diagnosis, 30.0% (n=65) developed foot complications between 1 and 5 years after diagnosis, 24.4% (n=53) developed foot complications less than a year after diagnosis while 13.4% (n=29) developed foot complications more than 5 years after diagnosis.

4.3.5 Outcome of foot complications among the respondents

The respondents were then asked whether their foot complications healed and confirmed through observation to check for scars or changes to their feet. They were further asked how long the complication took to heal, whether or not the foot complication(s) recurred
and whether or not they had ever been hospitalized over their foot complication(s). The results were then presented on table 4.9 below.

**Table 4.9: Foot complications among the respondents**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Alternative response</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whether the foot complication healed</td>
<td>Yes</td>
<td>114</td>
<td>52.5</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>103</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>217</td>
<td>100</td>
</tr>
<tr>
<td>How long the foot complication took to heal</td>
<td>Less than one month</td>
<td>9</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td>1-3 months</td>
<td>63</td>
<td>55.3</td>
</tr>
<tr>
<td></td>
<td>More than 3 months</td>
<td>42</td>
<td>36.8</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>114</td>
<td>100</td>
</tr>
<tr>
<td>Recurrence of the foot complication(s)</td>
<td>Yes</td>
<td>103</td>
<td>90.4</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11</td>
<td>9.6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>114</td>
<td>100</td>
</tr>
<tr>
<td>Number of times the foot complication has recurred</td>
<td>Once</td>
<td>2</td>
<td>1.9</td>
</tr>
<tr>
<td></td>
<td>2-4 times</td>
<td>39</td>
<td>37.9</td>
</tr>
<tr>
<td></td>
<td>More than 4 times</td>
<td>62</td>
<td>60.2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>103</td>
<td>100</td>
</tr>
<tr>
<td>HCP advice on foot complication</td>
<td>Yes</td>
<td>156</td>
<td>71.9</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>61</td>
<td>28.1</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>217</td>
<td>100</td>
</tr>
</tbody>
</table>

Fifty two point five percent (n=114) of the respondents reported that the foot complication healed, with 55.3% (n=63) saying that the foot complication(s) healed within 1-3 months. Ninety point four percent (n=103) reported recurrence of the foot complication(s), with 60.2% (n=62) reporting that the foot complication(s) had recurred more than 4 times. Majority, 71.9% reported that they had been advised by a healthcare provider regarding their foot complication.
4.4 Knowledge on foot self-care

Whether or not the respondents knew what foot care is was considered in this study. Those who said they knew what it is, were asked to define and to state where they learnt of it. The results were then summarized in table 4.10 below.

Table 4.10 Knowledge of respondents on foot care

<table>
<thead>
<tr>
<th>Variable</th>
<th>Response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you know what foot care is?</td>
<td>1. Yes</td>
<td>78.1% (n=268)</td>
</tr>
<tr>
<td></td>
<td>2. No</td>
<td>21.9% (n=75)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100% (n=343)</strong></td>
</tr>
<tr>
<td>Definition</td>
<td>1. Practices to ensure health of the foot and ankle</td>
<td>29.1% (n=78)</td>
</tr>
<tr>
<td></td>
<td>2. Taking care of the foot</td>
<td>31.7% (n=85)</td>
</tr>
<tr>
<td></td>
<td>3. Wearing shoes</td>
<td>33.6% (n=90)</td>
</tr>
<tr>
<td></td>
<td>4. Washing feet</td>
<td>5.6% (n=15)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100% (n=268)</strong></td>
</tr>
<tr>
<td>Where learnt</td>
<td>1. Health care provider</td>
<td>74.4% (n=198)</td>
</tr>
<tr>
<td></td>
<td>2. Community Health worker</td>
<td>6.8% (n=18)</td>
</tr>
<tr>
<td></td>
<td>3. Family/friend</td>
<td>9.4% (n=25)</td>
</tr>
<tr>
<td></td>
<td>4. Own reading</td>
<td>6.0% (n=16)</td>
</tr>
<tr>
<td></td>
<td>5. Trainings/seminars</td>
<td>4.1% (n=11)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100% (n=268)</strong></td>
</tr>
</tbody>
</table>

4.4.1 Foot care definition

Majority, 78.1% (n=268) reported knowing what foot self-care is. On being further asked to define it, only 29.1% (n=78) gave the correct definition which is practices carried out by an individual on one’s foot and ankle to prevent foot complications and manage them should they have occurred. Majority 74.4% of those who said they knew what foot self-care is learnt of it from a health care provider.
4.4.2 Knowledge of the respondents on foot self-care activities

A list of 13 activities drawn from the American Diabetes Association (2012) was read out to the respondents and asked to identify which of the foot care activities they were familiar with. The results were then shown in table 4.11 below.

Table 4.11: Knowledge of the respondents on foot care activities

<table>
<thead>
<tr>
<th>Activity</th>
<th>Response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Checking feet daily</td>
<td>73 (21.3%)</td>
<td>270 (78.7%)</td>
</tr>
<tr>
<td>Exercising/being more active</td>
<td>194 (56.60%)</td>
<td>149 (43.4%)</td>
</tr>
<tr>
<td>Washing feet daily</td>
<td>273 (79.60%)</td>
<td>70 (20.4%)</td>
</tr>
<tr>
<td>Drying feet carefully especially between the toes</td>
<td>143 (41.70%)</td>
<td>200 (58.3%)</td>
</tr>
<tr>
<td>Keeping skin smooth and soft</td>
<td>92 (26.8%)</td>
<td>251 (73.2%)</td>
</tr>
<tr>
<td>Trimming toe nails appropriately</td>
<td>196 (57.1%)</td>
<td>147 (42.9%)</td>
</tr>
<tr>
<td>Wearing shoes and socks</td>
<td>146 (42.6%)</td>
<td>197 (57.4%)</td>
</tr>
<tr>
<td>Protecting feet from hot and cold</td>
<td>119 (34.7%)</td>
<td>224 (65.3%)</td>
</tr>
<tr>
<td>Keeping blood flowing to the feet</td>
<td>66 (19.2%)</td>
<td>227 (80.8%)</td>
</tr>
<tr>
<td>Avoiding barefoot gait</td>
<td>299 (87.2%)</td>
<td>44 (12.8%)</td>
</tr>
<tr>
<td>Checking shoes for objects</td>
<td>184 (53.6%)</td>
<td>159 (46.4%)</td>
</tr>
<tr>
<td>Reporting anything unusual to HCP immediately</td>
<td>147 (42.9%)</td>
<td>196 (57.1%)</td>
</tr>
<tr>
<td>Covering injury with clean cloth</td>
<td>198 (57.7%)</td>
<td>145 (42.3%)</td>
</tr>
</tbody>
</table>
The most known foot care activity among the respondents was avoiding barefoot gait, as it was known by 87.2% (n=299) of the respondents. It was followed by washing feet daily which was known by 79.6% (n=273) of the respondents.

Seven foot care activities were known by less than 50% of the respondents. These were, reporting to a HCP immediately anything unusual on the foot which was known by 42.9% (n=147), wearing shoes and socks at all times, which was known by 42.6% (n=146), carefully drying feet especially between the toes, which was known by 41.7% (n=143), protecting feet from hot and cold, which was known by 34.7% (n=119), keeping skin soft by applying moisturizing lotion, which was known by 26.8% (n=92), checking feet daily, which was known by only 21.3% (n=73) and the least known foot self-care activity was keeping blood flowing to the feet especially when one is seated, as it was known by only 19.2% (n=66) of the respondents.

