COMPLIANCE TO CHILDHOOD IMMUNIZATION SCHEDULE AMONG CAREGIVERS OF CHILDREN 0- 23 MONTHS IN INFORMAL SETTLEMENTS IN NAIROBI CITY COUNTY, KENYA

PONVENTRAS BULIVA AMUGUNE (BSc. FND)

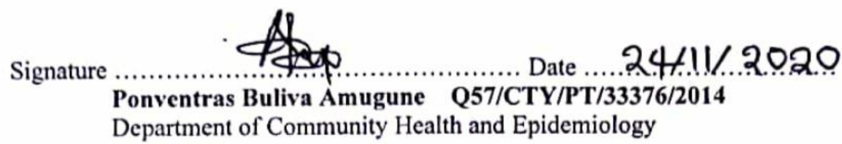
Q57/CTY/PT/33376/2014

A RESEARCH THESIS SUBMITTED FOR THE DEGREE OF MASTER OF PUBLIC HEALTH (MONITORING AND EVALUATION) IN THE SCHOOL OF PUBLIC HEALTH AND APPLIED HUMAN SCIENCES OF KENYATTA UNIVERSITY

NOVEMBER, 2020

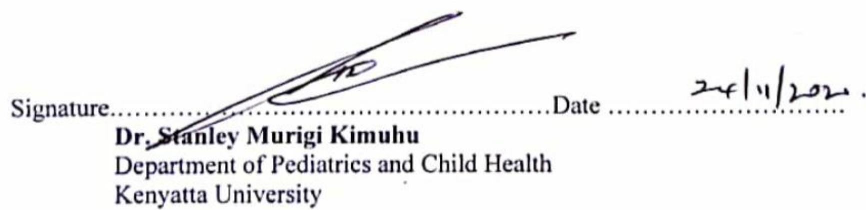
DECLARATION

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

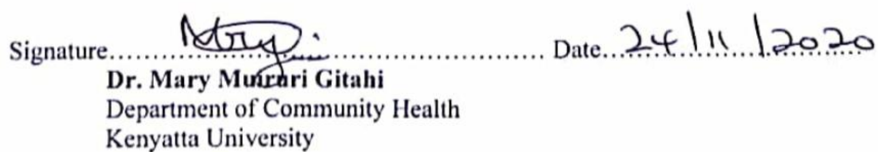


Signature .... Date 24/11/2020
Ponventras Buliva Amugune Q57/CTY/PT/33376/2014
Department of Community Health and Epidemiology

Supervisors: This thesis has been submitted for review with our approval as University Supervisors.



Signature..Date ....24/11/2021.
Dr. Stanley Murigi Kimuhu
Department of Pediatrics and Child Health
Kenyatta University



Signature.. Date...24/11/2020
Dr. Mary Murari Gitahi
Department of Community Health
Kenyatta University

DEDICATION

This work is dedicated to God, he who gives grace, wisdom and ability to turn ideas into reality.

ACKNOWLEDGEMENT

I acknowledge the support of my supervisors Dr. Mary Muiruri Gitahi and Dr. Stanley Kimuhu of Kenyatta University, who took an enthusiastic interest in my dissertation. Thank you for investing quality time in reviewing this thesis.

My sincere gratitude goes to Dr. Gerald Musiega for helping with data analysis and editing of this work.

I would like to thank my parents Peter and Emmy Amugune for their unwavering support from the first to the last day of my master’s studies. My siblings Sherywin, Wesley and Daphyne thank you for always believing in me, I know you will achieve greater things.

TABLE OF CONTENTS

DECLARATION.. ii

DEDICATION.. iii

LIST OF TABLES.. ix

LIST OF FIGURES.. x

ABBREVIATIONS AND ACRONYMS... xi

DEFINITION OF OPERATIONAL TERMS.. xii

ABSTRACT...... ………………………………………………………………..xiii

CHAPTER ONE: INTRODUCTION.. 1

1.1 Background of the study.. 1

1.2 Statement of the problem.. 3

1.3 Justification.. 4

1.4 Research Questions... 5

1.5 Null Hypotheses.. 6

1.6 Research Objectives.. 6

1.6.1 Specific Objectives.. 6

1.7 Delimitation and limitation.. 7

1.8 Conceptual framework... 7

1.9 Significance of the study.. 8

CHAPTER TWO: LITERATURE REVIEW.. 10

2.1 Introduction... 10

2.2 Empirical review.. 10

2.3 Study Variables....15

2.3.1 Level of Knowledge.... 15

2.3.2 Perception of Caregivers....16

2.3.3 Caregiver Practices.... 18

2.3.4 Access to Health Services....19

2.4 Summary of Literature Review and gaps addressed....20

CHAPTER THREE: MATERIALS AND METHODS.... 21

3.1 Introduction....21

3.2 Research Design.... 21

3.3 Location of Study.... 22

3.4 Study Population....22

3.5 Sampling Techniques and Sample Size....22

3.5.1 Sampling Techniques....22

3.5.2 Sample Size.... 23

3.6 Designing and construction of research instrument....24

3.7 Data Collection.... 24

3.8 Pre-test.... 25

3.8.1 Validity.... 25

3.8.2 Reliability.... 25

3.9 Data Analysis and Presentation.... 26

3.9.1 Model Specification....27

3.10 Ethical Considerations....27

CHAPTER FOUR: RESULTS... 29

4.1 Introduction..29

4.2 Response Rate..29

4.3 Respondents socio - Demographic and General Information.....................................29

4.5.1 Descriptive Results of Caregiver Level of Knowledge... 31

4.5.2 Descriptive Results for Caregivers Perception... 32

4.5.3 Descriptive Results for Caregiver Practices... 34

4.5.4 Descriptive Results on Access to Health services.. 35

4.5.5 Descriptive Results on Caregiver Compliance... 36

4.6.1 Correlation for Caregivers Level of Knowledge.. 38

4.6.2 Correlation for Caregiver Perception...38

4.6.3 Correlation for Caregiver Practices.. 39

4.6.4 Correlation for Access to Health Services..40

4.6.5 Multiple Correlation of Variables...40

4.7 Regression Results..42

4.7.1 Regression Results for Caregivers Level of Knowledge...42

4.7.2 Regression Results for Caregiver Perception... 43

4.7.3 Regression for Results Caregiver Practices..45

4.7.4 Regression Results for Access to Health Services.. 47

4.7.5 Multiple Regression of variables..48

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS.. 50

5.1 Discussion...50

5.1.2 The Influence of Caregivers Level of Knowledge on Compliance to Childhood Immunization Schedule....50

5.1.3 The influence of caregiver perception on immunization on compliance to childhood immunization schedule....52

5.1.4 The influence of caregivers practices on compliance to childhood immunization schedule....54

5.1.5 The influence of access to healthcare services on compliance to childhood immunization schedule....55

5.2 Conclusion.... 57

5.3.1 Recommendations from the study.... 58

5.3.2 Recommendations for further research....59

REFERENCES....60

APPENDICES.... 64

Appendix I: Consent form.... 64

Appendix II: Questionnaire.... 66

Appendix III: Proposed Vaccination Schedule as proposed by Ministry of Health Kenya.... 73

Appendix IV: Map of Nairobi County....74

Appendix V: Kenyatta University Approval of Research Proposal.... 75

Appendix VI: Kenyatta University Research Authorization.... 76

Appendix VII: Kenyatta University Ethical Review Approval.... 77

Appendix VIII: National Commission for Science, Technology and Innovation.... 79

APPENDIX IX: Kenyan Immunization Card....80

LIST OF TABLES

Table 3. 1: Measurement of Variables....21

Table 3.2: Proportionate sample size distribution.... 24

Table 3.3: Reliability Table.... 26

Table 4.1 Socio-Demographic Characteristics of the Study Respondents.... 30

Table 4.2: Descriptive Analysis for Caregiver Level of Knowledge....32

Table 4.3: Descriptive Analysis for Caregiver Perception.... 33

Table 4.4: Descriptive Results for Caregiver Practices.... 34

Table 4.5: Descriptive results for access to health services....36

Table 4.6 Descriptive Results for Caregiver Compliance.... 37

Table 4.7: Correlation for Caregivers Level of Knowledge.... 38

Table 4.8: Correlation for Caregiver perception....39

Table 4.9.: Correlation for Caregiver Practices.... 39

Table 4.10: Correlation for Access to Health Services....40

Table 4.11: Multiple Correlation of the variables....41

Table 4.12 Regression Results for Caregivers Level of Knowledge....43

Table 4.13: Regression Results for Caregiver Perception.... 44

Table 4.14: Regression Results for Caregiver practices.... 46

Table 4.15 Regression for Health Services and Compliance....48

Table 4.16: Model summary table for multiple regression....49

LIST OF FIGURES

Figure 1.1: Conceptual framework... 8

ABBREVIATIONS AND ACRONYMS

ANC	Antenatal Care
BCG	Bacille Calmette - Guérin vaccine
DPT	Diphtheria, Tetanus and Pertussis Vaccine
GAVI	The Global Vaccine Alliance
Hib	Haemophilus influenza type b vaccine
KDHS	Kenya Demographic Health Survey
KEPI	Kenya Expanded Program on Immunization.
MMR	Measles, Mumps and Rubella
MOH	Ministry of Health
SPSS	Statistical Package for Social Scientists
WHO	World Health Organization

DEFINITION OF OPERATIONAL TERMS

Catch up vaccination:	Is when an individual gets vaccinated with a dose of vaccine they missed to be up-to-date with the immunization schedule.
Immunization compliance:	Is when a child has received the age-appropriate vaccination at the time of interview.
Immunization coverage:	Is the total of children who have received all vaccines for their age compared to the entire number of surviving infants in a target population.
Immunization dropout:	Is comparing the number of infants who start the immunization schedule with the number who complete it.
Immunization:	Is where an animal is made resistant to an infectious disease, either by contracting the disease or by the administration of a vaccine.
Infant vaccination card:	Is a booklet or paper that contains relevant information about an individual's immunization history.
Vaccine Hesitancy:	Is when a caregiver delays or totally refuses to vaccinate a child despite the availability of vaccines and vaccination services.
Vaccine :	Is a biological preparation made from weakened or killed forms of a microbe to improve immunity against a particular disease.

ABSTRACT

Childhood immunization has played a big role in universal child survival; it has been used to eradicate infectious communicable illnesses and also in the control of epidemics and outbreaks in many parts of sub-Saharan Africa. With most health initiative researches in Kenya focusing on rural areas, Informal settlements have always been overlooked when it comes to health improvement efforts by stakeholders. The study objectives were : To establish the influence of level of knowledge on compliance to childhood immunization schedule; To establish the influence of caregiver perception on immunization on compliance to childhood immunization schedule; To determine the influence of caregivers practices on compliance to childhood immunization schedule; To determine the influence of access to healthcare services on compliance to childhood immunization schedule among caregivers of children 0 – 23 months in informal settlements in Nairobi city County, Kenya. The study sites were Viwandani and Mukuru kwa Njenga informal settlements in Nairobi city County, Kenya. A descriptive research design was used for this study. Pre-test of the research instrument was done in Mathare informal settlement using 10% of the study sample size. Purposive sampling was used to select Viwandani and Mukuru areas and cluster sampling was used to select the number of villages in Mukuru kwa Njenga Simple random sampling was used to select the study participants. Quantitative data was collected through questionnaires. The study used SPSS version 22 to establish the descriptive and inferential results regarding the mean, frequencies, standard deviation, regression and correlation. The results were presented in form of tables. The findings revealed that 91.8% of caregivers had taken their children for vaccination at the appropriate age and had complied to the immunization schedule. Only 67.8% of the respondents knew the age at which vaccination was to start. Only 73.2% of respondents could mention diseases prevented by immunization and most caregivers 56% got information on immunization from healthcare workers. The test of independence at significance level of 0.01 results showed that the main determinants of compliance to immunization were level of knowledge ($R^2 = 0.033$, df = 1, $P<0.003$), access to health services ($R^2 = 0.192$, df= 1, $P<0.0001$), caregiver perception ($R^2 = 0.289$, df=1, $P<0.0001$ and caregiver practices ($R^2 = 0.002$, df=1, $P<0.854$). The concept of childhood immunization schedule needs to be incorporated in the education curricula, programs for non-formal education and adult literacy programs, this will help magnify the importance of immunization and as well as show the demerits not complying with immunization schedule as well as harmful consequences of incomplete immunization. Perception of caregivers can be improved by training and educating caregivers on importance of compliance to childhood immunization schedule.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Childhood immunization has played a big role in universal child survival. Immunization has been used to eradicate infectious communicable illnesses and also in the control of epidemics and outbreaks in many parts of sub-Saharan Africa. An estimated 2 to 3 million people worldwide die from vaccine-preventable diseases yearly (WHO, 2018).

In Africa, vaccine-preventable diseases such as Tetanus, Diphtheria, Tuberculosis, Pneumonia and Whooping cough, in combination are the leading causes of death in children under 60 months. (WHO, 2018).Vaccination has proven potential in averting millions of deaths and it is a safety net against many diseases if the recommended levels are embraced and followed.

