

**VACCINATION COVERAGE AND ITS DETERMINANTS AMONG PASTORALISTS
CHILDREN AGED 0 TO 59 MONTHS IN LAGDERA SUB-COUNTY OF GARISSA
COUNTY, KENYA**

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**Vaccination Coverage and its Determinants among Pastoralists Children Aged 0 to 59
Months in Lagdera Sub-county of Garissa County, Kenya**

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**A Thesis Submitted in Partial Fulfilment for the Degree of Master of Science in Public
Health in the Jomo Kenyatta University of Agriculture and Technology, Kenya**

2017

DECLARATION

This thesis is my original work and has not been presented for an award of a degree in any university or institution.

Signature..... Date

Ahmed Noor Unshur

Supervisors

This thesis has been submitted for examination with our approval as university supervisors

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DEDICATION

I dedicate this thesis to my late father Mr. Noor Unshur, who has been my constant source of inspiration and encouragement. Daddy, this is for you!

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LIST OF ABBREVIATIONS AND ACRONYMS

ArcGIS	GIS software
BCG	Bacille Calmette and Guérine
CDC	Centre for Disease Control and Prevention
EPI	Expanded Program on Immunization
GIS	Geographical Information System
GPS	Global Position System
HHs	Households
KDHS	Kenya Demographic Health Survey
KEMRI	Kenya Medical Research Institute
KNBS	Kenya National Bureau Statistics
KPPs	Knowledge, Perception and Practice
MVS	Mothers' Vaccination Score
ODK	Open Data Kit
OPV	Oral Polio Vaccine
PCV	Pneumococcal Vaccine
PPS	Probability proportionate to size
SPSS	Statistical Package for Social Science
UNICEF	United Nation Children Fund
VPDs	Vaccine Preventable Diseases

ABSTRACT

Vaccination is the most cost-effective, highest-impact health intervention to reduce the morbidity and mortality of Vaccine Preventable Diseases (VPDs). Globally, it is estimated that about 2 to 3 million mortalities occur annually due to VPDs with approximately 1.5 million deaths among under-five children. Most of these deaths due to VPDs occur in developing countries. The complete vaccination coverage in Kenya in 2014 was 71%; a decline from 77% in 2008 with huge inequality in pastoral dominated counties. Despite success in Kenya implementing the Expanded Program on Immunization (EPI), VPDs remain prevalent in pastoralist communities. Pastoralism was defined as raising any livestock other than fowl; nomadism was defined by seasonal movement of animals for grazing. The objective of the study was to determine the vaccination coverage and its associated factors among pastoralists in Lagdera Sub-county of Garissa County.

A cross-sectional survey was conducted in February 2015, which utilized a cluster survey methodology to randomly select 25 clusters based on Probability Proportional to Size (PPS) sampling for settled pastoralist and 25 clusters in nomadic pastoralist using simple random sampling. Twelve mothers were selected for interview per cluster. The study used a structured instrument to survey pastoralist mothers with children aged 0–59 months old. For every eligible mother, vaccination data were collected by record or recall for all her children under five years. Mobile devices (Tablets) programmed with Open Data Kit (ODK) software was used to collect and transmit data to an online server. Data was downloaded and then analysed using Statistical Package for Social Science (SPSS) version 22.0 while the level of significance was set at $p < 0.05$. Ordinal logistic regression analysis was used to identify independent predictors of complete vaccination.

A total of 476 eligible mothers were interviewed with 725 children; 241 mothers (50.6%) belonged to nomadic Households (HHs) while 235 (49.4%) belonged to settled HHs. Forty percent of nomadic mothers stated that vaccination was “very important” compared to 87.2% of mothers from settled HHs. Nearly 60% of mothers from nomadic HHs had never vaccinated their children in comparison to 7.2% of mothers from settled pastoralist. The main reason for non-vaccination among mothers from nomadic HHs was “hospital or clinic was too far away” (78.6%). Ordinal logistic regression revealed the following factors as independent predictors of vaccination coverage in both groups: purpose of vaccination (settled, $P=0.001$; nomadic, $P<0.0001$), importance of vaccination ($P<0.0001$), age of first vaccination (settled, $P=0.015$;

nomadic, $P < 0.0001$), safety of vaccines ($P < 0.0001$), communication indicators like radio ownership (settled, $P = 0.02$; nomadic, $P < 0.011$) and euclidean distance to health facility ($P = 0.018$).

In conclusion, nomadic pastoralist exhibited very low vaccination coverage than their settled counterpart. Improvements in vaccination service delivery, stronger involvement of the nomadic communities and special outreach services for this population are required to improve vaccination rates in these remote areas of Kenya.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Childhood vaccination is the most successful and cost-effective public health intervention in terms of number of deaths prevented per year (Odusanya, Alufohai, Meurice, & Ahonkhai, 2008). Worldwide about 29,000 children under the age of five die every day, mainly from preventable causes (Animaw, Taye, Merdekios, Tilahun, & Ayele, 2014). Every year around 8 million children in developing countries die before they reach their fifth birthday; many during the first year of life (Animaw et al., 2014). In Kenya, under-5 mortality declined from 115 deaths per 1,000 live births in 1999-2003 to 74 deaths per 1,000 in 2004-08, and further decreased by 30 percent to 52 deaths per 1,000 in the five years preceding the 2014 (KNBS, 2014).

Vaccines avert disease in the persons who receive them and also provides herd immunity, hence reducing disease transmission in the population (Mapatano, Kayembe, Piripiri, & Nyandwe, 2008). Vaccination is responsible for the control of many infectious diseases that were once common globally, including Polio, Measles, Diphtheria, Pertussis, Tetanus, and Haemophilus influenza type b (Hib) (Singh, Singh, & Singh, 2012). Kenya is a diverse country with regional inequality in vaccination coverage or variation between urban or rural/pastoralist populations (Calhoun et al., 2014). According to the Kenya Demographic Health Survey (KDHS) 2014, vaccination coverage is highest in the Central Kenya region (90 percent) and lowest in the North-Eastern region (largely pastoralist), where only 51 percent of children are fully vaccinated. Eleven percent of children in North Eastern have not received any of the recommended vaccinations, as compared with 2 percent or less in the other regions.

Vaccine Preventable Diseases (VPDs) remain the most common cause of childhood mortality among pastoralist in Kenya. Dubale and Mariam (2007) define 'pastoralist' as those whose livelihood depends on and typically derive at least half of their food and income from their livestock (Dubale & Mariam, 2007). In developing countries, there are about 50 to 100 million pastoralists, in which 60% are found in Sub-Saharan Africa (Gele, BJune, & Abebe, 2009). Pastoralism is a common source of livelihood in countries in the Horn of African region i.e. Somalia, Djibouti, Eritrea, Ethiopia, Sudan and Kenya (Gele, Sagbakken, Abebe, & BJune, 2010).

In Kenya, pastoralism is commonly practiced in arid and semi-arid areas of Northern Kenya i.e. Wajir, Garissa, Mandera, Isiolo, Marsabit, Turkana and Tana River Counties. Two forms of pastoralism are practiced in Kenya. The first group is nomadic pastoralists where herders adapt to spatial-temporal variability in pasture and water availability through carefully calculated herd movements (Abdikarim & Velema, 1999). The second group is the settled pastoralists who usually keep smaller herds than those found in nomadic pastoralists because they no longer rely solely on livestock and depend on a finite grazing area which can be reached from their villages within a day (Blench, 2001).

The reasons for inadequate vaccination coverage among pastoralists are several. Factors such as distance to health facility, Knowledge, Perceptions and Practices (KPPs) of parents are known to contribute to success or failure of vaccination programs (Matsumura, Nakayama, Okamoto, & Ito, 2005; Montavon et al., 2013; Torun & Bakırcı, 2006). Information on KPPs and geographical access as determinants of vaccination are lacking among pastoralists in Kenya.

1.2 Statement of the problem

Vaccination needs of pastoralists have been neglected as compared to non-pastoral populations (Spicer, 1999). Health care facilities in Kenya are unevenly distributed, clustered in urban areas and scarce in poor rural zones like Northern Kenya (Noor, Alegana, Gething, & Snow, 2009). Most of the pastoralists reside in the arid and semi-arid areas in Northern Kenya where health facilities are scarce and only targeting the settled population (Duba, Mur-Veeman, & van Raak, 2001; Kimalu et al., 2004).

Studies have revealed that nomadic pastoralists have very low vaccination coverage as compared to settled pastoralist (Abdikarim & Velema, 1999; Kruger, Olsen, Mighay, & Ali, 2013). Therefore, nomadic pastoralists form a pool of susceptible among which an outbreak can occur. Anecdotal reports from health care providers indicate that the 2012 measles outbreak in Garissa County largely affected nomadic pastoralists and those who had recently transitioned from nomadism to settled pastoralism.

Gaps in vaccination coverage present a serious public health challenge. In the 2013/2014 polio outbreak in Kenya and Somalia, the discovery of wild poliovirus in nomadic children living along the Kenya-Somali border with no history of vaccination confirmed that nomadic

pastoralists are not being reached by vaccination service (Haydarov et al., 2016; Porter, Diop, Burns, Tangermann, & Wassilak, 2015). Unvaccinated pastoralist children can serve as vectors for infectious diseases like polio and unwittingly contribute to the continued transmission of VPDs. Diseases earmarked for eradication and elimination like polio and measles cannot be eradicated until nomadic populations are fully vaccinated.

Given the growing importance to vaccinate all children in light of global efforts to eradicate diseases like polio, there is a need to evaluate vaccination coverage and its determinants among Kenyan pastoralists.

1.3 Justification of the study

Pastoralists face a unique set of challenges, particularly in accessing vaccination services designed for more stable, settled populations. Grazing areas can be far from towns and villages, and frequent movement makes it difficult for health workers to plan outreach services to mobile/nomadic homes in “hard-to-reach” areas. As a result, nomadic pastoralist children usually miss routine immunizations, which are offered regularly in health facilities.

Currently, fixed health services have only a limited radius of action while mobile outreach services that commonly target nomads in other parts of Kenya are not in place in Garissa County, even at watering places. Therefore, nomadic pastoralists are among communities that are most vulnerable to exclusion from primary health services including vaccination and they remain lowest strata of health care utilization, which make them vulnerable to VPDs (Abdikarim & Velema, 1999).

1.4 Research Questions

1. What is the vaccination coverage for the routine vaccines offered to pastoralist children?
2. What are the mothers’ level of Knowledge, Perception, and Practices (KPPs) towards vaccinations?
3. What are the factors associated with complete vaccination coverage?

1.5 General Objective

To determine the vaccination coverage and its associated factors among pastoralists in Lagdera Sub-county of Garissa County.

1.5.1 Specific Objectives

- a) To determine vaccination coverage for the routine vaccines among pastoralist children
- b) To characterize mothers' levels of Knowledge, Perception, and Practices (KPPs) towards vaccination
- c) To determine the factors associated with complete vaccination coverage among pastoralist

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Pastoralism and childhood immunization

Pastoralists are some of the poorest sub-populations living in remote areas (Rass, 2006). They rarely seem to utilize services of professional health workers including basic vaccination services. Globally, this results in high child mortality due to VPDs like measles (Zinsstag, Schelling, Wyss, & Mahamat, 2006).

Inequalities in childhood vaccination have been shown to be common particularly in all arid and semi-arid areas with the nomadic pastoralist remaining among the lowest echelon of health utilization (Abdikarim & Velema, 1999). The organization and distribution of conventional health care services do not seem to take into consideration the peculiar lifestyle of the pastoralist. While nomads are mobile looking for water and grazing fields for their animals with changing seasons, the usually static health services do not often address their health care needs (Nathan, Fratkin, & Roth, 1996).

A study by Blanford and others (2012), that examined spatial accessibility of health facilities in Niger reported that among urban children, 50% were completely vaccinated by 12-months of age compared to only 8% of rural which were mainly pastoralist children (Blanford, Kumar, Luo, & MacEachren, 2012). Another study among the settled and nomadic Rendille in Northern Kenya revealed that all children over one year of age in settled villages had full vaccination coverage, while among their nomadic counterparts immunization coverage was nearly zero (Nathan et al., 1996).

2.2 Global picture of childhood immunization

Annually, VPDs account for a quarter of all mortalities occurring among children under-five (WHO, 2008). In 2009, about 80% of children worldwide are receiving vaccination (Singh et al., 2012). UNICEF estimates that 75% of the world's child population is reached with necessary vaccines, but only 50% of the children of Sub-Saharan Africa get access to basic vaccination. Moreover, in poorer remote/pastoral areas of developing countries, only 5% of children have access to vaccination (UNICEF, 2009).

The expanded programme of immunization (EPI) provides vaccination against VPDs which is the most cost-effective public health interventions (Bosu, Ahelegbe, Edum-Fotwe,

Bainson, & Kobina Turkson, 1997) that are contributing significantly to achieve the millennium development goals of reducing the child mortality rate (under five) by two-thirds (Singh et al., 2012).

2.3 Health care delivery in Kenya

The health system in Kenya is organized in a referral hierarchy, starting from communities (Level 1), to dispensaries (Level 2), to health centres (Level 3) to Sub-County hospitals (Level 4), County Referral hospitals (Level 5) and lastly to national referral hospitals (Level 6) (Maro et al., 2012). Although the pyramidal structure of the health system works well in settled populations, it is limited when it comes to meeting the needs of nomadic communities living in northern Kenya (Duba et al., 2001). North Eastern Province (Garissa, Wajir and Mandera Counties) is least well served with only 29% of the population within 5 km of a public health service provider as compared to other provinces like Central, Nairobi, Nyanza and Western, all of which have 97% to 100% of their population within 5 km of a public health facility in 2008 (Noor et al., 2009).

Health facilities are quite scarce and are poorly equipped in the vast landscape of Garissa County with many lacking vaccines and other supplies. Lagdera Sub-County has only 9 public health facilities (one Sub-County hospital, two health centre, and six dispensaries). Health facilities in all pastoral areas in Northern Kenya rarely offer outreach services to reach the remote nomadic populations and their quality of services they offer are poor. Health facilities in pastoral areas, most often lack adequate infrastructure, personnel and drugs/equipment and, therefore, have a weak performance (E Schelling, Wiebel, & Bonfoh, 2008).

2.4 Expanded Programme on Immunization

The EPI was launched in Kenya in 1981 with the objective of reducing morbidity, mortality, and disabilities from the six VPDs by making free vaccination services easily available to all eligible children. The six VPDs originally instituted as part of the Kenya Primary Health System include poliomyelitis, measles, diphtheria, tetanus, pertussis and tuberculosis. This group has been subsequently expanded to include hepatitis B, Haemophilus influenza type b (Hib), streptococcal pneumonia and Rotavirus. According to the comprehensive multi-year plan 2013-2017, the Kenya EPI acknowledges that pastoral areas in Kenya have low vaccination coverage as compared to the rest of the country citing distance to health facilities,

poor health seeking behaviour of caregivers due to socio-cultural issues and insecurity as the main reasons (MoPHS, 2013).

2.5 Kenya EPI Coverage Review

The Kenya Demographic and Health Survey (KDHS) of 2014 reported a decline in vaccination coverage for fully vaccinated children aged 12–23 months from 77% in 2008–09 to 71% in 2014 (KNBS, 2014). According to the KDHS report of 2014, the highest percentage of fully vaccinated children was in Nandi County (86%) an entirely settled population, whereas Garissa County, which is largely pastoral population, recorded a lower proportion of fully vaccinated children (54.4%) (KNBS, 2014).

2.6 Vaccination Schedule in Kenya

In Kenya, a child should receive BCG at birth, three doses of Pentavalent [Diphtheria, Pertussis, Tetanus, Hepatitis B and Haemophilus influenza type b (Hib)] (at 6, 10 and 14 weeks), three doses of Pneumococcal Vaccine(PCV) (at 6, 10, and 14 weeks), four doses of Oral Polio Vaccine(OPV) (at birth and 6, 10 and 14 weeks), two doses of Rotarix [Rota virus vaccine] (at 6 and 10 weeks), one dose of Measles vaccine (at 9 months) and Measles booster dose at 18 months.