4.4.3 The extent to which the respondents knew foot care activities.

In order to determine the extent to which the respondents knew foot care activities, sum of the activities they knew was calculated for each respondent. Those who knew 0-4 activities were rated to have poor knowledge, those who knew between 4-9 activities were rated to have moderate knowledge and those who knew between 9-13 activities were classified as to have good foot self-care knowledge. The results were presented in figure 4.7 below.
Figure 4.7: Knowledge of the respondents on foot self-care

Only 17.2% (n=52) of the respondents had good knowledge of foot self-care activities while majority 50.4% (n=173) had moderate foot care knowledge.

4.4.4 Association between knowledge on foot care and socio-demographic characteristics of respondents

The study sought to determine whether or not socio-demographic characteristics influenced the respondents’ knowledge on foot care. The results were presented in table 4.12 below.
Table 4.12: Association between knowledge on foot self-care and socio-demographic characteristics of the respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Foot care knowledge of the respondents</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Poor (36.4%)</td>
<td>Moderate (45.5%)</td>
<td>Good (18.2%)</td>
</tr>
<tr>
<td>Age of respondents (years)</td>
<td>18-38</td>
<td>20 (36.4%)</td>
<td>25 (45.5%)</td>
<td>10 (18.2%)</td>
</tr>
<tr>
<td></td>
<td>39-59</td>
<td>57 (38.8%)</td>
<td>69 (46.9%)</td>
<td>21 (14.3%)</td>
</tr>
<tr>
<td></td>
<td>60-80</td>
<td>32 (23.9%)</td>
<td>77 (57.5%)</td>
<td>25 (18.7%)</td>
</tr>
<tr>
<td></td>
<td>&gt;80</td>
<td>2 (28.6%)</td>
<td>2 (28.6%)</td>
<td>3 (42.9%)</td>
</tr>
<tr>
<td>Sex of respondents</td>
<td>Male</td>
<td>44 (28.0%)</td>
<td>88 (56.1%)</td>
<td>25 (15.9%)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>67 (36.0%)</td>
<td>85 (45.7%)</td>
<td>34 (18.3%)</td>
</tr>
<tr>
<td>Marital status of respondents</td>
<td>Single</td>
<td>12 (36.4%)</td>
<td>13 (39.4%)</td>
<td>8 (24.2%)</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>66 (29.9%)</td>
<td>123 (55.7%)</td>
<td>32 (14.5%)</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>4 (26.7%)</td>
<td>5 (33.3%)</td>
<td>6 (40.0%)</td>
</tr>
<tr>
<td></td>
<td>Separated</td>
<td>7 (50.0%)</td>
<td>5 (35.7%)</td>
<td>2 (14.3%)</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>22 (36.7%)</td>
<td>27 (45.0%)</td>
<td>11 (18.3%)</td>
</tr>
<tr>
<td>Religion of respondents</td>
<td>Muslim</td>
<td>0 (0.0%)</td>
<td>4 (100%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td></td>
<td>Christians</td>
<td>111 (32.7%)</td>
<td>169 (49.9%)</td>
<td>59 (17.4%)</td>
</tr>
<tr>
<td>Level of education</td>
<td>Never</td>
<td>12 (29.3%)</td>
<td>20 (48.8%)</td>
<td>9 (22.0%)</td>
</tr>
<tr>
<td></td>
<td>Primary</td>
<td>63 (36.6%)</td>
<td>84 (48.8%)</td>
<td>25 (14.5%)</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>33 (30.6%)</td>
<td>61 (56.5%)</td>
<td>14 (13.0%)</td>
</tr>
<tr>
<td></td>
<td>Tertiary</td>
<td>3 (13.6%)</td>
<td>8 (36.4%)</td>
<td>11 (50.0%)</td>
</tr>
<tr>
<td>Employment status of respondents</td>
<td>Employed</td>
<td>7 (20.0%)</td>
<td>21 (60.0%)</td>
<td>7 (20.0%)</td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>41 (44.1%)</td>
<td>39 (41.9%)</td>
<td>13 (14.0%)</td>
</tr>
<tr>
<td></td>
<td>Self-employed</td>
<td>58 (32.8%)</td>
<td>92 (52.0%)</td>
<td>27 (15.3%)</td>
</tr>
<tr>
<td></td>
<td>Retired</td>
<td>5 (13.2%)</td>
<td>21 (55.3%)</td>
<td>12 (31.6%)</td>
</tr>
</tbody>
</table>
Fifty percent (50%) of those with tertiary level of education had good foot care knowledge while only 22% of those who had never gone to school had good foot care knowledge. There was a statistically significant association between foot care knowledge and level education and employment status. ($\chi^2 = 17.561$, df=6, p=0.007 and $\chi^2 = 17.846$, df=6, p=0.007) implying that level of education influenced the respondents’ foot care knowledge.

Majority of those respondents with good foot care knowledge (31.6%) were retired while those who were least knowledgeable on foot care were the unemployed. There was a significant association between foot care knowledge of the respondents and their employment status ($\chi^2 = 17.846$, df=6, p=0.007). This implied that employment status of the respondents influenced their knowledge on foot care.

### 4.4.5 Association between knowledge on foot care and medical history of respondents

The study sought to determine how medical history of the respondents influenced their foot care knowledge. The results were presented in table 4.13 below.
Table 4.13: Association between foot self-care knowledge and medical factors of the respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Foot care knowledge of the respondents</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Poor (32.0%)</td>
<td>Moderate (49.3%)</td>
<td>Good (18.7%)</td>
</tr>
<tr>
<td>Family history of DM</td>
<td>Yes</td>
<td>48</td>
<td>74</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>63</td>
<td>99</td>
<td>31</td>
</tr>
<tr>
<td>Length of time with DM</td>
<td>&lt;1 year</td>
<td>32</td>
<td>33</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>1-5 years</td>
<td>39</td>
<td>60</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>&gt;5 years</td>
<td>40</td>
<td>80</td>
<td>40</td>
</tr>
<tr>
<td>Having any other medical condition</td>
<td>Yes</td>
<td>80</td>
<td>135</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>31</td>
<td>38</td>
<td>10</td>
</tr>
<tr>
<td>How soon after diagnosis they began medication</td>
<td>Immediately</td>
<td>106</td>
<td>167</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Weeks later</td>
<td>4</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>&gt;a month</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Modified diet</td>
<td>Yes</td>
<td>56</td>
<td>117</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>55</td>
<td>56</td>
<td>15</td>
</tr>
<tr>
<td>Having a foot complicatio n</td>
<td>Yes</td>
<td>64</td>
<td>110</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>47</td>
<td>63</td>
<td>16</td>
</tr>
</tbody>
</table>

Among the respondents who were diagnosed with type 2 diabetes mellitus less than 1 year ago, 45.1% had poor foot care knowledge, 46.5% had moderate knowledge and only 8.5% had good foot care knowledge. Among those who had had diabetes for between 1-5 years, 34.8% had poor foot care knowledge, 53.6% had moderate foot care knowledge
and 11.6% had good foot care knowledge. Of those who had had diabetes for more than 5 years, 25.0% had poor foot care knowledge, 50.0% had moderate foot care knowledge, and 25.0% had good foot care knowledge. There was a significant association between length of time one had had diabetes and knowledge on foot care ($\chi^2=17.733$, df= 4, p=0.001). This implied that those who had had diabetes for a longer period of time (more than 5 years) were more likely to have good foot care knowledge as compared to those who had had diabetes for a shorter period of time.

Eighteen point six percent (18.6%) of those who had another medical condition besides diabetes had good foot care knowledge as compared to 12.7% who did not have any other medical condition besides diabetes. Having any other medical condition besides diabetes had no statistical significant association with knowledge on foot care ($\chi^2=2.843$, df=2, p=0.241).