In Kenya, 12 vaccinations are given according to the national childhood immunization schedule to be completed by 9 months.The Ministry of Health Kenya (MOH) stipulates that a child is considered fully vaccinated when they have received a vaccination regimen of one dose of Measles, Mumps and Rubella, one dose of Tuberculosis (BCG), three doses of Diphtheria, Pertussis, and Tetanus (DPT) and three doses of oral Polio vaccine. As a low middle-income country, Kenya does not have enough resources and manpower to enhance vaccination services against a rapidly increasing population; this has resulted in persistent coverage gaps in immunization countrywide (A Kariuki, 2014).

A study by Djesika A, Steven B, Shukri M., (2014) found that informal settlements in Nairobi County lag behind in health indicators; in comparison to formal areas in Nairobi County and other regions in the country.

The study further found that failure by the national government to identify informal settlements as distinct from other urban areas in national censuses hampers health intervention efforts in informal settlements. Informal settlements are always overlooked when it comes to improvement efforts by the government and humanitarian organizations. This has resulted in most research efforts on poverty reduction and health improvements focusing on rural areas, (Djesika *et al*., 2014).

Sheillah Simiyu, Sandy Cairncross & Mark Swilling.,(2015) noted that informal settlements are greatly under-sampled in national and sub-national surveys. Homogenization of data trends between wealthier urban localities and informal settlements leads to a false presentation of the true situation in Nairobi County. Nairobi County is a high risk county in reference to immunization diseases, in order to improve compliance with immunization schedules in Nairobi County and in particular in informal settlements, there is a need to study how caregivers comply with immunization schedule guidelines.

The study focused on children under 23 months because WHO, (2018) recommends that 0-23 months is the best age bracket to vaccinate children. The age between 0 – 23 months is when a child's body produces the best possible reaction to a vaccine. A child who has been vaccinated is likely to suffer from less serious complications and milder symptoms from a disease they have been vaccinated against in comparison to a child who is yet to be vaccinated.

1.2 Statement of the problem

African Population Health Research Council [APHRC] in 2018 found that under-five mortality in Nairobi informal settlements was about 3.6 times higher than that of Nairobi as a whole with vaccine-preventable illnesses playing a great role in the outcomes. Blessing, Tilahun, Catherine and Alex., (2016) also found that in the period 2012 - 2013, the under-five mortality rate in Nairobi informal settlements was higher than all other estimates for Nairobi County and national levels. This therefore raised the need to investigate what influences compliance to immunization schedule among the caregivers in the informal sectors in Nairobi City County.

One of the reasons why informal sector dwellers in Nairobi County experience high mortality from conditions that are preventable by immunization is because health interventions in Kenya focus on the rural population. According to Catherine Kyobutungi, Abdhalah, Kasiira, Ziraba, Alex Ezeh and Yazoumé Yé.,(2008) it is important to focus on the health of Nairobi's informal settlements dwellers since their health outcomes are worse than the health outcomes of rural dwellers.

In present times most diseases are easily treatable with antibiotics making caregivers reluctant to immunize their children (WHO, 2015). APHRC (2018) found that many caregivers in Nairobi County take their children for only the first two rounds of immunization and fail to complete the full immunization schedule. In Kenya, childhood vaccinations services are voluntary and free at public health centers, but still immunization rates remain below the WHO targets of 90%, with only 74.4% of children below 5 years in Nairobi County being fully immunized (KDHS, 2014).

A lack of clear understanding of the advantages of vaccination and suspicion of national health services among caregivers are possible contributing factors to non-compliance with childhood immunization schedule in Kenya. To fully eradicate some diseases from informal areas in Nairobi County, adherence to immunization schedule must be observed to keep the herd immunity against vaccine preventable diseases high.

1.3 Justification

When obtained at the correct time immunization increases protection of children from vaccine preventable illnesses and decreases the outbreak of diseases (Patience *et al*., 2018). Compliance to immunization schedule is pivotal in ensuring that population reap the full benefit of immunization. At the same time compliance may be influenced by many factors including the care givers' level of knowledge on the importance of immunization to their children. This study therefore sought to determine caregiver's compliance with childhood immunization schedule among caregivers of children 0 – 23 months in informal settlements in Nairobi County, Kenya. The study focused on children aged 0-23 months because recent studies by WHO, (2018) confirm that this is the best age bracket to vaccinate children, because this is when a child's body produces the best possible reaction to a vaccine.

A large percentage of caregivers in present times have never met someone with Polio or Whooping cough, with vaccine-preventable illnesses being less common and infrequent in today's populations, some caregivers view vaccination as less urgent despite having general knowledge of the importance of immunization (Shelly, 2014).

In Kenya, various studies have researched and published information on different aspects of immunization and immunization coverage in different regions of the country. However, these studies have been limited to local geographic areas and in rural areas. Kariuki (2014) and Catherine, *et al.*, 2008, proposed further research be done to reduce immunization dropout rates in urban informal settlements in Kenya hence providing a gap for this study.

1.4 Research Questions

I. What is the influence of caregiver's level of knowledge on compliance to childhood immunization schedule among caregivers of children aged 0- 23 months in informal settlements in Nairobi city County, Kenya?

II. What is the influence of caregivers' perception on compliance to childhood immunization schedule among caregivers of children aged 0- 23 months in informal settlements in Nairobi city County, Kenya?

III. What is the influence of caregiver practices on compliance to childhood immunization schedule among caregivers of children aged 0- 23 months in informal settlements in Nairobi city County, Kenya?

IV. What is the influence of access to health services on compliance to childhood immunization schedule among caregivers of children aged 0- 23 months in informal settlements in Nairobi city County, Kenya?

1.5 Null Hypotheses

H_{01}– Caregiver's knowledge, perception, practices and access to health services have no influence on compliance to childhood immunization schedule among caregivers of children 0 – 23 months in informal settlements in Nairobi County, Kenya.

1.6 Research Objectives

The overall objective of the study is to assess compliance to childhood immunization schedule among caregivers of children 0-23 months in informal settlements in Nairobi County, Kenya.

1.6.1 Specific Objectives

I. To determine the influence of level of knowledge on compliance to childhood immunization schedule among caregivers of children 0 – 23 months in informal settlements in Nairobi city County, Kenya.

II. To determine the influence of caregiver perception on immunization on compliance to childhood immunization schedule among caregivers of children 0-23 months in informal settlements in Nairobi city County, Kenya.

III. To determine the influence of caregivers practices on compliance to childhood immunization schedule among caregivers of children 0 – 23 months in informal settlements in Nairobi city County, Kenya.

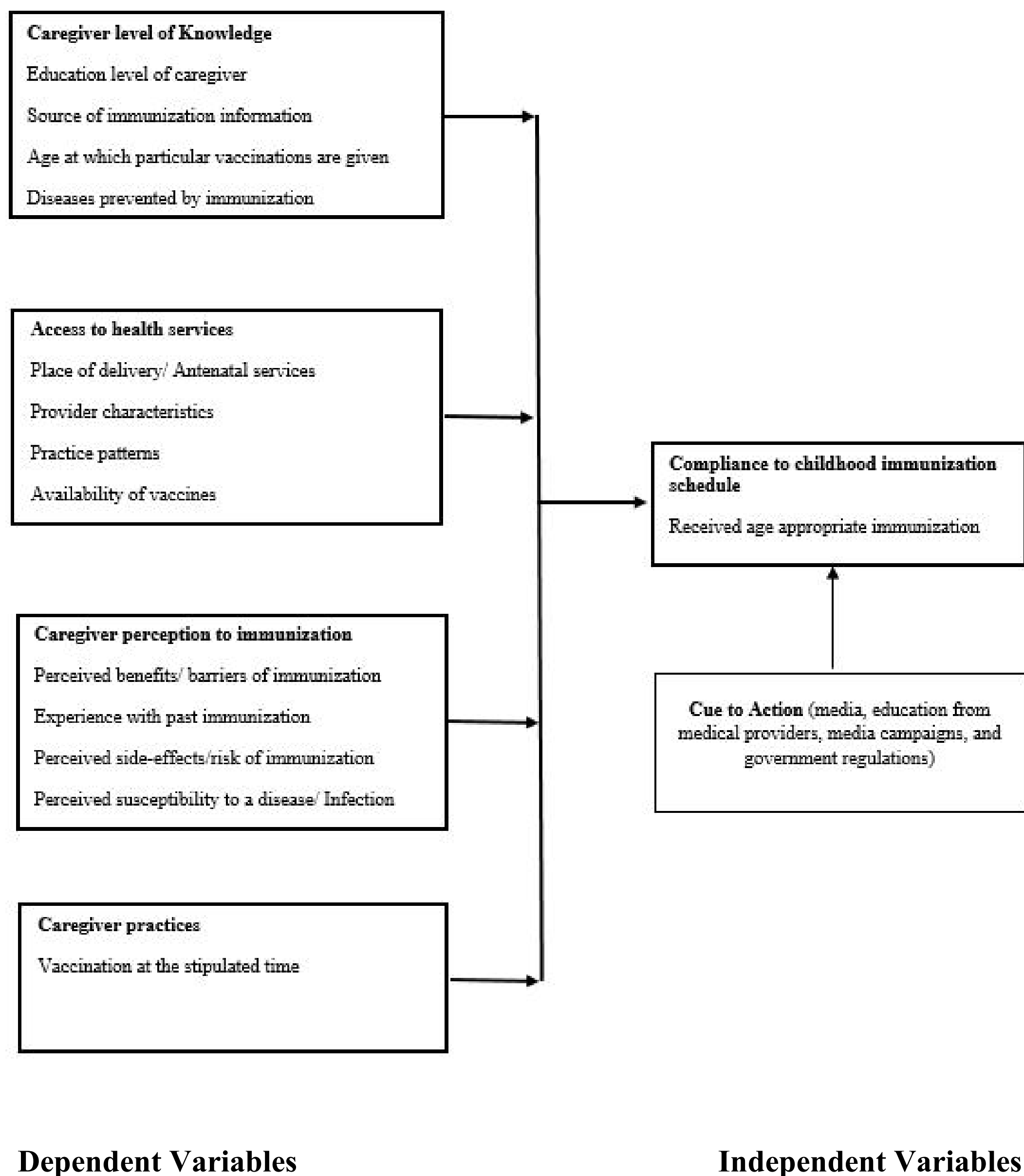
IV. To determine the influence of access to healthcare services on compliance to childhood immunization schedule among caregivers of children 0 – 23 months in informal settlements in Nairobi city County, Kenya.

1.7 Delimitation and limitation

Recall bias was a problem as some caregivers failed to accurately recall what vaccines their children received. Self-reported data was accepted from caregivers in the absence of an immunization card. From the study 84.3% of the respondents had their children's immunization cards.

1.8 Conceptual framework

A conceptual framework is an illustrative pictorial representation of links between variables to explain a broad concept (Borg, 2005). Funimilayo (2013) in his research on determinants on full child immunizations among children in Nigeria, utilized education level and knowledge as a determinants. Kongxay (2007) utilized knowledge and perception as independent variables. This study adopted caregiver knowledge, caregiver perception, caregiver practices and access to health services as independent variables, with compliance to childhood immunization schedule as the dependent variable.



Dependent Variables **Independent Variables**

Figure 1.1: Conceptual framework

Source: Adopted and modified from Funimilayo (2013) & Kongxay (2007).

1.9 Significance of the study

This study will be of great importance to: The Kenyan government since it is responsible in health service provision and formulating policies that look to strengthen health care delivery in informal settlements. The data from this study will

be vital for health planning, reducing stress on health facilities and preventing disease outbreaks.

The study will be important to humanitarian organizations in setting emergency thresholds and target areas for child health interventions. Parents and caregivers of children living in informal settlements will benefit from this study since it will enable caregivers to understand the importance of childhood immunization. Like any other research, the findings will be a good reference for future studies on improving healthcare for children in Kenya.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature on compliance to childhood immunization. It will expound on research gaps on compliance to childhood immunizations schedule among caregivers of children 0 – 23 months living in informal settlements in Nairobi County.

2.2 Empirical review

Mouhamed, Mousa, Adama, Ousseynou, Fatou, Souleymane, and Tandakha., (2017) undertook a study on determinants to complete immunization among Senegalese children aged 12 – 23 months for the period 2010 to 2011. The independent variables were education levels of the mother, antenatal visits and access to healthcare facility; the dependent variable was full childhood immunization. Stratified sampling was used on a total of 392 strata, with 8212 households sampled.

The multivariable logistic model result from the Mouhamed, *et al*., 2017 study confirmed that an increase in caregiver's level of education was directly proportional to compliance to vaccination schedule. The study further that found mothers who had attended at least 4 antenatal visits during pregnancy were more likely to have their children vaccinated, the same study confirmed that increased access to health facilities increases the probability of vaccination. Mouhamed, *et a*l., 2017 in their study found that immunization coverage among children aged 12 – 23months in Senegal was 80%, which is below the international objective of 90%. The study concluded that complete vaccination is dependent on different factors directly related to the caregiver's individual characteristics.

