

**FACTORS INFLUENCING UPTAKE OF POLIO
VACCINE AMONG CHILDREN UNDER 5 YEARS IN
BANADIR, SOMALIA**

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**Factors Influencing Uptake of Polio Vaccine among Children Under
5 Years in Banadir, Somalia**

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Science in Public health in the Jomo Kenyatta University of
Agriculture and Technology**

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DECLARATION

This theses is my original work and has not been presented for a degree in any other University

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This theses has been submitted for examination with our approval as University Supervisor.

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DEDICATION

This Thesis is dedicated to my mother Khadija Sheikh Farah for her passion as evidenced by her commitment to educating her children in pursuit of knowledge despite the limited resources coupled with competing needs. Secondly I dedicate this piece of work to my lovely wife Sahra Osman Nur and our children for their continuous support. I could not have done it without you!

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TABLE OF CONTENT

DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENT	v
LIST OF TABLES	x
LIST OF FIGURES	xi
LIST OF APPENDICES.....	xiii
ABBREVIATIONS	xiv
DEFINITION OF TERMS	xv
ABSTRACT	xvi
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background information	1
1.2 Problem statement	2
1.3 Justification	3
1.4 Objectives	4
1.4.1 Main objective	4
1.4.2 Specific objective	4

1.5 Research question.....	4
1.6 Scope.....	4
CHAPTER TWO	5
LITERATURE REVIEW	5
2.1 Overview of immunization	5
2.3 Socio economic factors influencing polio vaccination.....	6
2.3.1 Gender	6
2.3.2 Level of education.....	7
2.3.3 Economic level	7
2.4 Cultural beliefs and practices	8
2.5 Conflicting priorities.....	8
2.6 Level of awareness	9
2.6.1 False contraindications	9
2.6.2 Knowledge on immunization.....	9
2.6.3 Attitude and behaviour	11
2.6.4 Fear of Side effects	11
2.7 Infrastructure and technological factors	12
2.7.1 Hospital facility.....	12
2.7.2 Cold storage	13

2.8 Research gaps.....	13
2.9 Conceptual framework.....	14
CHAPTER THREE	15
METHODOLOGY	15
3.1 Study area.....	15
3.2 Study design.....	15
3.3 Study population.....	16
3.4 Sample size determination	16
3.5 Sampling techniques: cluster sampling	16
3.6 Data collection tools	17
3.7 Piloting.....	17
3.8 Method of data collection	18
3.9 Inclusion and Exclusion criteria	18
3.10 Data Analysis and Presentation.....	18
3.11 Ethical consideration	18
CHAPTER FOUR.....	19
RESULTS.....	19
4.1 Caregiver socio demographic information.....	19
4.2 Level of awareness of caregivers on Polio campaign.....	20

4.3 Caregivers knowledge and attitude towards OPV	21
4.4 Caregiver health seeking behaviours	26
4.5 Level of awareness factors influencing polio vaccine uptake.....	30
4.6 Socio economic and cultural factors influencing polio vaccine uptake	31
4.7 Healthcare service related factors.....	33
4.8 Association between healthcare service related factors with polio vaccine uptake	34
CHAPTER FIVE	36
DISCUSSION.....	36
5.1 Introduction.....	36
5.2 Socio demographic characteristics	36
5.3 Health seeking behaviour.....	37
5.4 False Contraindications.....	38
5.5 Knowledge and awareness on OPV	38
5.6 Attitude towards OPV.....	38
5.7 Support on OPV	39
5.8 Healthcare service related factors.....	40
CHAPTER SIX.....	41
CONCLUSION AND RECOMMENDATION	41
6.1 Conclusion	41

6.2 Recommendation.....	41
REFERENCES	42
APPENDICES.....	48

LIST OF TABLES

Table 4.1: Caregiver socio demographic information.....	19
Table 4.2: Support on OPV	24
Table 4.3: Most trusted source of information on child health.	28
Table 4.4: Model Summary.....	30
Table 4.5: Hosmer and Lemeshow Test.....	30
Table 4.6: Variables in the Equation.....	31
Table 4.7: Model summary.....	32
Table 4.8: Hosmer and Lemeshow Test.....	32
Table 4.9: Variables in the Equation.....	32
Table 4.10: cross tabulation of healthcare service related factors and polio vaccine uptake.....	34

LIST OF FIGURES

Figure 2.1: Conceptual framework.....	14
Figure 3.1: Map of Banadir districts depicting number of polio cases per districts..	15
Figure 4.1: Knowledge of the last polio vaccine.	20
Figure 4.2: Preferred venue for vaccination.....	21
Figure 4.3: Causes of polio.	22
Figure 4.4: Concern of polio contraction among caregivers.	22
Figure 4.5: Effectiveness of polio vaccine in preventing polio.....	23
Figure 4.6: Safety of polio vaccine.....	23
Figure 4.7: Reasons why polio vaccine is unsafe.....	24
Figure 4.8: Frequency of polio vaccination.	25
Figure 4.9: Reasons for failed vaccination against polio.....	26
Figure 4.10: Consultation of health practitioners on child health.	26
Figure 4.11: Consultation of relatives and neighbours on child health.	27
Figure 4.12: Consultation of Imams/ Madrassa teachers on child health.	27
Figure 4.13: Consultation for health services.....	28
Figure 4.14: Presence of immunization cards.	29
Figure 4.15: Support of routine immunization from family.....	29
Figure 4.16: Main fear against vaccination.....	30

Figure 4.17: Nearest health facility.33

Figure 4.18: Availability of vaccines.....33

LIST OF APPENDICES

Appendix I: Map of study area.....	48
Appendix II: Consent to participate in the study	49
Appendix III: Questionnaire	50
Appendix IV: Application for proposal approval by ethicalreview committee.....	60
Appendix V: ERC certificate	62
Appendix VI: Request to conduct a pilot study in Hodon and Heliwa districts of Banadir region.....	63
Appendix VII: Authorization to conduct a pilot study in Hodon and Heliwa districts of Banadir region	64

ABBREVIATIONS

CDC	Centre for Disease Control
CIMCI	Community Integrated Management of Childhood Illness
CSA	Central Statistical Agency
EPI	Expanded Program of Immunization
FMOH	Federal Ministry of Health
KNBS	Kenya National Bureau of Statistics
OPV	Oral Polio Vaccine
WPV	Wild Polio Virus
WHO	World Health Organization
UNICEF	United Nations Children’s Fund

DEFINITION OF TERMS

Immunization:	Is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine
Polio Coverage:	The rates of immunization against polio
Polio eradication:	The complete prevention of polio
Polio:	Is an infectious disease caused by the poliovirus.
Uptake:	The process of receiving the polio vaccine given in drops

ABSTRACT

Lack of vaccination against diseases is a major cause of morbidity and mortality among children below the age of 5 years. Therefore the WHO made a commitment to eradicate polio in the world through the GPEI. The fight has been successful however polio outbreaks have been reported in Afghanistan, Nigeria and Somalia. In addition there is low immunization coverage which could potentially trigger the resurgence of polio. Therefore the main objective of this study was to investigate factors influencing polio vaccination among children under 5 years in Banadir, Somalia. A cross sectional study design was adopted where quantitative data was collected using a semi structured questionnaire by two data clerks who had experience on Expanded Program of Immunization. Multi stage sampling was used in sampling. Banadir region was first divided into 8 clusters (i.e. the 8 districts in Banadir region). Two districts namely Hodon and Heliwa were conveniently selected due to the reported high cases of polio outbreaks. Then based on population proportional distribution 257 and 128 Caregivers or mothers were randomly selected from Hodon and Heliwa districts respectively. The data was analysed using Statistical Package for Social Scientists (SPSS version 20.0). Regressions analysis was done to determine the interactions between the independent variables on dependent variables. The regression analysis was done at 95% confidence level. From the results 48% of the children had received 4 Polio doses, however the rate was very low compared to the national target of 70%. A high percentage of caregivers (60%) were not concerned that their children can contract polio while at least 40% of the caregivers were concerned. Furthermore only 35% of caregivers were aware that polio is caused by a virus. Level of awareness was found to influence polio vaccine uptake. Socioeconomic and cultural factors found to influence polio vaccine uptake were care givers education level ($p= 0.042$) and healthcare information seeking behaviours ($p=0.035$). There was significant association between healthcare related factors and polio vaccine uptake.

CHAPTER ONE

INTRODUCTION

1.1 Background information

The first outbreak of polio was reported in Europe in the 19th century, and in USA polio outbreak was first reported in 1843. Due to this being a public health concern the World Health Assembly of the World Health Organization (WHO) made a decision to eradicate polio at a global level and between 1988 and 2009 the global incidence of polio reduced by 99% from about 350,000 cases to 1606 cases with the rapid decline being running up-to 2000 after which the rates stagnated (WHO, 2012). Since the year 2004 the polio cases have remained above 1000 and in countries such as Pakistan, India, Nigeria and Afghanistan the transmission of polio have remained uninterrupted (Wassilak, Orenstein, & Wassilak, 2014).

In Africa Countries such as Angola, have managed to prevent the transmission of Wild Polio Virus (WPV)(Patel *et al.*, 2012). However Nigeria marks as one of the countries where polio is still endemic. Furthermore In 2014 4 cases of polio were reported in Nigeria and countries across the Lake Chad basin region i.e Cameroon, Niger, Central African Republic and Chad (WHO, 2018a). In the horn of Africa the last case of polio was reported in Central Somalia in 2014. However interventions are still being implemented to make Africa a polio free continent (WHO, 2015).

In Somalia polio outbreak was confirmed in May 2013 when the first case presented in a two-year-old girl from Mogadishu, quickly spread, affecting 194 people by the end of 2013. Furthermore five new cases of polio were reported in 2014. Additionally on on 11th August 2014 the latest case of wild polio virus type 1 (WPV1) with onset of paralysis was reported in Hobyo district of Mudug province, central Somalia (Global Polio Eradication Initiative, 2015).

The outbreaks of polio in Somalia have been attributed to several factors. For instance the political landscape in Somalia has been characterized by insecurity and instability. Furthermore the lack of a functioning government in Somalia for the last two decades has greatly affected the health system and consequently immunization against polio. For instance the Expanded Program of Immunization that began in Somalia in 1978 was significantly affected by the civil war of 1988-1992 (Kamadjeu *et al.*, 2011). Furthermore based on a UNICEF report the national coverage of vaccination was below 70% with polio vaccination coverage being at 49% by 2011 (UNICEF & WHO, 2011). In addition the infant mortality and under 5 mortality rates in Somalia were still high at 108 and 180 per 1000 live births.

Health services in Somalia are run by the local government and humanitarian agencies, the immunization program is supported by UNICEF Somalia, WHO Somalia and 40 Non-Governmental Organisations (FMOH of Ethiopia, 2004). For instance In 2008 WHO and UNICEF supported the adoption of Reaching Every District (RED) strategy aimed at strengthening the EPI in Somalia (Kamadjeu *et al.*, 2011). Immunization schedule for Somalia includes the 6 antigens of EPI, OPV dosage at birth and vitamin A dose at 6 months (FMOH of Ethiopia, 2004). The low coverage could potentially trigger the resurgence of polio. The main reasons that have been cited for under vaccination have been associated to immunization services and parental knowledge and attitude (Favin *et al.*, 2012). However other reasons that could potentially influence polio vaccination are still not well understood. Therefore the basis of this study is to help understand factors that will potentially influence the uptake of polio vaccine in Banadir, Somalia.

1.2 Problem statement

The 2013-2014 polio outbreak in Somalia affected about 200 people with a big percentage being children. This outbreak was confirmed in May 2013 when the first case was reported in Mogadishu. In Somalia only about 33% of children are routinely vaccinated (UNICEF, 2015), this results to a low herd immunity and therefore potential for resurgence of polio in Somalia. On 11th August 2014, a case of wild polio virus type 1 (WPV1) with onset of paralysis was reported in Hobyo

district of Mudug province, central Somalia (Global Polio Eradication Initiative, 2015).

There is inadequate information on the causes of partial vaccination among children. The reasons for the partial uptake are not well understood (Abdulraheem & Onajole, 2011). Much of the information available is on medical contraindications and issues relating to the accessibility of vaccination (Hull *et al.*, 2001; Yawn *et al.*, 2000). Immunization and parental knowledge and attitude have been cited to be the major reasons for partial immunization, however studies should be well planned so as to get full details on the causes of partial vaccination. In addition local reviews remains important in understanding the reasons for partial vaccination (Favin *et al.*, 2012). There is therefore a need to determine the factors influencing polio vaccination in Banadir, Somalia.