How soon the respondents began medication after being diagnosed with diabetes was also considered. The results of the study showed that among those who began medication immediately, 32.7% had poor foot care knowledge, 51.5% had moderate foot care knowledge and 15.7% had good foot care knowledge. Among those who began medication weeks later, 25.0% had poor foot care knowledge, 37.5% had moderate foot care knowledge and 37.5% had good foot care knowledge. Among those who started medication more than a month later, 33.3% had poor foot care knowledge, none (0.0%) had moderate foot care knowledge and 66.7% had good foot care knowledge. There was a statistically significant association between how soon the respondents began medication and their knowledge on foot care ($\chi^2=9.713$, df=4, p= 0.046).
Among those who modified their diet as advised by a health care provider, 25.8% had poor foot care knowledge, 53.9% had moderate foot care knowledge and 20.3% had good foot care knowledge. Among those who did not modify their diet as advised by a health care provider, 43.7% had poor foot care knowledge, 44.4% had moderate foot care knowledge and 11.9% had good foot care knowledge. There was a statistical significant association between modifying one’s diet and their knowledge on foot care ($\chi^2=12.510$, df=2, $p=0.002$). This implies that those who modified their diet as directed by a health care provider were more likely to have better foot care knowledge as compared to those who did not.

4.5 Practice of foot self-care

4.5.1 Footwear of the respondents

The respondents were asked what kind of footwear they mainly wear as they carry out their normal activities back home. The results were summarized in table 4.14 below.

Observation was done to check the nature of shoes that the respondents wore at the time of study.
Table 4.14: Footwear of the respondents

<table>
<thead>
<tr>
<th>Footwear</th>
<th>Frequency</th>
<th>Percent</th>
<th>Whether they wore them both in and outdoor</th>
<th>Response</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>8</td>
<td>2.3</td>
<td>Yes 8 (100%)</td>
<td>No 0 (0.00%)</td>
<td>8 (100%)</td>
</tr>
<tr>
<td>Gumboots</td>
<td>63</td>
<td>18.4</td>
<td>Yes 36 (57.1%)</td>
<td>No 27 (42.9%)</td>
<td>63 (100%)</td>
</tr>
<tr>
<td>Slippers/sandals</td>
<td>159</td>
<td>46.4</td>
<td>Yes 134 (84.3%)</td>
<td>No 25 (15.7%)</td>
<td>159 (100%)</td>
</tr>
<tr>
<td>A special shoe</td>
<td>17</td>
<td>5.0</td>
<td>Yes 17 (100%)</td>
<td>No 0 (0.00%)</td>
<td>17 (100%)</td>
</tr>
<tr>
<td>Rubber shoes</td>
<td>50</td>
<td>14.6</td>
<td>Yes 38 (76.0%)</td>
<td>No 12 (24.0%)</td>
<td>50 (100%)</td>
</tr>
<tr>
<td>Closed laced up shoes</td>
<td>44</td>
<td>12.8</td>
<td>Yes 37 (84.1%)</td>
<td>No 7 (15.9%)</td>
<td>44 (100%)</td>
</tr>
<tr>
<td>Socks only</td>
<td>2</td>
<td>0.6</td>
<td>Yes 1 (50%)</td>
<td>No 1 (50%)</td>
<td>2 (100%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>343</strong></td>
<td><strong>100.0</strong></td>
<td><strong>Yes 343 (100%)</strong></td>
<td></td>
<td><strong>343 (100%)</strong></td>
</tr>
</tbody>
</table>

The most common footwear was slippers/sandals as it was worn by majority of the respondents 46.4% (n=159), 84.3% (n=134) of whom wore them both indoors and outdoors. Eighteen point four percent (n=63) of the respondents wore gumboots, of whom 57.1% (n=36) wore them both in and outdoor. The results of the observation
showed that 48.1% of the respondents had footwear with soft insoles while 51.9% had footwear whose insoles were rough. Two thirds (67.9%) of the respondents had footwear with rough uppers and 32.1% had footwear with soft uppers and there was presence of objects in the footwear of 14.6% of respondents.

4.5.2 Distribution of footwear of the respondents by sex

The distribution of footwear in relation to gender of the respondents was determined and tested for association. The results were presented in table 4.15 below.

4.15: Distribution of footwear by sex of the respondents.

<table>
<thead>
<tr>
<th>Footwear</th>
<th>Sex</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing</td>
<td>Female</td>
<td>8</td>
<td>100.0</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8</td>
<td>100.0</td>
</tr>
<tr>
<td>Gumboots</td>
<td>Male</td>
<td>23</td>
<td>36.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>40</td>
<td>63.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>63</td>
<td>100.0</td>
</tr>
<tr>
<td>Slippers/sandals</td>
<td>Male</td>
<td>74</td>
<td>46.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>85</td>
<td>53.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>159</td>
<td>100.0</td>
</tr>
<tr>
<td>A special shoe</td>
<td>Male</td>
<td>13</td>
<td>76.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>4</td>
<td>23.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>17</td>
<td>100.0</td>
</tr>
<tr>
<td>Rubber shoes</td>
<td>Male</td>
<td>15</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>35</td>
<td>70.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>50</td>
<td>100.0</td>
</tr>
<tr>
<td>Closed laced up shoes</td>
<td>Male</td>
<td>31</td>
<td>70.5</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>13</td>
<td>29.5</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>44</td>
<td>100.0</td>
</tr>
<tr>
<td>Socks only</td>
<td>Male</td>
<td>1</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>1</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Of the 159 respondents who wore slippers/sandals, 53.5% (n=85) were female and 46.5% (n=74) were male. Among those who wore gumboots, 63.5% (n=40) were female and 36.5% (n=23) were male. Of the 50 respondents who wore rubber shoes, 70% (n=35) were female and 30% (n=15) were male, of those who wore closed laced up shoes, 70.5% (n=31) were male and 29.5% (n=13) were female, among those who wore a special shoe, 76.5% (n=13) were male and 23.5% (n=4) were female. Of those who did not wear anything on their feet, all 100% (n=8) were female while none was male. Among those who wore socks only, 50% (n=1) was female and 50% (n=1) was male.

4.5.3 Practice of foot self-care activities

A list of 13 activities drawn from the America Diabetes Association (2012) was presented to the respondents and asked to identify which of the foot care activities they carried out. The results were then shown in table 4.16 below.
Table 4.16: Practice of foot care activities among the respondents

<table>
<thead>
<tr>
<th>Activity</th>
<th>Response</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Checking feet daily</td>
<td>45(13.1%)</td>
<td>298(86.9%)</td>
</tr>
<tr>
<td>Exercising/be more active</td>
<td>165(48.1%)</td>
<td>178(51.9%)</td>
</tr>
<tr>
<td>Washing feet daily</td>
<td>240(70.0%)</td>
<td>103(30.0%)</td>
</tr>
<tr>
<td>Drying feet carefully especially between the toes</td>
<td>116(33.8%)</td>
<td>227(66.2%)</td>
</tr>
<tr>
<td>Keeping skin smooth and soft</td>
<td>95(27.7%)</td>
<td>248(72.3%)</td>
</tr>
<tr>
<td>Trimming toe nails appropriately</td>
<td>192(56.0%)</td>
<td>151(44.0%)</td>
</tr>
<tr>
<td>Wearing shoes and socks</td>
<td>114(33.2%)</td>
<td>229(66.8%)</td>
</tr>
<tr>
<td>Protecting feet from hot and cold</td>
<td>128(37.3%)</td>
<td>215(62.7%)</td>
</tr>
<tr>
<td>Keeping blood flowing to the feet</td>
<td>54(15.7%)</td>
<td>289(84.3%)</td>
</tr>
<tr>
<td>Avoiding barefoot gait</td>
<td>285(83.1%)</td>
<td>58(16.9%)</td>
</tr>
<tr>
<td>Checking shoes for objects</td>
<td>170(49.6%)</td>
<td>173(50.4%)</td>
</tr>
<tr>
<td>Reporting anything unusual to HCP immediately</td>
<td>121(35.3%)</td>
<td>222(64.7%)</td>
</tr>
<tr>
<td>Covering injury with clean cloth</td>
<td>234(68.2%)</td>
<td>109(31.8%)</td>
</tr>
</tbody>
</table>

The most practiced foot self-care activity was avoiding barefoot gait as it was carried out by 83.1% (n=285) of the respondents. It was followed by washing feet daily, which was practiced by 70.0% (n=240) of the respondents. The least carried out foot care activities were keeping blood flowing to the feet which was practiced by 15.7% (n=54) of the respondents and checking feet daily which was practiced by only 13.1% (n=45).
Practice of foot care among the respondents was categorized into poor, moderate and good by calculating the sum of activities practiced by each respondent. Those who carried out 0-4 activities were rated to have poor practice, those who carried out between 4-9 activities were rated to have moderate practice and those who carried between 9-13 activities were classified as to have good foot self-care practice. The number of respondents with poor, moderate and good foot care practice was summarized in table 4.17 below.