The routine vaccination of a child requires at least six visits to vaccination centre. At each visit after vaccination, mothers/parents are given an appointment for the next vaccination. Every child is issued with vaccination card, which the mothers/parents are required to produce on each visit. Inadequate levels of vaccination against childhood diseases remain a significant public health problem in pastoralist areas of Kenya (Moïsi, Kabuka, Mitingi, Levine, & Scott, 2010). Nomadic pastoralists tend to prefer traditional health care providers over modern medical practitioners, as health facilities are perceived less favorably because they are too far away, lack the necessary services and equipment, and services are not adapted to a mobile lifestyle (Haydarov et al., 2016).

2.7 Factors associated with vaccination coverage

2.7.1 Distance/travel conditions/access

Many studies in conducted in developing countries document geographical inaccessibility as a significant cause of partial or under-vaccination (Melnyk, 1988; Rainey et al., 2011). More than 43% of mothers in Siaya, Kenya found distance/access as an obstacle, as did in 33% in Nigeria, and 30% in Liberia (Babalola & Adewuyi, 2005; Favin, Steinglass, Fields, Banerjee,

& Sawhney, 2012). A 2003 Mozambique study found the distance to health services to be the major obstacle to vaccination. (Sheldon & Alons, 2003). A study conducted in Senegal found that 71% of children completely vaccinated lived less than 10 km from the nearest health centre, while in remote rural villages only 10% of children were completely vaccinated (Favin et al., 2012).

2.7.2 Poor health staff motivation, performance/competence, and attitudes

Attitudes and behaviour of health workers – treating parents/mothers in a rude, disrespectful, or even abusive manner – are often cited as discouraging children’s vaccination. Health workers reportedly shouted/screamed at mothers who forgot/lost the child’s card, missed a scheduled vaccination appointment, or had a dirty, poorly dressed, or malnourished child. Mothers felt humiliated and discouraged from returning to the health facility (Rainey et al., 2011). Such cases were reported from many developing countries (Kruger et al., 2013; Razum, 1993).

2.7.3 Lack of resources/logistics

Numerous studies conducted in developing countries noted that vaccine stock-outs and/or cold chain problems caused unavailability of vaccination (Favin et al., 2012). When mothers miss work, travel long distances, wait for long hours, and then are denied health service, they are less likely to return for vaccination (Rainey et al., 2011). Vaccine stock-outs are caused by lack of funding or storage capacity, or poor ordering and distribution skills and systems. One journal described a vicious cycle in Guinea in which public health facilities lacked medicines, driving most parents to private health facilities which do not provide vaccination (Millimouno, Fairhead, & Leach, 2006). Pastoralist in Kenya and Somalia became less likely to seek vaccination because of health facilities’ frequent stock outs of drugs or failure to offer curative and other services at the time and place of vaccination (Favin et al., 2012).

2.7.4 False contraindications

A major cause of missed opportunities is health workers’ refusal to vaccinate eligible children. Behind this are various fears and false beliefs such as that a sick child should not be vaccinated, that a child should not receive multiple vaccinations on the same visit, that a child over 12 months is ‘too old’ for measles vaccination, or that underweight children should not be vaccinated. The most common false contraindication concerns vaccinating a sick child, which is mentioned in many studies in Kenya, Nigeria and Pakistan (Gurmu & Etana, 2016).

Various journals reported that health workers said they delayed vaccinating a sick child for fear that the vaccination would be liable if the child's condition deteriorated (Gurmu & Etana, 2016).

2.7.5 Lack of parental knowledge

Numerous studies assume that parents' good understanding of VPDs, how vaccination works, and the vaccination schedule will lead to good vaccination outcome (Babalola & Adewuyi, 2005; Favin et al., 2012). Although many findings did find strong correlations between KPPs and good vaccination status, however, some studies found high vaccination coverage among mothers with a very low understanding of vaccination (Rainey et al., 2011). Most evidence indicates that good knowledge among parents is not essential for complete vaccination. This is shown clearly in studies on Indonesia, Rwanda, Mozambique and Uganda, among others (Favin et al., 2012; Habimana & Bararwandika, 1991; Raharjo & Corner, 1989; Sheldon & Alons, 2003). A study conducted in Uganda found low levels of knowledge of vaccination, but over 90% of mothers believe vaccination is important; there is an immense positive drive in the midst of lack of knowledge (Favin et al., 2012). From a survey conducted in Rwanda, Habimana and Bararwandika (1991) established that knowledge of vaccination on the part of parents is not an important factor in vaccination coverage (Habimana & Bararwandika, 1991). Leach and Fairhead (2008) stated that in Gambia, 29% of urban and 48% of rural mothers could not name any VPDs, however, the reported national coverage was 90% (Leach & Fairhead, 2008). What appears to be essential is a positive attitude/perception towards vaccination: mothers' belief that vaccination is good for their children's health and prevents VPDs and their practical knowledge about services (Rainey et al., 2011).

2.7.6 Fear of side effects

Parents commonly mention the fear of side effects as a reason for not vaccinating their children (Gurmu & Etana, 2016). In some cases, if an older sibling or acquaintance's child had side effects, parents refused to undertake vaccinations for younger children (Favin et al., 2012). Depending on other factors, this discomfort may or may not be sufficient to cause under-vaccination (Gurmu & Etana, 2016). Some mothers' stated that better health worker communication, e.g. warning caregivers about the side effects, what to expect, and what to do, would reduce this problem (Gurmu & Etana, 2016).

2.7.7

It is difficult for poor parents in developing countries to travel long distances and then wait for hours for vaccination when they should be working to feed their families; especially, for pastoralist who are quite mobile and are constantly grazing their animals. In many pastoralist cultures, families refuse to take the baby out for vaccination during a period of post-partum seclusion. Other conflicting priorities mentioned are taking care of sick or other children, not being able to leave older children while traveling to get the younger ones vaccinated, and mothers' illness (Gurmu & Etana, 2016). Studies on Kenya, Bangladesh, and other countries cited mothers' conflicting priorities as a significant cause of under-vaccination (Atienza, Abing, & Galleposo, 2016; Uddin et al., 2008). Possibly some of these claims mask other factors, but clearly, conflicting priorities are an obstacle for many mothers. Unfortunately, vaccination times and locations are rarely adjusted for mothers' convenience (Favin et al., 2012).

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Study area

The survey was conducted as a community-based cross-sectional survey in Lagdera Sub-county of Garissa County, in February 2015. Lagdera Sub-county is largely a pastoral area that covers a vast arid area of about 8,389.8 km² with a population of about 92,636 individuals (2009 census). It is a low-lying area, characterized by an arid climate with an average annual rainfall of about 350 millimetres that suits both nomadic and settled pastoralism. Lagdera Sub-county has 3 divisions 9 locations and 12 sub locations (figure 3.1).

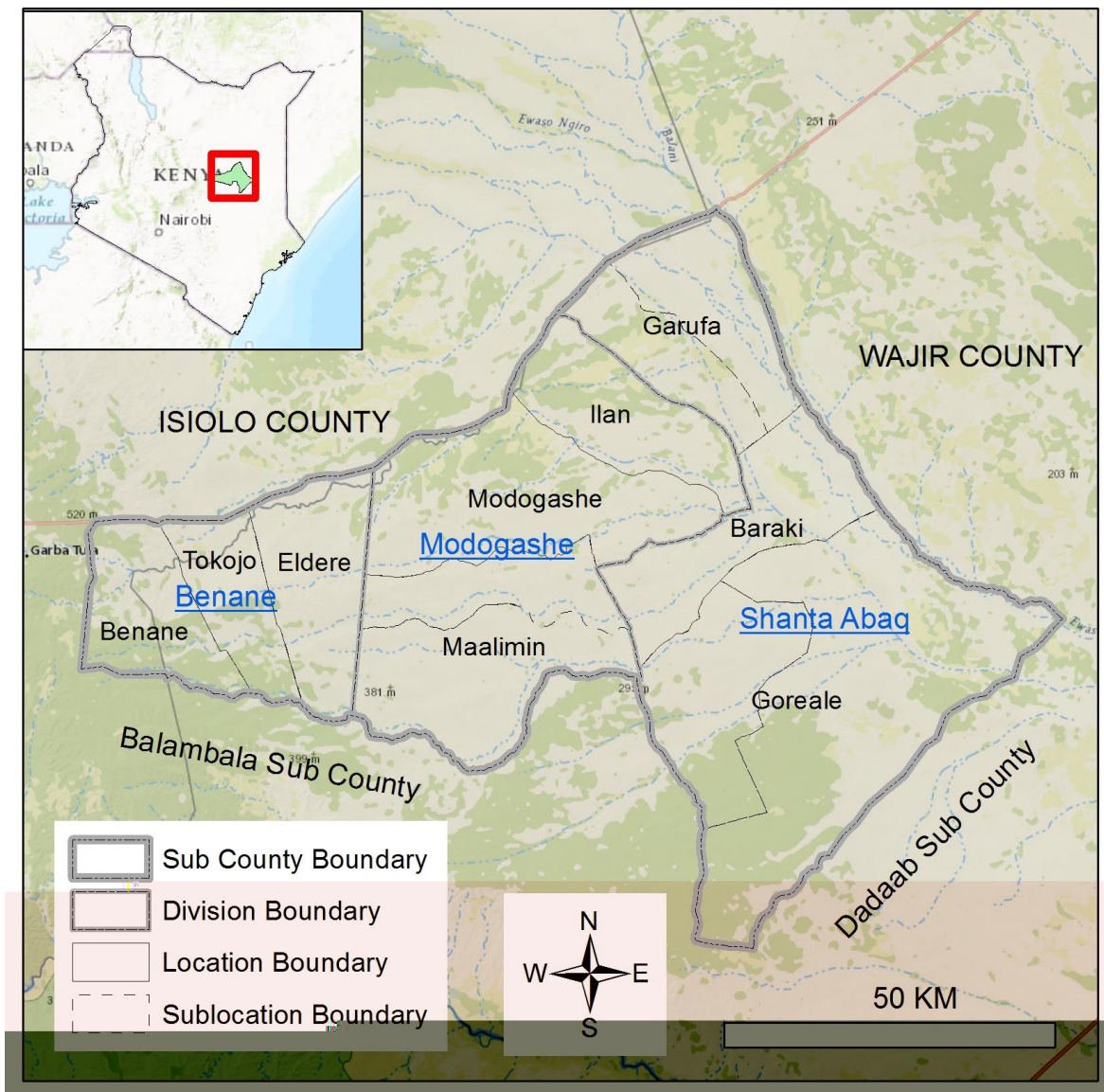


Figure 3.1: Lagdera Sub-county (Base map: National Geographic)

3.2 Study design

The study was conducted as a community-based cross-sectional survey

3.3 Study population

The study targeted mothers with children aged between 0–59 months.

3.4 The criteria for inclusion and exclusion

To be eligible for recruitment into the survey, mothers were required to give consent, to have lived in Lagdera Sub-county for greater than 6 months and have children aged 0–59 months.

3.5 Sampling

3.5.1 Sampling frame

One of the inherent challenges in studying nomadic populations relates to creating a sampling frame for a population that is fluid in its composition and location during over time. The most precise frame available for Sub-county localities is that developed by health centres for polio micro planning. The micro-plan developed for the polio outbreak by the Lagdera health team listed 119 permanent settlements and 75 nomadic sites. The micro-plan was validated by conducting key informant interviews at the Sub-county and division headquarters. The first validation verified 121 settled sites and 62 nomadic sites. After the 1st validation, the study received additional map layers from other sources that increased the scope of our sampling frame in the second validation. Using maps as a mnemonic prompt during subsequent key informant interviews, the researcher elicited a more complete and accurate data on temporary, seasonal nomadic sites, which increased to 148 while settled sites increased to 136. The 148 seasonal sites are all the possible areas that may be inhabited by nomads in a one-year cycle; some areas may be occupied in one season while others may be occupied in the next seasons.

3.5.2 Sample size determination

The sample sizes for each group (Nomadic and Settled) were estimated to provide the following precision based upon the estimated coverage (Table 3.1).

Table 3.1: Precision table

No. of clusters in each group	No. of eligible HHs per block	Target eligible HHs	Target HHs assuming 10% non-response	Design Effect (E)	Effect sample size(D/E)	Estimate Coverage	Expected precision
25	12	300	270	2	135	0.3	7.7
25	12	300	270	2	135	0.4	8.3
25	12	300	270	2	135	0.5	8.4
25	12	300	270	2	135	0.6	8.3
25	12	300	270	2	135	0.7	7.7
25	12	300	270	2	135	0.8	6.7
25	12	300	270	2	135	0.9	5.1
25	12	300	270	2	135	0.95	3.7

3.6 Sampling technique

Using a computer algorithm, 25 settled pastoralists' clusters were randomly selected by Probability Proportional to Size sampling from the sampling frame. Similarly, 25 nomadic pastoralist clusters were also selected using simple random sampling with replacement in cases where the cluster was not available seasonally. Within each cluster (in both groups), 12 mothers with children younger than 5 years of age from non-contiguously located households within the cluster were randomly selected for the survey. A household was defined as those in which one or several families share the kitchen/cooking area. Only one family (mother and children) was selected per household. Within each cluster, the systematic random method was used to select the first household. Subsequent households were selected following the "5th household from the last household to the right" criteria until the required sample size for the cluster was obtained.

3.7 Data collection tool

A structured survey instrument was used to collect quantitative data such as social-demographic, KPPs of the study groups and geographical coordinates of the household and was administered by six trained interviewers (Appendix 5). The survey instrument was pilot tested in July 2014. Based on the results of the pilot and interviewer feedback, some questions were added, deleted or modified. Because of the complex skip pattern, the study adopted an automated survey instrument that uses mobile devices that can transmit data to an online server. The survey instrument was programmed in both English and Somali using Open Data Kit (ODK) software; it was then loaded into Samsung tablets for data collection and data transmission into an online server.

3.8 Interviewer recruitment and Training

Six interviewers with diploma certificate were recruited and trained for three days on the best practices of survey administration on an ODK platform, use of Global Position System (GPS) devices and the study protocol of sampling participants.

3.9 Data management

3.9.1 Quantitative data collection

Interviewers visited the homes of selected or sampled mothers; obtained informed consent (or assent as appropriate) and completed survey instrument using the ODK platform and collected geo-coordinates of mothers' household using GPS devices. Every eligible mother was asked to produce a vaccination card for all her children aged 0–59 months. In cases where the vaccination card was not available or lost, the mother was asked to recall the vaccine's antigens administered to the child. After completing the survey instrument, the data were automatically transmitted from the tablets to an online server via a secure cellular network. Geo-coordinate of all vaccination centres in the Sub-county was also captured using handheld GPS devices.

3.9.2 Data entry and cleaning

During field operation, at the end of each day of data collection, all survey data were reviewed by the principal investigator to ensure that all variables were correctly filled and securely transmitted to the server. Tablets were password protected and data transmission between the tablets and the online server was secured through encryption. The online server or the computer hosting the database was accessible only to the principle investigator and was password protected. Data was downloaded from the ODK server for data cleaning and analysis. Data cleaning and validation were performed by the principle investigator.

3.9.3 Data Analysis

The study used four measures to describe the vaccination status of children: “never vaccinated” to indicate that a child received none of the five vaccines {BCG, Pentavalent, OPV, PCV and Measles at 9 month}; “partially vaccinated” to indicate that a child received at least one complete dose of either BCG, Pentavalent, OPV, PCV or Measles at 9 months, but did not receive all recommended doses of all five vaccines; “fully vaccinated” to indicate that a child received all recommended doses of all five vaccines and “age appropriately vaccinated” to indicate that a child received all recommended vaccines as per his/her age and vaccination schedule. For every mother, vaccination data was collected for all her children

aged between 0–59 months. Because of multiple children per mother, the study scored the mother using vaccination status of her children (Mother’s Vaccination Score). A score of “0” if her all her children were unvaccinated, a score of “1” if some of her children were unvaccinated or partially vaccinated and a score of “2” if all her children were fully vaccinated or age-appropriately vaccinated.