1.3 Justification

The Somalia government and other stakeholders are implementing strategies aimed at reducing the polio cases. For example the WHO and UNICEF have been supporting the RED strategy. Equally the Somalia government has been implementing door to door vaccination as well as mobile clinics. Despite the efforts there are reported cases of polio outbreaks in the country. Therefore this study aims at unearthing the deterrents to a polio free country. Additionally this study will potential aid in identifying factors influencing polio vaccine uptake and based on the recommendations of the study organisations such as UNICEF, WHO and Ministry of Health Somalia will be able to implement targeted interventions. Consequently the implementation of recommendations will help reduce incidences of polio outbreaks in Somalia.

1.4 Objectives

1.4.1 Main objective

To investigate factors influencing uptake of polio vaccination among children under 5 years in Banadir, Somalia.

1.4.2 Specific objective

- 1) To assess the level of awareness of polio vaccination uptake among children under 5 years in Banadir region.
- 2) To determine socio-economic and cultural factors influencing polio vaccine uptake uptake among children under 5 years in Banadir region.
- 3) To determine healthcare service related factors influencing polio vaccine uptake uptake among children under 5 years in Banadir region.

1.5 Research question

- 1) What is the level of awareness in polio vaccine uptake in Banadir region.
- 2) What are the socioeconomic and cultural factors influencing polio vaccine uptake in Banadir region?
- 3) What are the healthcare service related factors influences polio vaccine uptake in Banadir region?

1.6 Scope

The study will be carried out in Banadir region. Two districts out of the 17 districts with the highest cases of polio reported will be targeted. The study will focus on caregivers who have at least one child under 5 years with completed or zero dose.

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview of immunization

At the global level the first commitment to fight polio was declared in 1988 by the World Health Assembly of the WHO which aimed to eradicate polio by 2000 (WHO, 2012). The declaration led to the launch of the Global Polio Eradication Initiative (GPEI) which by 2010 was the largest internationally coordinated public health project (Linkins, Sutter, Aylward, & Thompson, 2010). In the period between 1988 to 2013 the rates of polio reduced from 350,000 cases to about 407 cases. Currently about 80% of the world population lives in polio free areas. Four regions certified to be polio free are; Europe, the Americas, South East Asia and Western Pacific. Globally only Nigeria, Pakistan and Afghanistan remain as polio endemic countries (CDC, 2017). In 1999 polio virus type 2 was completely eradicated and the last case of polio virus type 3 was reported in 2012 in Nigeria. India arguably one of the most technically challenging country succeeded in stopping polio in 2011 resulting with the entire South East Asia region being declared as Polio free in March 2014 by the WHO (WHO, 2019).

In Africa polio was paralysing 1000 children per day, this was before the launch of the GPEI. In 2014 4 cases of polio were reported in Nigeria and countries across the Lake Chad basin region i.e Cameroon, Niger, Central African Republic and Chad. In response vaccination coverage was intensified in the region and equally steps to strengthen and improve disease surveillance were implemented (WHO, 2018a). In 2017 2 cases of poliovirus type 2 were reported in Congo with factors such as insecurity and low immunity among populations influencing the control of the outbreak. The insecurity has led to about 4.1 million internally displaced persons (WHO, 2018b).

In most African countries the immunization coverage is still low. For instance despite the successful improvements in the accessibility of health facilities in Ethiopia, vaccination coverage remains at 23.4% thus not all children have benefited

from the benefits arising from vaccination. Due to the underutilization of vaccination programs Ethiopia records a higher infant and under 5 mortality rates that account for 59 and 88 deaths per 1000 live births, respectively (CSA, 2011). The vaccination coverage in Ethiopia is much lower compared to other African countries like Kenya 57.7 % (Obonyo, 2008), Malawi 51 % (Munthali, 2007), Uganda 68 % (Odiit & Amuge, 2003) and other countries like India (39 %) (Banerjee *et al*, 2010), Brazil 47 % (Barreto & Rodrigues, 1992) and Pakistan 71.9 % (Shaikh *et al*, 2010).

In Somalia polio outbreak was confirmed in May 2013 when the first case presented in a two-year-old girl from Mogadishu, quickly spread, affecting 194 people by the end of 2013. Furthermore five new cases of polio were reported in 2014. Additionally on 11th August 2014 the latest case of wild polio virus type 1 (WPV1) with onset of paralysis was reported in Hobyo district of Mudug province, central Somalia (Global Polio Eradication Initiative, 2015). Since 2014 no polio case has been reported in the region though the risks are still high due to substantial surveillance, insecurity, immunization gaps and population movements. However in February 2018 there was an outbreak of vaccine derived polio virus type 2 and as a result response was mounted to prevent the spread of the virus to neighbouring countries(WHO, 2018c).

2.3 Socio economic factors influencing polio vaccination

2.3.1 Gender

Gender according to WHO refers to the communally constructed roles, activities and attributes that defines one as either a woman or a man. Being a female has been associated with poor health outcomes in infant and young children (Antai, 2009).In some areas such as South Asia and India more girls are not vaccinated unlike the boys. Moreover the few who are vaccinated are vaccinated at later times than their male counterparts (Paul & Chaudhuri, 2007). The decision to vaccinate a child is also widely influenced by the gender of the parents. Some husbands may prohibit their wives from taking their children for immunization (CIMCI, 2005).

2.3.2 Level of education

Education level is a major contributor to children health and well-being. Studies have shown strong correlation between knowledge on vaccination and improved health outcome of children. Low parental education has been associated with poor health outcomes in most children (Jani *et al.*, 2008). In Nigeria high awareness levels among educated mothers increases the chances of their children enjoying the benefits of full immunization (Mosiur & Sarker, 2010). In Ethiopia mothers with low levels of education are equally not aware of the vaccination schedule. Most of them postpone the child immunizations dates and some completely avoid it because of ignorance (Tadesse *et al.*, 2009). Most mothers also perceive vaccination as a way of getting incentives from health facilities (Etana, 2012). A study in Bangladesh has shown that mothers who have been exposed to social media have greater chances of vaccinating their children unlike mothers who have not been exposed to social media (Mosiur & Sarker, 2010). On the contrary some studies have found no correlation between educational level of parent and the vaccination status of their children. For instance in Gambia 29% of urban based mothers and 48% in the rural areas are not aware of the diseases their children are being vaccinated against, however a valued 90% of children in that area are vaccinated nationally (Leach & fairhead, 2008).

2.3.3 Economic level

Low income parents have been victims of high mortality rates of children who have not been vaccinated (Kusima *et al.*, 2010). Income levels have also been associated with the place of delivery for most mothers (Cayan *et al.*, 2014). For instance mothers who deliver at home due to lack of maternal fee never get the chance of being taken through the vaccination schedule by health practitioners and as a result the vaccination of their children is highly hampered. Mothers delivering in health facilities have a potential chance of following the immunization schedule to the latter. Income status also affects the ability of some households to reach the hospital facilities in case such facilities are far from their residence (Mohamud *et al.*, 2014). Studies in Bangladesh and southern Ethiopia have shown that rich households are more likely to vaccinate their children as compared to poorer families. A study in

Guinea reported public lack of vaccines which forced patients and parents to opt for private health facilities (Milimouno *et al.*, 2006). When low income parents miss out on the vaccination after sacrificing their working hours and others distance, most of them are likely to return for the vaccination and even subsequent vaccines (Milimouno *et al.*, 2006).

2.4 Cultural beliefs and practices

In some communities, taboos and culture forbid vaccination believing it's a bad omen. Some religions especially the Islamic do not vaccinate their children (Gyimah, 2007). For instance in Pakistan communities are swayed by anti – polio vaccination propaganda spread by religious clerks and terrorist groups (Mushtaq *et al.*, 2015). Equally based on a study conducted in Nigeria it was concluded that cultural beliefs influenced health seeking behaviours of communities and consequently influencing vaccination (Dalhatu & Ghani, 2015). Somalia being an Islamic state is largely affected by these religious beliefs. In addition, traditional gatherings and ceremonies like weddings and funerals last up to a week in some communities. This may lead to mothers missing out on vaccination. In many traditional cultures, families refuse to take the baby out for vaccination during a period of post-partum seclusion.

2.5 Conflicting priorities

Studies done in Bangladesh (Uddin *et al.*, 2008) 1990) Guinea (Milimaino *et al.*, 2006) and other countries cited mothers' conflicting priorities as a major cause of under-immunization. Most families are made of large family sizes with a large number of children in the family being below 5 years. Mothers have a significant role in the family in taking care of the young ones and placing food on the table each day. A study in Dhaka for instance noted that mothers are engaged in two or more jobs which is overwhelming. It's therefore difficult for most mothers to travel long distance to hospital facilities and to make long queues waiting for the vaccine yet they still need to work to feed their families at the end of the day. Another conflicting priority arises when the mother is supposed to take care of other sick children as opposed to taking this one who is not sick for a vaccination. Due to the large family

size mothers are also not able to choose who to prioritize for the vaccination and who not to (Mesganaw *et al.*, 2014).

2.6 Level of awareness

2.6.1 False contraindications

Inadequate awareness has led to fear among health workers who consequently fail to administer vaccines to some children. Among false beliefs and fears is that children who are sick and underweight should not be vaccinated, children should not receive multiple vaccinations at the same time and children over 1 year should not be vaccinated against measles (WHO, 2018c). Based on a study done in Somalia health workers delayed vaccinating a sick child since they feared being blamed in case the health of the child deteriorated (Ministry of Health and Labour, 2009). Based on a study done in Cape town South Africa a valued 5.4% of children below 5 years had incomplete immunizations, the incomplete immunization was attributed partly to false contraindications on immunization by health workers (Jacob & Coetzee, 2015). These false contraindications therefore reduce the efficiency of the immunization programs and consequently result to low herd immunity. There is need to reduce missed chances for immunization by training health workers to correct misconceptions on false contraindications about vaccination (Onyiriuka, 2009).

2.6.2 Knowledge on immunization

Knowledge on the importance of vaccination plays a big role in decision making at the family level for parents to vaccinate their children (Lorenz & Khalid, 2012). The information on importance of vaccination should be passed to people by the health practitioners, additionally the practitioners should be able to build a relationship based on trust with the patients (Ozawa & Stack, 2013). A trust based relationship with patients will help to ensure effective communication. Based on a study the main reason for defaulting was inadequate knowledge among mothers on immunization (Oku *et al.*, 2017). In a study done in Benin, Nigeria the default rate was 27.6% and this was associated with inadequate knowledge among mothers on immunization (Onyiriuka, 2009). Based on a study done in Ethiopia the vaccination coverage for

three doses of DPT and Polio were 36.5% and 44.3% respectively, among the recommendation for improving the coverage for vaccination was deploying and strengthening the Women's Development Army (WDA) initiative under public health extension aimed at promoting communication among mothers on issues such as immunization (Mohamud *et al.*, 2014).

Effective public health communication strategy is very crucial when it comes to public health related issues such as vaccination. In 2007 controversial rebel religious leaders in Khyber Pakhtunkhwa and Federally Administered Tribal Areas (FATA) claimed that the polio vaccine was a plan hatched by western countries to sterilize Muslims (Hameed, 2007). Some religious leaders also claimed that polio vaccination is un-Islamic and if death occurred due to lack of vaccination one became a martyr (Hameed & Jahalat, 2007). Unfortunately due to inadequate public health communication 24,000 children were not vaccinated against polio in Khyber Pakhtunkhwa and Federally Administered Tribal Areas. The lack of trust in the health workers were also demonstrated when they became a target during the polio awareness campaigns (Walsh, 2007). Based on a study a projected 75% of the reasons why people do not take their children for vaccination could be countered by use of vaccination teams, the teams used to help by enhancing awareness of disease, the importance and ways of preventing the disease and importance of vaccination (Lorenz & Khalid, 2012). Based on a study done in Nigeria, a projected 72.2% of mothers got the information on immunization from the health workers, 10.3% from public announcers and 5.1% from the radio (Abdulraheem & Onajole, 2011). About 38.8% and 2.5 % of mothers did not complete the vaccination schedule for their children due to concern on the safety of immunization and inadequate information on the schedule of vaccination respectively (Abdulraheem & Onajole, 2011).