**Table 4.17 Foot care practice of the respondents.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>170</td>
<td>49.6</td>
</tr>
<tr>
<td>Moderate</td>
<td>126</td>
<td>36.7</td>
</tr>
<tr>
<td>Good</td>
<td>47</td>
<td>13.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>343</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Only 13.7% (n=47) of the respondents had good practice of foot self-care while 49.6% (n=170) of the respondents had poor foot self-care practice and those with moderate foot self-care practice were 36.7% (n=126).

**4.5.4 Association between foot care practice and foot care knowledge**

The study sought to determine the association between foot care knowledge of the respondents and their practice of foot care activities. The results were then presented in table 4.20 below.
Table 4.18: Association between knowledge on foot self-care activities and foot care behavior of the respondents

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Foot care practice by the respondents</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Moderate</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>Foot care knowledge of the respondents</td>
<td>Poor</td>
<td>94 (84.7%)</td>
<td>17 (15.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>72 (41.6%)</td>
<td>92 (53.2%)</td>
<td>9 (5.2%)</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>4 (6.8%)</td>
<td>17 (28.8%)</td>
<td>38 (64.4%)</td>
</tr>
</tbody>
</table>

The study showed that among the respondents who had poor foot self-care knowledge, majority (84.7%) had poor foot self-care behavior and none (0.0%) had good foot care behaviour, 53.2% of those who had moderate knowledge on foot care had moderate foot self-care behavior and 64.4% of those who had good foot self-care knowledge had good foot self-care behavior. There was a strong statistical significant association between knowledge on foot self-care activities and practice of foot self-care among the study respondents ($\chi^2=214.254$, df=4, p<0.001) (Table 4.18 above)

This indicates that those who had good knowledge on foot self-care activities, though few, were likely to translate it to practice and those who had poor foot self-care knowledge who were so many, were likely to have poor foot care practice.

4.5.5 Association between foot care practice and medical history factors

The study sought to determine whether there was an association between foot care practice of the respondents and their medical history. The results were presented in table 4.19 below
Table 4.19: Association between foot care practice and medical history factors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Foot care practice of the respondents</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Moderate</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>Family history of DM</td>
<td>Yes</td>
<td>73 (48.7%)</td>
<td>57 (38.0%)</td>
<td>20 (13.3%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>97 (50.3%)</td>
<td>69 (35.8%)</td>
<td>27 (14.0%)</td>
</tr>
<tr>
<td>Length of time with DM</td>
<td>&lt;1 year</td>
<td>55 (77.5%)</td>
<td>11 (15.5%)</td>
<td>5 (7.0%)</td>
</tr>
<tr>
<td></td>
<td>1-5 years</td>
<td>60 (53.6%)</td>
<td>44 (39.3%)</td>
<td>8 (7.1%)</td>
</tr>
<tr>
<td></td>
<td>&gt;5 years</td>
<td>55 (34.4%)</td>
<td>71 (44.4%)</td>
<td>34 (21.2%)</td>
</tr>
<tr>
<td>Having any other medical condition</td>
<td>Yes</td>
<td>127 (48.1%)</td>
<td>99 (37.5%)</td>
<td>38 (14.4%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>43 (54.4%)</td>
<td>27 (34.2%)</td>
<td>9 (11.4%)</td>
</tr>
<tr>
<td>How soon after diagnosis they began medication</td>
<td>Immediately</td>
<td>164 (50.6%)</td>
<td>119 (36.7%)</td>
<td>41 (12.7%)</td>
</tr>
<tr>
<td></td>
<td>Weeks later</td>
<td>5 (31.2%)</td>
<td>7 (43.8%)</td>
<td>4 (25.0%)</td>
</tr>
<tr>
<td></td>
<td>&gt;a month</td>
<td>1 (33.3%)</td>
<td>0 (0.0%)</td>
<td>2 (66.7%)</td>
</tr>
<tr>
<td>Using medication as directed by HCP</td>
<td>Yes</td>
<td>123 (45.9%)</td>
<td>107 (39.9%)</td>
<td>38 (14.2%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>47 (62.7%)</td>
<td>19 (25.3%)</td>
<td>9 (12.0%)</td>
</tr>
<tr>
<td>Observing HCP appointments</td>
<td>Yes</td>
<td>103 (46.0%)</td>
<td>85 (37.9%)</td>
<td>36 (16.1%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>67 (56.3%)</td>
<td>41 (34.5%)</td>
<td>11 (9.2%)</td>
</tr>
<tr>
<td>Modified diet</td>
<td>Yes</td>
<td>94 (43.3%)</td>
<td>87 (40.1%)</td>
<td>36 (16.6%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>76 (60.3%)</td>
<td>39 (31.0%)</td>
<td>11 (8.7%)</td>
</tr>
<tr>
<td>Having a foot complication</td>
<td>Yes</td>
<td>99 (45.6%)</td>
<td>83 (38.2%)</td>
<td>35 (16.1%)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>71 (56.3%)</td>
<td>43 (34.1%)</td>
<td>12 (9.5%)</td>
</tr>
</tbody>
</table>

Majority (50.3%) of those who had no family history of diabetes had poor foot self-care practice. The Key Informant Interviews showed that most of the diabetic patients whose
close relative had diabetes were more likely to have good foot care practice as compared to those with no family history of diabetes. The study however showed that there was no significant association between family history of diabetes and foot self-care practice.

Good foot care practice increased with the length of time since the respondents were diagnosed with type 2 diabetes mellitus. Among those who had had diabetes for less than one year, 7.0% had good foot care practice, among those who had had diabetes for between 1-5 years, 7.1% had good foot care practice and among those who had had diabetes for more than 5 years, 21.2% had good foot care practice. Poor foot care practice also decreased with increase in duration with diabetes as among those who had had diabetes for less than 1 year, 77.5% had poor foot care practice, among those who had had diabetes for between 1-5 years, 53.6% had poor foot care and among those who had had diabetes for more than 5 years, 34.4% had poor foot care practice. There was a significant association between length of time with diabetes and practice of foot care ($\chi^2=42.891$, df=4, $p<0.001$). This was an indication that the longer one had had diabetes the more likely they were to have good foot care practice.

Among those who had another medical condition in addition to diabetes, 48.1% had poor foot care practice while 14.4% had good foot care practice. Among those without any other medical condition in addition to diabetes, 54.4% had poor foot care practice while 11.4% had good foot care practice. The study showed that there was no significant association between having any other condition in addition to diabetes and foot care practice ($\chi^2=1.073$, df=2, $p=0.585$). This implies that whether one had another medical condition in addition to diabetes or not did not influence their foot care practice.
The results of the study showed that 12.7% of those respondents who began medication immediately after diagnosis had good foot care practice, 25.0% of those who started weeks later had good foot care practice and 66.7% of those who started medication more than a month later had good foot care practice. There was however no statistical significant association between how soon the respondents started medication and foot care practice ($\chi^2=8.519$, df=4, p=0.074) (Table 4.19).