The dependent variable was Mothers’ Vaccination Score (MVS) while Independent variables were socio-demographic characteristics, mothers KPPs on vaccination, sources of information on vaccination and euclidean (straight line) distance to a health facility. Euclidean distance (straight line distance) to the nearest health facility was computed from the household and health facility GPS data. SPSS version 22 was used for statistical analysis while ArcGIS 10.2 was used for spatial analysis. Ordinal logistic regression method was conducted to determine the predictors of MVS for both settled and nomadic mothers. A p -value < 0.05 was considered statistically significant.

3.10 Ethical considerations

The consent of the respondents was sought and obtained before administration of the questionnaire (Appendix 1). The participants were informed that their participation was voluntary and they could withdraw from the study at any time without giving any reason. The findings were treated with confidentiality and for this research only. The objectives and results of the study were explained to the study participants. The participants were informed that the research did not pose any potential risk and their identities and personal particulars were kept confidential. Scientific and Ethical clearance was sought and obtained from KEMRI Scientific Steering Committee (Appendix 7) and Ethical Review Committee (Appendix 8).

3.11 Study Limitations

Nomadic pastoralists are always on the move in a much larger area than the selected confines of Lagdera sub-county, the study assumes that the current nomadic pastoralists are repeat/serial inhabitants of the study area. The euclidean distance model for calculating the travel distance between a household and nearest health facility may not accurately give travel distance since it may not be possible to travel in a straight line to a specific location, as it is necessary to avoid obstacles such as a river or a steep slope. However, it is the best model for this study since transport is pedestrian and there is no specific road path used by the pastoralists in the semi-arid landscape of Garissa County.

CHAPTER FOUR

4.0 RESULT

4.1 Social demographic characteristics among nomadic and settled pastoralist

A total of 553 mothers were visited by the interviewers in Lagdera sub-county. However, 77(13.9%) mothers were excluded on account of not meeting the eligibility criteria. Thus, there were 476(86.1%) mothers for a total of 725 children aged 0–59 months with an average 1.5 children per mother. Two hundred and forty-one (50.6%) mothers belonged to nomadic household and 235(49.4%) belong to settled households. Table 4.1 and 4.2 summarizes the socio-demographic characteristics of the mothers and their children.

Table 4.1: Social demographic characteristic of the mother by nomadic and settled pastoralist

Variable	Nomadic N=241(%)	Settled N=235(%)
Mothers Age group(years)		
< 20yrs.	32(13.3%)	12(5.1%)
20–29yrs.	74(30.7%)	82(34.9%)
30–39yrs.	106(44%)	115(48.9%)
≥ 40yrs.	29(12%)	26(11.1%)
Marital status		
Married	238(98.8%)	229(97.4%)
Single	3(1.2%)	6(2.6%)
Marriage Type		
Monogamous	216(89.6%)	211(89.8%)
Polygamous	25(10.4%)	24(10.2%)
Education status		
Islamic education		
No	92(38.2%)	42(17.9%)
Yes	149(61.8%)	193(82.1%)
Formal education		
No formal education	239(99.2%)	225(95.7%)
Lower primary school	1(0.4%)	5(2.1%)
Upper primary school	0(0%)	3(1.3%)
Secondary school and above	0(0%)	0(0%)
Missing data	1(0.4%)	0(0%)
No of biological children < 5yrs.		
1	126(52.3%)	130(55.3%)
2	100(41.5%)	91(38.7%)
3	15(6.2%)	14(6%)

Table 4.2: Child characteristic by type of pastoralist

Variable	Nomadic N=371(%)	Settled N=354(%)
Mean age ± SD (months)of children	27±15.08	24±14
Gender of children		
Male	194(52.3%)	202(57.1%)
Female	177(47.7%)	152(42.9%)

The mean age (\pm standard deviation) of nomadic mothers was slightly lower than (29.8 ± 7 years) than mothers from settled pastoralist (31.17 ± 6). Most mothers in both groups (nomadic and settled HHs) were married ($>97\%$) with approximately 10% of them in polygamous marriages. Nearly all the mothers in both groups (nomadic and settled) received no formal (western) education ($>95\%$) but Islamic education had a significant penetration; 61.8% for nomads and 82.1% for settled pastoralist. Out of the 725 children aged 0–59 months, 371(51.2%) were born to nomadic mothers while 354(49.8%) were from settled pastoralist. The mean age (\pm standard deviation) of children was 27 ± 15 months for nomads and 24 ± 14 months for settled pastoralist.

4.2

The majority of mothers from settled household (94%) stated that vaccination “protects children from diseases” as compared to mothers from nomadic pastoralist (68.9%). Most of the nomadic mothers did not know when to start vaccination for their children; only 14.9% of nomads stated that vaccination should be started at birth as compared to mothers from settled HHs (66.4%). Nomads also demonstrated lower knowledge on the question when measles vaccine is administered to their children; 20.33% of nomads and 58.7% of settled pastoralist stated 9 months as a time for measles vaccination. Nearly two-thirds of mothers from both groups were generally knowledgeable about symptoms of measles with 62.1% of settled and 65.1% of nomads mentioning rash as a symptom but the picture was different for polio; only 28.2% nomadic pastoralist could recognise sudden onset paralysis as compared to 48.5% of their settled counterpart. Eighty per cent of mothers from nomadic households and 61.7% of mothers from settled HHs didn’t know the cause of polio with many of them citing non-biological causes like wind and ghost while others directly attributing to God. Table 4.3 summarizes the mothers’ knowledge on vaccination.

Table 4.3: Mothers' knowledge on vaccination by nomadic and settled pastoralist

Variable	Nomadic N=241(%)	Settled N=235(%)
Purpose of vaccination		
Help a child grow	4(1.7%)	5(2.1%)
Protect a child from certain diseases	166(68.9%)	221(94%)
Gives the child strength	5(2.1%)	2(0.9%)
Don't know	65(27%)	7(3.0%)
Others	1(0.4)	0(0%)
Age at first vaccination		
At birth	36(14.9%)	156(66.4%)
1 to 2 weeks after birth	3(1.2%)	12(5.1%)
1 month after birth	11(4.6%)	4(1.7%)
40 days after birth	43(17.8%)	33(14%)
Others	1(0.4%)	0(0%)
Don't know	146(60.6%)	29(12.3%)
Missing data	1(0.4%)	1(0.4%)
Age at measles vaccination		
9 months	49(20.3%)	138(58.7%)
Other times	31(12.9%)	10(4.3%)
Don't know	161(66.8%)	87(37%)
Symptoms of Measles*		
Red month	55(22.8%)	90(38.3%)
Rash	157(65.1%)	146(62.1%)
Cough	81(33.6%)	106(45.1%)
Fever	160(66.4%)	149(63.4%)
Diarrhoea	4(1.7%)	6(2.6%)
Vomiting	8(3.3%)	12(5.1%)
Others	1(0.4%)	12(5.1%)
Symptoms of Polio*		
Red month	3(1.2%)	2(0.8%)
Rash	4(1.7%)	3(1.3%)
Cough	8(3.3%)	5(2.1%)
Fever	28(11.6%)	19(8.1%)
Diarrhoea	8(3.3%)	12(5.1%)
Vomiting	6(2.5%)	0(0%)
Sudden paralysis	68(28.2%)	114(48.5%)
Others	10(4.1%)	3(1.3%)
Don't know	162(67.2%)	116(49.4%)
Causes of Polio		
Don't know	193(80.1%)	145(61.7%)
Wind/Ghost/God	45(18.7%)	86(36.6%)
Lack of vaccination	0(0%)	2(0.9%)
Others	3(1.2%)	2(0.9%)

*Multiple response questions

4.3 on vaccination

Most of the mothers from settled HHs (87.2%) stated that vaccination was “very important” whereas only 40.2% of their nomadic counterparts thought vaccination was very important. Similarly, when we posed the question “do you feel that vaccinations are safe” 95.7% of mothers from settled HHs stated that vaccination was “safe” or “very safe” whereas less than half (48.5%) of their nomadic counterparts believed vaccination was safe. More than 85% of mothers (in both groups) whose children received vaccines were willing to accept any remaining vaccine antigens and were also willing to pay for the vaccines. The perception of mothers on vaccination in both groups is shown in Table 4.4 below.

Table 4.4: Mothers’ Perception on vaccination by nomadic and settled pastoralist

Variable	Nomadic	Settled
Importance of vaccination	n=241	n=235
Not very important	9(3.7%)	6(2.6%)
Somewhat important	65(27%)	17(7.2%)
Very important	97(40.2%)	205(87.2%)
Don’t know	70(29%)	7(3%)
Do you feel that vaccination is safe	n=241	n=235
Not Safe	61(25.3%)	6(2.6%)
Somewhat safe	60(24.9%)	4(1.7%)
Safe	68(28.2%)	142(60.4%)
Very safe	49(20.3%)	83(35.3%)
Missing data	3(1.2)	0(0%)
Willing to accept remaining vaccines	n=101	n=219
Probably not	7(6.9%)	0(0%)
Unsure	4(4%)	11(5%)
Probably yes	2(2%)	8(3.7%)
Yes	88(87.1%)	200(91.3%)
Willing to pay for vaccines	n=101	n=219
No	14(13.9%)	16(7.3%)
Yes	86(85.1%)	194(88.6%)
It depends on the cost	1(1%)	7(3.2%)
Others	0(0%)	1(0.5%)
Don’t know	0(0%)	1(0.5%)

4.4 Practices of mothers

Out of 371 children from nomadic HHs, only 11.6% were fully vaccinated. Similarly, out of 354 children from settled HHs, only 50.3% were fully vaccinated. A huge proportion of nomadic children (61.7%) were never vaccinated as compared to their settled counterpart (9.6%) (Table 4.5). Nearly 60% of mothers from nomadic HHs and 7.2% of mothers from

settled pastoralist had never vaccinated all their children or MVS=0. Reasons cited by mothers from nomadic HHs for non-vaccination were; hospital or clinic was too far away (78.6%), 23.6% reported that they did not know the child needed vaccination and 44.3% stated that “no one comes to our village” which suggests that they are relying on health centres for outreach. However, only 29.6% children from nomadic HHs and 38.1% of children from settled communities possessed a vaccination card. The most common form of transport to a health facility in both groups is pedestrian; 98.8% for nomads and 81.3% for settled pastoralist.

Table 4.5: Practices of mothers by nomadic and settled pastoralist

Variable	Nomadic	Settled
Child Vaccination Status	n=371	n=354
Fully vaccinated	43(11.6%)	178(50.3%)
Age Appropriately vaccinated	24(6.5%)	53(15%)
Partially vaccinated	75(20.2%)	89(25.1%)
Never vaccinated	229(61.7%)	34(9.6%)
Mothers Vaccination Score(MVS)	n=241	n=235
0 - All children never vaccinated	143(59.3%)	17(7.2%)
1 - Some children are partially/never vaccinated	73(30.3%)	82(34.9%)
2 - All children are fully/age appropriately vaccinated	25(10.4%)	136(57.9%)
Mode of transport to health facility*	n=241	n=235
Walk/on foot	237 (98.8%)	191(81.3%)
Bus	7(2.9%)	33(14%)
Motorcycle	1(0.4%)	0(0%)
Private vehicle	0(0%)	5(2.1%)
Others	1(0.2%)	7(3%)
Vaccination card possession	n=142	n=320
Yes	42(29.6%)	122(38.1%)
No	100(70.4%)	198(61.9%)
Place children get vaccinated	n=101	n=219
At health facility	50(49.5%)	156(71.2%)
Outreach	5(5%)	29(13.2%)
Both health facility and outreach	44(43.6%)	33(15.1%)
Private clinic	0(0%)	1(0.5%)
Others	2(2%)	0(0%)
Husband accompanying mother during child vaccination visits	n=101	n=219
No	61(60.4%)	141(64.8%)
Yes	10(9.9%)	27(12.3%)
Sometimes	30(29.7%)	50(22.8%)
Reason for non-vaccination*	n=140	n=16
Did not know they needed vaccination	33(23.6%)	5(31.3%)

Don't know where to go	8(5.7%)	0(0%)
Hospital/clinic too far away	110(78.6%)	7(43.8%)
Local clinic does not offer vaccination	5(3.6%)	0(0%)
No one comes to our village	62(44.3%)	4(25%)
Side effects of vaccination/safety	17(12.1%)	6(37.5%)
No time/Busy with household chores	19(13.6%)	4(25%)
Children too young	1(0.7%)	0(0%)
The clinic charges for vaccines	1(0.7%)	0(0%)

*Multiple response questions

4.5 Distance to health facility

The average distance to a health facility was 4.8 Km for settled HHs while it was 13.1 Km for nomadic pastoralist. A total of 151(64.3%) mothers from settled HHs were within 5 Km to a health facility, in which 96 mothers had MVS of 2 as compared to mothers from nomadic HHs; only 5(2.1%) mothers were within 5 Km to health facility, in which all of them had MVS of zero. Similarly, 86(35.7%) mothers from nomadic HHs were above 15 Km to a health facility, in which 61 mothers had MVS of zero while 21 mothers from settled were above 15 Km to a health facility, in which none of them had MVS of zero (Table 4.6). Figure 4.1, visualizes how distance to health facility affect uptake of vaccination.

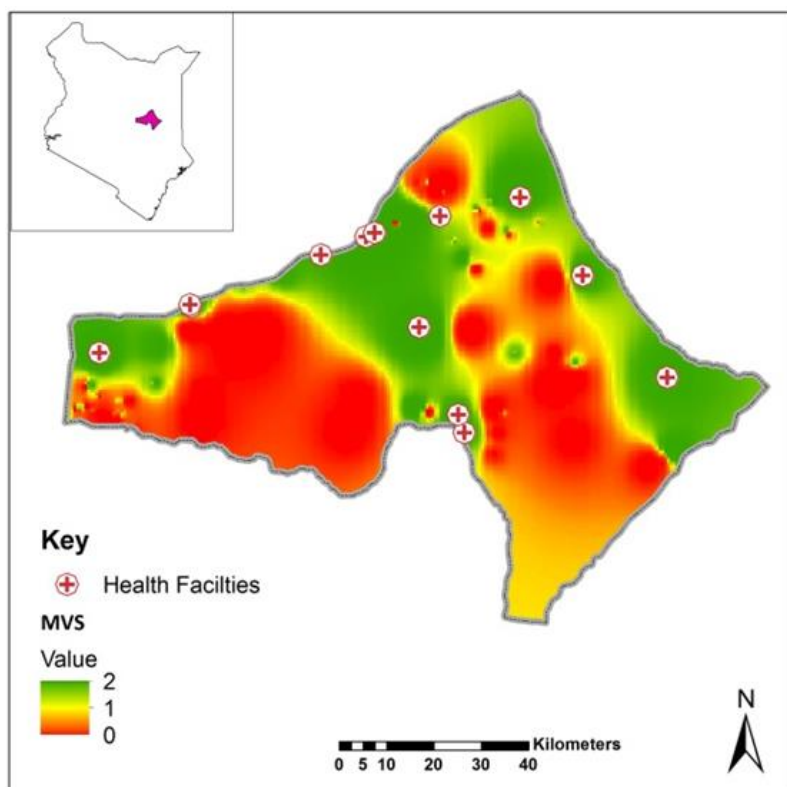


Figure 4.1: Spatial distribution of combined MVS for both nomadic and settled pastoralist in a relationship with health facility locations. The map illustrates how geographical proximity to health facilities influences MVS.