2.6.3 Attitude and behaviour

Attitude among mothers and health workers will highly influence the quality of the vaccination program. The acceptance of vaccination services have been shown to be highly dependent on mothers knowledge and attitude (Matsumura *et al.*, 2005; Torun & Bakirci, 2006). Parental attitude towards vaccination is influenced by perception of severity of disease and on safety and effectiveness of the vaccine (Lorenz & Khalid, 2012). Based on a study done in Nigeria, it was concluded that the positive attitude among mothers resulted to about 93.5% of children being vaccinated (Odusanya *et al.*, 2008).

Negative attitude and behaviour by health workers towards mothers and caregivers have highly affected vaccination, for instance treating mothers in unfriendly, abusive and disrespectful manner; screaming at women who forget their children immunization cards and mothers with malnourished children (Favin *et al.*, 2012). This could possibly result to mothers developing a negative attitude towards immunization; furthermore inadequate education aggravates this negative attitude. Based on a study done in Bangladesh and Kenya, women felt discouraged to return for vaccination after being humiliated by health workers (Khan *et al.*, 2005). Health workers have also been accused on inadequate communication to mothers on the schedule for next vaccination and also how to deal with side effects (UNICEF, 2001). Some health workers have also been reported of mishandling mothers by charging mothers for vaccination, starting vaccination sessions late and closing early (Millimouno *et al.*, 2006). This potentially results to poor vaccination coverage and inconsistencies of vaccination.

2.6.4 Fear of Side effects

The most common side effects of vaccination is soreness at the site of injection. The risk of a serious reaction is less than 1%, therefore vaccines are quite safe (CDC, 2011). However parents refuse to take their children for immunization in case an older child in the family or close relative developed side effects. The situation is worsened by fathers and mothers-in-law who forbid mothers from vaccinating their children (Favin *et al.*, 2012a). Based on a study done in Armenia the fear of side

effects was among the main reasons as to why mothers did not take their children for vaccination (UNICEF & WHO, 2006). Similarly based on a study about 8.9% were not sure of the vaccine and about 6% of mothers refused to have their children vaccinated, a high percentage of these two categories of parents main reasons for doubt of the vaccines was side effects and safety (Gust *et al.*, 2008). Public health communication is therefore important to clear doubt among mothers and caregivers. A study showed that the change of doubt about immunization among mothers was attributed to information and assertion from health workers (Gust *et al.*, 2008).

2.7 Infrastructure and technological factors

2.7.1 Hospital facility

Vaccination is commonly done in health facilities, however during outbreaks vaccination is done at the community level by health workers. Therefore the availability of health facility that is well staffed and with adequate vaccines is key to the success of a vaccination program. Based on a study done in Nigeria 15.2% of parents did not vaccinate their children fully due to long waiting in health facilities (Abdulraheem & Onajole, 2011). The lack of drugs and long waiting times were some of the reasons mothers gave for defaulting vaccinating their children (MacLeod *et al.*, 2000).

The distance to health facility is also a major factor contributing to the achievement of herd immunity. A number of studies show inaccessibility to health services as a reason of incomplete vaccination (Favin *et al.*, 2012a). Based on a study done in Nigeria more than 33% of mothers cited long distance and inaccessibility to health facilities as a cause of partial immunization. Similarly 30% of women in Liberia gave the same reason (Babalola & Adewuyi, 2005). In a study done in Mozambique distance to access health services was the main hindrance to vaccination (Sheldon & Alons, 2003). In a study done in Senegal 71% of children who were fully vaccinated were less than 10km from the bordering health facility, while in the rural areas only 10% of children were fully vaccinated (Attah, 2016).

2.7.2 Cold storage

For vaccines to remain viable they are stored at refrigerated conditions. World Health Organisation (WHO) guidelines and manufacturers recommend that all vaccines with an exception of oral Polio vaccine be stored at 2-8°C during in country distribution (Matthias *et al.*, 2007). Lack of refrigeration equipment is a big hindrance to vaccination. Lack of storage capacity, funding and poor distribution results to inadequate stocks of vaccines in health facilities (Favin *et al.*, 2012a). Based on a study done in Guinea the inadequacy of drugs in public hospitals resulted to people seeking services in private hospitals at an extra cost (Millimouno *et al.*, 2006). Similarly in Somalia the inadequacy of vaccines in hospitals resulted to mothers terminating vaccination schedule of their children (Abdullahi, 2018). Based on a research done in Nigeria, cold chain and good outreach services were among the factors influencing the efficiency of immunization programs (Abdulraheem & Onajole, 2011). In rural parts of Ethiopia there is inadequate cold chain storage of vaccines. Therefore there is a high probability that vaccines reaching rural parts of Ethiopia may be less effective as compared to vaccines in urban centres such as Addis Ababa the capital (Roy, 2010).

2.8 Research gaps

Major initiatives has been implemented to aid ensure a polio free world for instance the GPEI by the WHO. Among the components of these interventions is promoting and strengthening of national coverage to polio immunization is key in polio eradication (WHO, 2018b). However despite the initiatives polio is endemic in countries such as Afghanistan, Nigeria and Pakistan (Wassilak *et al.*, 2014). Additionally cases have been reported in Somalia the latest outbreak being in 2014 (WHO, 2018c).

Therefore in the fight of ensuring polio free world factors that are deterrent need to be well understood. This could be religious beliefs, cultural factors, caregiver's levels of awareness, attitude, infrastructure and technologically related factors. Such data will help governments and stakeholders of the GPEI to better strategize on how to completely eradicate polio especially in regions that have not been certified as

polio free. This data is however not available in Banadir region Somalia. This is the knowledge gap this study seeks to fill.

2.9 Conceptual framework

Socio-economic, cultural factors, level of awareness, infrastructure and technology are the independent variables. The uptake of polio vaccine is the dependent variable. The independent variables been shown to influence polio vaccine uptake among children under the age of 5 years.

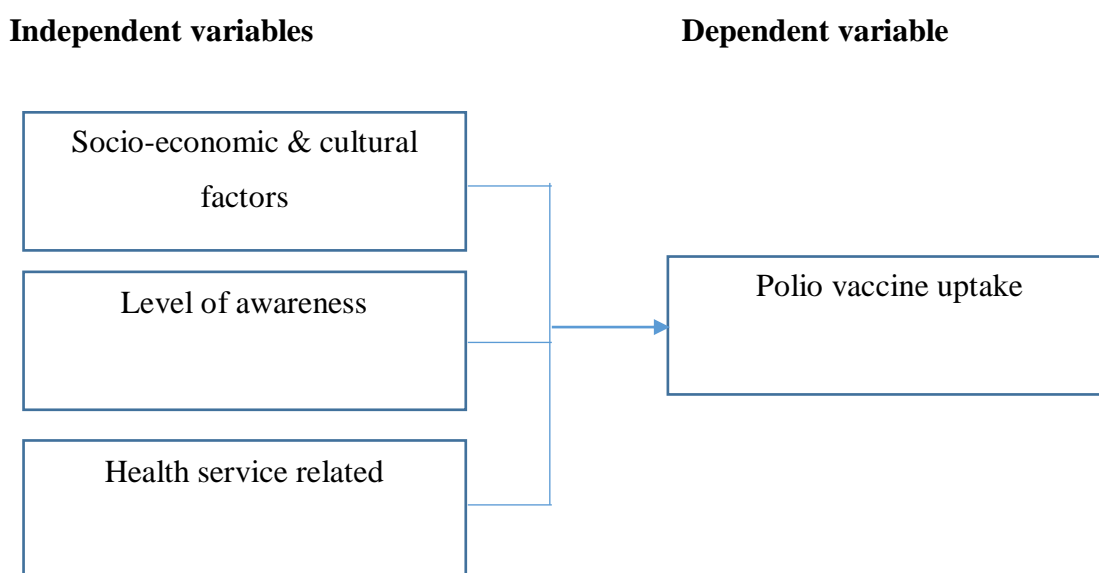


Figure 2.1: Conceptual framework

CHAPTER THREE

METHODOLOGY

3.1 Study area

Banaadir region is bordered by the Middle Shebelle on the northern side and Lower Shebelle on the eastern side and as well as the Indian Ocean on the southern side. Banadir region serves as the capital city of Somalia, Mogadishu, although the administrative region itself is coextensive with the city. Banadir has the largest population estimated 2,587,183 and It has the highest percentage of residents who are internally displaced persons among the regions of Somalia, because of it's relatively availability of resources. The region hosts the capital city of Somalia with biggest commerce harbor of Somalia and is linked by road with Kenya and Ethiopia and is home to Somalia's international airport. The main economic activity in Banadir is trading and fishing. The region is divided into 8 districts of which Hodon and Heliwa districts were selected based on the high number of polio cases in 2103. Hodon has the highest IDPs other than any other districts in Banadir region.

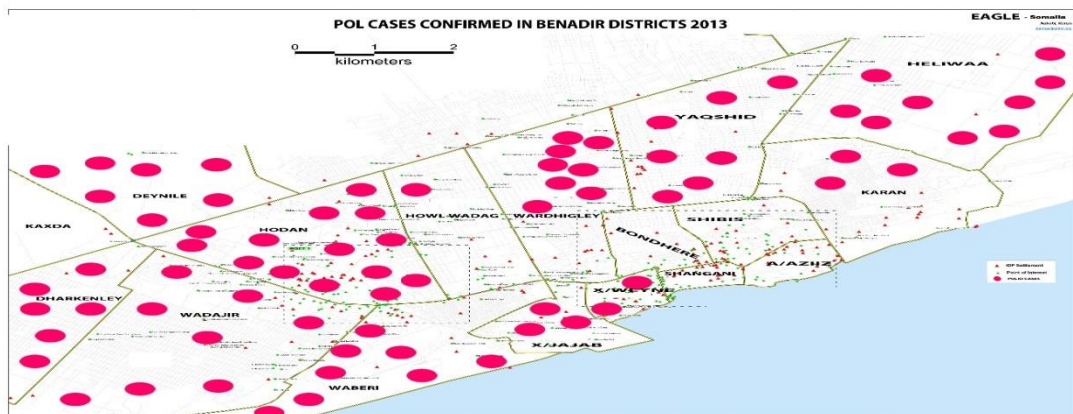


Figure 3.1: Map of Banadir districts depicting number of polio cases per districts

3.2 Study design

The study adopted a descriptive cross-sectional design where quantitative data was collected.

3.3 Study population

The study population was caregivers having children under 5 years residing in Hodon and Heliwa districts of Banadir region since both districts experienced significantly higher numbers of Wild Polio virus cases in 2013.

3.4 Sample size determination

The formulae developed by Cochran (1977) was used to calculate the sample size of the study population as follows:

Cochran's formulae

$$n_0 = \frac{t^2 p(q)}{d^2}$$

where:

n = is the sample size

t = The standard normal deviate = 1.96. (Corresponding to 95% Confidence Interval) d = The level of precision

p = Proportion of the target population estimated to have the desired characteristics. 50% estimated rate of vaccine coverage.

q = 1 - p

$$385 = \frac{1.96^2 \times 0.5 \times 0.5}{(0.05)^2}$$

3.5 Sampling techniques: cluster sampling

Multi stage sampling was used in determining the sample. Banadir region was first divided into 8 clusters (i.e. the 8 districts in Banadir region). Then 2 districts namely Hodon and Heliwa were conveniently selected due to the reported high cases of polio outbreaks. Then based on population proportional distribution 257 and 128

Caregivers or mothers were randomly selected from Hodon and Heliwa districts respectively.

The sample size per district was derived as follows:

Total sampling frame in Hodon and Heliwa= 143926

Total population in Hodon district = 96,075

Sample size in Hodon district $\frac{96075}{143926} \times 385 = 257$

143926

Total population in Heliwa district = 47,851

Sample size in Bogeka ward $\frac{47851}{143926} \times 385 = 128$

143926

3.6 Data collection tools

Quantitative data was collected using a questionnaire which had both close ended and open ended questions. The questionnaire was segmented into the following sections; socio-demographic characteristics of the population sample, level of awareness of caregivers about Polio immunization and Infrastructural and technological factors related to polio vaccine uptake as shown in appendix II.

3.7 Piloting

Piloting was done using 39 questionnaires in Bondhere district. Coefficient of reliability was tested and the cronch bar alpha was found to be 0.75. The Cronbanch's Alpha values obtained were above the cut off value of 0.7 and this showed the scales used in the questionnaire were reliable to measure the various variables.

3.8 Method of data collection

Interviews were conducted to collect data by two data clerks who had experienced on EPI. Prior to data collection, the data clerks were trained on how to conduct interviews with the respondents. After the training each data clerk was deployed in each district. During the data collection process the principal investigator (student) monitored the data collection process through conducting debrief sessions with the data clerks.