There was a statistical significant association between using medication as directed by a health care provider and foot care practice ($\chi^2=6.925$, df=2, p=0.031). Among those who took medication as directed by a health care provider, 45.9% had poor foot care practice and 14.2% had good foot care practice while among those who did not use medications as directed by a health care provider, 62.7% had poor foot care practice and 12.0% had good foot care practice (Table 4.19). This is an indication that those who adhered to medication and used them as directed by a health care provider were more likely to have good foot care practice as compared to those who did not.

Among those who observed health care provider appointments 46.0% had poor foot care practice and among those who did not observe health care provider appointments, 56.3% had poor foot care practice. There was no significant association between observing health care provider appointments and foot care practice ($\chi^2=4.572$, df=2, p=0.102) (Table 4.19).

Among the respondents that modified their diet as advised by a health care provider, 43.3% had poor foot care practice and 16.6% had good foot care practice. Among those who did not modify their diet as advised by a health care provider, 60.3% had poor foot care practice and 8.7% had good foot care practice. There was a statistical significant
association between modifying one’s diet as directed by a health care provider and foot care practice ($\chi^2=10.54$, df=2, p=0.007) an indication that those who modified their diet as advised by a health care provider were more likely to have good foot care practice as compared to those who did not.

Sixteen point one percent (16.1%) of those who had/ever had a foot complication had good foot care practice as compared to 9.5% of those who had never had a foot complication and had good foot care practice. Ever having a foot complication however had no statistical significant association with foot care practice ($\chi^2=4.758$, df=2, p=0.093). This is an indication that whether one had ever had a foot complication or not did not have any influence on their foot care behavior.
CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section entails discussion, conclusion and recommendations on socio-demographic characteristics, medical history of the respondents, prevalence of foot complications, knowledge on foot self-care activities and practice of foot self-care among the diabetes mellitus patients in Nakuru county.

5.2 Discussion

This section discusses the important findings of this study and compares it to other studies to see if it is in line with or at variance with the existing literature.

5.2.1 Socio Demographic Characteristics of Respondents

There were more females than males in the study, which is consistent with other studies including one done by Dikeukwu, 2011 in South Africa among diabetic patients which showed that the females were 60% while the male respondents were 40%. It is also in line with the key informants’ information which reported that diabetes is more common in females than in males in Nakuru County and that females were more likely to seek medical attention more than their male counterparts so there could be many undiagnosed/unreported cases of diabetes among males. It however disagrees with an Egyptian study done by Sabra et al., 2011 which showed that nearly half of the diabetic patients in the study were males (49.7%).

Majority of the respondents were between the age of 38-58 and the least being those above the age of 78. This is consistent with a Maltese study which reported that no significant difference was found between age of respondents and their foot care behavior.
(Bartolo et al., 2013). It also agrees with a study conducted by Ryan and Geckle (2000a) which showed that learning, memory and problem-solving were unaffected in adults with diabetes.

5.2.2 Medical history

Most of the respondents had no family history of diabetes, this is in line with a study by Kalayou et al., 2013 which reported that 71% of the respondents did not have family history of diabetes.

More than half were diagnosed by a health care provider after developing signs and symptoms of diabetes, this disagrees with a study done in United Arab Emirates which reported that forty nine percent of the study populations were diagnosed to have DM without presenting with symptoms of diabetes and 35% had hypertension (Maskari et al., 2007).

In this study, 77% of the respondent had at least one other condition in addition to diabetes. This was similar to other studies in Libya (68.7%), Iran (74.2%), and Russia (70.7%) (Khazai et al., 2006, Roaeid and Kablan 2010, Litwak et al., 2013). It was also consistent with studies that showed that the prevalence of chronic complications varied from 52.0% to 74.2% (Worku et al., 2010, Roaeid and Kablan 2010). It was however higher than a study in China (52.0%) (Liu et al., 2010). This difference might lie at the level of practice and the attitude and knowledge gap between the patients.

More than three quarter of the respondents had hypertension making it the most common co-morbidity. It was followed by eye problems that also affected more than three quarter
of the respondents. The respondents reported that they had these complications even before being diagnosed with diabetes. This is in agreement with a report which indicated that Type 2 diabetes can remain undetected, i.e. asymptomatic, for many years and the diagnosis is often made from associated complications or incidentally through an abnormal blood or urine glucose test.” (International Diabetes Federation, 2006). This also agrees with an Ethiopian study that reported hypertension, visual disturbance and neuropathy as the commonest chronic complications among diabetic patients (Abejew et al., 2015).

The study showed that there was a statistically significant association between the length of time with diabetes and developing co-morbidity. It indicated that the longer one has diabetes, the higher the likelihood of developing co-morbidity. This could be attributed to suppressed immunity over time as a result of diabetes.

Most of the respondents modified their daily diet as advised by a health care provider and began taking the modified diet immediately. This agreed with a study by Gauthier-Chelle et al., (2004) which supported the hypothesis that, even if the diabetic patients’ diets were far from the official recommendations, self-declared diabetic patients tried to modify their dietary habits. This study is however inconsistent with a study done at Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia, which indicated that the majority of the patients had poor adherence to self-care practices, especially in diet management practices (Berhe et al., 2012). This difference could be as a result of different professional dietary assessment, follow-up and advice by health care providers, which are the main influencers on dietary practice of type 2 diabetic patients.
There was no statistically significant association between age of respondents and their adherence to diabetes medication. This could imply that, regardless of one’s age any unwell person would take medications as directed by a health care provider in hope of getting better. This finding however disagrees with a study by Figge (2010), which stated that the elderly people failed to comply with medication as a result of their poor recall of the prescribed medication regimen.

There was a statistically significant association between level of education and adherence to medication. Those who had tertiary education were more likely to adhere to medication more than those with lower or no education. This agrees with a survey conducted in patients with Type 2 diabetes mellitus by Guillausseau which demonstrated a positive correlation between compliance with diabetes medication and level of education (Guillausseau, 2003). This could be attributed to the fact that those with higher levels of education can read further on their condition and learn better on ways of managing it.

5.2.3 Prevalence of foot complications.

Majority of the respondents had had at least one foot complication in their lifetime. The most common foot complication was peripheral neuropathy, followed by Peripheral Arterial Disease and the least common was gangrene. This agrees with an observational Study of the Infected Diabetic Foot carried out by Lavigne et al., (2010), among 291 patients with a DFI which indicated that almost all of the patients had peripheral neuropathy and more than half had Peripheral Arterial Disease (PAD).
The prevalence of foot ulcers was 18.9%, this is in line with a Nigerian study that demonstrated that the prevalence of limb ulceration was between 11.7% and 19.1% among individuals with diabetes in Nigeria (Unachukwu et al., 2007). It also agrees with National Evidence-Based Guideline for the Prevention Identification and Management of Foot Complications in Diabetes, 2011 which estimated the prevalence of foot ulcers to be around 19%.

There was a statistically significant association between prevalence of foot complications and marital status. Those who were divorced, separated and widowed were more likely to have foot complications as compared to the single and married ones. This could mean that those who were separated, divorced or widowed did not take time to take care of their feet. This is consistent with a Brazilian study which concluded that organized and structured families provide a more appropriate environment to support diabetic patient health care, strongly influencing their behavior towards the disease and making them collaborate to obtain good metabolic control. It also emphasized that 18.5% of the investigated patients were widowed and that this factor could have affected diabetes management, since, in some cases, losing one's spouse causes health changes, such as depression, dismay and loss of the will to live or take care of oneself (Liudmila et al., 2007)

There was a statistically significant association between length of time with diabetes and having foot complications. Those who had had diabetes for a longer period of time were likely to have/ develop foot complications. This finding agrees with a Saudi Arabian
study which reported that occurrence foot complications such as foot ulcers were influenced by many risk factors including long duration of diabetes (Yahia, 2008).