Table 4.6: Cross-tabulation of distance to health facility and MVS

Distance (Km)	Nomadic				Settled			
	MVS=0	MVS=1	MVS=2	Total	MVS=0	MVS=1	MVS=2	Total
< 5	5	0	0	5(2.1%)	9	46	96	151(64.3%)
5 to 10	44	30	11	85(35.3%)	6	16	18	40(17%)
10 to 15	33	23	9	65(27%)	2	13	8	23(9.8%)
>15	61	20	5	86(35.7%)	0	7	14	21(8.9%)
Total	143	73	25	241(100%)	17	82	136	235(100%)

4.6 Vaccination coverage for routine vaccines antigens

The coverage of BCG, Pentavalent3, OPV3, PCV3 and measles at 9 months for nomadic pastoralist was 36.9%, 16.9%, 15.2%, 17.2% and 23.9%, while for settled pastoralist was 87.3%, 71.2%, 71.2%, 70.5% and 78.6% respectively (Table 4.7). The coverage for measles at 18 months (booster) was poor in children from settled HHs (32.9%) while it was worse in their nomadic counterpart (5.4%). The dropout rate for nomadic pastoralist was 16.1% while the settled group was 14% (Pentavalent 1- Pentavalent 3).

Table 4.7: Vaccine antigen coverage for routine vaccination

Antigens	Nomadic		Settled	
	N	%	N	%
BCG (at birth)	371	36.9	354	87.3
OPV0 (at birth)	371	15.9	354	61.0
Pentavalent 1 (at 6 weeks)	355	33.0	337	85.2
OPV1 (at 6 weeks)	355	32.1	337	84.3
PCV1 (at 6 weeks)	355	32.7	337	84.3
Pentavalent2 (at 10 weeks)	351	25.6	326	83.1
OPV2 (at 10 weeks)	351	26.5	326	81.6
PCV2 (at 10 weeks)	351	25.4	326	83.1
Pentavalent3 (at 14 weeks)	349	16.9	319	71.2
OPV3 (at 14 weeks)	349	15.2	319	71.2
PCV3 (at 14 weeks)	349	17.2	319	70.5
Measles (at 9 months)	322	23.9	295	78.6
Measles Booster (at 18 months)	261	5.4	231	32.9
Never vaccinated	371	61.7	354	9.6

4.7 Factors associated with MVS

The factors that were significantly associated with MVS in the settled group were KPPs indicators like; the purpose of vaccination ($P=0.001$), the importance of vaccination ($P<0.0001$), the age of first vaccination ($P=0.015$), and safety of vaccines ($P<0.0001$). In addition, communication indicators like ownership of radio ($P=0.02$) and 5km euclidean

distance to a health facility ($P=0.018$) were significantly associated with MVS in the settled group.

Similarly, the factors that were significantly associated with MVS in the nomadic group were also KPPs indicators like; the purpose of vaccination ($P<0.0001$), the importance of vaccination ($P<0.0001$), the age of first vaccination ($P<0.0001$), the safety of vaccines ($P<0.0001$). Furthermore, communication indicators like ownership of working radio ($P=0.011$) and 15km euclidean distance to a health facility ($P=0.018$) were significantly associated with MVS in the nomadic group. Surprisingly, Islamic education/Quranic ($P<0.0001$) and mobile phone ownership ($P=0.001$) was significantly associated with the nomadic group only. Age of mother was not significantly associated with MVS in the settled group (in all age group); however, for nomads – mothers of age >30 years recorded a significant association (Table 4.8 and 4.9 summarizes the independent variables that are associated with MVS)

Table 4.8: Factors affecting the rate of MVS for nomadic mothers

Independent Variable	OR	95% CI		P value
		Lower	Upper	
Social demographic characteristic				
Age of Mother				
>40yrs	3.796	1.344	10.708	0.012
30 to 39yrs	3.435	1.585	7.433	0.002
20 to 29yrs	1.317	0.604	2.869	0.489
<20yrs	1	-	-	-
Islamic Education/Quran				
No	3.077	1.747	5.414	<0.0001
Yes	1	-	-	-
Mobile phone ownership				
No	2.638	1.504	4.627	0.001
Yes	1	-	-	-
KPPs				
Purpose of Vaccination				
Doesn't Knows	13.860	5.737	33.48	<0.0001
Knows	1	-	-	-
Importance of Vaccination				
Not very important/Don't Know	15.487	6.411	37.41	<0.0001
Somewhat important/Very important	1	-	-	-
At what age, should a child receive its first vaccine				
Other times/Don't know	7.221	3.540	14.75	<0.0001
At Birth	1	-	-	-
Do you feel Vaccination are safe				
Not safe/Somewhat safe	4.549	2.633	7.854	<0.0001
Safe/very safe	1	-	-	-

Communication				
Having a working Radio				
No	2.540	1.241	5.202	0.011
Yes	1	-	-	-
Distance to health facility				
Euclidean distance				
≥ 15Km	2.195	1.261	3.819	0.005
< 15Km	1	-	-	-

Table 4.9: Factors affecting the rate of MVS for settled mothers

Independent Variable	OR	95% CI		P value
		Lower	Upper	
Social demographic characteristic				
Age of Mother				
>40yrs	0.451	0.114	1.775	0.254
30 to 39yrs	0.803	0.254	2.535	0.708
20 to 29yrs	0.747	0.231	2.413	0.626
<20yrs	1	-	-	-
Islamic Education/Quran				
No	1.55	0.813	2.965	0.183
Yes	1	-	-	-
Mobile phone ownership				
No	0.836	0.494	1.415	0.505
Yes	1	-	-	-
KPPs				
Purpose of Vaccination				
Doesn't Knows	6.203	2.149	17.903	0.001
Knows	1	-	-	-
Importance of Vaccination				
Not very important/Don't Know	21.520	6.560	70.598	<0.0001
Somewhat important/Very important	1	-	-	-
At what age, should a child receive its first vaccine				
Other times/Don't know	1.944	1.140	3.317	0.015
At Birth	1	-	-	-
Do you feel Vaccination are safe				
Not safe/Somewhat safe	53.732	12.122	238.174	<0.0001
Safe/very safe	1	-	-	-
Communication				
Having a working Radio				
No	2.586	1.435	4.660	0.02
Yes	1	-	-	-
Distance to health facilities				
Euclidean distance				
≥ 5Km	1.883	1.113	3.190	0.018
< 5Km	1	-	-	-

CHAPTER FIVE

5.0 DISCUSSION, CONCLUSION, AND RECOMMENDATION

5.1 Discussion

5.1.1 Social demographic characteristics among nomadic and settled pastoralist

The uptake of formal (western) education among mothers is poor in both groups. Leggett (2005) reported that pastoralists in North Eastern Kenya generally have a low level of formal education with a huge gender gap that favours boys (Leggett, 2005). A study conducted in a similar pastoral setting in Eastern Ethiopia, Mohamud *et al.* (2014) reported very low formal education (12.4%) among mothers (Mohamud, Feleke, Worku, Kifle, & Sharma, 2014). As observed elsewhere, Islamic/Quranic education is generally accepted in both groups, however, significant association with MVS was only reported by the nomadic group ($P < 0.0001$). In addition, a meta-analysis conducted by Schelling *et al.* (2008) stated that Islamic/Quranic education is seen as a religious obligation by Muslim pastoralist in the Sahel and Horn of Africa (E Schelling et al., 2008). Mobile phone ownership was significantly associated with MVS only in the nomadic group ($P = 0.001$), indicating that some of the nomadic pastoralists can access a cellular network and health facility which are often co-located in trading centres/towns. Age of mother was not an independent predictor of MVS in the settled group (in all age groups); however, for nomads – mothers of age >30 years recorded a significant association. A study conducted in Zimbabwe, Mukungwa, (2015) found out that maternal age is an important determinant of full vaccination; He stated that mothers of middle ages 25-34 and 35-44 were more likely to fully vaccinate their children than younger mothers (Mukungwa, 2015).

5.1.2 Knowledge, Perception, and Practices of Mothers

In this study, Knowledge about vaccination is strongly associated with vaccination status of a child/MVS. Knowledge indicators are summarised in table 4.8 and 4.9. This finding is in conformity with previous studies; for example, Kamau and Esamai (2001), Mapatano (2008) and many other researchers reported that knowledge on vaccination significantly influenced vaccination (Kamau & Esamai, 2001; Mapatano et al., 2008). Mothers from nomadic HHs exhibited lower knowledge on vaccination as compared to the settled group and is the same group that recorded high non-vaccinated children (61.7%). Low vaccination knowledge among nomads is due to lack of awareness, high illiteracy levels, and poverty. For settled group, knowledge on vaccination was lower as compared to other rural settled setting; for

example, a study conducted in peri-urban Kenya and rural Ghana, Singh *et al.* (2012) and Maina *et al.* reported higher knowledge indicators than settled pastoralist (Maina, Karanja, & Kombich, 2013; Singh *et al.*, 2012)

Mothers from settled HHs had higher positive perception towards vaccination, which the majority in this group regarded vaccination as an important intervention (87.2%) compared to their nomadic counterpart (40.2%). The importance of vaccination was a strong predictor of MVS in both groups ($P=0.001$). Positive perception/attitude about vaccination are reported in many previous studies (Angelillo *et al.*, 1999; Fitch & Racine, 2004; Roodpeyma, Kamali, Babai, & Tajik, 2007). However, a study by Zelaya-Bonilla *et al.* stated that a positive perception/attitude may not translate to full vaccination; despite the positive perception, mothers may sometimes not complete vaccination schedule because of poor knowledge on vaccination (Zelaya-Bonilla, Mata-Gamarra, & Mills-Booth, 1985).

Nearly 60% of mothers from nomadic HHs have never vaccinated all their children in comparison to 7.2% of mothers from settled HHs. These findings are in agreement with many other studies that examined access to health among the nomadic pastoralist in Chad, Nigeria, and elsewhere (Dao & Brieger, 1994; Daoud *et al.*, 2000). Reasons cited by mothers from nomadic HHs for non-vaccination were; hospital or clinic was too far away (78.6%), 23.6% reported that they did not know the child needed vaccination and 44.3% stated that “no one comes to our village” which suggests that they are relying on health centres for outreach. Reasons cited by researchers for low health service utilization among the nomadic pastoralist are spatial mobility, illiteracy, social-cultural barriers and exclusion by health policy makers (Hampshire, 2002; Omar, 1991; Esther Schelling *et al.*, 2010). The study could only observe cards for 35.5% of the children – more in the settled (38.1%) than in the nomads (29.6%), implying that mothers in both groups do not understand the importance of vaccination cards.

5.1.3 Vaccination coverage

The coverage rates for settled pastoralist (BCG 87.3%, Pentavalent3/OPV3 71.2%, PCV3 70.5%, Measles at 9 month 78.6%) was slightly lower than the findings of KDHS, 2014 for Garissa county except for BCG (BCG 80.3%, Pentavalent3 91.6%, OPV3 75.9%, PCV3 84.7%, Measles at 9 month 81.2%) (KNBS, 2014). Sadly, the coverage rates for nomadic pastoralist are very low (BCG 36.9%, Pentavalent3 16.9%, OPV3 15.2%, PCV3 17.2%, Measles at 9 months 23.9%); supporting the argument that nomads are not being reached

with vaccines. The KDHS 2014 report, pointed out low coverages for all pastoral counties in Northern Kenya as compared to non-pastoral counties (KNBS, 2014). Similar findings were reported from nomadic populations in Chad, Tanzania, and Ethiopia (Gurmu & Etana, 2016; Kruger et al., 2013; Esther Schelling et al., 2007).

5.1.4 Distance to health facility

The distance a mother travels had a significant impact on the utilization of vaccination services in both nomadic and settled HHs. Sixty-four percent of mothers from settled HHs and 2.1% of mothers from nomadic HHs were within 5 Km to a health facility. In addition, transport is pedestrian for 98.8% of nomadic and 81.3% of settled HHs. Many studies in Egypt, Mozambique, Yemen, and Nigeria have documented service inaccessibility as an important cause of partial or non-vaccination (Al-Taiar, Clark, Longenecker, & Whitty, 2010; Babalola & Adewuyi, 2005; Reichler et al., 1998; Sheldon & Alons, 2003). We were able to show the distance decay effect, observed elsewhere in Kenya, Malawi, and Niger, where vaccination diminishes with increasing distance from the health facility (Blanford et al., 2012; Jahn et al., 2008; Ndiritu et al., 2006). However, a study conducted in Western Kenya failed to link distance and vaccination uptake (Calhoun et al., 2014). It may be because 29% of the population in the North Eastern Kenya lives within 5 km of a public health facility, suggesting that geographical access is a barrier to vaccination uptake than in areas where health facilities are close to one another (Noor et al., 2009).

5.1.5 Other factors associated with vaccination coverage

Communication indicator like ownership of a working radio was found to be significantly associated with MVS in both nomadic ($P=0.011$) and settled HHs ($P=0.02$). Mothers mostly from settled HHs were able to tune to local vernacular stations that educate the population on relevant topics including health messages. Media is one of the means through which utilization of vaccination services can be enhanced (Rahman & Obaida-Nasrin, 2010). Similar to the findings in Ethiopia, Bangladesh and Uganda children's full vaccination is higher among mothers who have frequent access to media (Bbaale, 2013; Gurmu & Etana, 2016; Rahman & Obaida-Nasrin, 2010). Vaccination of children requires not only availability of services in their villages but also the commitment of mothers to vaccinate her children. Hence, improving active participation of pastoralist and also plays an important role in creating awareness and public demand for the benefits of vaccination (Gurmu & Etana, 2016).

5.2 Conclusion

The study revealed very low vaccination coverage among the nomadic pastoralist as compared with their settled counterpart. Moreover, the vaccination coverage for settled pastoralist was lower when compared with the non-pastoral rural setting in Kenya and elsewhere. Ordinal logistic regression revealed the following factors as determinants of vaccination coverage:

- Social demographic variables like age of mother >30 years, Islamic/Quranic education and ownership of mobile phone was significantly associated with the nomadic group. However, the same was not observed for the settled pastoralists.
- Multiple KPPs indicators were found to be significantly associated with vaccination coverage in both nomadic and settled pastoralist. The KPPs factors that significantly influences vaccination coverage in both groups includes;
 - ✓ the purpose of vaccination,
 - ✓ Importance of vaccination
 - ✓ Age of first vaccination
 - ✓ Safety of vaccines
- Distance to a health facility or service/geographical inaccessibility plays an important role in the uptake of vaccination in both groups.
- Other factors like ownership of a working radio were significantly associated vaccination coverage in both groups.

5.3 Recommendation

To improve vaccination rates among nomadic and other hard-to-reach populations the following recommendations are made; (1) Community health workers should adopt a proactive approach by following nomadic pastoralist to locate their children in the respective sites and vaccinate them. They should develop a detailed micro-plan with clear maps showing the seasonal movements of nomadic populations to ensure targeted outreach services to these populations. The plan should include sketch maps showing actual locations and seasonal movement of these communities. However, sustaining such a robust outreach services over long distances and time periods is a continuing challenge. (2) An innovative approach like “one health” can be established to increase vaccination rates among pastoralist. In one health, human and animal vaccination services are combined. This has been shown to drastically improve vaccination coverage among the nomadic population.

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APPENDICES

Appendix 1: Informed consent form for mothers in English

Study Title:

Vaccination Coverage and its Determinants among Pastoralists in Lagdera District of Garissa County, Kenya

Institutions and Investigators:

Principle investigator	Institution
Ahmed Unshur	Postgraduate Student at Jomo Kenyatta University of Agriculture and Technology
Prof. Mohamed Karama	Kenya Medical Research Institute(KEMRI)
Pro. Gideon Kikuvi	Jomo Kenyatta University of Agriculture and Technology

Study Location

The study will be conducted in Lagdera District.

Purpose of the study

The study aims to collect information on factors that affect vaccination among the pastoralist living in Lagdera District. You are being asked to participate in this study as a parent from this location and would be grateful if you are willing to participate by answering questions from this study.

Description of the study

If you agree to participate in this study the following will occur:

- i. You will sit with a trained interviewer and will be requested to answer questions that have been prepared for the study through an interview in order to obtain the intended information on immunization. The interviewer will be recording your responses in a questionnaire.
- ii. No identifying information such as name will be collected from you during this interview, except your age, level of education, marital status, and your current occupation.
- iii. You will be interviewed only once for approximately 60 minutes in a private setting.