3.9 Inclusion and Exclusion criteria

In this study caregivers who had one or more children below the age of 5 years were included in the study. Furthermore only caregivers who consented were included. Additionally non-permanent residents of Hodon and Heliwa districts were excluded in the study.

3.10 Data Analysis and Presentation

Quantitative data was cleaned, coded and data entry done. The data was analysed using Statistical Package for Social Scientists (SPSS version 20.0). Descriptive analysis was done and data was presented using tables, bar graphs and pie charts. Regression analysis was then done to determine the association between the independent variables on dependent variables. The regression analysis was done at 95% confidence level.

3.11 Ethical consideration

The ethical clearance for the study was sought from the Pwani University Ethical Review Committee forwarded through JKUAT, Public Health department. Access to the community was gained through Banadir Municipal Government Officials. The study participants were provided with consent forms prior to participating in the study and participation was completely voluntary. Respondents were assured that the data collected would be for purposes of the study and would be treated with uttermost confidentiality.

CHAPTER FOUR

RESULTS

4.1 Caregiver socio demographic information

Table 4.1: Caregiver socio demographic information.

Variables	Frequency	Percentage
Age		
18-45yrs	296	76.88
>45yrs	89	23.12
Marital status		
Married	270	70.13
Unmarried	65	16.88
Widowed	50	12.99
No.of children under 5 years		
One	89	23.12
Two	123	31.95
Three	111	28.83
Four	62	16.10
Father education status		
Islamic	73	18.96
Primary	58	15.06
Secondary	96	24.94
College	158	41.04
Mother education status		
Islamic	169	43.90
Primary	154	40.00
Secondary	42	10.91
College	20	5.19
How well can the caregiver read		
Very well	50	12.99
With difficulty	227	58.96
Not at all	108	28.05
Caregiver primary occupation		
Salaried employee	31	8.05
Formal business owner	154	40.00
Informal business owner	200	51.95

76.88 % of the caregivers are 18-45 years and 23.12% are above the age of 45 years.

70.13% of the caregivers are married, 16.88% are unmarried and 12.99% are

widowed. 23.12% of the caregivers have a child below the age of years, 31.95% of the caregivers have two children below the age of 5 years, 28.83% and 16.10 of the caregivers have three and four children below the age of 5 years respectively. Only 18.96% of the fathers have studied up-to the Islamic level, 24.96% of the fathers have studied up to secondary level and 41.04% have studied up-to college level. 43.90% of the caregivers have studied up-to Islamic level, only 10.91% and 5.19% have studied up to secondary and college level. 12.99% of the caregivers can read well, 58.96% can read with difficulty and 28.05% can't read at all. 8.05% of the caregivers are salaried employees, 40% and 51.95% are formal and informal business owners respectively.

4.2 Level of awareness of caregivers on Polio campaign

44% of the caregivers were aware of the last polio vaccination campaign, 56% of the caregivers were not aware of the last polio vaccination campaign.

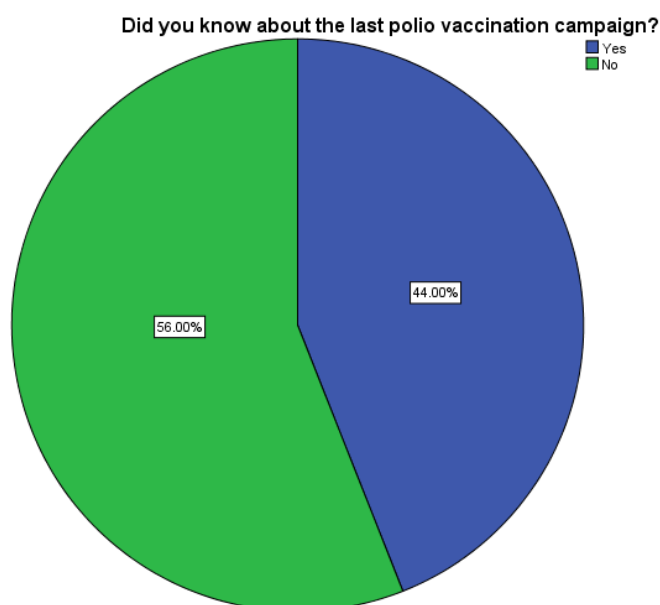


Figure 4.1: Knowledge of the last polio vaccine.

60% of the caregivers preferred that vaccination be done from home, 23% of the caregivers preferred the nearest health facility and the rest preferred that vaccination be done at school.

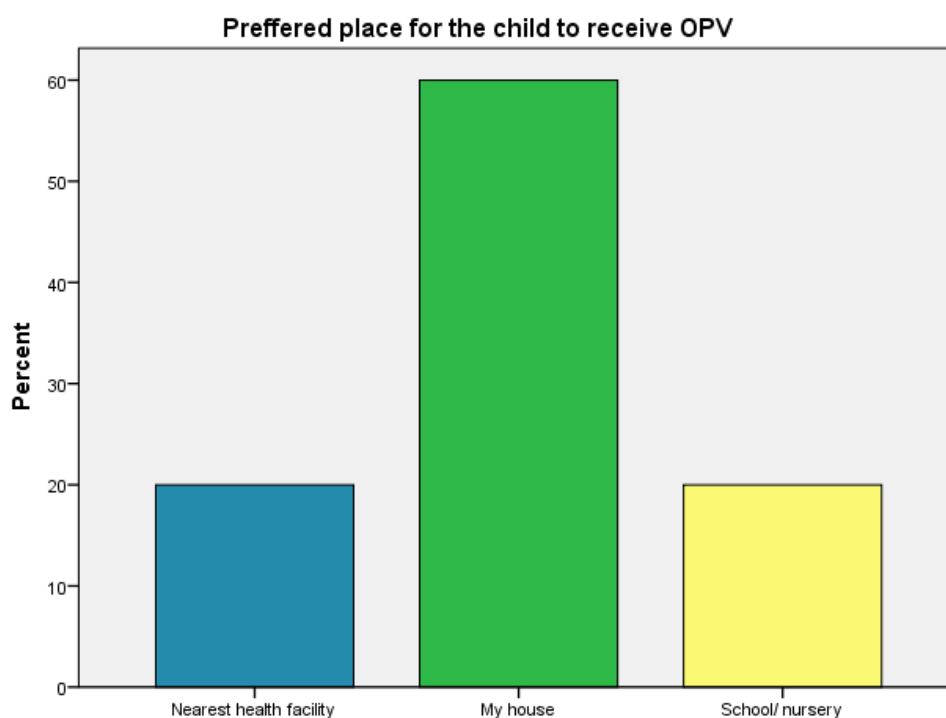


Figure 4.2: Preferred venue for vaccination.

4.3 Caregivers knowledge and attitude towards OPV

35% of the caregivers proposed that polio is caused by a virus, 13% proposed lack of vaccination, 21% believe it is Gods punishment while 32% did not know the cause of polio.

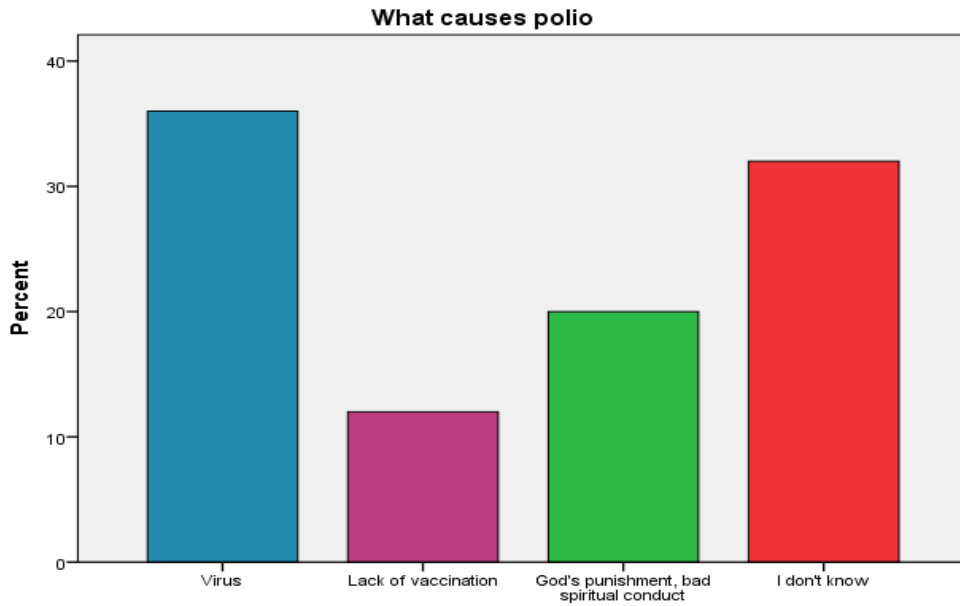


Figure 4.3: Causes of polio.

60% of the caregivers were not concerned that their children can contract polio while at least 40% of the caregivers were concerned.

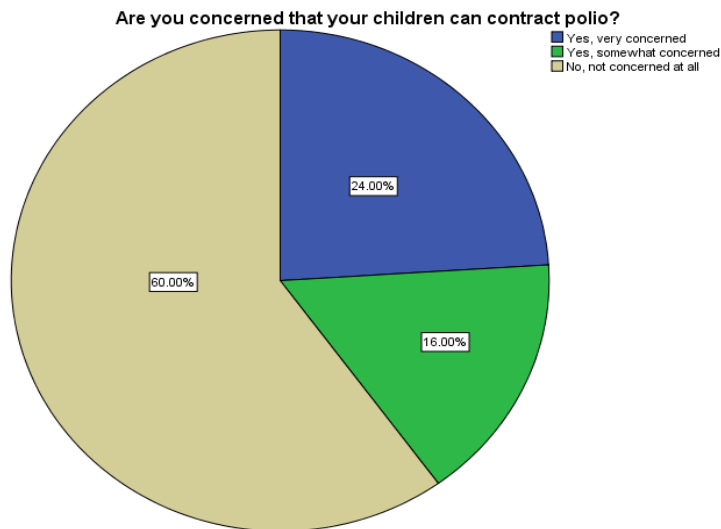


Figure 4.4: Concern of polio contraction among caregivers.

68% of the caregivers confirmed that vaccination could prevent polio and 32% of the caregivers were not sure of the effectiveness of polio vaccination.

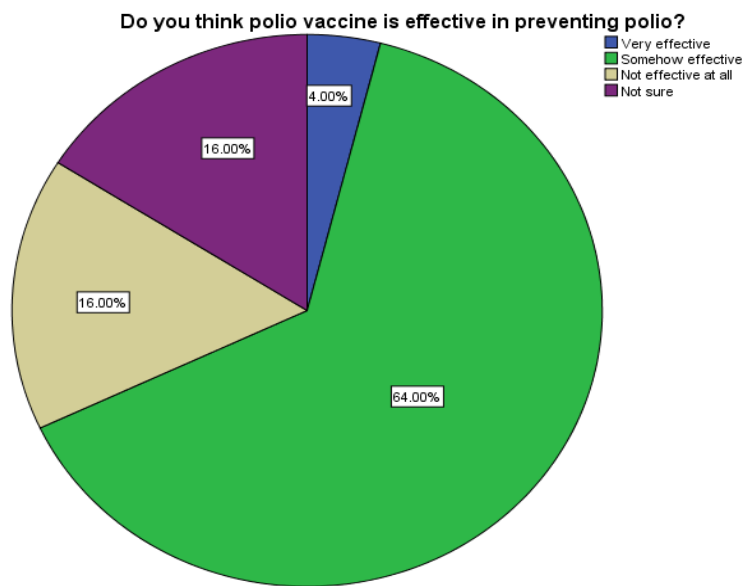


Figure 4.5: Effectiveness of polio vaccine in preventing polio.

80% of the caregivers were not sure of the safety of the polio vaccine and only 20% of the caregivers were partly sure of the safety of polio vaccine.