There was a significant association between co-morbidity and foot complications. Those who had co-morbidity were more likely to have foot complications as compared to those who did not. This could be attributed to the fact that with co-morbidities, the diabetic patients’ immunity had been greatly suppressed making them more susceptible to other conditions including difficulty in maintaining blood glucose, poor supply of blood and oxygen to their feet, slow healing of wounds on their feet among others.

There was a significant association between adherence to medication and development of foot complications. Those who failed to adhere to medication were more likely to develop foot complications. This could be because the medications help to keep the blood sugar at bay, and with failure to adhere to them or failure to take them appropriately could lead to increased blood glucose levels resulting to increased pressure on the feet, leading to foot complications. Individuals with diabetes should maintain adequate foot care, as foot complications can quickly develop in the absence of good glycaemic control, which increases the risk of ulcerations, amputations and mortality. This finding is in line with a study which revealed that lack of adherence to medications by diabetic patients was a contributing factor to diabetes complications such as foot complications, because it affects treatment outcome (Ajayi et al., 2009 and Chijioke et al., 2010).

On developing foot complications, majority of the respondents took between a week and a month before seeking medical attention. This could be attributed to people tending to give time to a condition they feel is not so serious, before seeking medical attention in the
hope that it would soon go away. This could also be related to poor health seeking behavior where people tend to seek medical attention with increased severity of the condition.

5.2.4 Knowledge on foot self-care.

Seventy four point four percent (74.4%) learnt of foot care from a health care provider, this shows that health care providers play a major role in education of patients regarding their condition and managing it. It agrees with a study which reported that nurses have important parts to play in giving education to patients about the importance of change in lifestyle and medication concordance in type 2 diabetes. In reference to diabetes educators, community resources and patient support groups help to enhance practice-based interventions by making sure that patients are empowered with the necessary information and support to make informed decisions about their everyday lifestyle. (Adiseshiah, 2005).

Given a list of foot care activities in order to determine their knowledge on foot care, majority had moderate knowledge and only 17.2% had good knowledge. This agrees with a Chinese study whose results showed that foot self-care knowledge was medium and the foot self-care behaviour was poor (Rao et al., 2014). The results also showed that the foot self-care behaviour is at a poor level overall, especially when it comes to performing daily foot checking and shoe-checking prior to wearing shoes.

The most known activity was avoiding barefoot gait, followed by washing feet daily. The least known foot care activities were, checking feet daily and keeping blood flowing to the feet especially when one is seated. This agrees with a study by Gale et al., 2008,
which reported that diabetic patients did not know that they should check their feet daily and didn’t know its importance either.

There was an association between level of education and knowledge on foot care, those with higher levels of education had better foot care knowledge as compared to those who were illiterate or with lower levels of education. This is consistent with a study which reported that education had a strong relationship with knowledge and practices about foot care (Seema et al., 2007). The relationship between education and foot care among DM patients has also been observed in similar studies in India, Iran and Pakistan where illiterate patients were the least knowledgeable. The association may be due to the fact that, educated patient were able to read and understand some of educational supportive materials and also use information technology to obtain more information about the disease. It could also be explained that those with higher levels of education are able to not only understand but remember information better than those who are illiterate.

There was an association between foot care knowledge and length of time with diabetes, level of education, employment status, how soon after diagnosis the respondents began medication, observing health care provider appointments and taking a modified diet as advised by a health care provider. Participants with higher educational status were more likely to have good knowledge as compared to illiterates and those with lower levels of education. Those who had had diabetes for a longer period of time were more likely to have better foot care knowledge. This agrees with a study whose result showed that knowledge on diabetic foot care was significantly associated with educational status, monthly income and duration of diabetic therapy (Awole and Yosief, 2014).
This can be attributed to multiple visits to the health care facility by people with longer duration of diabetes which would have exposed the subjects to more patient education and those with higher levels of education could understand information easily and faster than those who are illiterate.

5.2.5 Foot self-care behavior.

Despite most of the respondents having moderate knowledge on foot care, majority of them had poor foot care practice, followed by those who had moderate practice and the least (13.7%) had good foot care practice. This is consistent with a study done in Malta where the mean results demonstrated suboptimal foot care behaviour among the respondents despite individuals with diabetes in Malta being offered one-to-one education during consultation visits as well as didactic group education during their course of disease (Bartolo et al., 2013). It also agrees with other research studies which suggest that suboptimal behaviour is common among people with type 2 diabetes (Hasnain and Sheikh, 2009; Ikpeme et al., 2010; Senussi et al., 2011). This could be an indication that the diabetic patients lack enough motivation to put the gained knowledge on foot care into practice.

The most practiced foot care activity was avoiding barefoot gait, which was carried out by 83.1% and only 16.9% walked barefoot. It was followed by washing feet daily. When the proportion is compared with South Africa, it is compatible that the majority 75% never walked barefoot and 25% reported that they walk barefoot. Similarly, it is compatible with a Saudi Arabian study in which 18% walked barefoot (Amogne et al., 2011 and Dikeukwu, 2011). It also agrees with a study that concluded that diabetic
patients had good foot care practices in the areas of washing of feet and not walking barefoot (Awole and Yosief, 2014).

The least carried out activities were keeping blood flowing to the feet and checking feet daily, with the patients reporting that they had never heard of them and did not know that they should practice them. This is consistent with a study by Gale et al., (2008) which reported that many diabetic patients may not understand the value of checking their feet on a daily basis. This finding was however inconsistent with a Sri Lankan study which reported that among all diabetic foot care principles, only regular foot observation was carried out by 65.5% of the respondents (Jinadasa and Jeewantha, 2011).

Fifty point four percent (50.4%) of the respondents never inspected their shoes before wearing them. This agrees with a study done by Bartolo et al., (2013) which showed that 49% of the participants reported that they never inspected their shoes before putting them on.

There was a strong statistically significant association between knowledge on foot care and its practice. Those who had good foot care knowledge were likely to translate to good practice and those who had poor knowledge were likely to have poor foot care practice. This finding agrees with other studies done including one by Bell et al., (2005), which found that attainment of foot self-care education and received foot self-care through health professional was associated with high foot self-care ability. This also agrees with a previous study which showed that diabetic patients with inadequate health literacy have poorer self-care practice than those with adequate health literacy (Tang et al., 2007).
There was no significant association between foot care practice and age, sex, marital status, religion and level of education. It is in agreement with a Chinese study by Wu et al., (2007) which found out that there was no statistically significant relationship between self-care and age. It also disagrees with other studies done by Bogner and Vries, 2010, Shigaki et al., 2010 and Xu and Pan, 2010 which found that there was a positive correlation between self-care and age. Shigaki et al., (2010) discovered that ageing or older adults were less likely to exercise. Xu and Pan 2010 showed that advanced age was associated with high level of physical activity, adherence to recommended eating, and carryout foot care. This could be attributed to older people having a lot of time on their hands and receiving a lot of social support from their families and friends.

This study revealed that there was no association between foot care behavior and gender. This is in line with a studies done by Boeing et al., (2010) and Tengblad et al., (2007) which revealed that there was no significant relationship between self-care behavior and gender. It however disagrees with a study by Baumann et al., 2010 which showed association between foot care behaviour and gender.

There was no significant association between foot care behavior and level of education. The findings of this study disagree with other studies which revealed positive correlation between self-care and the level of education. Among these studies are Chiou et al., 2009, Samuel-Hodge et al., 2008, Tang et al., 2008 and Xu and Pan, 2010).