Geethu, Avita, Sulekha, Ratna, and Aby, (2016) carried out a research on barriers to childhood immunization among women in an underprivileged urban area of Bangalore city, India. The data was obtained from key informant interviews and a series of focus group discussions with mothers of children under the age of five concluded that barriers to complete childhood immunization were caused by lack of knowledge and poor awareness among mothers on immunization schedule and vaccine-preventable diseases. The study identified that barriers to effective utilization of immunization services ranged from economic constraints inconvenient timings for caregivers, long distance to health facility, loss of daily wages while attending immunization clinics and hampered communication. The mentioned barriers tended to have a negative influence on compliance to immunization. Geethu, *et a*l., 2016 identified barriers to knowledge, attitude and utilization of immunization services in urban underprivileged areas as important while planning immunization strategies at health system level.

Fatima and Chizoma (2013) applied a cross-sectional survey to collect data from 153 nursing mothersin their study on factors influencing compliance with immunization regimen in Ibadan, Nigeria. They study found that 62.8% complied fully with immunization while 37.2 % did not, majority of the mothers 65.4% cited child sickness as the main reason for their failure to immunize their children other reasons provided were vaccination side effects, waiting time/ number of visits and attitude of healthcare workers. Fatima and Chizoma (2013) identified that a significant relationship existed between the age of the respondents and compliance with childhood immunization; they found that poor compliance was higher among young caregivers.

Another finding from the study showed that there is a significant relationship between the respondents' occupation and compliance with immunization regimen; a clear indicator that compliance is dependent on respondents` occupation. Results of the chi-square analysis from the Fatima and Chizoma study confirmed a significant relationship between time spent at the immunization centers by the respondents and compliance with immunization regimen, implying that compliance is dependent on time spent at immunization centers.

Mojoyinola and Olaleye (2012) studied physical and psychological factors influencing maternal non-compliance with immunization schedules of children 0-2 years in Nassarawa State, Nigeria. The study applied a descriptive survey research design using an administered structured questionnaire tagged "Maternal Non-compliance with Immunization Schedule Questionnaire (MNCWISQ) for data collection. The study clearly established there was a significant relationship between physical factors like distance to immunization centers and non-compliance with immunization schedule. Mojoyinola and Olaleye (2012) recommended that nurses, medical, social workers and practitioners take the initiative in providing health advice on immunization.

Marjorie, Roselle, Romarie, and Maureen, (2014) in their research on the extent of compliance to immunization, reasons for non- continuity and its consequences, conducted in selected towns in the Philippines on 175 respondents with self-administered questionnaires. The study focused on mothers who had attained a higher level of education and were most likely to know more about the importance of immunization. From the study, the majority of the respondents were of the idea that getting immunized was important to protect children from infectious diseases and

complications they also agreed that vaccines were a sure way to prevent infectious diseases.

Marjorie *et al*., 2014 recommended further research to assess' determinants of compliance with childhood immunizations in other areas.

Roos, Fatmah, Noura, Rowayah, Noura, John and Michal.,(2011) did their research on Knowledge, attitude, and practices towards childhood immunizations among mothers in Abu Dhabi, 240 mothers were sampled. The study recorded that over 80% of the participants were aware of the importance of adherence to the childhood immunization schedule; more than 85% of the participants knew that childhood vaccinations prevent life-threatening diseases and 62% were aware that immunizations provided lifelong protection. The range of knowledge score was 1-9 (theoretical range 0- 9), and the mean (s.d) was 5.87 (1.67). About one third scored 5 or lower, and about 40% scored 7 or higher.

Roos et al., 2011 found that more than 50% of respondents obtained information on immunizations passively from health professionals, while over one-third of the respondents actively asked for immunization information. Only 16% of respondents reported a health professional as the main source of information regarding the side effects of childhood immunizations. The most likely reason provided by respondents for the refusal of immunizations was that the mother perceived immunization as unnecessary. Other reasons mentioned by the respondents indicated lack of knowledge. Out of the 240 women 175 had borne children, 74 (42%) reported side effects of childhood immunizations, while 100% were satisfied with the immunization service in the United Arab Emirates (UAE).

Heba, Sahar,and Rabab (2016) in their research on knowledge, attitude, and practice of mothers toward children's obligatory vaccination used the cluster sampling approach. The study used a total of 30 clusters each providing 7 mothers. Houses from each cluster were selected randomly; the total number of mothers sampled was 1050.

The study assessed the socio-demographic data, knowledge, attitude, and practice of mothers toward obligatory vaccination. Descriptive statistics including frequency, distribution, mean, and standard deviation were used to describe different characteristics. Chi-Square test was used to test the significance of results. Pearson correlation was conducted to show correlations between knowledge, attitude and practice scores among mothers. P-value of less than 0.05 was considered as denoting statistical significance. Reliability of attitude questionnaire by Cronbach alpha test (r alpha) were =.778.Regarding to their level of education, the results showed that 625 (59.5%) of the studied mothers had intermediate education and only 30 (2.9%) of them had primary education 462 (44%) of the studied mothers had poor knowledge score while 328(31.2%) had good knowledge score, 735 (70%) of the studied mothers had good attitude score, while the minority 6 (0.6%) of them had poor attitude score, 373 (35.5%) of mothers had good practice score while 265 (25.2%) of them had poor practice score. As for the source of information 161 (49.1%) of the studied mothers who's acquired their information from health providers had good knowledge. There were statistically significant associations between knowledge level and education and also with a source of information ($x2= 89.201$ & 30.558 respectively at $p< 0.001$) shows that there were positive statistically significant correlations between mothers age and knowledge but it was a negative between age, attitude.

2.3 Study Variables

2.3.1 Level of Knowledge

Smith (2006) found that children from poor backgrounds and where the caregiver's level of education is low were less likely to be vaccinated as the caregivers lacked finances to immunize children and also the caregivers failed to understand the importance of childhood immunization. A similar trend was seen in Nepal, where immunization dropout rates in children decreased with increase in maternal level of education (Basel *et al*., 2012).

Funimilayo (2013) found that caregivers' level of education has a positive influence on a child being fully immunized. Funimilayo further found that children born from parents with higher education and knowledge are more likely to comply with childhood immunization schedule as opposed to parents with no education. A clear indication that immunization uptake increases as the parent's knowledge and education increases.

Abidoye, and Odeyemi (2013) in their research on knowledge, attitude, and practice of mothers to childhood immunization in Lagos State, Nigeria found that over 73% of their respondents knew about different kinds of immunization. The high knowledge level in the study was attributed to immunization vaccines being named by the diseases they prevent and also to some extent the educational status of the respondent. From the study, only 42% of the respondents knew about Hepatitis B (HBV) vaccination. However, only 6.5%of respondents had knowledge about meningococcal immunization. This could be because of non- integration of meningococcal vaccine into the national immunization programme in many developing countries. Only

36%of respondents responded correctly to what Diptheria, Pertussis, and Tetanus (DPT) vaccines protect against.

Although 89.5%of the respondents knew of Bacille Calmette Guerin (BCG) vaccination, only 25% of them clearly knew what it vaccinated against. Less than 9% of the mothers were able to tell what meningococcal vaccine protects against.

Jisy, Melba, Nisha, Shilpa, and Umarani (2013) carried out a study on immunization awareness among mothers of children less than five years in Mangalore, India. The study sample was 30 mothers; the study data was collected using a structured knowledge questionnaire, they found that 3.3% of caregivers had excellent knowledge on immunization whereas 30% of mothers had poor knowledge. Overall the study found that religion ($\chi2= 0.09$), occupational status ($\chi2= 0.32$), compliance ($\chi2= 10.1$) and age of mother ($\chi2= 1.28$), had no significant association with knowledge score.

2.3.2 Perception of Caregivers

Caregivers' perception on immunization is important in the uptake of immunization programs in populations. A strong will to keep children in a population healthy against vaccine-preventable illnesses is a consistent attribute that influences caregivers to have their children vaccinated (Bingham *et a*l. 2012). A study conducted on immunization safety concluded that caregivers who considered vaccines safe had a higher probability of taking their children to be vaccinated in comparison to those who were undecided on immunization (Allred, 2005).

Parental fear is a major hindrance in the optimal uptake of vaccinations (Tickner, Leman, and Woodcock 2006). A similar finding by Bardenheier, Yusuf, Schwartz,

Gust, Barker, Rodewald (2004) found that caregiver concerns about side-effects could influence a caregiver to avoid vaccinating their children.

Abidoye, and Odeyemi (2013) in their research on knowledge, attitude and practice of mothers to childhood immunization in Lagos State, Nigeria, found respondents attitude towards childhood immunization positive with (95.5%) of the mothers perceiving immunization to be good for their children. This is, however, contrary to what was previously documented in a study conducted on the knowledge, perceptions, and beliefs of mothers on routine childhood immunization in Northern Nigeria half where (54%) of the respondents showed unfavorable attitude towards immunization (Kabir *et al*., 2005). Based on the ages of the respondents' children, 73.5% of the mothers interviewed revealed that all their children had been fully immunized. The study also found that 82.5% of mothers knew the role that immunization plays in disease prevention. However only 7% of the respondents attributed its role to child's growth while a lesser percentage 5% disclosed they did not know. This may be attributed to lack of health education on immunization.

Stetanoff, Mamelund, Robinson, and Netherlid (2010) in their study on tracking parental attitudes on vaccination across European countries found that parental attitudes on vaccinations in the childhood vaccination programmes are positive. Steinhoff *et al*., 2010 found that there was a negative association between parental distrust in the MMR (Measles, Mumps, and Rubella) vaccine and corresponding MMR compliance in the five countries they studied. Furthermore the study found that low vaccine coverage for the MMR vaccine in England is a direct reflection of the attitude of the parents who rank mumps, measles, and rubella as less serious than other vaccine-preventable diseases.

2.3.3 Caregiver Practices

WHO (2009) concluded that routine reports from health centers provide crucial data on vaccination coverage with most estimates based on health center records being incorrect. This could be attributed to the high turnout of women for immunization of their children leading to work pressure on the staff. Antai (2009) in his research noted that the proportion of mothers who delivered in a hospital setting is a predictor of child immunization uptake, hence important determinant to compliance immunization schedule.

Chris-Otubor, Dangiwa, Ior, and Anukam., (2015) carried out a study on assessment of knowledge, attitudes and practices regarding immunization of mothers in Jos North, Nigeria. The study classified children and their level of immunization, depicting the immunization practices of their mothers. In terms of receiving the vaccine at the stipulated time about 56.0%, 40.5%, and 39.7% mothers vaccinated their children within the stipulated time for BCG, DPT and hepatitis vaccines respectively. Over 30% of the study sample was said to be immunized against each of the diseases but, there was no record in the form of immunization cards available to prove it.

Chris-Otubor et al., (2015) study results showed that there was incomplete dosage for DPT (7.8%), OPV (8.6%) and hepatitis (9.9%). Some children had not been presented for vaccination; yellow fever registered the highest prevalence (10.7%), and BCG had the lowest (2.2%). One of the health indicators of achieving a reduction in child mortality is to increase the proportion of one-year-olds that have been immunized against measles. From this study, only 50% of the children were immunized promptly against measles, and 9.5% were yet to be immunized even after one year of age.

Sadoh and Eregie (2009) in Benin, Nigeria had similar findings where uptake of vaccines was the highest for BCG, OPV0, and Hepatitis at birth having a percentage rate of 89.5%, 96.7%, and 93.8% respectively having studied the records of a clinic. They, however, noticed that uptake was the lowest for measles and yellow fever vaccines having percentage rates of 57.6% and 57.2% respectively.

2.3.4 Access to Health Services

Abdulraheem, Onajole, Jimoh,and Oladipo.,(2011) had their research on reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children. Accessibility to a health facility with immunization facilities was measured according to mothers' verbal information on impression of the distance, time spent to reach the nearest vaccination site and the money spent on transport. Various reasons were provided by the mothers for incomplete vaccination of their children. These include long waiting time at the health facility (15.2%), lack of vaccine on the appointment day (3.5%), absence of personnel at the health facility (5.4%), child ill-health at the time of immunization (3.6%), lack of information about the days for vaccination (2.5%), forgetting the days of immunization(1.5%), long distance walking (17.5%), mother's illness on the day of vaccination (0.5%), social engagements (0.4%), lack of money (10.6%), schooling mothers (0.5%), parents objection, disagreement or concern about immunization safety (38.8%) and other miscellaneous reasons (3.5%).

A study carried out in India and Pakistan to investigate the Polio Eradication Initiative in the two countries found that pockets of hard to reach areas have low vaccination coverage (Obregon, 2009).

A recurring concern among caregivers in Mozambique was the distance to vaccination services, the long queue of service when they arrived, and the hours of service had an inverse relation with the caregivers' intention to vaccinate their children (Bingham *et al.*, 2012). Nearness to a health service provider increases the likeliness of utilization of immunization services.

2.4 Summary of Literature Review and gaps addressed

Compliance to childhood immunization is a national and global burden that requires rigorous management in order to avert communicable infections and epidemics. Literature has shown that caregivers only take their children for the first rounds of immunization making compliance a challenge to many. Studies on compliance in Kenya majorly focus on immunization coverage and concentrate in the rural parts of the country hence there is limited literature on compliance childhood immunization schedule. Determination of factors that influence compliance to these recommendations are also not well documented. This study therefore sought to assess compliance to childhood immunization schedule among caregivers of children 0-23 months in informal settlements in Nairobi City County, Kenya.

CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

This chapter focused on how data was collected and which analysis methods were executed to explain the research objectives. The chapter further discusses the methodology that was observed with a great focus on instruments for data collection and guidelines which were adhered to and the target population.

3.2 Research Design

This study adopted a descriptive cross-sectional research design, this design was chosen because the study was intended to provide an analysis of caregiver behaviors and decisions at one particular point in time.

Table 3. 1: Measurement of Variables

Variable	Item	Method of testing
Dependent Variables		
Knowledge	ıse transmission. y ented	5 point Likert
Availability of health services.	Place of delivery. Distance to a health facility. Availability of antenatal care services.	5 point Likert
Caregiver perception	ved benefits ved severity Perceived barriers	5 point Likert
Caregiver practices	liance to immunization schedule	5 point Likert
Independent Variable		
Compliance with the immunization schedule	Age - appropriate immunization	5 point Likert

3.3 Location of Study

The study was a household-based community study undertaken in Mukuru Kwa Njenga and Viwandani informal settlements in Nairobi County. Nairobi County has an estimated population of 3 million with the main economic activities being commerce and manufacturing.

The study areas of Mukuru kwa Njenga and Viwandani were selected because they manifested an increase in the rates of non-compliance to childhood immunization schedule according to KDHS 2014.

3.4 Study Population

Sekaran and Bougie (2011) define a population as a group of individuals of particular interest to be studied. The study population were caregivers of children in the age range of 0 - 23 months old at the time of the interview.

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Techniques

Ember and Ember, (2009) define primary data as initial data collected first hand by the investigator. Mukuru and Viwandani areas were purposively selected because they manifested an increased rate of non compliance to childhood immunizaton according to KDHS 2014, Cluster sampling was used to select the number of villages in Mukuru kwa Njenga, where 6 villages out 12 were selected by simple random sampling. To select study respondents, simple random sampling was used. A serialized list of all households the in the study areas was prepared using a continuous numbering system.

A table of random numbers was used to randomly select and recruit households to participate in the study.

Where more than one child in a household met qualification criteria to participate in the study, the youngest child in the family was selected to minimize over-representation from a single household.

3.5.2 Sample Size

The sample Size was determined using Fischer's Formula for sample size determination:

$$N = \frac{Z^2 * P(1-P)}{D^2} = \frac{1.96^2 * 0.744(1-0.744)}{(0.05)^2} = 293 + 10\% \text{ attrition rate} = 323$$

N is the desired sample size, for populations greater than 10,000.

Z is the value representing 95% confidence interval, (set at 1.96)

D is the precision with which to measure the prevalence of the study ±5%.

P is the estimated immunization compliance. This is 74.4% in Nairobi County according to KDHS 2014. P = 0.744.

Table 3.2: Proportionate sample size distribution

Informal Settlement	Population (Approx.)	Proportion	Sample
1. Mukuru KwaNjenga	100,000	0.77	249
2. Viwandani	30,000	0.23	74
Total	**130,000**	**1**	**323**

3.6 Designing and construction of research instrument.

The research instrument was constructed and arrived at by prototyping. The final questionnaire was an improvement of the original tool, constructed from guidance and insights acquired from previous related studies. Parts of the questionnaire were adopted from the WHO vaccine hesitancy matrix, (2016) and ranked in a 5-point Likert scale.

The questionnaire covered demographic characteristics of caregivers, level of immunization knowledge, compliance level and factors influencing compliance to immunization recommendations. Data on knowledge and compliance was collected through a series of questions whereby respondents reported on their own practices (self-reporting).

3.7 Data Collection

The study used a combination of secondary and primary data. Secondary data was collected from vaccination cards in possession by the caregiver. Ember and Ember (2009), define secondary data as data collected by other people other than the user. In the study, primary data was collected through a questionnaire using nominal and scaled items.

3.8 Pre-test

The pre-test was carried out in Mathare informal settlements in Nairobi County. This study used 10% of the total sample size used in the main study which was 32 respondents. Pre-testing ensured identification, amendment of potential problems and calculate the time required for actual field work.

3.8.1 Validity

The questionnaire was validated by extensively discussing it with supervisors of the thesis and their views incorporated to enhance content and construct validity of the questionnaire. The study used short closed-ended questions on the Likert scale range of 1 to 5. Where 5 = strongly agree, 4 = agree, 3 = not sure, 2 = disagree and 1 = strongly disagree.

Simple and understandable language was used in constructing the questions to ensure the respondents clearly understood the questions.

3.8.2 Reliability

Reliability ensures consistent measurement in the various items in an instrument. In this study, reliability was observed in all items. The Cronbach Alpha is a reliability measure which shows how well the items in the instrument are correlated to each other (Sekaran, 2006). Below is the Cronbach's coefficient alpha formula applied:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Here N is equal to the number of items, C-bar is the average inter-item covariance among the items, and v-bar equals the average variance. Cronbach's Alpha value index of 0.7 and above was considered reliable. Enumerators where comprehensively trained for 3 days, to agree on a standard way of asking questions, later on using the test retest method and within a period interval of fourteen days the same set of questions were administered to the same group of respondents. Correlation coefficients are presented in table 4.1

Cronbach alpha was used to test for reliability tests, it was applied for each variable, in this thesis Cronbach alpha statistic with a value of $\geq$ 0.7 was accepted as reliable.

The test items were retained and used in this study hence considered reliable as shown. Likert scale questions were subjected to a split half test to yield an average of Cronbach's alpha Coefficient for reliability of 0.725

Table 3.3: Reliability Table

Variable	**Cronbach Alpha**
Level of Knowledge	0.708
Perception of Caregivers	0.776
Caregiver practises	0.706
Availability of Health Services	0.723
Compliance	0.714

3.9 Data Analysis and Presentation

Quantitative data collected, was coded and entered into SPSS version 22.0 for data analysis. Correlation and multiple regression were applied to test for association of caregiver's access to health facilities, caregiver's perception towards immunization caregiver's knowledge with compliance to childhood immunization schedule.

3.9.1 Model Specification

The regression analysis for primary data was run using SPSS software version 22.0. The study used shortclosed-ended questions on the Likert scale range of 1 to 5. The regression model that was used is shown below:

$COP = \alpha + \beta_1 KN + \beta_2 HS + \beta_3 PC + \beta_4 CP + \mu$

KN- Knowledge

HS- Health services

PC- Perception

CP- Caregivers practices

COP – Compliance with childhood immunization schedule

μ - error term

$\beta_1, \beta_2, \beta_3, \beta_4,$ regression coefficient.

3.10 Ethical Considerations

Approval was sought from Kenyatta University graduate school (Appendix V). Ethical approval for the study was obtained from Kenyatta University Ethics Review Committee (KU-ERC)/(Appendix VII). The National Council of Science and Technology and Innovation granted a research permit for the study (NACOST/P/19/69160/30235)/ (Appendix VIII). Approval to conduct the study in Nairobi County was granted by the ministry of health.

A written informed consent was obtained for all interviews carried out and the study participants were informed of their right to withdraw from the study at any stage if they so wish they. The study participants were given an explanation of how confidentiality was to be ensured and how the data was to be utilized and its

usefulness. All interviews were conducted in private. Household and Individual identifier variables were anonymized in the final datasets, and all the questionnaires had no identifiers.

CHAPTER FOUR: RESULTS

4.1 Introduction

The chapter contains details of data analysis, sample characteristics and presentation of data analysis. The results are in form of tables for each objective, the data gathered was exclusively from the questionnaires.

4.2 Response Rate

Two hundred and sixty three (263) questionnaires were received this represented 81 % response rate. Babbie (2004) explains that a return rate of 60% is good and a 70% return rate is exemplary.

4.3 Respondents socio - Demographic and General Information

This section presents the description of the study population according to the data collected, the analyzed results reveal that: 95.8% (252) of respondents were mothers, 3.8% (10) were fathers and 0.4% were guardians. In the age bracket section, 55.5% (146) of the respondents were less or equal to 25yrs, 31.6% (83) of respondents were between 26-30yrs; 6.8%(18) were between 31-35yrs; 3.8% (10) were between 36 – 39yrs and 2.3 % (6) were above 40 yrs.

The study found that; 33.5% (88) and 60.1% (158) of respondents had attained primary and secondary level education respectively only 6.5% (17) had attained tertiary level education. On marital status section; 93.5% (246) were married, 2.3% (6) separated or divorced and 4.2% (11) were widowed as summarized in the table 4.1 below.

Table 4.1 Socio-Demographic Characteristics of the Study Respondents

Particulars		Frequency (n=263)	Percentage
Gender	Male	253	96.0%
	Female	10	4.0%
Age	≤25yrs	146	55.5%
	26-30 yrs	83	31.6%
	31-35 yrs	18	6.8%
	36-39 yrs	10	3.8%
	40≥	6	2.3%
Education Level	Primary	88	33.5%
	Secondary	158	60.1%
	Tertiary	17	6.5%
Marital Status	Married	246	93.5%
	Divorced	6	2.3%
	Widowed	11	4.2%

The study also found 91.8% (241) of the respondents had taken their children for immunization at the appropriate age, hence they were compliant with the child immunization schedule. Most caregivers, 73.2 % (193) knew about Polio and 6.7% (18) knew about Whooping cough and 19.9% (52) of respondents did not know any of the diseases prevented by childhood immunization.

Forty one percent (41%) (108) of the caregivers had no first-hand experience or ever seen a person suffering from diseases prevented by childhood immunization. Fifty six percent (56%) (147) of respondents got their information on immunization from health workers, 41% (108) of the respondents got immunization information from the mass media, 1.3 % (4) got news from family members and only 1.1% (3) got their information about vaccination from the internet.

Eighty four point three percent (84.3%) (222) of the respondents had in possession vaccination cards for their children. A majority of the respondents (93.5%) (246) had attended antenatal clinic sessions.

4.5.1 Descriptive Results of Caregiver Level of Knowledge

The study sought to determine the extent to which respondents agree or disagree with the statements on caregiver knowledge based on a five point Likert scale where 1= Strongly disagree; 2= disagree; 3= Not sure; 4= agree and 5 strongly disagree.

The findings revealed, 77.2% (203) of caregivers strongly agreed that the current vaccination schedule should be maintained. A further 81.4% (214) of caregivers strongly agreed that they would recommend others to vaccinate their children.

On whether vaccines are safe for children 70.7% (186) of the respondents strongly agreed that vaccines are safe for children. The implication of the findings is that majority of the respondents indicated that caregivers level of knowledge had an influence on compliance to childhood immunization schedule as shown by a mean of 4.47. There is a small variation in the responses given by the respondents as shown by a standard deviation of 0.76. The results are summarized in the table 4.2 :

Table 4. 2: Descriptive Analysis for Caregiver Level of Knowledge

4.5.2 Descriptive Results for Caregivers Perception

Opinion Statements	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	Mean	Std Dev
Vaccination should be given according to schedule	0.0% (0)	1.1% (03)	1.1% (03)	20.5% (54)	77.2% (203)	4.31	0.73
Is it important for children to get recommended vaccines	0.0% (0)	0.4% (01)	1.5% (04)	24% (63)	74.1% (195)	4.72	0.51
Vaccines are safe for children	0.4% (01)	0.0% (0)	3.8% (10)	24.7% (65)	70.7% (186)	4.65	0.61
Would you recommend others to vaccinate their children	0.0% (0)	1.9% (05)	0.8% (02)	16.0% (42)	81.4% (214)	4.45	0.77
A child with HIV should be vaccinated	2.3% (6)	1.5% (4)	25.5% (67)	10.6% (28)	60.1% (158)	4.25	1.03
Measles, Mumps, Rubella vaccine is administered to children at 15-18 months	1.1% (3)	6.1% (16)	9.9% (26)	21.3% (56)	61.6% (162)	4.36	0.97
Measles can be prevented by immunization	0.0% (0)	8.7% (23)	0.8% (2)	17.5% (46)	73.0% (192)	4.55	0.67
Average						**4.47**	**0.76**

On the descriptive results for caregiver's perception on compliance to childhood immunization schedule, 82.5% (217) of the caregivers strongly agreed that children who complete immunization have a stronger immune system.

On the question whether a child should develop immunity by getting immunization rather than by getting sick 89.0% (234) of the respondents strongly agreed that it's is

better for a child to develop immunity by getting vaccination rather than by getting sick as illustrated in the table 4.3 below.

The implication of the findings is that majority of the respondents indicated that caregivers perception had an influence on compliance to childhood immunization schedule as shown by a mean of 4.76. There is a small variation in the responses given by the respondents shown by a standard deviation of 0.58.

Table 4.3: Descriptive Analysis for Caregiver Perception

Opinion Statements	Strongly disagree	Disagree	Not Sure	Agree	Strongly agree	Mean	Std Dev
Vaccination is necessary even when a disease in no longer prevalent	0.4% (01)	2.7% (07)	2.7% (07)	11.8% (31)	82.5% (217)	4.73	0.67
Children who complete immunization have a stronger immune system	0.0% (0)	2.3% (06)	2.7% (07)	12.5% (33)	82.5% (217)	4.75	0.61
It is better for a child to develop immunity by getting vaccination rather than by getting sick?	0.4% (01)	0.8% (02)	0.0% (0)	9.9% (26)	89.0% (234)	4.86	0.46
Immunization at the right time is more effective in strengthening a child's immune system	0.0% (0)	1.1% (03)	0.8% (02)	14.4% (38)	83.7% (220)	4.81	0.49
Immunization services in my area is satisfying	0.0% (0)	2.3% (06)	3.4% (09)	22.1% (58)	72.2% (190)	4.64	0.66
Average						**4.76**	**0.58**

4.5.3 Descriptive Results for Caregiver Practices

Under caregiver practices 84.4% (222) of the respondents had vaccinated their children with the BCG vaccine at the stipulated time and only 6.1% (16) of the respondents had vaccinated their children against yellow fever as summarized in the table 4.4 below.