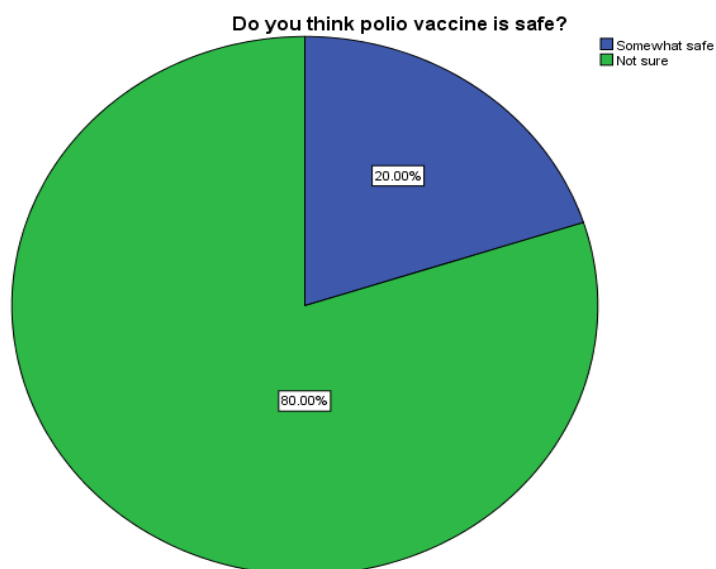


Figure 4.6: Safety of polio vaccine.

33% of the caregivers believe that the polio vaccine is unsafe since it causes fever, another 32% believe that the polio vaccine is unsafe because it comes from western countries and 4% believe that the polio vaccine is unsafe because its ingredients are haram.

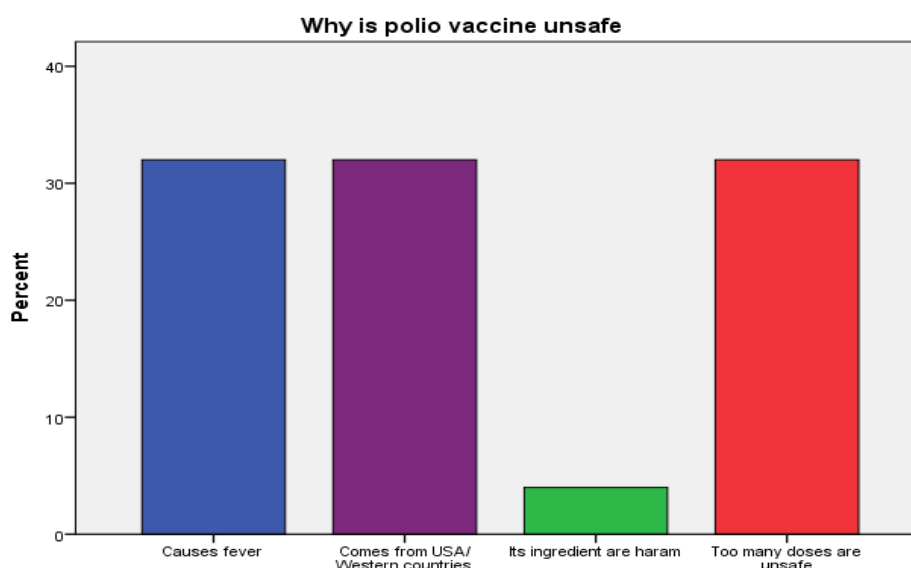


Figure 4.7: Reasons why polio vaccine is unsafe.

Table 4.2: Support on OPV

	Religious/ traditional leaders		People in the Community household			
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Support on Polio campaign						
Very supportive	62.00	16.10	135.00	35.06	62.00	17.32
Somewhat supportive	77.00	20.00	50.00	12.99	139.00	38.83
Against Polio campaign	204.00	52.99	142.00	36.88	62.00	17.32
Not sure	42.00	10.91	58.00	15.06	122.00	34.08

16.10%, 35.06% and 17.32% of the caregivers received support from religious/traditional leaders, the household members and the community respectively. A valued 52.99% of the caregivers received no support at all from the religious/traditional leaders, 36.88% and 17.32% of the caregivers did not receive support on OPV from the household members and the community respectively.

64% of the children below 5 years had received more than 3 polio vaccines, about 16% of the children below 5 years had not been vaccinated against polio.

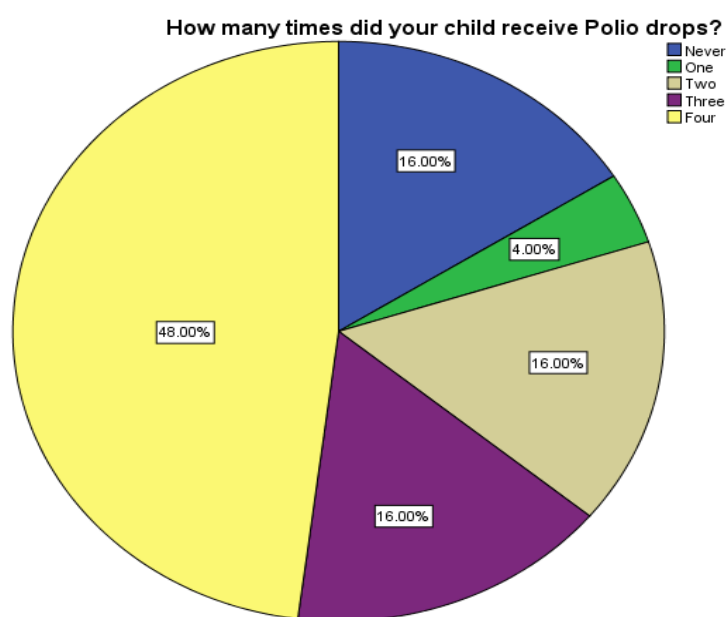


Figure 4.8: Frequency of polio vaccination.

37% of the caregivers did not vaccinate their children because of fatigue, fear of vaccine was the second main reason why caregivers did not vaccinate their children, travel to other regions and child was sick were the third and fourth reasons why caregivers did not vaccinate their children respectively.

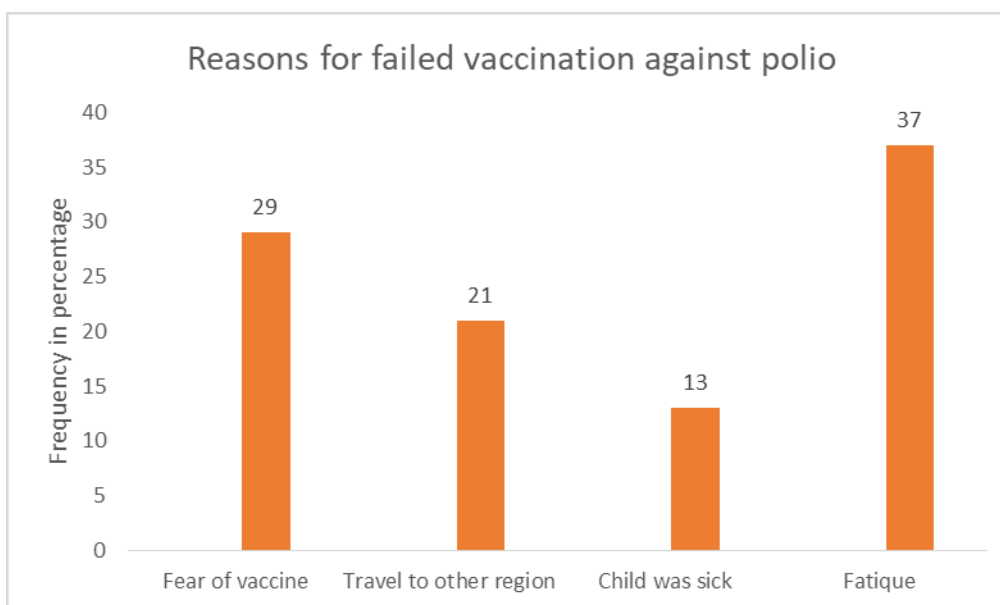


Figure 4.9: Reasons for failed vaccination against polio.

4.4 Caregiver health seeking behaviours

Almost half of the caregivers consult health practitioners about their children health.

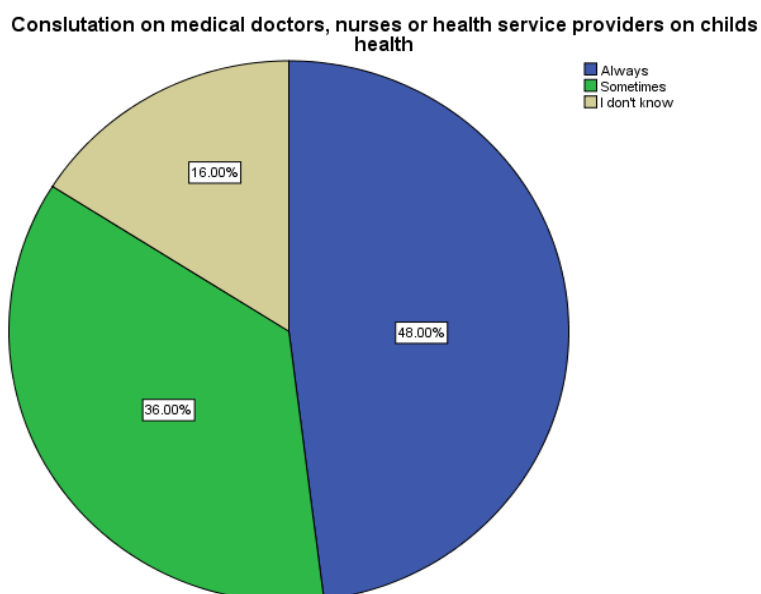


Figure 4.10: Consultation of health practitioners on child health.

Over 50% of the caregivers reported that they always consult their neighbours about their child's health.

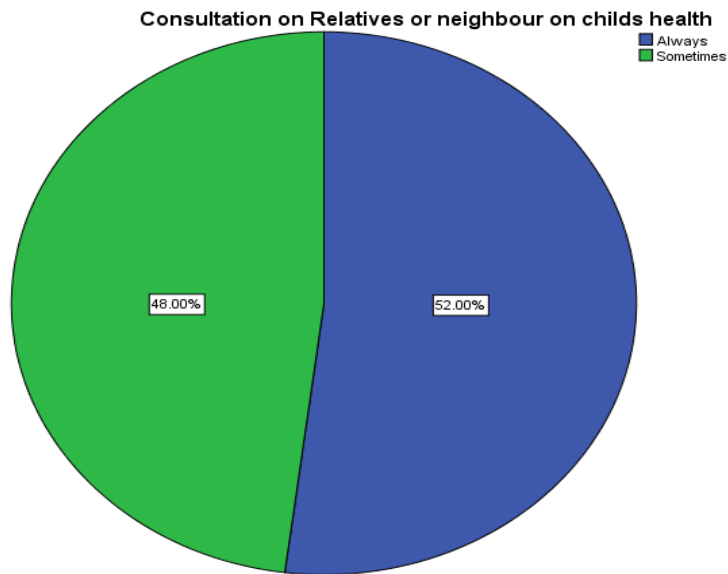


Figure 4.11: Consultation of relatives and neighbours on child health.

64% of the caregivers always consult the imams about their childs. 32% of the caregivers consult the imams at times while only 4% of the caregivers don't consult the imamas.

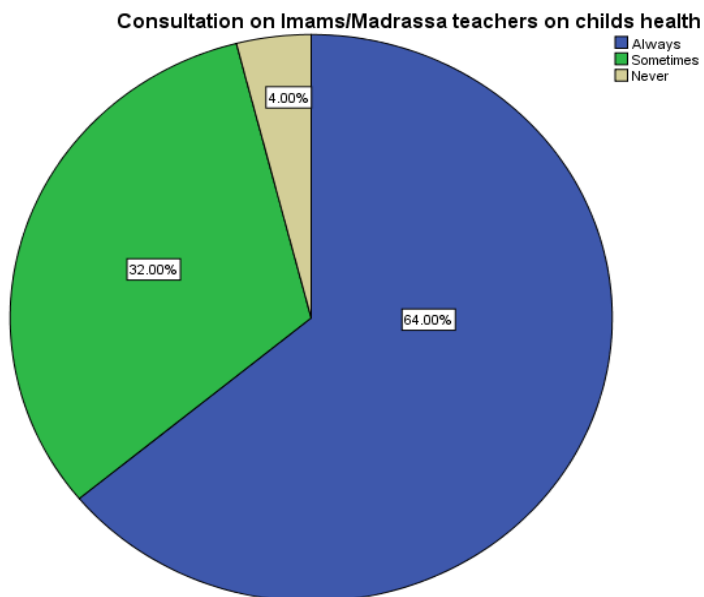


Figure 4.12: Consultation of Imams/ Madrassa teachers on child health.

Table 4.3: Most trusted source of information on child health.

Source of information	Frequency	Percentage
Medical doctors, nurses or health service providers	65	16.88
Pharmacists	35	9.09
Imams	70	18.18
Relatives and neighbours	71	18.44
TV	27	7.01
Radio	120	31.17

38.18% of the caregivers trusts the media as a credible source of information in regard to child health, 29% of the caregivers trusts the health service providers and about 19% trusts relatives and neighbours.