There was a significant association between practice of foot care and employment status of the respondents. Those who were retired were more likely to have good foot care practice as compared to the unemployed, employed and self-employed. This could be
attributed to the fact that the retired have more time on their hands to take care of themselves.

There was a significant association between foot care practice and length of time with diabetes. Those who had had diabetes for a longer period of time had good foot care practice compared to those who had had diabetes for a shorter period of time. This agrees with a study which concluded that relatively, patients with long duration of diabetic therapy had better knowledge and practice of foot care (Awole and Yosief, 2014). This could mean that those who had had diabetes for a longer period of time had learnt how to cope with the condition better. It could also mean that the probability of having good knowledge and practice is higher among individuals who stay in DM therapy for long period of time.
5.3 Conclusion

The medical histories of the respondents showed that most of the type 2 diabetes mellitus patients are diagnosed with diabetes mellitus after developing symptoms of diabetes.

The prevalence of foot complications was 63.3% with the most common foot complication being peripheral neuropathy, whose prevalence was 53.9%. There was however no association between foot self-care behavior and having a foot complication in Nakuru County, so the first hypothesis is therefore upheld.

Majority of the respondents from this study had poor foot self-care practice. This was an indication that foot self-care behaviour was generally poor among the type 2 diabetes mellitus patients from the selected health facilities in Nakuru County.

There was a strong statistical significance between knowledge on foot self-care and foot self-care behavior among type 2 diabetes mellitus patients in Nakuru County. The second hypothesis was therefore rejected.

5.4 Recommendations

1. There is need for diabetes screening so that people can know their diabetes status early enough hence begin management therapy early and minimize the morbidities associated with Type 2 diabetes mellitus

2. Type 2 diabetes mellitus patients should be given holistic education regarding foot care activities so that they can be aware of all the recommended activities
3. Since foot care behaviour was generally poor, appropriate education on the importance and benefits of good foot care practice should be given to diabetic patients by health care professionals in order to motivate them carry out adequate foot self-care practices.

4. When patients go for checkups, they should be told what the healthcare professional is checking or testing for and what they find out. This would not only help in increasing the patient’s awareness on their condition but also act as a motivation to increasing the rate of adoption of the foot care activities learnt by the patients.

**Further research**

1. The fact that the diabetic patients did not know some of the most basic yet very important foot care activities such as checking their feet daily is alarming. Further research should therefore be carried out to look into health care providers’ role in educating type 2 diabetic patients on foot care.

2. Peripheral neuropathy affected more than half of the type 2 diabetes mellitus patients in the study. It is important to carry out a study to determine the risk factors associated with development of peripheral neuropathy and how to control them.

3. This having been a facility based study, a similar study should be conducted in the community to determine foot care behaviour as type 2 diabetes patients go about their daily activities

4. There was generally poor foot self-care behaviour among the type 2 diabetic patients despite their moderate foot care knowledge. Reasons behind this should be studied.
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**Dikeykwu, A.R.**(2011). The Awareness And Performance of Appropriate Foot Self-Care Practices Among Diabetic Patients Attending Dr. Yusuf Dadoo Hospital, Gauteng Province, South Africa.


**Fatma , A.M., and Mohammed, E.S.**(2007). Prevalence of risk factors for diabetic foot complications Department of Community Medicine, Faculty of Medicine & Health Sciences, United Arab Emirates University *BMC Family Practice* 1186/1471,2296-8-59


APPENDICES

Appendix 1: Map of the study area
Appendix 2: Informed consent

My name is JOAN CHEPKOECH KONES. I am a master of Public Health student from Kenyatta University. I am conducting a study on “Foot self-care behavior among Type 2 diabetes mellitus patients in Nakuru County.” The information will be used by the ministry of Health to increase awareness on foot care among diabetic patients and strengthen the capacity of health care providers, private practitioners and NGOs on the areas that need emphasis when it comes to diabetic patients such as health education, in Nakuru County as well as other regions in Kenya.

Procedures to be followed.

Participation in this study will require that I ask you some questions then I will record the information from you in a questionnaire.

You have the right to refuse participation in this study. You will get the same care and medical treatment whether you agree to join the study or not and your decision will not change the care you will receive from the diabetic clinic and that you will get from any other clinic at any other time.

Please remember that participation in this study is voluntary. You may ask questions related to the study at any time.

You may refuse to respond to any questions and you may stop the interview at any time. You may also stop being in the study at any time without any consequences to the services you receive from the diabetic clinic or any other organization now or in the future.

Discomforts and risks

Some of the questions you will be asked are on intimate subject and may be embarrassing or make you uncomfortable. If this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time. The interview may take approximately 30 minutes of your time.

Benefits

If you participate in this study you will help us to learn how to provide adequate education on foot self-care that can improve management of diabetes hence improving the health of diabetic patients. You will also benefit from being educated on appropriate foot care practice and if you are found to have a problem, you will be advised on seeking medical attention.
Reward

If you agree to participate in this study, you will get free advice on how to care for your feet in order to improve diabetes management.

The results from this study will also be forwarded to the County Director of Health so that foot care policies among diabetic patients can be put in place and implemented.

Confidentiality

The interviews and examinations will be conducted in a private setting. Your name will not be recorded on the questionnaire. The questionnaires will be kept in a locked cabinet for safe keeping at Kenyatta University. Everything will be kept private.

Contact information

If you have any questions you may contact Dr. Peterson Warutere on 0721993833 or Dr. Justus Osero on 0724869330 or the Kenyatta University Ethical Review Committee Chairma on kuerc@ku.ac.ke or secretary on kuerc@ku.ac.ke

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. I understand that I will still get the same care and medical treatment whether I decide to leave the study or not and my decision will not change the care I will receive from the diabetic clinic or that I will get from any other clinic at any other time.

Name of participant……………………………………………………………………

………………………………………...............................................................

Signature or thumbprint Date.

Investigator’s statement.

I, the undersigned, have explained to the volunteer in a language s/he understands, the procedures to be followed in the study and the risks and benefits involved.
Name of the interviewer.................................................................

........................................... ...........................................

Interviewer signature. Date
Appendix 3: Data collection instruments

3.1.1 Questionnaire

- The aim of this study is to assess the status of foot self-care behaviour among type 2 Diabetes mellitus patients in Nakuru County.
- The objective will be achieved through giving honest information.
- The information given will be used for the purpose of the study only and confidentiality will be ensured.

Respondent identification code: ………………………

Section A: Demographic information.

1) Age in years …………..

2) Sex: a. Male (  )
   b. Female (  )

3) Marital status.
   i. Single (  )
   ii. Married (  )
   iii. Divorced (  )
   iv. Separated (  )
   v. Widowed (  )
   vi. Others, specify……………………………

4) Religion
   i) Muslim (  ) iii) protestant (  )
   ii) Catholic (  ) iv) Others, specify……………………………

5) Highest level of education attained.
i. Primary school ( )

ii. Secondary school ( )

iii. Higher learning ( )

6) Employment status.

i) Employed ( )

ii) Unemployed ( )

iii) Retired ( )

7) Lifetime smoking.

i) Never smoked ( )

ii) Past smoker ( )

iii) Current smoker ( )

8) Alcohol use.

i) Never drank ( )

ii) Past use ( )

iii) Current use ( )

Section B: Prevalence of Diabetic foot complications

This section has 8 questions

9) For how long have you had diabetes?

i. Less than one year ( )

ii. 1-5 years ( )

iii. More than 5 years ( )

10) Have you ever had a foot complication (s)?

i. Yes ( )
11) Which one(s)? (Ask how the respondent felt)
   i. Peripheral neuropathy (loss of sensation especially in your feet)
   ii. Foot ulcers
   iii. Peripheral arterial disease
   iv. Peripheral vascular disease
   v. Diabetic foot lesions
   vi. Gangrene
   vii. Others, specify………………………

12) How long after being diagnosed with diabetes did you get the foot complication?
   i. Less than one year ( )
   ii. 1-5 years ( )
   iii. More than 5 years ( )

13) Did it heal?
   i. Yes ( )
   ii. No ( )

14) After how long?
   i. Less than a month ( )
   ii. 1-3 months ( )
   iii. More than 3 months ( )

15) Has it recurred since then?
   i. Yes ( )
ii. No ( )

16) If yes, how many times?
   i. Once ( )
   ii. 1-3 times ( )
   iii. More than thrice ( )

Section C: Knowledge on foot self-care behaviours.