The implication of the findings is that majority of the respondents indicated that caregivers practices had an influence on compliance to childhood immunization schedule as shown by a mean of 4.52. There is a small variation in the responses given by the respondents shown by a standard deviation of 0.52.

Table 4.4: Descriptive Results for Caregiver Practices

Opinion Statements	Vaccinated at the stipulated time	Vaccinated but not at the stipulated time	Incomplete doses	Not vaccinated	Mean	Std Dev
BCG (At birth)	84.4% (222)	15.6% (41)	0.0% (0)	0.0% (0)	4.71	0.59
OPV (At birth, 6wk, 10wk, and 14wk)	84.0% (221)	10.6% (28)	4.2% (11)	1.1% (03)	4.53	0.52
DPT (6 wk, 10wk, and 14wk)	92.4% (243)	6.8% (18)	1.5% (04)	0.8% (02)	4.52	0.5
Pneumococcal Vaccine (6wk, 10wk, and 14wk)	92.4% (243)	6.1% (16)	1.1% (03)	0.4% (1)	4.58	0.52
Measles Mumps Rubella (MMR) (9 months 18 months)	89.4% (235)	0.8% (02)	5.7% (15)	4.2% (11)	4.16	0.45
Yellow fever. (9 months)	6.1% (16)	0.0% (0)	0.0% (0)	93.9% (247)	4.6	0.49
Average					**4.52**	**0.52**

4.5.4 Descriptive Results on Access to Health services

On the descriptive results for access to health services 75.3% (198) strongly agreed that health workers are friendly when they take their children for immunization. On whether caregivers can freely discuss their fears and concerns about vaccination shots with their health service provider 59.7% (157) of the respondents strongly agreed.

The implication of the findings is that majority of the respondents indicated that access to immunization services had an influence on compliance to childhood immunization schedule as shown by a mean of 3.82. There is a small variation in the responses given by the respondents shown by a standard deviation of 0.58 as summarized in the table 4.5 .

Table 4.5: Descriptive results for access to health services

Opinion Statements	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	Mean	Std Dev
Health workers are very friendly when I take my child for immunization	0.8% (02)	0.8% (02)	0.0% (0)	23.2% (61)	75.3% (198)	3.84	0.36
It takes a short time to be attended to when I take my child for immunization	0.0% (0)	0.0% (0)	1.1% (03)	44.5% (117)	54.4% (143)	3.78	0.57
Iam always given a reminder as to when I should visit the health facility to take my child for immunization	0.0% (0)	0.0% (0)	0.0% (0)	47.9% (126)	52.1% (137)	3.91	0.36
The health facilities where I take my child for immunization are near and accessible.	0.0% (0)	0.0% (0)	1.5% (4)	39.2% (103)	59.3% (156)	3.75	0.74
The place where one delivers the child will have an influence on immunization of the child	0.0% (0)	0.0% (0)	3.0% (8)	77.6% (204)	19.4% (51)	3.75	0.74
I am able to freely discuss my fears and concerns about vaccination shots with my child ’ s health provider	0.0% (0)	0.0% (0)	0.0% (0)	40.3% (106)	59.7% (157)	3.82	0.72
Average						**3.82**	**0.58**

4.5.5 Descriptive Results on Caregiver Compliance

From the table 4.13 on caregiver compliance; 75.3% (198) strongly agreed that they adhere to the dates written on the vaccination cards and 12.5% (32.9) agreed that they do not need to be reminded to take their children for immunization. 5.3% (14) of the respondents strongly disagreed. A further 74.1% (195) of caregivers strongly agreed that failure by caregivers in their community delaying or refusing to immunize their

children puts their child at risk of diseases. The implication of the findings is that majority of the respondents indicated that caregivers level of knowledge had an influence on compliance to childhood immunization schedule as shown by a mean of 4.71 and an SD of 2.59.

Table 4.6 Descriptive Results for Caregiver Compliance

Opinion Statements	Strongly disagree	Disagree	Not sure	Agree	Strongly Disagree	Mean	Std Dev
I adhere to the dates written on the vaccination card	0.8% (02)	0.8% (02)	0.0% (0)	23.2% (61)	75.3% (198)	4.71	0.58
I do not mind taking time off my normal schedule to take my child to be vaccinated	0.4% (01)	5.3% (14)	0.0% (0)	11.8% (31)	82.5% (217)	4.71	0.76
I do not need to be reminded to take my child for Immunization	0.0% (0)	2.3% (06)	2.7% (07)	12.5% (33)	82.5% (217)	4.75	0.61
I am concerned that caregivers in my community delaying or refusing to immunize their children are putting my child at risk of diseases	0.0% (0)	0.4% (01)	1.5% (04)	24% (63)	74.1% (195)	4.72	0.51
Reports I have heard or read in the media/ social media make me reconsider vaccinating my child	0.4% (01)	0.0% (0)	3.8% (10)	24.7% (65)	70.7% (186)	4.65	0.61
Average						**4.71**	**2.59**

4.6 Correlation results

4.6.1 Correlation for Caregivers Level of Knowledge

The table 4.7 shows F=0.181 and P= 0.003, indicating that caregiver knowledge is positively correlated to compliance and is significant at 99% level of confidence thus and increase in knowledge makes results in an increase in compliance. F=0.181 indicates a relatively weak positive association.

Table 4.7: Correlation for Caregivers Level of Knowledge

		Knowledge	Compliance
Knowledge	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	263	
Compliance	Pearson Correlation	.181**	1
	Sig. (2-tailed)	.003	
	N	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

4.6.2 Correlation for Caregiver Perception

From the table 4.7 caregiver perception had a correlation of F value 0.540 and P value 0.0001, it shows that caregiver perception was positively correlated to compliance to immunization, thus significant at 99% level of confidence. It also signifies that increase in caregiver perception makes performance increase. F=0.540 indicating a strong positive association.

Table 4.8: Correlation for Caregiver perception

		Perception	Compliance
Perception	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	263	
Compliance	Pearson Correlation	.540**	1
	Sig. (2-tailed)	.0001	
	N	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

4.6.3 Correlation for Caregiver Practices

From the table 4.9, Caregiver perception had a correlation of F value 0.011 and P value of 0.854, showing that caregiver practices was positively correlated to compliance and it was significant at 99% confidence level thus an increase in caregiver practices results in an increase in compliance

Table 4.9.: Correlation for Caregiver Practices

Correlations

		Caregivers Practice	Compliance
Caregivers Practice	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	263	
Compliance	Pearson Correlation	.011	1
	Sig. (2-tailed)	.854	
	N	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

4.6.4 Correlation for Access to Health Services

From the table 4.10 Health services had a correlation of F value 0.438 and P value 0.0001, this shows that health services were positively correlated to compliance (p-value<0.01) and it was significant 99% level. This means an increase in access to health services results to an increase in compliance to childhood immunization schedule. F=0.438 indicates a strong positive association.

Table 4.10: Correlation for Access to Health Services

		Health Services	Compliance
Health Services	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	263	
Compliance	Pearson Correlation	.438**	1
	Sig. (2-tailed)	.0001	
	N	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

4.6.5 Multiple Correlation of Variables

From the multiple correlation table 4.12 the correlation value of caregiver practices to compliance is F=0.11 and the P Value = 0.854 this shows it is significant at 99% confidence level. The correlation value of knowledge of caregiver to compliance is F = 0.181 and the P value = 0.003, this shows a significant relationship at 99% confidence level. The correlation value for perception to compliance is F=0.540 and the P value =0.00, this shows a significant relationship at 99% confidence level. The correlation value for health services to compliance is F= 0.438 and the P value = 0.00, this shows a significant relationship at 99% confidence level.

Table 4.11: Multiple Correlation of the variables

Multiple Correlation						
		Caregivers practices	**Caregivers Knowledge**	**perception**	**Health services**	**Compliance**
Caregivers practices	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	263				
Knowledge caregivers	Pearson Correlation	.377**	1			
	Sig. (2-tailed)	.000				
	N	263	263			
Perception	Pearson Correlation	.062	-.095	1		
	Sig. (2-tailed)	.315	.123			
	N	263	263	263		
Health services	Pearson Correlation	.071	-.058	.375**	1	
	Sig. (2-tailed)	.254	.352	.000		
	N	263	263	263	263	
Compliance	Pearson Correlation	.011	.181**	.540**	.438**	1
	Sig. (2-tailed)	.854	.003	.000	.000	
	N	263	263	263	263	263

**. Correlation is significant at the 0.01 level (2-tailed).

4.7 Regression Results

4.7.1 Regression Results for Caregivers Level of Knowledge

From the model summary table 4.12, R squared was 0.033, this shows that caregiver's level of knowledge accounts for 3.3% of variance in compliance. From the ANOVA table the relationship is significant, this is shown by F value is 8.829 and P value 0.003 showing that the model is significant at 99% level of confidence. The regression equation for knowledge becomes:

Y compliance = 4.685 + 0.043 Level of Knowledge

From the regression equation it means that when the caregiver's level of knowledge increases by 0.043 % compliance increases by 1% in the same direction, thus the relationship is positive and significant. From the table 4.4 the Durbin-Watson value was 1.606 which is between 1.5 and 2.5 thus no autocorrelation problem.

Table 4.12 Regression Results for Caregivers Level of Knowledge

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.181[a]	.033	.29	.44964	1.606

a. Predictors: (Constant), Knowledge
b. Dependent Variable: Compliance

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.785	1	1.785	8.829	.003b
	Residual	52.768	261	.202		
	Total	54.553	262			

a. Dependent Variable: Compliance
b. Predictors: (Constant), Knowledge Of Caregiver

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.685	.058		80.744	.000
	Knowledge	.043	.014	.181	2.971	.003

a. Dependent Variable: Compliance

4.7.2 Regression Results for Caregiver Perception

From the model summary table 4.14, R squared was 0.289 this shows that caregiver's perception accounts for 28.9% of variance in compliance. From the ANOVA table the relationship is significant, this is shown by F value is 107.456 and P value 0.00 showing that the model is significant at 99% confidence level (p value <0.01). The regression equation for caregiver perception becomes:

$Y_{compliance} = 1.505 + 0.636_{perception}$

From the equation it means that when the caregiver perception increases by 0.636% in caregiver perception results in an increase of 1% in compliance. Caregiver's perception was positive and significant to compliance to childhood immunization at 99% level of confidence. The Durbin-Watson value was 1.806 which is between 1.5 and 2.5 thus no autocorrelation problem.

Table 4.13: Regression Results for Caregiver Perception

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.540[a]	.292	.289	.38478	1.806

a. Predictors: (Constant), Perception
b. Dependent Variable: Compliance

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	15.910	1	15.910	107.456	.000[b]
	Residual	38.643	261	.148		
	Total	54.553	262			

a. Dependent Variable: Compliance
b. Predictors: (Constant), Perception

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.505	.293		5.133	.000
	Perception	.636	.061	.540	10.366	.000

a. Dependent Variable: Compliance

4.7.3 Regression for Results Caregiver Practices

From the model summary table 4.3, the value of R squared was 0.002, this shows that caregiver's practises accounts for 0.2% of variance in compliance. From the ANOVA table the relationship is significant, this is shown by the F value being is 0.034 and P value as 0.854 showing that the model is insignificant both at 95% and 99% levels of confidence. The regression equation for caregiver practices becomes:

$Y_{compliance} = 4.474 + 0.018_{practices}$

From the equation it means that when caregiver practices increase by 0.018% it results in 1% increase in compliance in the same direction. Caregiver's practices was positive and insignificant to compliance to childhood immunization at 99% level of confidence. From the table 4.14 the Durbin-Watson value was 1.587 which is between 1.5 and 2.5 thus no autocorrelation problem.

Table 4.14: Regression Results for Caregiver practices

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.011[a]	.002	.004	.45715	1.587

a. Predictors: (Constant), Caregivers Practice

b. Dependent Variable: Compliance

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.007	1	.007	.034	.854[b]
	Residual	54.546	261	.209		
	Total	54.553	262			

a. Dependent Variable: Compliance
b. Predictors: (Constant), Caregivers Practice

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.474	.325		13.767	.000
	Caregivers Practice	.018	.096	.011	.184	.854

a. Dependent Variable: Compliance

4.7.4 Regression Results for Access to Health Services

From the model summary table 4.15, R squared was 0.192, this shows that health service availability accounts for 19.2% of variance in compliance. From the ANOVA table the F value is 62.116 and P value 0.00 showing that the model is significant at 99% level. The regression equation for availability of health services becomes:

Y Compliance = 1.508 + 0.669 Availability of health services

From the equation when access to health services increases by 0.669% compliance will change by 1% in the same direction. Caregiver's perception was positive and significant to compliance to childhood immunization at 99% level of confidence. The Durbin-Watson value was 1.748 which is between 1.5 and 2.5 thus no autocorrelation problem.