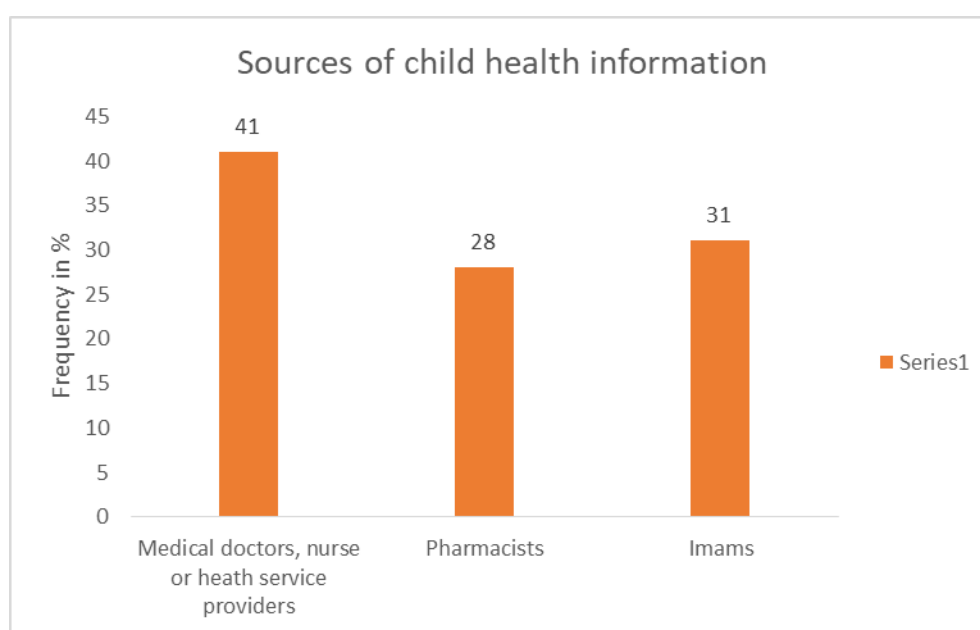


Figure 4.13: Consultation for health services.

69% of the caregivers take their children to health care providers when they are sick, 31% of caregivers take their children to Imams when sick.

64% of the caregivers did not have their children immunization cards, only 36% of the respondents had their children immunization cards.

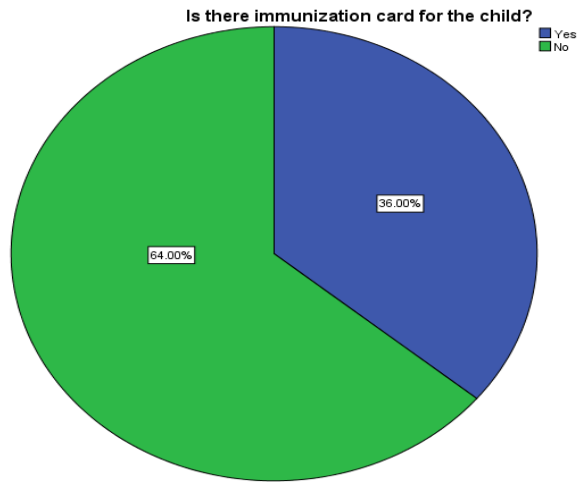


Figure 4.14: Presence of immunization cards.

36% of the caregivers receive support on routine immunization of their children from their family members, 64% of the caregivers do not receive full support from family members on routine immunization of their children.

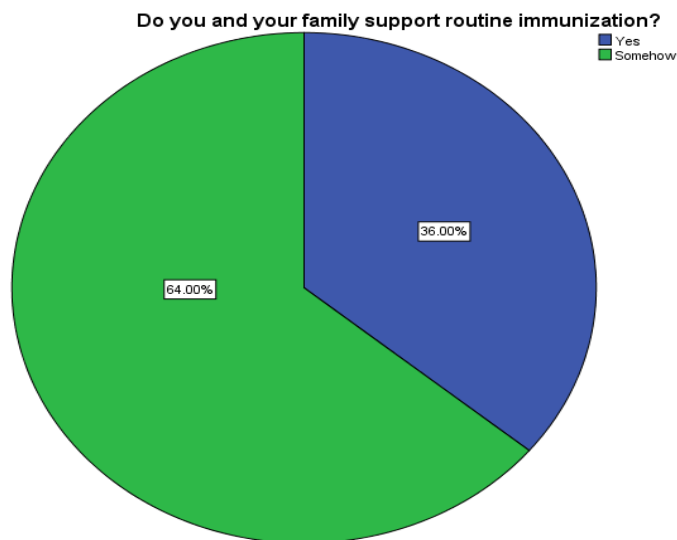


Figure 4.15: Support of routine immunization from family.

60% and 40% of the care givers main fear against vaccination is fever and safety issues respectively.

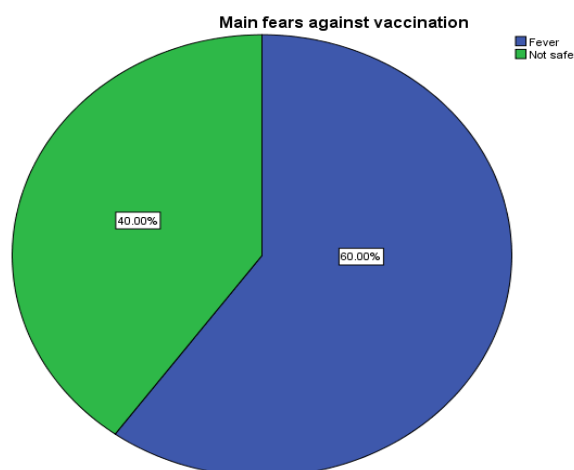


Figure 4.16: Main fear against vaccination

4.5 Level of awareness factors influencing polio vaccine uptake

A regression analysis was performed to ascertain the effects of knowledge about the last polio campaign, household support towards OPV and knowledge on the symptoms of Polio on the likelihood that caregivers would have their children immunized against Polio. The logistic model was significant at $p < 0.005$, the model explained 52.4% variance in polio vaccine uptake.

Table 4.4: Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	21.317 ^a	.356	.524

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 4.5: Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	5.444	5	.024

The model was significant with a p value of 0.024.

Table 4.6: Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95%		
							C.I. for EXP(B)		
							Lower	Upper	
Step 1 ^a	Knowledge on the symptoms of Polio	-2.933	1.866	2.469	1	.043	.053	1.001	2.066
	Household support towards OPV	.312	.570	.300	1	.029	1.366	1.447	4.174
	Knowledge about the last Polio outbreak	1.198	1.878	.407	1	.037	3.315	1.083	131.630
	Constant	1.781	1.734	1.055	1	.304	5.938		

a. Variable(s) entered on step 1: Knowledge on the symptoms of Polio, Household support towards OPV, Knowledge about the last Polio outbreak

Level of awareness was found to influence the uptake of polio vaccine. Variables found to influence were: knowledge on the symptoms of polio ($p = 0.043$), household support towards OPV ($p = 0.029$) and knowledge about the last polio outbreak ($p = 0.037$).

4.6 Socio economic and cultural factors influencing polio vaccine uptake

A regression was performed to ascertain the effects of caregivers/ mothers education level, the number of children below the age of 5 years and seeking of health information from health providers on the likelihood that caregivers would have their children immunized against Polio. The logistic model was significant at $p < 0.005$, the model explained 45.2% variance in polio vaccine uptake.

Table 4.7: Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	40.367 ^a	.235	.613

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

The model explained 61.3% variation in polio vaccine uptake

Table 4.8: Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	19.528	7	.007

The model was significant (p= 0.007)

Table 4.9: Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Number of children below 5yrs	-.508	.482	1.110	1	.521	.602	.234	1.548
Caregiver educ level	.590	.648	.829	1	.042	1.805	1.507	6.431
Health information seeking behaviour	-.351	.399	.774	1	.035	1.704	1.322	1.538
Constant	1.368	1.383	.979	1	.322	3.927		

a. Variable(s) entered on step 1: Number of children below 5yrs, Caregiver education level, Health information seeking behaviour

Socio economic and cultural factors influencing polio vaccination uptake were: care givers education level (p = 0.042) and health information seeking behavior (p = 0.035).

4.7 Healthcare service related factors

68% of the caregivers travel over 2km to the nearest health facility and only 32% travel a distance of less than 1km to the nearest health facility.

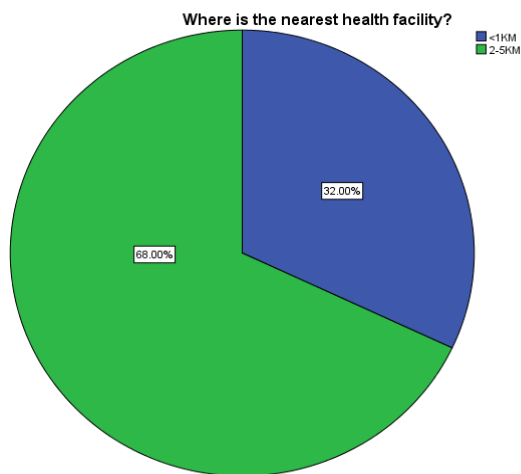


Figure 4.17: Nearest health facility.

80% of the caregivers are not able to access all vaccinations for their children from one health facility, 20% of the caregivers are able to access all vaccinations for their children from one health facility.

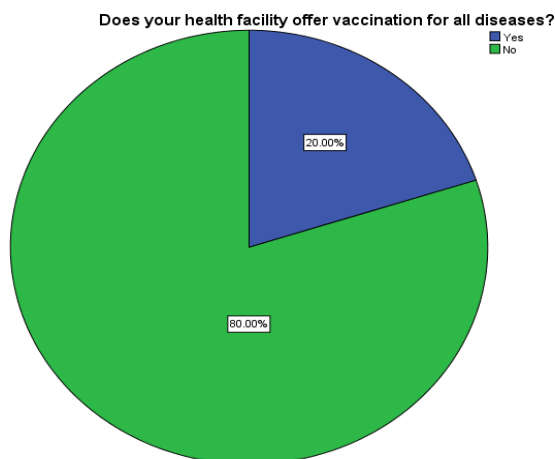


Figure 4.18: Availability of vaccines.

4.8 Association between healthcare service related factors with polio vaccine uptake

100% of the caregivers who lived <1km from the health facility had their children given the 4 polio vaccines. 23.5 % of caregivers who lived 2-5 km from the health facility had not vaccinated their children against polio while 5.9%, 23.5%, 23.5% and 23.5% of caregivers who lived 2-5 km from the hospital had their children vaccinated against polio once, twice, thrice and four times respectively.

Table 4.10: cross tabulation of healthcare service related factors and polio vaccine uptake

Variables	How many times did your child receive polio drops					P value
	Never	One	Two	Three	Four	
Distance to the nearest health facility						
<1 km	0.0%	0.0%	0.0%	0.0%	100.0%	
2-5 km	23.5%	5.9%	23.5%	23.5%	23.5%	0.013
Availability of all vaccines in the hospital						
Yes	0.0%	20.0%	0.0%	0.0%	80.0%	
No	20.0%	0.0%	20.0%	20.0%	40.0%	0.040

80% of caregivers who responded that the health facility near to them offer vaccination for all diseases had their children receive 4 drops of polio vaccine while 20% had their children receive one drop of polio vaccine. 20% of caregivers who responded that the health facility near them do not offer vaccination for all diseases had not vaccinated their children against polio while 20%, 20% and 40% had vaccinated their children against polio twice, thrice and four times respectively.

There was significant association between distance from the health facility and polio vaccine uptake ($p = 0.013$). Equally there was significant association between availability of vaccines in health facilities and polio vaccine uptake ($p = 0.040$).

CHAPTER FIVE

DISCUSSION

5.1 Introduction

Overall the polio immunization coverage was low, about half (48%) of the children below the age of five years had received four oral Polio vaccine doses. The rate is below the targeted national coverage of vaccination (70%) (UNICEF & WHO, 2011). The caregivers cited fear of vaccine, children sleeping, fatigue and children having travelled to other regions as reasons why they failed to vaccinate their children. In Ethiopia the immunization coverage was 49.9% (Kidane *et al.*, 2006). However the coverage in this study was lower compared to other countries in Sub Saharan Africa for instance Kenya 57.7% (KNBS, 2010), Malawi 51% (Munthali, 2007) and Uganda 68% (Odiit & Amuge, 2003). The differences in coverage rates could be attributed to the scope of the survey and differences in health service coverage in terms of immunization (Lakew *et al.*, 2015).