21) Do you know what foot self-care is?
   i. Yes ( )
   ii. No ( )

22) How would you define it?
   i. All preventive and corrective practices carried out on the foot and ankle by an individual in order to prevent occurrence of foot complications or manage them if they have already occurred.
   ii. Taking care of the foot ( )
   iii. Wearing shoes ( )
   iv. Don’t know ( )

23) From where did you hear/learn of foot self-care?
   i. Health care provider ( )
   ii. Community Health worker ( )
   iii. School ( )
   iv. Own reading ( )

24) Which are some of the foot self-care behaviours you know of?
   i. Checking/ inspecting feet every day. ( )
ii. Being more active (  )

iii. Washing feet every day (  )

iv. Drying feet carefully, especially between the toes (  )

v. Keeping skin soft and smooth (  )

vi. Trimming toenails appropriately them when needed (  )

vii. Wearing shoes and socks at all times (  )

viii. Protecting feet from hot and cold (  )

ix. Keeping the blood flowing to ones feet (  )

x. Avoiding barefoot gait (  )

25) If you found redness or bleeding between your toes or anywhere on your foot, what is the first thing you would do?

i. Leave it for some days and see if it goes away (  )

ii. Wash it (  )

iii. Report to your health care provider immediately (  )

iv. Don’t know (  )

26) Do you know why it’s important to inspect the inside of your shoes before wearing them?

i. Yes (  )

ii. No (  )

iii. Not sure (  )

**Section D: Practice of foot self-care.**

**This section contains 25 questions.**

31) Do you have a foot complication/ have you had one before?
i. Yes ( )

ii. No ( )

32) How did you know that you had a Diabetic foot complication?
   i. Through a healthcare provider at the hospital ( )
   ii. Through a community health worker ( )
   iii. Through self-examination ( )
   iv. Through a family member/caretaker ( )

If answer is (iii) or (iv)

33) On discovery that you had a foot complication, how long did you take before seeking medical attention?
   i. Immediately ( )
   ii. Between a week and a month ( )
   iii. Between one and three months ( )
   iv. More than 3 months ( )

34) Has/does the health care provider advice you on your foot complication?
   i. Yes ( )
   ii. No ( )

35) Has your physician advised you regarding shoes?
   i. Yes ( )
   ii. No ( )

36) What do you wear on your feet on a normal day?
   i. Nothing ( )
   ii. Gumboots ( )
iii. Slippers/Sandals (    )
iv. A special shoe (    )
v. Others, specify………………

37) Do you wear them both outdoor and indoor?
   i. Yes (    )
   ii. No (    )

38) Do you always wear socks with shoes?
   i. Yes (    )
   ii. No (    )

39) How often do you wash/change your socks?
   i. Rarely (    )
   ii. Daily (    )
   iii. Often (    )
   iv. Don’t keep track (    )

40) Do you use footwear in the shower?
   i. Yes (    )
   ii. No (    )

41) Do you walk bare-footed at any time?
   i. Yes (    )
   ii. No (    )

42) How often do you visit your healthcare provider/ podiatrist?
   i. Often (    )
   ii. Rarely (    )
iii. Just when I am sick (   )
iv. Just when I have an appointment (   )
v. Never (   )

43) If rarely or never, why?
i. They are not available (   )
ii. I don’t see the need (   )
iii. It is expensive (   )
iv. Others, specify…………………………

44) Do you inform your physician about foot pain or lesions?
i. Yes (   )
ii. No (   )

45) How often do you examine the surface and bottom of your feet?
i. Daily (   )
ii. Often (   )
iii. Rarely (   )
iv. Never (   )

46) How often do you examine between the toes of your feet?
i. Daily (   )
ii. Often (   )
iii. Rarely (   )
iv. Never (   )

47) How often do you wash your feet?
i. Daily (   )
ii. Often ( )

iii. Rarely ( )

48) What temperature of water do you use?
   i. Hot ( )
   ii. Cold ( )
   iii. Lukewarm ( )

49) Do you thoroughly dry your feet after washing?
   i. Yes ( )
   ii. No ( )

50) When your skin is dry, do you apply moisturizing lotion on them?
   i. Yes ( )
   ii. No ( )

51) How often?
   i. Daily ( )
   ii. Often ( )
   iii. Rarely ( )
   iv. Never ( )

52) Do you apply moisturizing lotion between your toes?
   i) Yes ( )
   ii) No ( )

53) Before you put on your shoes how often do you check them for objects?
   i. Daily ( )
   ii. Often ( )
iii. Rarely (    )
iv. Never (    )

54) When you have an injury do you cover it with a clean cover?
   i. Yes (    )
   ii. No (    )

55) Do you have another person cut your toenails or trim your calluses?
   i. Yes(    )
   ii. No (    )

3.1.2 Observation checklist

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<tr>
<th>FOOTAPPEARANCE</th>
<th>NO</th>
<th>YES</th>
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<tbody>
<tr>
<td>Presence of ulceration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of skin fissures, cracks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of infected toe nail</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of callus, corns</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of blisters</td>
<td></td>
<td></td>
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<tr>
<td>Presence of abrasion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of sores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of foot deformity</td>
<td></td>
<td></td>
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<tr>
<td>If present, was sterile dressing applied on the affected part?</td>
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<td></td>
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<tr>
<td>SKIN</td>
<td>YES</td>
<td>NO</td>
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<td>-----------</td>
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<td>----</td>
</tr>
<tr>
<td>Dry</td>
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<td>Moist between toes</td>
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<th>TOENAIL APPEARANCE</th>
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<td>Trimmed</td>
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</tr>
<tr>
<td>Not cut to shape of toe</td>
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</tr>
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<td>Presence of rough edges or corners</td>
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<td></td>
</tr>
<tr>
<td>With pedicure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of ingrown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of infected ingrown</td>
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</table>

<table>
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<tr>
<th>FOOTWEAR DURING EVALUATION</th>
<th>Presence of foreign object/s</th>
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<tbody>
<tr>
<td>1. Lace-up, closed, leather shoes</td>
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<tr>
<td>2. Boots</td>
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<tr>
<td>3. Sneakers/Rubbershoes</td>
<td></td>
<td></td>
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<tr>
<td>5. High heels</td>
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<tr>
<td>6. Sandals</td>
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<tr>
<td>7. Rubberslippers/Flip-flops</td>
<td></td>
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<tr>
<td>8. Custom-made shoes</td>
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</table>
9. Plastic shoes

10. Barefoot

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<th>NATURE OF FOOTWEAR</th>
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<tbody>
<tr>
<td>Soft uppers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft/cushioned insoles</td>
<td></td>
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</tbody>
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### 3.1.3 Key informant interview guide

1. How is the distribution of diabetes between males and females?
2. Are foot complications common?
3. How is the distribution of foot complications among gender?
4. How long after diagnosis do diabetic patients develop complications?
5. Are the diabetic patients given guidance/guidelines on self-management and its importance?
6. Do they adhere to these guidelines, including diet modification and adherence to treatment?
7. Do you think the diabetic patients in Nakuru are knowledgeable about foot care?
8. To what extent do you think they practice foot care?