Table 4.15 Regression for Health Services and Compliance

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.438[a]	.192	.189	. 41089	1.748

a. Predictors: (Constant), Health Services
b. Dependent Variable: Compliance

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	10.487	1	10.487	62.116	.000[b]
	Residual	44.065	261	.169		
	Total	54.553	262			

a. Dependent Variable: Compliance
b. Predictors: (Constant), Health Services

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.508	.385		3.921	.000
	Health Services	.669	.085	.438	7.881	.000

a. Dependent Variable: Compliance

4.7.5 Multiple Regression of variables

From the model summary table 4.16, R squared was 0.372, this shows that independent variables accounts for 37.2% of variance in compliance. From the ANOVA table the relationship is significant, this is shown by F value is 38.208 and P value 0.00 showing that the model is significant at 99% confidence level.

From the coefficient table, caregiver's perception is significant from the coefficient variables: Caregiver practices P=0.780 hence it is not significant. Knowledge of the caregiver P=0.016, hence it is significant at 95% level of confidence. Perception and Health services have P=0.000, hence they are significant at 99% level of confidence.

From the table 4.16 the Durbin-Watson value was 1.786 which is between 1.5 and 2.5 thus no autocorrelation problem.

Forming the regression equation below:

Y compliance =0.313+0.031KN+0.413HS+501PC+0.023CP

Table 4.16: Model summary table for multiple regression

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.610[a]	.372	.362	.36440	1.786

a. Predictors: (Constant), health services, knowledge of caregiver, perception, caregivers practices

b. Dependent Variable: Compliance

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20.294	4	5.073	38.208	.000[b]
	Residual	34.259	258	.133		
	Total	54.553	262			

a. Dependent Variable: compliance

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.313	.441		.709	.479
	Caregivers practices	.023	.083	.015	.279	.780
	Knowledge	.031	.013	.130	2.425	.016
	perception	.501	.063	.425	7.943	.000
	Health services	.413	.081	.270	5.070	.000

a. Dependent Variable: compliance

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

This section contains discussion, conclusions and recommendations of this study

5.1.2 The Influence of Caregivers Level of Knowledge on Compliance to Childhood Immunization Schedule.

The study revealed that caregivers had good knowledge on immunization and immunization schedule; this is because more than half (175) of the caregivers could answer the questions on knowledge on immunization. According to the WHO document from which the questions were adopted, caregivers who were able to answer 60% of questions in this study were considered to have good knowledge in immunization.

The study revealed that caregivers could only identify vaccines based on the diseases they prevent, this is in agreement with a study by Abidoye, and Odeyemi, (2013) and Jisy, Melba, Nisha, Shilpa,and Umarani.,(2013) which established that caregivers were only able to name diseases prevented diseases they vaccinate against. The value of R squared under knowledge was 0.033, this shows that caregiver's level of knowledge accounts for 3.3% of variance in compliance, 96.7% of variance is accounted for by other factors. The Durbin-Watson value was 1.606 which is between 1.5 and 2.5 thus no auto-correlation problem. The correlation for the level of knowledge and compliance is F = 0.181, this shows that the strength of the relationship was positive p value 0.003 at 99% level of confidence. In multiple correlation the values were positive and significant, this is indicates that increase in

caregiver's level of knowledge increases compliance level. From the multiple regression results an increase in caregivers level of knowledge by 0.043% results in a 1% increase in compliance in the same direction. Mouhamed *et al*, (2017) in their research on determinants of complete immunization among Senegalese children aged 12 – 23 months, had similar findings to this study where caregivers' level and knowledge was significant to compliance to full child immunization.

The findings from this study contradict research by Jisy, Melba, Nisha, Shilpa, and Umarani., (2013) who carried out a study on immunization awareness among mothers of children less than five years in Mangalore, India, they found that 30% of mothers had poor knowledge, 43.4% of mothers had the average knowledge, 23.4% mothers had good knowledge, and 3.3% of mothers had excellent knowledge. Overall the study found that there is no significant association between knowledge score and compliance.

The findings of this study show that education is the strongest predictor to childhood immunization, the findings are similar to a study done by Mouhamed, *et a*l., 2017 who found that, an increase in maternal education increases the likelihood of childhood immunization. This could be attributed to the fact that educated caregivers have resources and a higher probability of accessing information on healthcare services. Educated caregivers are more likely to use modern health services, and adopt healthy practices. Educated caregivers are more empowered to exercise authority over their own lives and those of their children.

5.1.3 The influence of caregiver perception on immunization on compliance to childhood immunization schedule

The correlation for the caregiver perception and compliance is 0.540, this shows that the strength of the relationship is positive p value 0.00 this shows that it is significant at 99% level of confidence.This is indicates that increase in caregiver's perception increases compliance to immunization schedule level. The value of R squared under perception of caregivers was 0.292, this shows that caregiver's perception accounts for 29.2% of variance in compliance, 70.8% of variance is accounted for by other factors. The Durbin-Watson value was 1.806 which is between 1.5 and 2.5 thus no auto-correlation problem. An increase of 0.61% in caregiver perception increases compliance by 1%.

The findings from this study are similar to Chris-Otubor *et a*l., (2015) who found that there was incomplete dosages were high for DPT (7.8%), OPV (8.6%) and hepatitis (9.9%). Yellow fever registered the highest prevalence (10.7%), and BCG had the lowest (2.2%). With a view to effectively reducing child mortality, there is need to increasing the overall number of children under 12 months immunized against measles. The study pointed out that 9.5% of children were yet to be immunized even after attaining their first birthday.

The study findings contradicted Bingham *et al*., 2012 who found that a strong will to keep children in a population healthy against vaccine-preventable illnesses is a consistent attribute that influences caregivers to have their children vaccinated. Such findings were also noted by Abidoye, and Odeyemi, (2013) in their research on knowledge, attitude and practice of mothers to childhood immunization in Lagos State, Nigeria, statistics from the study showed that (95.5%) of the mothers do not mind

vaccinating their children and view childhood immunization as important. This is, however, contrary to a study by Kabir *et al*., 2005 where 54% of respondents had a poor attitude towards childhood immunization, the study carried out in Northern Nigeria reviewed attitudes towards immunization and encompassed mothers views of knowledge, perceptions, and beliefs.

From this study 83% of parents did not like the injection method of administration of vaccines this is supported by findings that apart from the side effects of the administered vaccines, parents have to handle swelling and fear of infection at the point of injection and pain that upsets the child during the vaccination process.

5.1.4 The influence of caregivers practices on compliance to childhood immunization schedule

The value of R squared under knowledge was 0.002, this shows that access to health services accounts for 2.0% of variance in compliance, 98.0% of variance is accounted for by other factors. The Durbin-Watson value was 1.587 which is between 1.5 and 2.5 thus no auto-correlation problem. The study found that caregiver practices had a correlation of F value 0.11 and P value 0.854 to compliance to childhood immunization schedule, this shows that caregiver practices has a positive and significant relationship to compliance to childhood immunization schedule. In multiple correlation the values were positive and significant. An increase of 0.018% in caregiver practices increases compliance by 1%.

Similar findings were found by Sadoh and Eregie (2009) in their study in Benin and Nigeria where they pointed out that uptake of vaccines was the highest for OPV0 (96.7%), Hepatitis (93.8%) and BCG (89.5%), at birth. With yellow fever (57.6%) and measles (57.2%) uptake being the lowest.

However contrasting findings were found by Chris-Otubor *et al*., (2015) their study results showed that there was incomplete dosage for DPT (7.8%), OPV (8.6%) and hepatitis (9.9%). Antai (2009) in his research noted that the proportion of mothers who delivered in a hospital setting is a predictor of child immunization uptake. Thus hospital delivery is an important preventive measure against child health outcomes, hence important determinant to full immunization.

On the benefits of immunization it was established that only (31%) were conversant with the benefits of immunization, the low findings can be attributed to low levels of education as shown in the socio-demographic section, clearly implying that the knowledge posed by the caregivers is not enough to ensure they comply with immunization schedule.

The data obtained shows that possession of vaccination card has a strong association with the uptake of childhood immunization, among children whose child health cards were seen by the interviewers, 60% were fully immunized and only 0.2% were unimmunized. Children without vaccination cards at the time of interviewer more likely to be unimmunized. This suggests that the possession of an immunization card assists in reminding caregivers to take their children for scheduled vaccinations, and reduces noncompliance. It could also be that parents who keep the vaccination cards are more careful about immunizations. Partial immunization might not confer immunity, especially in the case of vaccines that require serial dosing, and such children are denied the full benefit of vaccinations.

5.1.5 The influence of access to healthcare services on compliance to childhood immunization schedule

The value of R squared under knowledge was 0.192, this shows that access to health services accounts for 19.2% of variance in compliance, 80.8% of variance is accounted for by other factors. The Durbin-Watson value was 1.748 which is between 1.5 and 2.5 thus no auto-correlation problem. The study found that Health services had a correlation of F value 0.438 and P value 0.0001 to compliance to childhood immunization schedule, showing that availability of health services had a positive and

significant relationship to compliance to childhood immunization schedule at 1% level.

In multiple correlation the values were positive and significant.An increase of 0.669% in access to healthcare results in 1% increase in compliance.

The findings of this study agree with by Abdulraheem *et al.*, (2011) on grounds for incomplete vaccination and reasons for missed vaccinations in children living in rural Nigeria. Access to vaccination health centers was measured according to mothers' testimony, Other components of access to healthcare services include long waiting time at the health facility, lack of vaccines, absence of personnel at the health facility, child ill-health at the time of immunization, lack of information about the days for vaccination, forgetting the days of immunization, long distance walking, mother's illness on the day of vaccination. Similar findings were found by Bingham *et al*., 2012 who concluded that distance to vaccination services, long queue of service at vaccination centers, and delay in service provision had an inverse relation with the caregivers' intention to vaccinate their children.

It emerged that (56%) of the caregivers got information about childhood immunization from health workers. This emphasizes that health workers are a major source of immunization. Which is a result of health workers role in educating mothers during pre and post natal clinics which majority (95.8%) of the female respondents agreed that health education during antenatal clinic influenced their decision to immunize their children. Nurses carry out an important role in assisting caregivers make informed decisions by providing the necessary knowledge.

5.2 Conclusion

From the study findings, it can be concluded that:

1. The level of knowledge was found to positively influence compliance to childhood immunization schedule.

2. An increase in caregiver's perception increases compliance to immunization schedule level.

3. Caregiver practices have a positive and significant relationship to compliance to childhood immunization schedule.

4. Availability of health services had a positive and significant relationship to compliance to childhood immunization schedule.

From the study knowledge, access to health services, and caregiver perception are essential when it comes to compliance to childhood immunization as they had a positive and significant relationship to compliance to childhood immunization schedule.

The study rejects the null hypothesis which says; Caregiver's knowledge, access to health services, perception and practices on immunization have no influence on compliance to childhood immunization schedule, since it was found that all objectives had an influence on compliance to childhood immunization schedule and adopts the alternative hypothesis which is; Caregiver's knowledge, access to health services, perception and practices on immunization have an influence on compliance to childhood immunization schedule.

5.3 Recommendations

5.3.1 Recommendations from the study

Objective 1: To improve the caregivers level of knowledge on immunization; health stakeholders should revamp educational campaigns on immunization. Health stakeholders should concentrate on hiring more Community Health workers to educate the community and improve knowledge of caregivers on immunization. This is so because the study found that health workers were the greatest source of information on childhood immunization.

Objective 2: Perception of caregivers towards compliance to childhood immunization schedule can be improved by training and educating caregivers on the benefits of immunization, information on immunization should be presented to caregivers in an easy and understandable format that promotes compliance.

Objective 3: Caregivers should be trained how to properly interpreter immunization cards, this will greatly help caregivers check their children's immunization status and avoid inappropriately timed or missed immunizations. The issuing of child health cards should be improved, seeing that about 15.7% of children in the study did not have vaccination cards.

Objective 4: To improve access to health services, The Nairobi County Government should ensure health services are accessible and near caregivers as it is essential to immunization. Emphasis on childhood immunization during ANC visits should prioritized since the study found it to have an impact on caregiver's decision to vaccinate their children. The County Government should integrate illness and demographic data with health center records using a unified database to gain better

understanding into the immunization rates of children in informal settlements in Nairobi County, Kenya

5.3.2 Recommendations for further research

Further research can be undertaken to consider the effect of government regulation on compliance to childhood immunization schedule.

Further research should explore how to encourage the completion of all scheduled vaccinations within the first year of a child's life. This is very important given the fact that there is a high proportion of partially immunized children in the country, who are deprived the full benefits of vaccinations.

REFERENCES

Abdulraheem I. S., Onajole A. T., Jimoh A. A. G. and Oladipo A. R. (2011). Reasons for incomplete vaccination and factors for missed opportunities among rural Nigerian children. *Journal of Public Health and Epidemiology 3* (4), 194-203,

Abidoye, A. and Odeyemi, K. (2013) Knowledge, Attitude And Practice of Mothers to Childhood Immunization in Kosofe Local Government Area of Lagos State Nigeria *International Journal of Basic, Applied and Innovative Research 2* (4), 66 – 72.