Risks

You will be asked questions about your personal particulars and information regarding vaccination. Some questions could potentially make you feel uncomfortable. You may refuse to answer any particular question and may stop the interview at any time. It is unlikely that any form of injury could happen to you as a result of being in this study. It is important that you tell the study staff if you feel that you have been irritated or damaged because of taking part in this study.

Benefits

The information you provide us is extremely important and valuable. It will help to increase our understanding on the level of knowledge, perception, and practices regarding vaccination among pastoralist living in Lagdera district. There is no direct benefit, however; the results

will be used to assist in formulating policies that may initiate improved access to immunization among your community.

Confidentiality

I assure you that all the information collected from you will be kept confidential. Only people working in this study will have access to the information. We will ensure that any information included in our report does not identify you as a respondent as we will not put your name or other identifying information on the records of the information you provide.

Compensation/Reimbursement

There will be no compensation or reimbursement of time spent during the interview; however, your participation is highly appreciated.

Participation

Your participation in this study is completely voluntary. If you choose not to participate in the study or if you decide to stop participating in the study you will not get any harm. You can stop participating in this study at any time, even if you have already given your consent. Refusal to participate or withdrawal from the study will not involve loss of any benefits to which you are otherwise entitled. You will receive a copy of this signed consent form to take away with you.

Who to contact

If you have questions about this study, please don't hesitate to contact:

- a) Ahmed Unshur, P.O Box 27 - 70200 Wajir, Mobile No. 0723929642
- b) For any questions pertaining to rights as a study participant the contact person is:
The secretary KEMRI Ethics Review Committee
P.O Box 54840-00200,
Nairobi. Tel 0202722541, 0722295901, 0733400003
Email address ercadmin@kemri.org

Signature

I have read/understood the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of Participant.....

Signature of Interviewer

Date

Appendix 2: Informed consent form for mothers in Somali

Lifaaqa 6aad: Foomka Wargalka ah ee Ogolaanshaha ee Loogu Tala Galay Qoyska

Cinwaanka Daraasada:

Qaadashada Tallaalka Reer Guuraaga Dagmatha Lagdera Gobolka Garissa, Kenya iyo Mirodhalkiisa

Macaahiida iyo Baaritaanada:

Baaraha ugu weyn	Machadka
Axmed Cunshur	Arti Jamacata Jomo Kenyatta University of Agriculture and Technology
Prof. Moxamed Karama	Kenya Medical Research Institute(KEMRI)
Pro. Gideon Kikuvi	Jomo Kenyatta University of Agriculture and Technology

Qorshaha daraasada

Daraasadaan waxay diirada saareysaa in lasoo aruursho xog ku saabsan caqabadaha/waxyaabaha dhiirigaliya tallaalka ee xoolo dhaqatada deegaanka Lagdera. Waxaa lagaa codsanayaa inaad ka qeyb qaadato daraasadaan maadaama aad tahay waalid kunool dagaankaan waxaana aad uga maqsuudi lahaa hadii aad ka qeyb qaadato ka jawaabida suaalaha daraasadaan.

Waxa Ka Qeyb Qaadashada Kujira

Hadii aad aqbasho inaad ka qeyb qaadato daraasadaan waxyaabaha soo socda ayaa dhacaya:

- i. Waxaad meel wada fariisanaysaan wareysi qaade tababaran waxaana lagaa doonayaa inaad ka jawaabto suaalaha daraasada loo diyaarshay ayadoo wareysi lagaa qaadayo si loo helo xogta la doonayo ee ku saabsan tallaalka. Wareysi qaaduhu wuxuu duubi doonaa jawaabahaaga waxaana lagu qori doonaa foomka suaalaha.
- ii. Xog aqoonsi sida magacaaga oo kale lama doonayo mana lagu weydiin doono inta wareysigu socdo, waxaan ka ahayn da'daada, heerkaaga waxbarasho, xaalada guur iyo shaqada aad iminka qabato.
- iii. Waxaa wareysiga lagaa qaadayo uu socon doonaa qiyaastii 60 daqiiqo oo qura meel gaar ah ayaana lagaaga qaadi doonaa.

Qarsoodi ahaanta

Waxaan kuu xaqiijinyaa in dhammaan xogta lagaa qaado qarsoodi laga dhigi doono. Dadka cilmi baaristaan ka shaqeynaya ayumbaa heli karaya xogtaan. Waxaanu xaqiijin doonaa in wixii xog ah ee warbixinteena lagu soo daro aysan muujin doonin magacaaga ama xog kale oo aqoonsi ah oo kujidha xogtii aad bixisay.

Halista

Waxaa lagu weydiin doonaa suaalo kusaabsan shakhsiyadaada iyo xog ku saabsan tallaalka. Qaar ka mid ah suaalaha waxaa laga yaabaa inaad jecleysan. Waad diidi kartaa inaad ka jawaabto suaalaha qaarkood waadna ka bixi kartaa wareysiga waqtigii aad doonto.

Xaqa Aad U Leedahay Inaad Ka Baxdo Daraasada Iyo Waxyaabo Kale Oo Aad Yeeli Karto

Ka qeyb qaadashadaada daraasada waa iskaa gebi ahaanba. Hadii aad doonto inaad ka qeyb qaadan daraasada ama hadii aad goansato inaad ka qeybqaadashada daraasada aad joojiso wax dhib ah kuma soo gaarayaan. Waqtigii aad doonto waad joojin kartaa ka qeyb qaadashada daraasadaan, xataa hadii aad markii hore ogolaatay. Diidmada ka qeyb qaadashada ama ka bixida daraasada waxba kaagama lumayaan oo wax markii horeba lagu qorsheeyay inaad ku heleysa majiraan.

Faaiidooyinka

Xogta aad bixiso oo aad anaga na siiso aad ayay muhiim u tahay waana qiimo badan tahay. Waxay wax ka tareysaa sidii aanu u fahmi lahayn heerka aqoonta, fikradaha iyo dhaqamada ku saabsan tallaalka ee xoolo dhaqatada kunool dagaanka Lagdera. Si kastaba ha ahaatee majirto faaiido toos ah; natiijada waxaa loo adeegsan doonaa qaabeynta siyaasadaha laga yaabo inay bilow u noqdaan helitaan horumarsan oo tallaalka ay hesho bulshadiinu.

Dhaawac la xiriira ka qeyb qaadashada daraasadaan

Waxaan marna la filan karayn in wax dhaawaca noocuu ahaadaba uu kaa soo gaaro ka qeyb qaadashada daraasadaan. Waxaa muhiim ah inaad u sheegto shaqaalaha daraasada hadii aad dareemeyso inaad ka carooneyso ama aad dareemeyso sharaf dhac ka qeyb qaadashadaada daraasadaan awgeed.

Mag dhaw

Ma jiri doono wax mag dhaw ah oo lagu siin doono waqtigii aad ku bixisay wareysiga lagula yeelanayo; si kastaba ha ahaatee waxaa lagaaga mahad celin doonaa ka qeyb qaadashadaada.

Cida ay tahay in lala xiriiro

Hadii aad wax suaalo ah ka qabto daraasadaan, fadlan durba la soo xiriir:

- a) Axmed Cunshur, Sanduuqa Boosto 27 - 70200 Wajeer, nambarka taleefanka gacanta. 0723929642
- b) Wixii suaalo ah oo ku saabsan xaquuqdaada ka kaqeyb qaate ahaan ka qeyb qaatay cilmi baarista la soo xiriir:

Xoghayaha Guddiga Dib-u-eegida Anshaxa ee KEMRI

Sanduuqa Boosto 54840-00200,

Nairobi. Tel 0202722541, 0722295901, 0733400003

E mail: ercadmin@kemri.org

Saxiixa

Aniga oo ah waxaan aqriyay/fahmay waxa ku xusan foomkaan. Suaalahayga waa laga jawaabay. Waxaan aqbalay inaan ka qeybqaato daraasadaan.

Saxiixa ka qeyb qaataha.....

Saxiixa wareysi qaadaha.....

Taariikhda ogolaanshaha la saxiixay.....

Appendix 3: Assent form for Mother less than 18 years in English

You are being invited to participate in a study about vaccination in children. This study is being conducted by Mr. Ahmed Noor Unshur, a post graduate student from Jomo Kenyatta University. You will be asked questions about your personal particulars and information regarding vaccination of your children. The interview will take you about 60 minutes. It is unlikely that any form of injury could happen to you as a result of being in this study. There is no direct benefit, however; the results will be used to assist in formulating policies that may initiate improved access to vaccination among your community.

All responses given will be kept confidential and will only be shared with team members. We will ensure that any information included in our report does not identify you as a respondent. You are free to participate or not to participate. If you decide to participate you may change your mind at any time and ask not to participate. It is important that you tell the study staff if you feel that you have been irritated or damaged because of taking part in this study. You will receive a copy of this signed assent form to take away with you.

Who to contact

If you have questions about this study, please don't hesitate to contact:

- a) Ahmed Unshur, P.O Box 27 - 70200 Wajir, Mobile No. 0723929642
- b) For any questions pertaining to rights as a participant the contact person is:

The secretary KEMRI Ethics Review Committee
P.O Box 54840-00200,
Nairobi. Tel 0202722541, 0722295901, 0733400003
Email address ercadmin@kemri.org

Signature

I have read/understood the contents in this form. My questions have been answered. I agree to participate in this study.

Signature of Participant.....

Signature of Interviewer

Date

Appendix 4: Assent form for Mother less than 18 years in Somali

Lifaaqa 4aad: Foomka Wargalka ah ee Ogolaanshaha hoyatha 18 sana kayar

Waxa lagudoortay in aad ka qaybqaadato cilimi baarid kusaabsan xal uhelida talalka ciyaalka. Cilimi baaridani waxa wadaa Axmed Nur Cunshur oo diyaarinaya shahadada majesterka caafimaadka bulshada ee jamacada Jomo Kenyatta. Waxaa lagu weydiin doonaa suaalaha kusaabsan shakhsiyadaada iyo xog ku saabsan tallaalka o kugathaneisa 60 dagiga. Qaar ka mid ah suaalaha waxaa laga yaabaa inaad jecleysan. Waad diidi kartaa inaad ka jawaabto suaalaha qaarkood waadna ka bixi kartaa wareysiga waqtigii aad doonto. Si kastaba ha ahaatee majirto faaiido toos ah natiijada waxaa loo adeegsan doonaa qaabeynta siyaasada laga yaabo inay bilow u noqdaan helitaan horumarsan oo tallaalka ay hesho bulshadiinu.

Dhammaan jawaabaha waxaa laga dhigi doonaa kuwo qarsoodi ah waxaana la tusin doonaa oo qura xubnaha cilmi baaristaan ka shaqeynaya ee kooxda. Waxaan marna la filan karayn in wax dhaawaca noocuu ahaadaba uu kaa soo gaaro ka qeyb qaadashada daraasadaan. Waxaa muhiim ah inaad u sheegto shaqaalaha daraasada hadii aad dareemeyso inaad ka carooneyso ama aad dareemeyso sharaf dhac ka qeyb qaadashadaada daraasadaan awgeed

Cida ay tahay in lala xiriir

Hadii aad wax suaal ah ka qabto daraasadaan, fadlan durba la soo xiriir:

- a) Axmed Cunshur, Sanduuqa Boosto 27-70200 Wajeer, nambarka taleefanka gacanta. 0723929642
- b) Wixii suaal ah oo ku saabsan xaquuqdaada ka kaqeyb qaate ahaan ka qeyb qaatay cilmi baarista la soo xiriir:

Xoghayaha Guddiga Dib-u-eegida Anshaxa ee KEMRI

Sanduuqa Boosto 54840-00200,

Nairobi. Tel 0202722541, 0722295901, 0733400003, E mail: ercadmin@kemri.org

Saxiixa

Aniga oo ah..... waxaan aqriyay/fahmay waxa ku xusan foomkaan. Suaalaha waa laga jawaabay. Waxaan aqbalay inaan ka qeybqaato daraasadaan.

Saxiixa ka qeyb qaataha.....

Saxiixa wareysi qaadaha.....

Taariikhda ogolaanshaha la saxiixay.....

Appendix 5: Survey Instrument in English

Good morning/afternoon! Jomo Kenyatta University and Kenya Medical Research Institute are trying to understand how pastoralist mothers think about childhood vaccination and their access to immunizations for their children. I would be grateful if you would agree to speak with me. There are about short answer 90 questions; this should take about an hour. Would that be okay? (If the mother agrees, obtain a written informed consent and proceed to ask the following screening questions. If the mother declines to consent, say thank you and move to next household).

Screening questions:

- i. Do have children between 0-59 months? Yes No
- ii. Does your family raise any animals (other than fowl)? Yes No
If one or more of the responses to questions i or ii is NO go to next HH
- iii. Do you migrate with your animals during the dry and rainy seasons? Yes No
 - a. If YES to iv, where do you go during INSERT [District/County/Country]
 - b. Summer/long dry season _____
 - c. Long rainy season _____
 - d. Winter dry season _____
 - e. Short rainy season _____

Demographic data			
1. Interviewer ID/Team		4. Division	
2. HH ID		5. Location	
3. Date	a. Start Time	b. End time	6. Settlement/village name/cluster
7. GPS Location of Household	Latitude		
	Longitude		
8. How old are you?			[numeric response]
9. Are you married?			<input type="checkbox"/> Yes <input type="checkbox"/> No (if NO, skip to question 15)
10. About how old is your husband?			[numeric response]
11. Does your husband have any co-wives?			<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No Answer
12. If YES, how many?			[numeric response]

13. [If YES], does she/do they live here with you or someplace else	<input type="checkbox"/> Here <input type="checkbox"/> Someplace else
14. [If Q13 is SOMEPLACE ELSE], where does she live now?	
15. What is the TOTAL number of children < 5 living in this household? A household means the people that share a kitchen or cooking fire.	[numeric response]
16. How many of your own children by birth between the ages 0-59 months live here now?	[numeric response]
17. How many of your own children under 5 years are present now?	[numeric response]
18. What kind of Islamic education have you received? (Check one)	<input type="checkbox"/> No Islamic education <input type="checkbox"/> Dugsi (Islamic education) <input type="checkbox"/> Madaraza (Islamic education)
19. What is the highest level of government education that you have received? (Check one)	<input type="checkbox"/> No government education <input type="checkbox"/> Lower primary school <input type="checkbox"/> Upper primary school <input type="checkbox"/> Secondary school <input type="checkbox"/> Secondary school completed <input type="checkbox"/> Tertiary/higher
20. Does your husband own a mobile phone?	<input type="checkbox"/> Yes <input type="checkbox"/> No
21. Does your husband have a mobile money transfer account such as MPESA on his phone?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know
22. Do you have your own mobile phone	<input type="checkbox"/> Yes <input type="checkbox"/> No
23. Do you have your own mobile money transfer account such as MPESA on your phone?	<input type="checkbox"/> Yes <input type="checkbox"/> No
24. Do you ever use your mobile phone to listen to the radio?	<input type="checkbox"/> Yes <input type="checkbox"/> No
25. IF you listen to radio on the phone, please tell me which stations you listen to?	<input type="checkbox"/> KBC <input type="checkbox"/> BBC Somali