5.2 Socio demographic characteristics

Lack of enough time have been cited by mothers as a reason for not vaccinating their children (Koumaré *et al.*, 2009). Parents could lack time due to responsibilities at home which include taking care of other children below the age of five years. In this study a projected 75% of the caregivers had more than two children below the age of 5 years and this could potentially explain the low vaccination coverage. Knowledge gap has been found to be a major deterrent in vaccination among children below the age of years. A valued 80% of the caregivers had studied up-to primary level and only 12.99% of the caregivers could read well. Education level of the caregivers had an influence on polio vaccine uptake ($p = 0.042$). The low education status among caregivers could be linked to low polio vaccine uptake (Markland & Durand, 1976). Based on a study done in Niger knowledge was a major factor influencing vaccination rate (Odusanya *et al.*, 2008). Similarly in a study done in Phillipines a valued 92% of the caregivers did not bring children back after the first vaccination because they were not aware of the importance of completing vaccination (Samia &

Sayeeda, 2013). About 2/3 of the fathers were educated past the secondary level, however the rates of immunization was still low. Studies have shown that families with low understanding of immunization still recorded high immunization rates (Leach & Fairhead, 2008; Sheldon & Alons, 2003). Similarly based on a study done in Rwanda high vaccination rates were recorded despite the moderate knowledge level about vaccination schedule among mothers and family members (Habimana, & Bararwandika, 1991).

5.3 Health seeking behaviour

Over two thirds of the caregivers had no vaccine cards for their children. Most of the mothers loose the vaccination cards, therefore the health service providers depends on the recall by caregivers which is at times biased (Lakew *et al.*, 2015). Therefore it becomes difficult to determine the actual rates of immunization. On average over 1/2 of the caregivers sought information about health services from the healthcare providers and pharmacists. Lack of information on vaccination schedules results to low levels of compliance to vaccination (Harmanci *et al.*, 2003).

In this study over a third of the parents trusted the media as a source of information with radio taking the highest percentage. Somalia is an oral society and this could potentially explain why Radio was more listened to compared to television. Based on a research done in the horn of Africa it was found that media i.e TV, Radio and magazines were important source of health information for refugee parents (Wilson *et al.*, 2010). Globally health care providers are the custodians of health information, in this study 25% of the caregivers trusted the healthcare providers as a source health information about the children. Additionally seeking of health information from healthcare providers had a significant influence on polio vaccine uptake ($p = 0.035$). Based on a study a high percentage of parents (36%) trusted their family doctor on vaccine safety information, 26% trusted other healthcare providers, 23% trusted government vaccine officials and 15% were shown to trust family members (Freed *et al.*, 2011). Similarly in a focused group discussion it was found that parents trusted physicians as sources of health information, even those who didn't vaccinate their children still trusted the physicians (Fredrickson *et al.*, 2004).

5.4 False Contraindications

In this study fever and safety were the main fears for vaccinating children. Based on a study done in Nigeria mild fever was reported as a reason for mothers not vaccinating their children (Anah *et al.*, 2006; Onyiriuka, 2009). Similarly 100% of mothers cited mild fever, mild respiratory infections, vomiting among others as reasons for refusal to vaccinate children (Samia & Sayeeda, 2013).

5.5 Knowledge and awareness on OPV

Awareness of the vaccination campaigns among the caregivers have been shown to result to high adherence rates. In this study knowledge about the last Polio outbreak had a significant effect on Polio vaccine uptake ($p=0.037$), more than half of the caregivers (56%) were not aware of the last polio vaccination campaign. Based on study done in Ghana (Belcher *et al.*, 1978), Egypt (Reichler *et al.*, 1998) and Mexico (Pérez-Cuevas *et al.*, 1999), lack of information was noted as the major deterrent towards vaccination. Misperceptions among caregivers towards vaccination results to reduced confidence on vaccination and as a result low rates of vaccination, this could lead to high rates of morbidity and mortality (Samia & Sayeeda, 2013). In this study a third of the caregivers were aware that polio was caused by a virus and a similar number were not aware of the cause of Polio. Punishment from God and lack of vaccination were the other causes mentioned by the respondents. A number of studies have shown a strong correlation between scientific knowledge among parents and high rates of immunization (Favin *et al.*, 2012b), however studies done in Mozambique (Sheldon & Alons, 2003), did not support this correlation. High fraction of evidence suggests that scientific knowledge among parents is not that essential (Favin *et al.*, 2012b).

5.6 Attitude towards OPV

About 60% of the caregivers were not concerned that their children could contract polio. Consequently only 4% of the caregivers were confident that polio vaccine was preventative against polio. Over two thirds of the mothers were also not sure of the safety of the polio vaccine, this could be attributed to the low level of education or

negative attitude among the caregivers. Unawareness of the need of immunization and lack of time to take children for vaccination were cited as a major reason why mothers of the unimmunized children did not immunize them (Mohamud *et al.*, 2014b).

Positive attitude is a major factor influencing vaccination rates positively (Favin *et al.*, 2012b). Based on a study done in the USA, over two thirds of the mothers (79%) were confident on safety vaccines and a valued 73% strongly agreed that the benefits of vaccination outweighed the risks. This positive attitude towards vaccination was reflected by the high rate of immunization (74.5%) (Kennedy *et al.*, 2011). About 99.1% of women in Nigeria felt that immunization was beneficial and that they would advise other mothers to have their children immunized, additionally a projected 93.5% of children had received at least one dose of a vaccine (Odusanya *et al.*, 2008).

5.7 Support on OPV

Inadequate support for mothers to vaccinate their children negatively impacts on immunization. In this study support towards OPV by household members had a significant effect on Polio vaccine uptake ($p= 0.029$). At least a third of the caregivers received support on immunization from the family members. Support from family members give the mothers more confidence in ensuring that their children are vaccinated. In Phillipines it was found that most the mothers were supported by their family members, though about 3% of the mothers did not receive support since the family members perceived the vaccines as unsafe and ineffective (Samia & Sayeeda, 2013). Over half of the mothers claimed that the religious/ traditional leaders were against polio vaccination and at least a third of the household members were against polio vaccination. A projected half a million children below the age of 5 years in 39 districts of Central and South Somalia have not experienced large scale immunization due to a ban imposed on immunization by anti-government forces (WHO, 2010), suboptimal provision of health services and insecurity (Kamadjeu *et al.*, 2014). Based on a study done in Nigeria lack of community ownership and

mobilization, inadequate funds and coverage were among the factors affecting Polio eradication (Jenkins *et al.*, 2008).

5.8 Healthcare service related factors

In this study caregivers travelled more than 2 kilometres to access a health facility, and over two thirds of the caregivers (80%) were able to access all the vaccination they needed from the health facility. A lot of support is provided by the Somalia government, UNICEF, WHO and partners of the Global Polio Eradication Initiative (GPEI) which include use of mobilisers who move house to house in case of an outbreak, however they still work under challenging security conditions (UNICEF, 2015). Therefore from this study infrastructure could be having very minimal effects on polio immunization in Somalia. However, a number of studies show inaccessibility to health services as a reason of incomplete vaccination (Favin *et al.*, 2012a). Based on a study done in Nigeria more than 33% of mothers cited long distance and inaccessibility to health facilities as a cause of partial immunization, similarly 30% of women in Liberia gave the same reason (Babalola & Adewuyi, 2005).

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study revealed that care givers were not adequately aware about polio vaccination and thus the level of awareness was found to be a major deterrent to polio vaccine uptake among children under 5 years. Furthermore education level, healthcare information seeking behaviours, knowledge and attitude among the caregivers and household support towards OPV were major factors found to influence polio vaccine uptake. Additionally a significant association was established between healthcare related factors and polio vaccine uptake. However these factors influence polio vaccine uptake up to a certain percentage. This therefore implies that there are still other variables influencing polio vaccine uptake and hence the need for more studies to unearth more constraints of polio vaccine uptake in Somalia.

6.2 Recommendation

I recommend that:-

- The family members and the community should be educated on the risks of delayed or lack of immunization to the health of the child.
- Caregivers to be educated on benefits of polio vaccination so as to reduce the immunization defaulting rates.
- Government and other stakeholders should ensure availability of polio vaccines in health facilities

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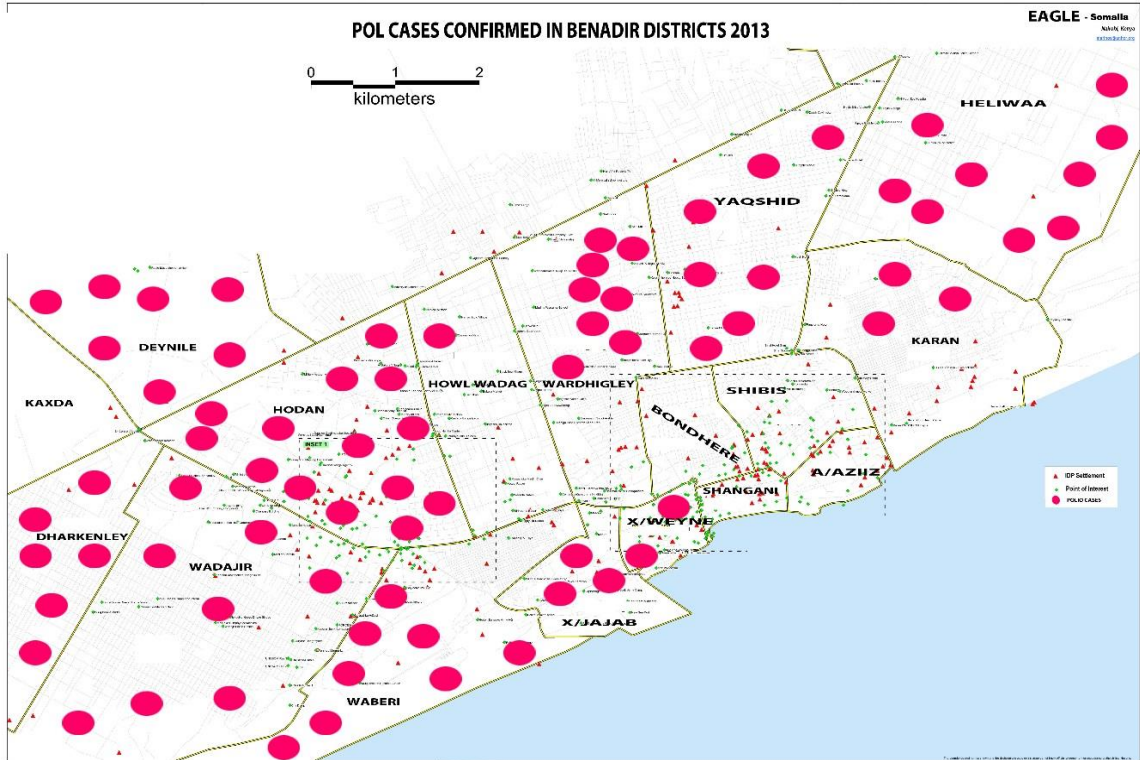
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APPENDICES

Appendix I: Map of study area



Source: Map data ©2015 WHO Sitrep

Appendix II: Consent to participate in the study

Hello, my name is Hussein Mumin Aden, I am student at Jomo Kenyatta University of Agriculture and Technology; I am here to investigate factors influencing polio vaccine uptake in Banadir region. I have come here to conduct a study on the factors influencing polio vaccine uptake.

I have a few questions about polio and related polio vaccine awareness. The result of this study will assist the ministry of health to identify the gaps and thereby informing policy makers on appropriate policy formulation for designing communication strategies. This study has been approved by the ministry of health, department of health promotion unit

This interview may take 15 minutes, are you willing to participate in the study?

If yes begin the interview. If no, thank you.

Declaration of consent to participate in the research

You have been asked to participate in a research study.

You have been informed about the study by research assistant.

You may contact research assistant at any time if you have questions about the research.

Your participation in this research is confidential, voluntary, and you will not be penalized if you refuse for your child to participate or decide to terminate participation.

The research study, including the above information has been verbally described to me. I understand what my involvement in the study means and I voluntarily agree to participate.