Adebiyi A. and Ajani A. (2017) Childhood immunization in Nigeria: factors influencing non-compliance *International Research Journals 8* (3) 34-38,

African Population and Health Research Center (2018). *Population and Health Dynamics in Nairobi's Informal Settlements. African Population and Health Research Center, Nairobi (Kenya).*https://aphrc.org/wp-content/uploads/2018/11/Report-The-Nairobi-Cross-sectional-Slums-Survey-NCSS-2000-1.pdf

Antai, D., (2009). Inequitable childhood immunization uptake in Nigeria: a multilevel analysis of individual and contextual determinants. *BMC Infectious Diseases*, 9, 181-191.

Ayebo, E. and Eregie, C. (2009) Timeliness and completion Rate of Immunization among Nigeria children attending a clinic-based Immunization service. *Journal of Health Population and Nutrition* 27(3), 391-395.

Bardenheier B, Yusuf H, Schwartz B, Gust D, Barker L, Rodewald L. (2004). Are parental vaccine safety concerns associated with receipt of measles-mumps-rubella, diphtheria and tetanus toxoids with acellular pertussis, or hepatitis B vaccines by children? *Archives of Pediatrics and Adolescent Medicine;* 158 (6): 569-7

Bingham A, Gaspar F, Lancaster K, Conjera J, Collymore Y, Nguz A.(2012) Community perceptions of malaria and vaccines in two districts of Mozambique. *Malaria Journal*. 11, 39-46

Blessing U. Mberu, T., Catherine K. and Alex C. (2016). An Urbanizing World: Global Report on.Health and health-related indicators in a slum, rural, and urban communities: a comparative analysis. United Nations Centre for Human Settlement Habitat.

Catherine Kyobutungi*, Abdhalah Kasiira Ziraba, Alex Ezeh and YazouméYé

Chege K., (2012)*Child Immunization Coverage in Kiandutu Informal settlements, Thika district,Kenya.* Kenya Demographic and Health Survey (2003). The government of Kenya.

Chris-Otubor, G.O., Dangiwa, D.A., Ior, L.D, & Anukam, N.C.(2015)Assessment of Knowledge, Attitudes, and Practices of Mothers in Jos North Regarding Immunization *Journal Of Pharmacy (e)- 5* (6), 34-45

Djesika D. Amendah, Steven Buigut, Shukri Mohamed. (2014). Coping *Strategies among Urban Poor: Evidence from Nairobi, Kenya* .https://doi.org/10.1371/journal.pone.0083428

Fatima. R., and Chioma .M. (2013) Factors Influencing Compliance with Immunization Regimen among Mothers in Ibadan, Nigeria *Journal of Nursing and Health Science (IOSR-JNHS) 2* (2), 01-09

Funimilayo A (2013). Determinants of full child immunization among 12 – 23 months in Nigeria (master's thesis University of Witwatersrand). https://iussp.org/sites/default/files/event_

Geethu M., Avita R., Sulekha T., Ratna K., and Aby V.,(2016). Barriers to childhood immunization among women in an underprivileged urban area of Bangalore city, Karnataka, India: a qualitative study. *International journal of community medicine and public health*. http://dx.doi.org/10.18203/2394-6040.ijcmph20161622

Ghasemi A, & Zahediasl S. (2012). Normality Tests for Statistical Analysis: A Guide for Non-Statisticians. *International Journal Endocrinology Metabolism,10* (2), 486-489. DOI: 10.5812/ijem.3505

Harmanci, H, Gurbuz, Y, Torun, S, Tumerdem, M and Erturk, T. (2003) Reasons for Non-vaccination during National Immunization days: A case study in Istanbul, Turkey. *Public Health 117* (1), 54-61.

Heba A., Sahar M., & Rabab G. (2016) Knowledge, Attitude,and Practice of Mothers toward Children's Obligatory Vaccination *Journal of Nursing and Health Science (IOSR-JNHS) 5*,(4)22–28

https:// www.who.int/immunization/sage/sage_wg_vaccine_hesitancy_apr12/en/

https://www.who.int/vaccines/questions-and-answers.

Jisy J., Melba R., Nisha. K., Shilpa G. and Umarani. J (2013) Awareness on Immunization among Mothers ofUnder-five Children. International. *Journal Of Innovative Research & Development 2* (6), 620-628.

John Carr E, Clements C.J and Martin Robert M (2000). Behavioral Factors immunization. Geneva: World Health Organization.

Kariuki Arphaxad (2014). *Child Immunization Coverage in Kiandutu Slums, Thika District, Kenya*. Master's Thesis.

Kenya Demographic and Health Survey (2009). Population Census Statistics Ministry of Planning- Government of Kenya

Kimalu P., Nafula N., Manda D.K., Mwabu G. and Kimanyi M.S. (2002). *Situational Analysis of Poverty in Kenya. Nairobi*: Kenya Institute for Public Policy Research and Analysis.

Kimalu P., Nafula N., Manda D.K., Mwabu G. and Kimanyi M.S. (2002). Situational Analysis of Poverty in Kenya. Nairobi: Kenya Institute for Public Policy Research and analysis.

Marjorie A., Roselle M., Romarie A., and Maureen L. (2014) Extent of Compliance to Immunization: Reasons for Non- Continuity and Its Consequences.*CAM Research Journal. 2* (1), 46-68.

Ministry of Health, Government of Kenya, (2004). *Clinical Guidelines: For diagnosis and treatment of common hospital conditions in Kenya*.

Mojoyinola J. K and Olaleye B. A (2012) Physical and psychological factors influencing maternal non-complianc ewith immunization schedule *continental journal of nursing science 4* (2): 37 – 51.

Mouhamed A., Moussa S., Adama F., Ousseynou B., Fatou B., Souleymane M., and Tandakha N., (2017). Determinants of complete immunization among Senegalese children aged 12- 23 months: evidence from the demographic and health survey. *BMC public health*. 17, 1-9.

Mugenda, A., (2008) *Research Methods; Quantitative and Qualitative Approaches* Social Science Research. Nairobi: Acts Press/

Mugenda, O. M., and Mugenda, A. G. (2003). *Research Methods; Quantitative and Qualitative Approaches.* Nairobi: African Centre for Technology Studies

Nath B., Singh J.V., Awasthi S., Bhusan V., and Khumar V. (2007). A Study on Determinants of Immunization Coverage among 12-23 months old children in Urban informal settlements of Lucknow District, India. *Indian J. Med*. *61*, 11 -18.

Nyamongo A. and Taffa N. (2004). The Triad of Poverty, Environment and Child Health in Nairobi Informal Settlements: *Journal of Health and Population in Developing Countries. 10* (4), 295-300.

Odusanya, OO, Alufohai, EF, Meurice, FP and Ahonkhai, VI (2008) Determinants of Vaccination Coverage in Rural Nigeria. *BMC Public Health* 8, 381-396.

Olivia K., Mark D., John R. and Diane L, (2011). Under-immunization in Ohio's Amish: Parental Fears Are a Greater Obstacle than Access to Care, http://pediatrics.aappublications.org/content /128/1/79.abstract**.**

Patience K., Funmilayo D., Seyi O, (2018). Determinants of compliance with child immunization among mothers of children under five years of age in Ekiti State, Nigeria, https://www.emerald.com/insight/content/doi/10.1108/JHR-05-2018-024/full/html

Ramavhoya T., Maputle S. and Lebese T. (2015) Knowledge of Mothers with Regard to Immunisation of Children in Vhembe District, Limpopo Province. *Journal of Human ecology 51(*2), 9-15

Roos M., Fatmah R., Noura A., Rowayah O., Noura A., John S. and Michal G. (2011). Knowledge, Attitude and Practice towards Immunizations among Mothers in a Traditional City in the United Arab Emirates *Journal of Medical Sciences 4* (3), 114-121.

Sadoh A.E. and Eregie C.O., (2009) Timeliness and Completion Rate of Immunization among Nigerian Children Attending a Clinic-based Immunization Service *Journal of Health Population and Nutrition 27* (3), 391–395.

Sekaran, U., and boogie, R. (2011). *Research Methods for Business: A Skill Building Approach. (*5th ed.). Aggarwal printing press, Delhi.

Sheillah Simiyu, Sandy Cairncross & Mark Swilling. (2018). *Understanding Living Conditions and Deprivation in Informal Settlements of Kisumu, Kenya.https://link.springer.com/article/10.1007/s12132-018-9346-3*

Shelly Hoekstra (2014). Alternative *vaccination schedules, parental vaccine decision making and the roles of nurses* Master's Thesis.

Stefanoff, P, Mamelund, S, Robinson, M, Netterlid, E, Tuells, MA, Bersaker, R, Heijbel, H and Yarwood, J (2010) Tracking parental attitudes on vaccination across European countries *Vaccine* 28, 5731-5737.

The burden of disease profile of residents of Nairobi's informal settlements: Results from a Demographic Surveillance System 2008

Tickner S, Leman PJ, Woodcock A. (2006) Factors underlying suboptimal childhood immunization. Elsevier. 24, 7030-7036

United Nations Human Settlements Programme (UN-Habitat). (2003). the Challenge of Informal settlements – Global Report on Human Settlements 2003. Earthscan Publications Ltd, Nairobi.

World Health Organization (2016). Vaccine Hesitancy.

World Health Organization (2018). Truths on Vaccination.

APPENDICES

Appendix I: Consent form

Introduction

My name is Buliva Amugune. I am a student studying master's in Public Health at Kenyatta University. As a requirement by the university, for the completion and award of my degree, I am conducting a study titled: **COMPLIANCE TO CHILDHOOD IMMUNIZATION SCHEDULE AMONG CAREGIVERS OF CHILDREN 0-23 MONTHS IN INFORMAL SETTLEMENTS IN NAIROBI COUNTY, KENYA**

Procedures to be followed

I am going to explain to you about this study and invite you to participate in this study voluntarily. I will use a questionnaire to guide our discussion. Feel free to consult before making any decision. You are free to ask any question or clarification about the research during or after data collection using the contact address provided at the end of this document.

Benefits

There are no direct individual benefits, but your involvement will of great help in finding the extent of the problem of childhood immunization schedule compliance. This information is important in developing future programmes and policies to improve child health.

Risks

There are no risks associated with participating in this study.

Voluntary Participation

Your involvement in this research is completely voluntary. It is your choice whether to participate or not. Whether you choose to take part or not will not affect you in any way. You may discontinue taking part in this study at any point.

Duration

The data collection will only take a period of 45 minutes. During this time, you will only be expected to answer questions as asked by the researcher from the provided questionnaire.

Confidentiality

The identity of those taking part in the research will remain private and confidential. The data collection forms will not bear any personal identifiers. All the data and the information obtained during the study will be used for the sole purpose of meeting the objectives of the study.

Contact Information

If you have any questions, you may contact the Kenyatta University Ethical Review Committee Secretariat on kuerc.secretary@ku.ac.ke/ 020-8710901

Consent Giver statement

The above information regarding my participation in the study is clear to me. The participation will be voluntary, and I can withdraw from the study at any time. I have clearly understood the risks and benefits involved in the study.

Name of Consent giver_____________________________________

Signature _________________ Date________________________

Appendix II: Questionnaire

SECTION 1: BACKGROUND INFORMATION

Relation to the Child

Mother [ ]

Father [ ]

Guardian/ Other [ ]

Respondent age

Less or equal to 25 yrs [ ]

26-30 yrs [ ]

31-35 yrs [ ]

36-39yrs [ ]

40yrs> [ ]

The respondent's highest level of education

Primary level [ ]

Secondary level [ ]

Tertiary level [ ]

University level [ ]

Caregiver's marital status

Single or separated/divorced/widowed **[ ]**

Married **[ ]**

Gender of your child

Male **[ ]**

Female **[ ]**

Age of Child in month(s) _______________

Birth sequence of child _____out of _______

1. Can you tell me what **immunity** is? **[** yes**]** **[** No**]** *(any answer that involves key words **vaccination** and **resistance** is correct)*

2. Name any diseases prevented by childhood immunization? *(Tick any that applies)*

- Measles Whooping Cough Influenza
- Mumps, Diphtheria Hepatitis B
- Rubella, Pertussis, Pneumonia
- Polio Tetenus,

3. Where do you get your information on immunization?

   (i) Media [ ] (ii) Health workers [ ] (iii) Peers [ ] (iv)Internet [ ] (v) Other [ ]

4. Do you have a child vaccination card for your child? Yes [ ] No [ ]

   If yes request to View it_______________

Caregivers Level of Knowledge Section

Opinion Statements	**Strongly disagree**	**Disagree**	**Not sure**	**Agree**	**Strongly agree**
Vaccination should be given according to schedule					
Is it important for children to get recommended vaccines					
Vaccines are safe for children					
Would you recommend others to vaccinate their children					
A child with HIV should be vaccinated					
Measles, Mumps, Rubella vaccine is administered to children at 15-18 months					
Measles can be prevented by immunization					