[DO NOT READ THE LIST. PROBE ONCE, “are there any others?” Tick any mentioned.]	<input type="checkbox"/> STAR FM <input type="checkbox"/> VOA Somali <input type="checkbox"/> Other <input type="checkbox"/> Deutsche Welle If others record answer_____
26. Does anyone else in this cluster have a mobile phone?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't Know
Pastoralist activities	
27. How far is the closest water point [one way/one direction]?	<input type="checkbox"/> Just here (Under 15mins) <input type="checkbox"/> Not long (Up to 1 hour) <input type="checkbox"/> A little while (Between 2-5 hours) <input type="checkbox"/> A half a day(6hours) <input type="checkbox"/> A whole day (12 hours) <input type="checkbox"/> Very far (Overnight)
28. How often do you collect water? (Check one)	<input type="checkbox"/> Everyday <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> About once a week <input type="checkbox"/> Never
29. Do your infants or young children go with you to collect water? (Check one)	<input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> Sometimes
<i>Now I would like to ask you about migration with your animals. Now we are in the middle of the summer season.</i>	
30. Where will you move to next during the long raining season? (Record answer as stated separated with a slash: if no movement, record this also)	
31. Where will you move to in winter season? (Record answer as stated separated with a slash: if no movement, record this also)	
32. Where will you move to in short raining season? (Record answer as stated separated with a slash: if no movement, record this also)	
33. Do your children migrate during the seasons with you? (Check one only)	<input type="checkbox"/> Yes, always <input type="checkbox"/> No, never <input type="checkbox"/> Only during certain seasons <input type="checkbox"/> Other If others record answer
34. Which seasons? (Check all that apply)	<input type="checkbox"/> Summer/long dry season <input type="checkbox"/> Long rainy season

	<input type="checkbox"/> Winter dry season <input type="checkbox"/> Short rainy season
35. At this moment, where is the closest market to where we are now? (Record name of area separated with a slash. If not in Lagdera, record another District or County name too).	
36. What day (s) of the week is this market? (Check all that apply for day of week or check "Don't Know")	<input type="checkbox"/> Monday <input type="checkbox"/> Tuesday <input type="checkbox"/> Wednesday <input type="checkbox"/> Thursday <input type="checkbox"/> Friday <input type="checkbox"/> Saturday <input type="checkbox"/> Sunday <input type="checkbox"/> Don't Know
37. How often do you attend the market? READ THE LIST and tick answer.	<input type="checkbox"/> Everyday <input type="checkbox"/> 2-3 times a week <input type="checkbox"/> About once a week <input type="checkbox"/> Twice a month/Every 2 week <input type="checkbox"/> Rarely/Once a month <input type="checkbox"/> Never
38. How do you get there? DO NOT READ LIST, listen to mother and tick answer.	<input type="checkbox"/> Walk/on foot <input type="checkbox"/> Bus <input type="checkbox"/> Motorcycle <input type="checkbox"/> Bicycles <input type="checkbox"/> Animal <input type="checkbox"/> Private vehicle <input type="checkbox"/> Other Record other means of getting to market -----
39. How long does it take you to reach the market? (Instruction: Re-confirm this is the time it takes to get there one way, not round trip) (Read the list, listen to mother and Check one)	<input type="checkbox"/> Just here (Under 15mins) <input type="checkbox"/> Not long (Up to 1 hour) <input type="checkbox"/> A little while (Between 2-5 hours) <input type="checkbox"/> A half a day(6hours) <input type="checkbox"/> A whole day (12 hours) <input type="checkbox"/> Very far (Overnight)
40. How much does it cost for you to get to market? (Enter the amount in KSH that it cost to travel to the market using transport)	
41. Do ANY of your children below 5 go to the market with you?	<input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> Sometimes
42. On what occasions, or under what conditions,	

might a child under 5 attend market with you?	
How many of the following livestock do you own?	
43. Fowl (chicken, ducks) [Please record either a number, or ZERO (0) if she owns none]	
44. Sheep [Please record either a number, or ZERO (0) if she owns none]	
45. Camels [Please record either a number, or ZERO (0) if she owns none]	
46. Donkeys/mules [Please record either a number, or ZERO (0) if she owns none]	
47. Goats [Please record either a number, or ZERO (0) if she owns none]	
48. Cattle [Please record either a number, or ZERO (0) if she owns none]	
49. Do animal health workers ever visit your livestock? (Check one)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
50. Have your livestock received any vaccines/shots/jabs to prevent any diseases? (PLEASE confirm with mother: a vaccine prevents disease in well animals, whereas a treatment is given to sick animals)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know
51. Who vaccinated your livestock? [multiple response okay]	<input type="checkbox"/> Veterinarian /extension worker <input type="checkbox"/> My husband <input type="checkbox"/> Me <input type="checkbox"/> Other If others, Record answer_____
52. What do you do if your livestock get sick? DO NOT READ LIST, listen to mother and tick one answer only.	<input type="checkbox"/> Don't know <input type="checkbox"/> Traditional medicine <input type="checkbox"/> Veterinarian /extension worker <input type="checkbox"/> Market /patent medicine <input type="checkbox"/> Other If others, Record answer

Health Concerns and Immunization Knowledge

<p>53. If you or your children are sick, what do you FIRST do for treatment? (DO NOT READ LIST. Check FIRST ONE mentioned)</p>	<p><input type="checkbox"/> Home remedies <input type="checkbox"/> Plant healer <input type="checkbox"/> Market/patent medicines <input type="checkbox"/> Traditional birth attendant/wise woman <input type="checkbox"/> Local health post <input type="checkbox"/> Hospital/clinic <input type="checkbox"/> Private clinic <input type="checkbox"/> Other Please specify if other-----</p>
<p>54. What diseases of children under 5 concern you as a mother? RECORD what is said in exact order and completeness</p>	
<p>55. What is the purpose of vaccination? (READ THE LIST ALOUD. If she says Other or something else, record her answer EXACTLY as stated)</p>	<p><input type="checkbox"/> Helps a child grow <input type="checkbox"/> Protects a child from certain diseases <input type="checkbox"/> Gives the child strength <input type="checkbox"/> Don't Know <input type="checkbox"/> Other Please specify if other-----</p>
<p>56. Did you have a Tetanus injection/jab in your upper arm when you were pregnant? (Check one)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know</p>
<p>57. How important is it to vaccinate your child? (READ THE LIST out loud. Check one)</p>	<p><input type="checkbox"/> Not very important <input type="checkbox"/> Somewhat important <input type="checkbox"/> Very Important <input type="checkbox"/> Don't Know</p>
<p>58. Who decides whether to vaccinate your child? (DO NOT READ the list. Check ONE answer only)</p>	<p><input type="checkbox"/> Me (wife) <input type="checkbox"/> Husband <input type="checkbox"/> Joint decision</p>
<p>59. At what age should a child receive its first vaccine? (DO NOT READ the list. Check ONE answer only)</p>	<p><input type="checkbox"/> At birth <input type="checkbox"/> 1-2 weeks <input type="checkbox"/> 1 month <input type="checkbox"/> After 40 days ("umul") <input type="checkbox"/> Don't Know <input type="checkbox"/> Other Please specify if other-----</p>
<p>60. Do you feel that immunizations are safe? (READ THE LIST OUT. Check one)</p>	<p><input type="checkbox"/> Very Safe <input type="checkbox"/> Safe <input type="checkbox"/> Somewhat Safe <input type="checkbox"/> Not safe</p>
<p>61. How do you know if your child has measles?</p>	<p><input type="checkbox"/> Red mouth</p>

<p>(What does measles look like? What are the symptoms of measles)? DO NOT READ THE LIST. (Check ANY that are recalled)</p>	<p><input type="checkbox"/> Rash <input type="checkbox"/> Cough <input type="checkbox"/> Fever <input type="checkbox"/> Diarrhea <input type="checkbox"/> Vomiting <input type="checkbox"/> Others <input type="checkbox"/> Don't Know Please specify if other-----</p>
<p>62. Has your child ever had measles disease? (Check one)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know</p>
<p>63. At what age does a child get measles vaccine? (record exact answer)</p>	
<p>64. How do you know if your child has polio? (What does polio look like? What are the symptoms of polio? [DO NOT READ THE LIST. Record all that are recalled and ask "are there any others?")</p>	<p><input type="checkbox"/> Red mouth <input type="checkbox"/> Rash <input type="checkbox"/> Cough <input type="checkbox"/> Fever <input type="checkbox"/> Diarrhea <input type="checkbox"/> Vomiting <input type="checkbox"/> Sudden paralysis in limbs <input type="checkbox"/> Others <input type="checkbox"/> Don't Know Please specify if other-----</p>
<p>65. What do you think can cause polio? (record exact answer, do not summarize) [open answer]</p>	
Communications Indicators	
<p>66. Do you have a WORKING radio in your household</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>67. IF you have a working radio, please tell me which stations you listen to? [DO NOT READ THE LIST. Record all that are recalled and ask "are there any others?"]</p>	<p><input type="checkbox"/> KBC <input type="checkbox"/> BBC Somali <input type="checkbox"/> STAR FM <input type="checkbox"/> VOA Somali <input type="checkbox"/> Other <input type="checkbox"/> Deutsche Welle If others record answer_____</p>
<p>68. Did you know that some children contracted polio in Garissa County in 2013?</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>69. Did you know there was a house to house polio campaign in December of last year?</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>

<p>70. How did you hear about the POLIO campaign? [DO NOT READ THE LIST.RECORD only what is said. You may probe “anything else?” MORE than ONE answer is allowed]</p>	<p><input type="checkbox"/> Radio <input type="checkbox"/> Newspaper <input type="checkbox"/> Religious/Traditional Leader <input type="checkbox"/> Community Posters <input type="checkbox"/> Health facility posters <input type="checkbox"/> From a friend or family member <input type="checkbox"/> Community health worker <input type="checkbox"/> Megaphone/PA/Town Crier <input type="checkbox"/> Others If others record answer_____</p>
<p>71. Did any vaccinators or outreach workers come to this village to give the children polio vaccine in December last year?</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know</p>
<p>Health Care Access</p>	
<p>72. At this moment, what is the closest government health facility to where we are now? (Record name of area. If not in Lagdera, record another District or County name too).</p>	
<p>73. What day(s) of week is the child immunization clinic at that government health facility? (Check all that apply for day of week or check "Don't Know)</p>	<p><input type="checkbox"/> Monday <input type="checkbox"/> Tuesday <input type="checkbox"/> Wednesday <input type="checkbox"/> Thursday <input type="checkbox"/> Friday <input type="checkbox"/> Saturday <input type="checkbox"/> Sunday <input type="checkbox"/> Don't know</p>
<p>74. How do you get to the health facility? [DO NOT READ THE LIST.RECORD only what is said. You may probe “anything else?” MORE than ONE answer is allowed]</p>	<p><input type="checkbox"/> Walk/on foot <input type="checkbox"/> Bus <input type="checkbox"/> Motorcycle <input type="checkbox"/> Bicycles <input type="checkbox"/> Animal <input type="checkbox"/> Private vehicle <input type="checkbox"/> Other If others record answer_____</p>
<p>75. How long does it take to travel there [one way/one direction]?</p>	<p><input type="checkbox"/> Just here (Under 15mins) <input type="checkbox"/> Not long (Up to 1 hour) <input type="checkbox"/> A little while (Between 2-5 hours) <input type="checkbox"/> A half a day(6hours) <input type="checkbox"/> A whole day (12 hours) <input type="checkbox"/> Very far (Overnight)</p>

<p>76. How much does it cost for you to get to the health facility? (Enter the amount in KSH that it cost to travel to the health facility)</p>	
<p>77. When you go to the health facility, how do the health workers treat you? [READ the list, check one only]</p>	<p><input type="checkbox"/> They are always nice <input type="checkbox"/> They are nice sometimes <input type="checkbox"/> They are rude <input type="checkbox"/> I don't have an opinion/don't know</p>
<p>78. What language do the health care workers speak at the health facility near here? (DO NOT READ LIST. Record whatever languages are mentioned)</p>	<p><input type="checkbox"/> Swahili <input type="checkbox"/> Somali <input type="checkbox"/> Borana <input type="checkbox"/> English <input type="checkbox"/> Don't Know <input type="checkbox"/> Other If others record answer_____</p>
<p>Immunization Practices and History</p>	
<p>79. Have any of your children received any vaccines?</p>	<p><input type="checkbox"/> Yes (If yes fill the child vaccination form for all the <5yrs, then proceed to question Q81 to Q90) <input type="checkbox"/> No (If No, skip to Q80)</p>
<p>80. If NONE of your children have ever been vaccinated, what is the reason? (DO NOT READ LIST: Check all that is appropriate)</p>	<p><input type="checkbox"/> Didn't know they needed vaccination <input type="checkbox"/> Don't know where to go <input type="checkbox"/> Hospital/clinic too far away <input type="checkbox"/> Local clinic does not offer vaccination <input type="checkbox"/> No one comes to our village <input type="checkbox"/> Side effects of vaccination/safety <input type="checkbox"/> No time/Busy with household chores <input type="checkbox"/> Children too young <input type="checkbox"/> Children too old <input type="checkbox"/> The clinic charges for vaccines <input type="checkbox"/> Others If others record answer_____</p>
<p>81. Do you intend to accept any remaining vaccinations for your child/children? READ LIST</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> Probably yes <input type="checkbox"/> Unsure <input type="checkbox"/> Probably not <input type="checkbox"/> Definitely not</p>
<p>82. If definitely not –Why not?</p>	
<p>83. Where do your children get vaccinated? READ LIST</p>	<p><input type="checkbox"/> At a public health Facility <input type="checkbox"/> By public health Outreach workers</p>

	<input type="checkbox"/> Both public health facility and outreach workers <input type="checkbox"/> Private Clinic <input type="checkbox"/> Other If others record answer_____
84. Does your husband ever go with you when children are vaccinated?	<input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> Sometimes
85. Have you ever gone to get a vaccine for your child and there was none?	<input type="checkbox"/> Yes <input type="checkbox"/> No
86. If YES to Q85, how many times has this happened?	
87. If YES to Q85, where was this? [insert Location / Division]	
88. Will you take your children for vaccination if you have to pay for it?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> It depends on the cost <input type="checkbox"/> It depends on the vaccine <input type="checkbox"/> Other <input type="checkbox"/> Don't Know
89. How much would you be willing to pay?	
90. Which vaccines would you be willing to pay for?	

Child Vaccination Form

Child demographic data	
1. Date of birth (By card)	Age of the child by mothers' recall.....
2. Sex of the child.....	Birth order <input type="checkbox"/> Youngest <input type="checkbox"/> Second youngest <input type="checkbox"/> Third youngest <input type="checkbox"/> Fourth youngest
3. Has the child received any vaccination (Routine or Supplemental)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
4. Do you have a vaccination card for the child?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5. Has ever had a vaccination card?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Vaccination data			
	Description	CARD	Mothers Recall
1. <input type="checkbox"/> BCG	(shot left forearm near elbow)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
2. <input type="checkbox"/> OPV0	(oral drops, birth dose)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
3. <input type="checkbox"/> OPV1	(oral drops, 6 weeks)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
4. <input type="checkbox"/> Pentavalent 1	(6 weeks, in the thigh)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
5. <input type="checkbox"/> PCV1	(6 weeks, in the thigh)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
6. <input type="checkbox"/> Rotavirus 1	(oral drops, 10 weeks)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
7. <input type="checkbox"/> OPV2	(oral drops, 10 weeks)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
8. <input type="checkbox"/> Pentavalent 2	(10 weeks, in the thigh)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
9. <input type="checkbox"/> PCV2	(10 weeks, in the thigh)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
10. <input type="checkbox"/> Rotavirus 2	(oral drops, 10 weeks)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
11. <input type="checkbox"/> OPV 3	(oral drops, 14 weeks)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
12. <input type="checkbox"/> Pentavalent 3	(14 weeks, in the thigh)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
13. <input type="checkbox"/> PCV3	(14 weeks, in the thigh)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
14. <input type="checkbox"/> Measles	(9 months, in the shoulder)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
15. <input type="checkbox"/> Measles (booster)	(18 months, in the shoulder)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
16. <input type="checkbox"/> Supplemental OPV doses by teams	(oral drops by teams or at health centre)		<input type="checkbox"/> Yes <input type="checkbox"/> No
17. <input type="checkbox"/> Supplemental Vitamin A	(oral, by teams or at health centre)		<input type="checkbox"/> Yes <input type="checkbox"/> No
			Number _____
			Number _____

Appendix 6: Survey Instrument in Somali

Subax wanaagsan/galab wanaagsan! Jaamacada Jomo Kenyatta University iyo Kenya Medical Research Institute waxay isku dayayaan inay fahmaan sida hooyooyinka qoysaska xoolo dhaqatada ah uu la yahay tallaalka carruurta la tallaalo inta ay aadka u yar yihiin, iyo sida ay ugu heli karaan carruurtooda tallaal. Aad ayaan ugu farxi lahaa hadii aad aqbali lahayd inaad ila hadasho. Waxaa halkaan ku yaal qiyaastii ilaa 90 suaalood oo jawaabo gaagaaban loo rabo; waxay qaadanayaan qiyaas ahaan hal saacad. Arintaas ma ogolaatay? (Hadii hooyadu ay aqbasho, ka hel ogolaansho qoraal ah oo dabadeed weydii suaalaha soo socda. Hadii hooyadu diido, waad mahadsan tahay ku dheh oo u gudub qoyska xiga).