Signature of Mother / Caregiver

Date

Appendix III: Questionnaire

Section A

Socio-economic

Caregiver	Socio-demographic	Information:	Caregiver	is
Father/Mother/Grandparents/Siblings and extended family				
1	Age	1. <18 years 2. 18-45 years 3. >45 years		
2	Gender	1.Male 2.Female		
3	Marital status	1.Married 2.Unmarried 3.Divorced 4.Widowed		
4	Relationship to the child under 5 years	1.Mother 2.Father 3.Grandmother 4.Grandfather 5.Other (<i>specify</i>)		
5	Number of children below 5 years	1.One 2.Two 3.Three		

		4.Four 5.More than four
Education level		
1	a) Father education status	1.Islamic 2.Primary 3.Secondary 4.College
	b) Mother education status	1.Islamic 2.Primary 3.Secondary 4.College
2	How well can the mother or child in this household read	1.Very easily 2.With some difficulty 3.Not at all
Caregivers socio- economic status		

1	Caregiver primary occupation	1.Livestock keeping 2.Salaried employee 3.Formal business owner 4.Informal business owner 5.Farming 6.Mixed farming 7. Others (specify).....
2	What is the monthly income from the named activity	01=below 1500 02=1501 to 3000 03=3001 to 4000 04=4001 to5000 05=5001 to 6000 06=6001 to 7000 07=7001 to 8000 08=>8001 09=Don't know 010=Refused

Caregiver Health Seeking Behaviors, cultural practices & Health Beliefs

From where do you receive information about your child's health provided by following source

((Do not read out the answers, but tick all that are mentioned...If caregivers only mention one source,

probe by asking "Is there anyone else from whom you seek this type of information?"):

1	a) Medical doctors, nurses or other health service providers?	1. Always 2. Sometimes 3. Never 4. I don't know
	b) Relative or neighbour?	1. Always 2. Sometimes 3. Never 4. I don't know
	c) Pharmacist?	1. Always 2. Sometimes 3. Never 4. I don't know
	d) Spiritual healers or herbalists?	1. Always 2. Sometimes 3. Never 4. I don't know
	e) Imams/Madrassa teachers?	1. Always 2. Sometimes 3. Never 4. I don't know
	f) Community's traditional leaders/elders and mobilizers?	1. Always 2. Sometimes 3. Never 4. I don't know
	g) Community mobilizers?	1. Always 2. Sometimes 3. Never 4. I don't know
	h) TV, radio, or newspaper?	1. Always 2. Sometimes 3. Never 4. I don't know

<p>2</p>	<p>Of the sources of information you mentioned, which one(s) do you trust the most?</p> <p><i>(tick all that are mentioned)</i></p>	<ol style="list-style-type: none"> 1. Medical doctors, nurse or other health service providers 2. Relative or neighbours 3. Pharmacist 4. Traditional healers, or herbalists 5. Imams/religious leaders 6. Community's traditional leaders/elders and mobilizers 7. community mobilizers 8. TV 9. Radio 10. Newspaper 11. Megaphones
<p>3</p>	<p>Where do you generally take your child when s/he is sick?</p>	<ol style="list-style-type: none"> 1. Medical doctors, nurse, or other health care professionals <p><i>Is it a public or private facility/service?</i></p> <p style="text-align: center;"> <input type="checkbox"/>public <input type="checkbox"/>private </p> <ol style="list-style-type: none"> 2. Pharmacist 3. Spiritual healers or herbalists 4. Imams, pastors, or religious figures 5. Other (<i>Specify</i>) : 6. I don't take him/her anywhere
<p>4</p>	<p>Is there Immunization card for the child?</p>	<p>Yes/No</p>

5	Do you & your family members accept routine immunization services	1. Yes 2. Somewhat No. why?
6	What are the main fears or concerns against vaccination?	

Section B

Level of Awareness for Caregiver Perspectives on Polio Campaign		
10	Did you know about the last polio campaign in your area before it started?	1. Yes 2. No
If yes, from which sources did you hear about it?		
	a) Medical doctors, nurse or other health service providers?	1. Yes 2. No
	b) Spiritual healers or herbalists?	1. Yes 2. No
	c) Imam/religious leaders?	1. Yes 2. No
	d) Community's traditional leaders/elders and mobilizers?	1. Yes 2. No
	e) TV	1. Yes 2. No
	f) Radio	1. Yes 2. No

	g) Newspaper	1. Yes 2. No
	h) Relatives/friends/neighbours?	1. Yes 2. No
	i) Others (specify)	
11	What is the preferred place for your child to receive OPV?	1. Nearest health facility 2. My house 3. School/nursery 4. On roads/public transport 5. Other (<i>Specify</i> :) 6. I will not let my child receive OPV anywhere.
12	Did a vaccinator visit your house during the last campaign?	<input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. Not sure <i>If "no" or "not sure," skip to the next section.</i>
13	Did you feel that the vaccinators that visited your house to give polio drops were of appropriate age?	<input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No
Mother's Knowledge and Attitude about Polio and OPV		
14	What do you think are the symptoms of polio?	<input type="checkbox"/> 1. Paralysis <input type="checkbox"/> 2. I don't know <input type="checkbox"/> 3. Other (<i>Specify</i> :
15	What do you think causes polio?	<input type="checkbox"/> 1. Virus <input type="checkbox"/> 2. Lack of

		<p>vaccination</p> <p><input type="checkbox"/> 2. God’s punishment, bad spirit/conduct</p> <p><input type="checkbox"/> 3. I don’t know <input type="checkbox"/> 4.</p> <p>Other (<i>Specify</i>):</p>
16	Are you concerned that your children can contract polio?	<p><input type="checkbox"/> 1. Yes, very concerned <input type="checkbox"/> 2. Yes, somewhat concerned</p> <p><input type="checkbox"/> 3. No, not concerned at all</p> <p><input type="checkbox"/> 4. Not sure</p>
17	Do you think polio vaccine is effective in preventing polio infection?	<p><input type="checkbox"/> 1. Very effective</p> <p><input type="checkbox"/> 2. Somewhat effective</p> <p><input type="checkbox"/> 3. Not effective at all</p> <p><input type="checkbox"/> 4. Not sure</p>
18	Do you think polio vaccine is safe?	<p><input type="checkbox"/> 1. Very safe</p> <p><input type="checkbox"/> 2. Somewhat safe</p> <p><input type="checkbox"/> 3. Unsafe <input type="checkbox"/> 4. Not sure</p>
19	<p>If the caregiver answers 2 or 3 in the above question, ask:</p> <p>“Why is polio vaccine unsafe?”</p>	<p><input type="checkbox"/> 1. Causes fever <input type="checkbox"/> 2. Comes from USA / western countries</p> <p><input type="checkbox"/> 3. Causes sterility <input type="checkbox"/> 4. Its ingredients are haram/not halal</p> <p><input type="checkbox"/> 5. Too many doses are unsafe</p>
20	Do you think your child needs multiple doses of OPV to fully protect him/her	<p><input type="checkbox"/> 1. Yes <input type="checkbox"/> 2. No <input type="checkbox"/> 3. Not sure / Don’t know</p>

	from polio?	
21	Do traditional/religious leaders in your community support polio campaigns / OPV?	<input type="checkbox"/> 1. Yes, very supportive <input type="checkbox"/> 2. Somewhat supportive <input type="checkbox"/> 3. No, they are against polio campaigns / OPV <input type="checkbox"/> 4. Not sure
22	Do people in your household support children to receive OPV?	<input type="checkbox"/> 1. Yes, very supportive <input type="checkbox"/> 2. Somewhat supportive <input type="checkbox"/> 3. No, they are against polio campaigns / OPV <input type="checkbox"/> 4. Not sure
23	Are the people in your community supportive of polio campaigns / OPV?	<input type="checkbox"/> 1. Yes, very supportive <input type="checkbox"/> 2. Somewhat supportive <input type="checkbox"/> 3. No, they are against polio campaigns / OPV <input type="checkbox"/> 4. Not sure
24	How many times did your child receive Polio drops?	_____
25	Why was your child never vaccinated for polio (zero dose)	1. Child was not at home 2. Fear of vaccine 3. Travel to other regions 4. Child was sleeping 5. Child was sick 6. Household never visited

		vaccinators OPV is unsafe/religious reasons/no family support
--	--	----------------------------------------------------------------------

Section C

Infrastructure		
1	Where is the nearest health facility	1.less than 1km 2.2-5km 3.5-10km 4. more than 10km
2	Does your health facility offer vaccination for all diseases?	1.Yes 2.No 3.Don't know
3	a) Have you attended hospital and failed to vaccinate your child	1.Yes 2.No
	b) what was the reason for failed vaccination	1. Lack of drugs 2.Lack of storage for vaccines 3.Getting to the hospital late 4.Lack of money 5.Long waiting time 6.Other (<i>specify</i>)
4	How many minutes does it take to walk to the closest community health center hospitals or clinic?	1. ____hours____ minutes 2. Don't know

Appendix IV: Application for proposal approval by ethicalreview committee

Hussein Mumin Aden

TM310-C005-4685/2013

PUBLIC HEALTH DEPARTMENT

COLLEGE OF HEALTH SCIENCE

JKUAT MOMBASA CBD CAMPUS

REF: APPLICATION FOR PROPOSAL APPROVAL BY ETHCS REVIEW COMMITTEE

I, Hussein Mumin Aden, a Master of Science in Public Health student in JKUAT, Mombasa CBD campus do hereby submit my research proposal for approval by Ethics Committee on the study topic “Factors Influencing Polio Vaccination among children, Banadir region, Somalia”

.....

Signature

.....

Date

Appendix V: ERC certificate

NACOSTI ACCREDITED



ERC/MSc/017/2016

ETHICS REVIEW COMMITTEE

ACCREDITED BY THE NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY
AND INNOVATION (NACOSTI, KENYA)

**CERTIFICATE OF
ETHICAL APPROVAL**

THIS IS TO CERTIFY THAT THE PROPOSAL SUBMITTED BY:

HUSSEIN M. ADEN

REFERENCE NO:
ERC/MSc/017/2016

ENTITLED:
**Factors influencing polio vaccination among children under 5 years in
Banadir, Somalia**

TO BE UNDERTAKEN AT:
BANADIR, SOMALIA

FOR THE PROPOSED PERIOD OF RESEARCH
HAS BEEN **APPROVED** BY THE ETHICS REVIEW COMMITTEE
AT ITS SITTING HELD AT PWANI UNIVERSITY, KENYA
ON THE 13th DAY OF MAY 2016

CHAIRMAN

SECRETARY

LAY MEMBER

Three handwritten signatures in black ink, corresponding to the Chairman, Secretary, and Lay Member positions listed above.

PTO



Pwani University, www.pw.ac.ke, email: r.thomas@pwaniuniversity.ac.ke, tel: 0719 182218.
The ERC, Giving Integrity to Research for Sustainable Development

Appendix VI: Request to conduct a pilot study in Hodon and Heliwa districts of Banadir region

TO: Dr. ABDULLAHI HASHI, Director General, Ministry of Health and Human service

CC: Dr. OSMAN ABDI, National EPI manager, Somalia

SUBJECT: Request for permission to conduct a pilot study at 2 districts of Banadirregion(Hodan and Heliwa districts)

I, Hussein Mumin Aden , a Master of Science in Public Health student in JKUAT, Mombasa CBD campus am hereby kindly reqesitingpermission to conduct a pilot study at Hodon and Hleiwa districts of Banadir region which have had high cases of Polio. Banadir.

The study is entitled “Factors Influencing Polio Vaccination among Children under five years in Banadir region, Somalia”. Please see the enclosed copy of the ethical approval certificate from the ethical review committee (ERC).

If you need further information, do kindly contact Hussein Mumin Aden, the researcher, at:

Cellphone: +252618116666

E-mail: dr.muumin2012@gmail.com

Requested by:HUSSEIN MUMIN ADEN

Signature

Date

Appendix VII: Authorization to conduct a pilot study in Hodon and Heliwa districts of Banadir region



جمهورية الصومال الفيدرالية

وزارة الصحة ورعاية

MINISTRY OF HEALTH AND HUMAN SERVICE

Somali Federal Republic

Ref:MOH&HS/MOH0/0376/2015

04/July/2015/2016/1\logadishu

To Hussein Mumin Aden, researcher

CC: Dr.AbdullahiHashi, Director General MinistryofHealth

CC: Dr.Osman Abdi, National EPImanager, Somalia

Re: Request for conducting research in Banadir region

The Ministry of Health and Human Service is hereby approving your above request for conducting research in Banadir region on the subject entitled "Factors Influencing Polio Vaccination among Children in Banadir region".

The EPI manager in copy here is kindly requested to provide any facilitation required in the course of the study.

H.E Hawa Hassan Mohamed
Minister for health, Federal Government of Somalia



Tel: +252-616102284 / E-mail: leh@fhs.gov.so
Best Regards **Mogadishu - Somalia**