Caregivers Perception Section

Opinion Statements	**Strongly disagree**	**Disagree**	**Not Sure**	**Agree**	**Strongly agree**
Vaccination is necessary even when a disease in no longer prevalent					
Children who complete immunization have a stronger immune system					
It is better for a child to develop immunity by getting vaccination rather than by getting sick?					
Immunization at the right time is more effective in strengthening a child's immune system					
Immunization services in my area is satisfying					

5. Do you know someone who had a bad reaction to a vaccine, which made you reconsider vaccination? Yes **[ ]** No **[ ]**
6. Is there a mode of vaccination you dislike? Yes [ ] No [ ]. Which one **………………..**
7. Has your community ever refused to accept a vaccine? **Yes [ ] No [ ] Don't Know [ ]**
8. Do you know of a child with a serious disease/ disability because they were not vaccinated? **Yes [ ] No [ ]**

Caregiver Practices Section

Opinion Statements	**Vaccinated at the stipulated time**	**Vaccinated but not at the stipulated time**	**Incomplete doses**	**Not vaccinated**
BCG (At birth)				
OPV (At birth, 6wk, 10wk, and 14wk)				
DPT (6 wk, 10wk, and 14wk)				
Pneumococcal Vaccine (6wk, 10wk, and 14wk)				
Measles Mumps Rubella (MMR) (9 months 18 months)				
Yellow fever. (9 months)				

Access to health services section

Opinion Statements	**Strongly disagree**	**Disagree**	**Not sure**	**Agree**	**Strongly agree**
Health workers are very friendly when I take my child for immunization					
It takes a short time to be attended to when I take my child for immunization					
Iam always given a reminder as to when I should visit the health facility to take my child for immunization					
The health facilities where I take my child for immunization are near and accessible.					
The place where one delivers the child will have an influence on immunization of the child					
I am able to freely discuss my fears and concerns about vaccination shots with my child's health provider					

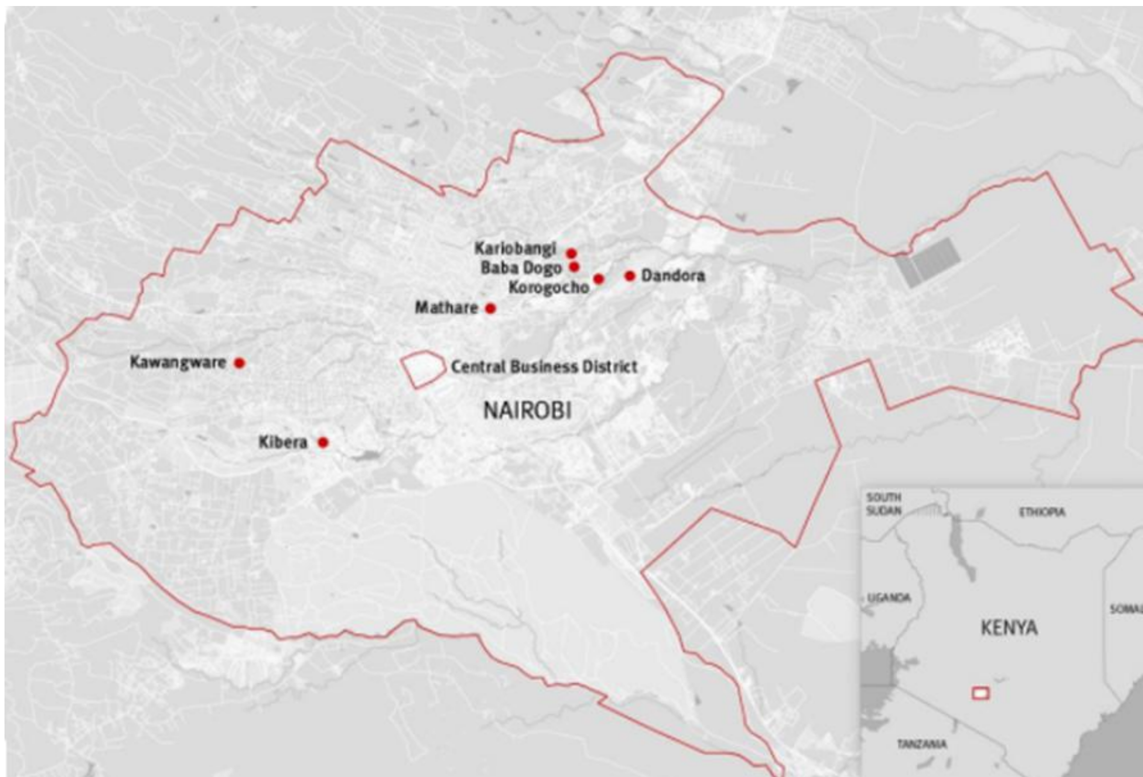
Caregiver Compliance Section

Opinion Statements	Strongly disagree	Disagree	Not sure	Agree	Strongly Disagree
I adhere to the dates written on the vaccination card	0.8%	0.8%	0.0%	23.2%	75.3%
I do not mind taking time off my normal schedule to take my child to be vaccinated	0.4%	5.3%	0.0%	11.8%	82.5%
I do not need to be reminded to take my child for Immunization	0.0%	2.3%	2.7%	12.5%	82.5%
I am concerned that caregivers in my community delaying or refusing to immunize their children are putting my child at risk of diseases	0.0%	0.4%	1.5%	24%	74.1%
Reports I have heard or read in the media/ social media make me reconsider vaccinating my child	0.4%	0.0%	3.8%	24.7%	70.7%

Appendix III: Proposed Vaccination Schedule as proposed by Ministry of Health Kenya.

Vaccine	**Diseases that are Prevented**	**Age at Vaccination**	**Section of the Country**
BCG	Tuberculosis	At Birth	All
OPV	Polio	At birth, 6wk, 10wk, and 14wk	All
DPT-Hep B- Hib	Diptheria, Pertussis, Tetenus, Influenza, Hepatitis B	6 wk, 10wk, and 14wk	All
Pneumococcal vaccine (PCV 10)	Pneumonia, Meningitis	6 wk, 10wk, and 14wk	All
Measles Rubella Vaccine (MMR)	Measles, Mumps, Rubella	6 months (outbreak) 9 months 18 months	All

Appendix IV: Map of Nairobi County



Adopted from: Nairobi County Urban Slum development, 2015

Appendix V: Kenyatta University Approval of Research Proposal

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke
P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Internal Memo

FROM: Dean, Graduate School DATE: 1st April, 2019

TO: Mr. Buliva Ponventras Amugune REF: Q57/CTY/PT/33376/2014
C/o Department of Community Health & Epidemiology

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

==

This is to inform you that Graduate School Board, at its meeting on 27th March, 2019, approved your Research Proposal for the M.P.H. Degree entitled, "Compliance to Childhood Immunization Schedule among Caregivers of Children 0-23 Months in Informal Settlements in Nairobi County, Kenya."

You may now proceed with your Data collection, subject to clearance with the Director General, National Commission for Science, Technology & Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

KENYATTA UNIVERSITY
OFFICE OF THE DEAN
25 APR 2019
GRADUATE SCHOOL
P.O. Box 43844-00100 NAIROBI

Thank you.

JULIA GITU
FOR: DEAN, GRADUATE SCHOOL

CC. Chairman, Community Health & Epidemiology Department

Supervisors:

1. Dr. Mary G. Wangui Muiruri
C/o Department of Community Health & Epidemiology
Kenyatta University

2. Dr. Stanley Murigi Kimuhu
C/o Department of Pediatrics & Child Health
Kenyatta University

Appendix VI: Kenyatta University Research Authorization

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 020-8704150

Our Ref: Q57/CTY/PT/33376/2014

DATE: 1st April, 2019

Director General,
National Commission for Science, Technology and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

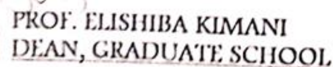
RE: RESEARCH AUTHORIZATION FOR MR. BULIVA PONVENTRAS AMUGUNE – REG. NO. Q57/CTY/PT/33376/14

I write to introduce Mr. Buliva Ponventras Amugune who is a Postgraduate Student of this University. He is registered for M.P.H. degree programme in the Department of Community Health & Epidemiology.

Mr. Buliva intends to conduct research for a M.P.H. thesis Proposal entitled, "Compliance to Childhood Immunization Schedule among Caregivers of Children 0-23 Months in Informal Settlements in Nairobi County, Kenya."

Any assistance given will be highly appreciated.

Yours faithfully,



PROF. ELISHIBA KIMANI
DEAN, GRADUATE SCHOOL

Appendix VII: Kenyatta University Ethical Review Approval

KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: kuerc.chairman@ku.ac.ke

Website: www.ku.ac.ke

P. O. Box 43844,
Nairobi, 00100
Tel: 8710901/12

Our Ref: KU/ERC/ APPROVAL/VOL.1 (270)

Date: 20th May, 2019

Buliva Ponventras Amugune
P.O Box 43844, 00100
Nairobi.

Dear Mr. Amugune

APPLICATION NUMBER PKU/1021/I1071: COMPLIANCE TO CHILDHOOD IMMUNIZATION SCHEDULE AMONG CAREGIVERS OF CHILDREN 0-23 MONTHS IN INFORMAL SETTLEMENTS IN NAIROBI COUNTY, KENYA

1. **IDENTIFICATION OF PROTOCOL**

The application before the committee is with a research topic **"Compliance to Childhood Immunization Schedule among Caregivers of Children 0-23 Months in Informal Settlements in Nairobi County, Kenya"**. Received on 24th April, 2019 and discussed on 14th May, 2019

2. **APPLICANT**

Buliva Ponventras Amugune

3. **SITE**

Nairobi County, Kenya

4. **DECISION**

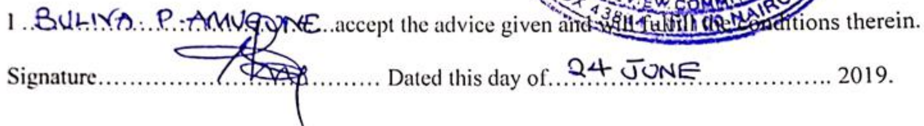
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines and **APPROVED that the research may proceed ON CONDITION that you incorporate its advice as below.**

5. **ADVICE/CONDITIONS**

i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this committee immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

PROF. JUDITH KIMIYWE
CHAIRMAN ETHICS REVIEW COMMITTEE



I ..BULIYA P. AMUGUNE..accept the advice given and will fulfill the conditions therein.

Signature........................... Dated this day of...24 JUNE.................. 2019.

cc.

DVC-Research Innovation and Outreach

Appendix VIII: National Commission for Science, Technology and Innovation

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone +254-20-2213471,
2241349,3310571,2219420
Fax +254-20-318245,318249
Email dg@nacosti.go.ke
Website www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref No. **NACOSTI/P/19/69160/30235**

Date **24th May, 2019**

Ponventras Buliva Amugune
Kenyatta University
P.O. Box 43844-00100
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Compliance to childhood immunization schedule among caregivers of children 0- 23 months in Informal Settlements in Nairobi County, Kenya"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **23rd May, 2020.**

You are advised to report to **the County Commissioner, the County Director of Education and the County director of Health Services, Nairobi County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

Appendix IX: Kenyan Immunization Card

BCG VACCINE: at birth	**Date Given**	**Date of next visit**
(Intra- dermal left fore arm)		
Dose:(0.05mls for child below 1 year)		
Dose:(0.1mls for child above 1 year)		
BCG-Scar Checked	Date Checked	
PRESENT		
ABSENT		Date BCG Repeated

IPV (Inactivated Polio Vaccine)		
IPV (0.5ml) Dose at 14 weeks Intramuscularly in the right outer thigh 2.5 cm (2 fingers apart) from the site of PCV10 injection		

DIPHTHERIA/PERTUSSIS/TETANUS/HEPATITIS B/HAEMOPHILUS INFLUENZA Type b	Date given	Date of next visit
Dose:(0.5mls) Intra Muscular left outer thigh		
1st Dose at 6 weeks		
2nd Dose at 10 weeks		
3rd Dose at 14 weeks		

POLIO VACCINE: (Bivalent Oral Polio Vaccine(bOPV)	Date Given	Date of next visit
Dose:2 drops orally		
Birth Dose at birth or within 2wks		
1st Dose at 6 weeks		
2nd Dose at 10 weeks		
3rd Dose at 14 weeks		
PNEUMOCOCCAL VACCINE	Date given	Date of next visit
Dose: (0.5mls) intramuscular right outer thigh		
1st Dose at 6 weeks		
2nd Dose at 10 weeks		
3rd Dose at 14 weeks		
ROTA VIRUS VACCINE (ROTARIX)	Date given	Date of next visit
1.5 mls administered orally, slowly		
1st Dose at 6 weeks		
2nd Dose at 10 weeks		

MEASLES RUBELLA VACCINE (MR) at 6 months; in the event of a measles rubella outbreak or HIV Exposed children (HEI)	Date Given
Dose; (0.5m/s) subcutaneously right upper arm	
MEASLES RUBELLA VACCINE (MR) at 9 months	Date Given
Dose; 0.5m/s) subcutaneously right upper arm	
MEASLES RUBELLA VACCINE (MR) at 18 Months	Date Given
Dose; 0.5m/s) Subcutaneously right upper arm	
YELLOW FEVER VACCINE at 9 months**	Date Given
Dose; (0.5m/s) Intra Muscular left upper deltoid	