Suaala Baaritaan:

- i. Ma leedahay carruur da'doodu tahay 0-59 bilood? Haa Maya
- ii. Qoyskiinu ma dhaqdaa wax xoolo ah (oo aan ahayn digaaga)? Haa Maya
Hadii labada su'aalood midood ay jawaabteedu tahay MAYA, ka qeyb qaataha aan u qalmin in ay ka qayb galaan daraasadda, Joji baadhitaanka aad qoyska xiga
- iii. Ma la guurguurtaa xoolahaaga inta lagu jiro xilliyada jiilaalka iyo xilli roobeedka? Haa Maya
Hadii suasha iii ay tahay Haa, halkee u gurta: U qor sida [tuulada/Deegaanka /gobolka]
 - a) Xilliga Kulaylaha(Orah'hetka) _____
 - b) Xilliga gu'ga _____
 - c) Xilliga xagaaga _____
 - d) Xilliga Deyrta _____

Macluumaadka la xiriira dadka			
1. Aqoonsiga wareysi qaadaha		4. Deegaanka	
2. HH ID		5. Degmo	
3. Date		a. Start Time	b. End time
7. GPS Location of Household	Latitude		
	Longitude		
8. Imisaad jirtaa?			[jawaab nambar ah]
9. Ma lagu qabaa?			<input type="checkbox"/> Haa <input type="checkbox"/> Maya (hadii ay MAYA tahay, u bood suaasha 15)

10. Qiyaas ahaan ninkaagu imisuu jiraa?	[jawaab nambar ah]
11. Ninkaagu xaasas kale ma qabaa?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
12. [Haddii HAA], immisa yihiin?	[jawaab nambar ah]
13. [[Hadii ay Haa tahay], miyaa ayada ama ayagu kula nool yihiin mise meel kale ayay kunooshahay ama kunool yihiin	<input type="checkbox"/> Halkan <input type="checkbox"/> Meel kale
14. [Haddii suaasha 13 ay MEEL KALE tahay], Hadda intay ku noosha	
15. Waa maxay tirada GUUD ee carruurta < 5 ee qoyska la nool? Qoys waa dad wada isticmaala jiko ama hal dhari wax ku wada karsada.	[jawaab nambar ah]
16. Imisaa ciyaalka aad dhashay [adiga qudhaadu] ee jira 0-59 bilood kugula nool halkan?	[jawaab nambar ah]
17. Imisa carruur ah oo aad dhashay oo ka yar da'da 5 sano jirka ayaa hada jooga?	[jawaab nambar ah]
18. Nooc ee waxbarasho islaami ah oo aad soo baratay? (Mid ka xulo jawaabaha)	<input type="checkbox"/> Ma soo marin waxbarasho oo aan islaami <input type="checkbox"/> Dugsi (Waxbarasho Islaami ah) <input type="checkbox"/> Madaraza (Waxbarasho Islaami ah) <input type="checkbox"/> Dugsi iyo Madaraza
19. Waa kee heerka ugu sareeya ee aqoonta dowladu bixiso ee aad soo baratay? (Mid ka xulo jawaabaha)	<input type="checkbox"/> Ma soo marin waxbarasho dowladda bixiso <input type="checkbox"/> Lower primary school <input type="checkbox"/> Fasalada hoose ee dugsi hoose <input type="checkbox"/> Fasalada sare ee dugsi hoose <input type="checkbox"/> Waan dhammeeyay waxbarashada dugsi sare <input type="checkbox"/> Koleejo/waxbarasho jaamacadeed
20. Ninkaaga ma u leeyahay taleefonka gacanta?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya

21. Ninkaagu miyuu leeyahay koonto uga furan taleefanka oo lacagta lagu xawilo sida MPESA?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Ma ogi
22. Ma leedahay telefoonka gacanta?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
23. Miyaad adiga qudhaadu leedahay koonto kaaga furan taleefonkaaga oo lacagta lagu xawilo sida MPESA?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
24. Weligaa maka dhagaysataan raadiyaha teleefonkaaga gacanta?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
25. Haddii aad ka dhagaysataan raadiyaha teleefonkaaga gacanta, fadlan noo sheeg Idaacadda aad dhageysataan? [HA AQRIN LIISKA. MAR KALIYA WEYDII, “kuwa kale miyay jiraan?” Calaamada saxda saar wixii la sheego	<input type="checkbox"/> KBC <input type="checkbox"/> BBC Somali <input type="checkbox"/> STAR FM <input type="checkbox"/> VOA Somali <input type="checkbox"/> Raadiyow KALE <input type="checkbox"/> Deutsche Welle (Haddii ay waxyaabo kale tahay qor jawaabta) _____
26. Ma jiraa qof kale oo deegankan ku nool oo qaba ama leh telefoonka gacanta?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Ma ogi
Hawlaha xoolo dhaqatada	
27. Intee ayaa tuubada/ceelka biyaha laga dhaansado ee ugu dhow idiin jirtaa [ha waddo/hal jiho]?	<input type="checkbox"/> Halkaan un (Wax ka yar 15 daqiiqo) <input type="checkbox"/> Ma dheera (waa un ilaa 1 saac) <input type="checkbox"/> Wax yar ka hor (2-5 saacadood) <input type="checkbox"/> Maalin galinkeed(6 saacadood) <input type="checkbox"/> Maalintii oo dhan(12 saacadood) <input type="checkbox"/> Aad u fog (Habeen dhax)
28. Imisa jeer ayaad biya dhaamisa? (Mid ka xulo jawaabaha)	<input type="checkbox"/> Toddobaadkiiba hal mar <input type="checkbox"/> 2-3 maalmood toddobaadkii <input type="checkbox"/> Hal mar maalin kasta <input type="checkbox"/> Maalintiiba hal mar ka badan <input type="checkbox"/> Waligeed
29. Carruurtaadu ma ku raacaan markaad biyaha soo dhaaminayso? (Mid ka xulo jawaabaha)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Mar mar
<i>Hadda waxaan doonayaa in aan ku waydiiyo guuritaanka xoolihiina. Hadda waxaan ku jirnaa bartamaha xilli Oras hetka</i>	
30. halkee u guurta xilliga gu'ga? (Uqor jawaabta sida lo sheegay: Haddii ay guurin, tani sida oo kale uqor)	

31. halkee u guurta xilliga xagaaga (Uqor jawaabta sida lo sheegay: Haddii ay guurin, tani sida oo kale uqor)	
32. halkee u guurta xilliga Derta (Uqor jawaabta sida lo sheegay: Haddii ay guurin, tani sida oo kale uqor)	
33. Miyey carruurtaadu kula guuran xilliyada kala duwan? (Mid ka xulo jawaabaha)	<input type="checkbox"/> Haa, mar walba <input type="checkbox"/> Maya, Marna <input type="checkbox"/> Xilliyada qaarkood oo kaliya <input type="checkbox"/> Mar Kale (Haddii ay waxyaabo kale tahay qor jawaabta) _____
34. Wa xillige? (Mid ka xulo jawaabaha)	<input type="checkbox"/> Xilliga Kulaylaha(Orah'hetka) <input type="checkbox"/> Xilliga Gu'ga <input type="checkbox"/> Xilliga xagaaga <input type="checkbox"/> xilliga Deyrta
35. Suuqa ugu dhow waa xagee meesha aan hada joogno? Qor magaca meeshaa. Haddii ay Lagdera ka tirsinen, qor magaca degmada ama gobolka	
36. Maalintee (ama maalmahee) asbuuca ka mid ah oo suuqu furan yahay? (ka xulo jawaabaha dhamaan kuwa khuseeya oo maalinta toddobaadka ama sax ma ogi)	<input type="checkbox"/> Isniin <input type="checkbox"/> Talaado <input type="checkbox"/> Arbaco <input type="checkbox"/> Khamiis <input type="checkbox"/> Jimce <input type="checkbox"/> Sabti <input type="checkbox"/> Axad <input type="checkbox"/> Ma ogi
37. Imisa jeer ayaad suuqa aadaa? AQRIN LIISKA. dhagaysa hooyada iyo calaamadee jawaabaha	<input type="checkbox"/> Maalin walba <input type="checkbox"/> 2-3 jeer asbuucii <input type="checkbox"/> Qiyaastii hal jeer asbuucii <input type="checkbox"/> Laba jeer bishii/ laba dii asbuucba mar <input type="checkbox"/> Dhifdhif/hal jeer bishiiba <input type="checkbox"/> Waligeed
38. Sidee baad halkaas ku tagtaan? HA AQRIN LIISKA. dhagaysa hooyada iyo calaamadee jawaabaha	<input type="checkbox"/> Lug <input type="checkbox"/> Bas <input type="checkbox"/> Mooto <input type="checkbox"/> Baaskiil <input type="checkbox"/> Xoolaha <input type="checkbox"/> Gaari gaar loo leeyahay <input type="checkbox"/> Waxyaabo kale Qor hab kale oo ku aad suuqa

39. Muddo intee le'eg aya suuqa lugu gaari karaa? (Tilmaan: Mar kale xaqiiji tani waa tilmaanta HAL JIHO) (Kor u aqri liiska soo socda, dhagaysa hooyada iyo mid ka xulo jawaabaha)	<input type="checkbox"/> Halkaan un (Wax ka yar 15 daqiiqo) <input type="checkbox"/> Ma dheera(waa un ilaa 1 saac) <input type="checkbox"/> Wax yar ka hor (2-5 saacadood) <input type="checkbox"/> Maalin galinkeed(6 saacadood) <input type="checkbox"/> Maalintii oo dhan(12 saacadood) <input type="checkbox"/> Aad u fog (Habeen dhax)
40. Imisaa qarash kaaga baxda aaditaanka suuqa? Haddii ay isticmaasha gaadiid, qor kharashka oo KSH ugu bahaya aaditanka suuga.	
41. Carruurtaada 5 sana ka yar Midkoodna mu kuu raacaa suuqa?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Mar mar
42. Haddii Mar mar ay Tahay, gorma carruurtaada 5 sana ka yaray ku raacikaran suuqa?	
Imisa neef ayaad leedahay xoolaha soo socda?	
43. Digaag [Fadlan qor tiro, ama eber (0) haddii ay iyadu leehen midkoodna]	
44. Ido ah [Fadlan qor tiro, ama eber (0) haddii ay iyadu leehen midkoodna]	
45. Geel ah [Fadlan qor tiro, ama eber (0) haddii ay iyadu leehen midkoodna]	
46. Dameero/baqal ah [Fadlan qor tiro, ama eber (0) haddii ay iyadu leehen midkoodna]	
47. Ari cad ah [Fadlan qor tiro, ama eber (0) haddii ay iyadu leehen midkoodna]	
48.Lo'ah [Fadlan qor tiro, ama eber (0) haddii ay iyadu leehen midkoodna]	
49. Shaqaalaha caafimaadka xoolaha miyay weligiin xoolihiina soo booqdeen? (Mid ka xulo jawaabaha) (Check one)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Ma ogi
50. Miyaa wax cuduro ah laga tallaalay xoolahaaga? (Fadlan ka xaqiiji hooyada: tallaal wuxuu cudurada ka difaaca xoolaha fayooow, halka daawada la siiyaa xoolaha buka)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Ma ogi
51. HADDII AY HAA TAHAY, Xoolahaaga ya tallaali?	<input type="checkbox"/> Dhakhtarka xoolaha <input type="checkbox"/> Ninkayga

[jawaab badan waa Okay]	<input type="checkbox"/> Aniga <input type="checkbox"/> axyaabo kale (Haddii ay waxyaabo kale tahay qor jawaabta) _____
52. Maxaad samaysaa hadii xooluhu kaa xanuunsadaan? HA AQRI LIISKA. dhagaysa hooyada iyo calaamadee hal jawaab ah	<input type="checkbox"/> Ma ogi <input type="checkbox"/> Daawo dhaqameed <input type="checkbox"/> Dhaqtarka xoolaha <input type="checkbox"/> Daawada suuqa /daawada aan u baahnayn in dhaqtar uu soo qoro <input type="checkbox"/> Waxyaabo kale (Haddii ay waxyaabo kale tahay qor jawaabta)
Walaacyada Laga Qabo Daryeelka Caafimaadka iyo Aqoonta Tallaalka	
53. Haddii adiga aad xanuunsato ama carruurta kaa xanuunsadaan, MARKA UGU HORAYSA maxaad isku daweysaan? (HA AQRI LIISKA. Calaamadee HAL HORE la xusay)	<input type="checkbox"/> Gurigaan ku daaweeyaa <input type="checkbox"/> Dhaqtar daawo dhireed <input type="checkbox"/> Daawada suuqa /daawada aan u baahnayn in dhaqtar uu soo qoro <input type="checkbox"/> Umuliso dhaqameed/naag caaqil ah <input type="checkbox"/> Xarun caafimaad oo maxali ah <input type="checkbox"/> sbitaal/isbitaal yar <input type="checkbox"/> Isbitaal si gaar ah loo leeyahay <input type="checkbox"/> Waxyaabo kale (Haddii ay waxyaabo kale tahay qor jawaabta) -----
54. Waa xannuunadee xannuunada ku dhaca carruurta <5 ee aad kuu walaaciya? QOR waxa la sheegayo sida saxda ah oo dhameystiran	
55. Waa maxay ujeedka tallaalka? KOR U AQRI LIISKA SOO SOCDA. Haddii ay dhahdo Kale ama wax kale, u qor jawaabteeda ISLA sidii ay u tiri	<input type="checkbox"/> Wuxuu horumariyaa koritaanka cunuga <input type="checkbox"/> uxuu ka badbaadiyaa carruurta cudurada <input type="checkbox"/> Carruurta ayuu awood siiyaa <input type="checkbox"/> Ma ogi <input type="checkbox"/> Wax kale (Haddii ay waxyaabo kale tahay qor jawaabta) -----
56. Malagugu dhufatay cirbada teetanada/cirbad la siiyaa garbaha markii aad uurka lahayd? (Mid ka xulo jawaabaha)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Ma ogi
57. Sidee ayaa in la tallaalo cunugaaga ay muhiim u tahay? (KOR U AQRI LIISKA SOO SOCDA. Mid ka xulo jawaabaha)	<input type="checkbox"/> Aad muhiim uma ahan <input type="checkbox"/> Xogaa waa muhiim <input type="checkbox"/> ad ayay muhiim u tahay <input type="checkbox"/> Ma og

<p>58. Yaa goaanka iska leh in la tallaalo ilmahaaga? (LIISKA HA AQRIN. HAL mid ka xulo jawaabaha) (DO NOT READ the list. Check ONE answer only)</p>	<p><input type="checkbox"/> Aniga (xaaska ah) <input type="checkbox"/> Ninkeyga <input type="checkbox"/> Joint decision</p>
<p>59. Da'dee ayay tahay in la talaalo cunuga marka ugu horeysa? (LIISKA HA AQRIN. HAL mid ka xulo jawaabaha)</p>	<p><input type="checkbox"/> Durba marka uu dhasho <input type="checkbox"/> 1-2 asbuuc <input type="checkbox"/> bilood <input type="checkbox"/> 40 maalmood ka dib(Marka hooyadu ka baxdo umusha "Afartanbaxa kadib") <input type="checkbox"/> Ma ogi <input type="checkbox"/> Waqti kale (Haddii ay waxyaabo kale tahay qor jawaabta) (Haddii ay waqti kale tahay Qor Jawabta) -----</p>
<p>60. Ma dareemaysaa in tallaalada ay ammaan yihiin/wax yeelo ma laha? (Kor u aqri liiska soo socda. Mid ka xulo jawaabaha)</p>	<p><input type="checkbox"/> Waa ammaan badan yahay <input type="checkbox"/> Waa ammaan <input type="checkbox"/> Waa Xoogaa Ammaan <input type="checkbox"/> Ma aha ammaan</p>
<p>61. Sidee lagu gartaa jadeeco? (Sidee ku ogaan kartaa in cunugaaga ay jadeeco hayso)? Waa maxay calaamadaha lagu garto cudurka jadeecada? LIISKA HA AQRIN. (Eeg bal in WAX ka mid ah jawaabaha ay xasuusato)</p>	<p><input type="checkbox"/> Afka cas noqonayaa <input type="checkbox"/> Furuurac ayaa jirka ka soo baxa <input type="checkbox"/> Qufac <input type="checkbox"/> Qandho <input type="checkbox"/> Shuban <input type="checkbox"/> Mantag <input type="checkbox"/> Calaamado kale <input type="checkbox"/> Ma ogi Haddii ay waxyaabo kale tahay qor jawaabta) -----</p>
<p>62. Ilmahaaga ma ku dhacday jadeecada (Mid ka xulo jawaabaha)</p>	<p><input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Ma ogi</p>
<p>63. Goormaa cunuga la siiyaa tallaalka jadeecada? (qor jawaabta saxda ah)</p>	
<p>64. Sidee lagu gartaa cudurka dabaysha ama polio? (Sidee ku ogaan kartaa in cunugaaga ay cudurka dabaysha ama polio hayso)? Waa maxay calaamadaha lagu garto cudurka dabaysha ama polio? [HA AQRIN LIISKA. Qor dhammaan inta la xasuusto. Weydii "kuwo kale ma jiraan?"]</p>	<p><input type="checkbox"/> Afka cas noqonayaa <input type="checkbox"/> Furuurac ayaa jirka ka soo baxa <input type="checkbox"/> Qufac <input type="checkbox"/> Qandho <input type="checkbox"/> Shuban <input type="checkbox"/> Mantag <input type="checkbox"/> Baaralays dagdag ah oo gacmaha iyo lugaha <input type="checkbox"/> Calaamado kale <input type="checkbox"/> Ma ogi</p>

	(Haddii ay waxyaabo kale tahay qor jawaabta) -----
65. Maxay kula tahay inu keeni kara cudurka dabaysha/polio? (qor jawaabta saxda ah, ha soo koobin) [jawaab furan]	
Tilmaameyaasha Xiriirka	
66. Raadiyow SHAQEYNAYA mayaalaa gurigaaga(oo aan ahayn kan telefonka)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
67. HADII aad leedihiin raadiyow shaqeynaya, fadlan noo sheeg Idaacadda aad dhageysataan? [HA AQRIN LIISKA. Qor dhammaan inta la xasuusto. Weydii “kuwo kale ma jiraan?”	<input type="checkbox"/> KBC <input type="checkbox"/> BBC Somali <input type="checkbox"/> STAR FM <input type="checkbox"/> VOA Somali <input type="checkbox"/> Raadiyow KALE <input type="checkbox"/> Deutsche Welle (Haddii ay waxyaabo kale tahay qor jawaabta) _____
68. Ma ogtahay in cudurka dabaysha uu carruur ku dhacay Dagmada Garissa sanadkii 2013?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
69. Ma og tahay in la qaaday olole guri ka guri ah bishii DECEEMBAR ee sanadkii la soo dhaafay?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
70. Sidee ku ogaatay in ololaha cudurka dabeysha ama polio uu jiri? [HA AQRIN LIISKA. QOR waxa la yiri oo qura. Waxaad ku yool baari kartaa “wax kale miyay jiraan?” Jawaabo badan ayaa la aqbali karaa]	<input type="checkbox"/> Idaacad <input type="checkbox"/> Wargeys <input type="checkbox"/> Hoggaamiye Diimeed/Dhaqameed <input type="checkbox"/> Boorar Bulshada wax loogu qoro <input type="checkbox"/> Boorar arimaha caafimaadka lagu qoro <input type="checkbox"/> Waxaa ii sheegay saaxiib ama qof qoyskeena ka tirsan <input type="checkbox"/> Shaqaale caafimaad <input type="checkbox"/> Makarafoon/PA <input type="checkbox"/> Waxyaabo kale (Haddii ay waxyaabo kale tahay qor jawaabta) _____
71. Miyaa dadka tallaalka bixiya ama dad wacyigalin sameeya ay yimaadeen tuuladaan si carruurta loo tallaalo bishii DECEEMBAR ee sanadkii la soo dhaafay?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Ma ogi
Helitaanka Daryeelka Caafimaadka	
72. Iminka, waa tee xarunta caafimaad ee dowladu maamusho ee ugu dhow meeshaan aan hada joogno? (Qor magaca meeshaa. Haddii ay Lagdera ka tirsanen, qor magaca degmada ama gobolka)	
73. Waa maalmahee maalmaha asbuuca ka midka ah	<input type="checkbox"/> Isniin

<p>ee cunuga la geeya xarunta caafimaad ee dowlada si loo soo tallaaloo? (ka xulo jawaabaha dhamaan kuwa khuseeya oo maalinta toddobaadka ama sax ma ogi)</p>	<input type="checkbox"/> Talaado <input type="checkbox"/> Arbaco <input type="checkbox"/> Khamiis <input type="checkbox"/> Jimce <input type="checkbox"/> Sabti <input type="checkbox"/> Axad <input type="checkbox"/> Ma ogi
<p>74. Maxaad ku tagtaan xarunta caafimaadka? [HA AQRIN LIISKA. QOR waxa la yiri oo qura. Waxaad ku yool baari kartaa “wax kale miyay jiraan?” Jawaabo badan ayaa la aqbali karaa]</p>	<input type="checkbox"/> Lug <input type="checkbox"/> Bas <input type="checkbox"/> Mooto <input type="checkbox"/> Baaskiil <input type="checkbox"/> Xoolaha <input type="checkbox"/> Gaari gaar loo leeyahay <input type="checkbox"/> Waxyaabo kale Qor hab kale oo ku aad suuqa -----
<p>75. Muddo intee le'eg ayaa halkaa loo safri karaa [hal waddo/hal jiho]?</p>	<input type="checkbox"/> Halkaan un (Wax ka yar 15 daqiiqo) <input type="checkbox"/> Ma dheera(waa un ilaa 1 saac) <input type="checkbox"/> Wax yar ka hor (2-5 saacadood) <input type="checkbox"/> Maalin galinkeed(6 saacadood) <input type="checkbox"/> Maalintii oo dhan(12 saacadood) <input type="checkbox"/> Aad u fog (Habeen dhax)
<p>76. Imisaa qarash kaaga baxda aaditaanka xarunta caafimaadka? Haddii aad isticmaasha gaadiid, qor kharashka oo KSH oo ku baxaya aaditanka isbitalka.</p>	
<p>77. Marka aad tagto xarunta caafimaadka, sidee shaqaalaha caafimaadku kuula dhaqmaan? [AQRI liiska, hal qura eeg]</p>	<input type="checkbox"/> Mar walba wey fiican yihiin <input type="checkbox"/> Marmar wey fiican yihiin <input type="checkbox"/> Si xun <input type="checkbox"/> Fikir kama haysto /ma aqaano
<p>78. Luuqadee ayay shaqaalaha caafimaadku ku hadlaan marka aad tagto xarunta caafimaadka ee halkaan u dhow? [HA AQRIN LIISKA. Qor dhammaan inta lugadood oo la xasuusto]</p>	<input type="checkbox"/> Af swahili <input type="checkbox"/> Af soomali <input type="checkbox"/> Af booran <input type="checkbox"/> Af Ingiris <input type="checkbox"/> Ma ogi <input type="checkbox"/> Luuqado kale (Haddii ay waxyaabo kale tahay qor jawaabta)_____
Dhaqamada Tallaalka iyo Taariikhda	
<p>79. Miyaa carruurtaada midkoodna horay loo tallaalay?</p>	<input type="checkbox"/> Haa Haddii ay HAA tahay buxi forma talanka cunuga, o u buxi carurta kuli ka yar 5

	sano, Ka bacdhi u bood suaasha Q81 ila Q90 <input type="checkbox"/> Maya (haddii ay MAYA tahay, u bood suaasha 80)
80. Haddii MIDKOODNA aanan la tallaalin weligii, waa maxay sababtu? (HA AQRIN LIISKA : Eeg dhammaan jawaabaha saxda ah)	<input type="checkbox"/> Ma ogeyn inay u baahan yihiin tallaal <input type="checkbox"/> Meelaan tallaal uga raadsho ayaan kasi waayay <input type="checkbox"/> Isbitaalka/xarunta caafimaadka ayaa naga fog <input type="checkbox"/> Isbitaalka maxaliga ah tallaal lagama helo <input type="checkbox"/> Tuuladeena cidna ma timaado <input type="checkbox"/> Waxaan kala baqay qandhada tallaalka/badbaadadooda darteed <input type="checkbox"/> aqti ayaan u waayay/Howlaha guriga ayaan ku mashquulsanaa <input type="checkbox"/> arruurtu aad ayay u yaryaraayeen <input type="checkbox"/> Carruurtu aad ayay u waaweynaayeen <input type="checkbox"/> Isbitalka tallalka lacag aa lu bixihiya <input type="checkbox"/> Waxyaabo kale (Haddii ay waxyaabo kale tahay qor jawaabta)_____
81. Ma doonaysaa inaad u ogolaato canugaaga in la siiyo tallaalada u harsan? Aqri liiska	<input type="checkbox"/> Haa <input type="checkbox"/> Haa dhab ahaantii <input type="checkbox"/> Ma hubo <input type="checkbox"/> Maya innaba <input type="checkbox"/> Xaqiiqdii maya
82. Sababta maxaa?	
83. Halkee carruurtaada lagu tallaalaa? Aqri liiska	<input type="checkbox"/> Xarun caafimaad oo bulshada ah <input type="checkbox"/> kooxaha caafimaadka oo bulshada ah <input type="checkbox"/> Intaba(Xarun caafimaad oo bulshada ah iyo kooxaha caafimaadka oo bulshada ah) <input type="checkbox"/> Isbitaal gaar ah <input type="checkbox"/> Meelo kale Haddii ay waxyaabo kale tahay qor jawaabta_____
84. Miyuu ninka ku qaba uu weli kuu raacay isbitaalka adoo carruurta halkaa u geynayay in la soo tallaalo?	<input type="checkbox"/> Maya <input type="checkbox"/> Haa <input type="checkbox"/> Mar mar
85. Weligaa inta u kaxaysay carruurtaada tallaal ma soo weyday tallaalkii?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya
86. Haddii ay tahay HAA, imisa jeer ayaa sidaasi kugu	

dhacday?	
87. Hadii jawaabta 87 ay tahay HAA, halkee ahayd meeshaa aad geysay? [kuqor magaca xarunta cafimad/magaca Dagmada]	
88. Carruurtaada tallaal ma u wadi lahayd hadii tallaalku lacag yahay?	<input type="checkbox"/> Haa <input type="checkbox"/> Maya <input type="checkbox"/> Inta lacagtu dhan tahay ayay ku xiran tahay <input type="checkbox"/> Tallaalka noociisa ayay ku xiran tahay <input type="checkbox"/> Sababo kale <input type="checkbox"/> Ma ogi
89. Intee in le'eg oo aad diyaar u tahay inaad bixiso	
90. Waa kuwee tallaalada aad diyaar u tahay inaad bixiso	

Forma tallanka cunuga

Macluumaadka la xiriira cunugga

1. Taariikhda dhalashada ee cunugga (o kaarka

		<input type="checkbox"/> Maya		
<input type="checkbox"/> Rotavirus 2	(tallaalka afka ah, oo 10 asbuuc ah)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	
<input type="checkbox"/> OPV 3	(tallaal afka ah, oo 14 asbuuc ah)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	
<input type="checkbox"/> Pentavalent 3	(tallaal 14 asbuuc ah, oo bowdada ah)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	
<input type="checkbox"/> PCV3	(tallaal 14 asbuuc ah, oo bowdada ah)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	
<input type="checkbox"/> Measles	(tallaal 9 bilood ah, oo garabka ah)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	
<input type="checkbox"/> Measles (booster)	(tallaal 18 bilood ah, oo garabka ah)	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	<input type="checkbox"/> Haa <input type="checkbox"/> Maya	
<input type="checkbox"/> OPV dhammaystir ah oo kooxuhu baxiyaan	(oo kan afka ah oo kooxaha tallaalku bixiyaan ama xarun caafimaad laga helo)		<input type="checkbox"/> Haa <input type="checkbox"/> Maya	Inta kuuro _____
<input type="checkbox"/> Fiitamiin A dhammaystir ah	(oo kan afka ah, oo kooxuhu bixiyaan ama xarun caafimaad laga helo)		<input type="checkbox"/> Haa <input type="checkbox"/> Maya	Inta kuuro _____

Appendix 7: Approval Letter by Scientific Steering Committee KEMRI



KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website:www.kemri.org

KEMRI/SSC/10237

6th November, 2013

Ahmed Unshur

Thro'

Director, CPHR
NAIROBI

Forwarded to
11/11/2013
KEMRI
RECEIVED
11 NOV 2013
P.O. Box 20752-00202, NAIROBI
CENTRE FOR PUBLIC HEALTH RESEARCH

REF: SSC No. 2712 (Revised) – Immunization Coverage and its Determinants among Pastoralists in North Eastern Kenya



I am pleased to inform you that the above mentioned proposal, in which you are the PI, was discussed by the KEMRI Scientific Steering Committee (SSC), during its 207th meeting held on 8th October, 2013 and has since been approved for implementation by the SSC.

Kindly submit 4 copies of the amended protocol to SSC within 2 weeks from the date of this letter i.e, 20th November, 2013.

We advise that work on this project can only start when ERC approval is received.

Sammy Njenga, PhD
SECRETARY, SSC

Appendix 8: Approval Letter by Ethical Review Committee KEMRI

KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel (254) (020) 2722541, 2713349, 0722-205901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website: www.kemri.org

KEMRI/RES/7/3/1 **January 14, 2014**

TO: AHMED NOOR UNSHUR (PRINCIPAL INVESTIGATOR)

THROUGH: DR. CHARLES MBAKAYA,
ACTING DIRECTOR, CPHR,
NAIROBI

Forwarded with my compliments to [Signature] 22/07/2014

Dear Madam,

RE: SSC PROTOCOL NO. 2712 (RESUBMISSION): IMMUNIZATION COVERAGE AND ITS DETERMINANTS AMONG PASTORALISTS IN LAGDERA DISTRICT OF GARISSA COUNTY, KENYA

Reference is made to your letter dated 9th January, 2014. The ERC Secretariat acknowledges receipt of the revised initial submission on January 10, 2014.

This is to inform you that the Ethics Review Committee (ERC) reviewed the documents submitted and is satisfied that the issues raised at the 222nd meeting held on 10th December, 2013 have been adequately addressed.

The study is granted approval for implementation effective this **January 14, 2014**. Please note that authorization to conduct this study will automatically expire on **January 13, 2015**. If you plan to continue with data collection or analysis beyond this date, please submit an application for continuing approval to the ERC Secretariat by **December 1, 2014**.

Any unanticipated problems resulting from the implementation of this protocol should be brought to the attention of the ERC. You are also required to submit any proposed changes to this protocol to the SSC and ERC prior to initiation and advise the ERC when the study is completed or discontinued.

You may embark on the study.

Yours faithfully,

EAB

**DR. ELIZABETH BUKUSI,
ACTING SECRETARY,
KEMRI/ETHICS REVIEW COMMITTEE**

In Search of Better Health