Factor Contributing the Sub-optimal uptake of vaccination in Galkacyo District, Somalia

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Abstract

Background:-The immunization coverage of Galkacyo district of Somalia, a security prone and volatile district situated at the central part of Somalia is low and less than the herd immunity intended by the World health Organization. The objective of this study was to determine those factors that contribute to the sub-optimal uptake of vaccination in Galkacyo district. The study observed both health system and community related issues that affect the uptake of vaccination.

Methods: - A phenomenological qualitative study was conducted using 6 Focus group discussions for parents, and one-to-one interview for 15 health workers from three selected settings (Galkacyo town, Bacadwayn, Bayra). A convenient sampling method was used to identify participants. Two focus group discussions of 8 participants were held in each setting, one with only mothers and the other a mixed participants of fathers and mothers. For the health worker interviews 5 health workers from different cadres were chosen in each setting. Thematic analysis technique was used to interpret and analyze data collected during this study.

Result: -The study analyze revealed that there are a number of factors that contribute to the sub-optimal uptake of vaccination in Galkacyo district. The factors included, poor social mobilization, hard to reach areas and populations, attitudes and perceived knowledge of health workers, supplies and infrastructure, missed parents, community awareness, religious related factors, refusals, gender, perceived quality of vaccines and lastly individuals promoting vaccines resistance for personal benefit gains.

Conclusion: - Immunization program of Galkacyo district is suffering from a number of setbacks and challenges that hinders the reach of intended herd immunity for vaccine preventable diseases and need joint intervention by the Puntland Ministry of health and its partners to avoid Polio and other disease outbreaks like what happened in 2013-2014. The factors that contribute to the sub-optimal uptake of vaccination in the district can be categorized in to two, a health system related issue and community parental issues.

Therefore, there is a need in real investment in social mobilization by increasing the social Mobilization days, increasing male community mobilization in the program, Mobilizing community elites such as professional doctors into the program as well as drawing traditional and religious leaders (Imams) to sensitize the community at the Mosques during Juma Prayers. There is also need to draw partners to aid in institutional and human resource capacity building as well as to support in supplies and system infrastructure.

Key words: - Immunization program, Puntland, Social Mobilization Imams, Somalia

1. Introduction

Immunization is one of the renowned greatest and cost effective public health interventions in human history which saves around three million lives each year; It is one of the keys to accomplishing the agreed Sustainable Development Goals (SDGs) especially those related to child and infant mortality. (WHO, UNICEF and World Bank, 2009).

In most WHO African and East Mediterranean Region countries including Somalia eight diseases are targeted to be vaccinated. These diseases that can be prevented through vaccination include Polio, Measles, Tuberculosis, Tetanus, Diphtheria, Whooping cough (Pertussis), Meningitis, Pneumonia and others illness using Haemophilus influenzae type b vaccination which was introduces in December 2013 in Africa, and most of these vaccines are given during childhood (WHO, 2015).

Despite above benefits and opportunities, vaccination uptake rates in most countries across the world especially low-and-middle-income countries are still less than the desirable rate of immunizing 100% of the target children population or the reaching the required herd immunity threshold for effective and efficiency use of this program, and children remain unimmunized or partially unimmunized (WHO, 2015; WHO, UNICEF and World Bank, 2009).

According to WHO (WHO, 2014), “Vaccine hesitancy refers to delay in acceptance or refusal of vaccines despite availability of vaccination services. Vaccine hesitancy is complex and context specific, varying across time, place and vaccines. It is influenced by factors such as complacency, convenience and confidence”.

Vaccine hesitancy does not mean that parents won’t allow their children to be immunized, but majority of them are seeking additional information and reassurance before making a decision, and if their concerns about immunization is sufficiently addressed, many parents will permit their child to be immunized (Barbara J. LaClair et al., 2014).

Apart from vaccine hesitancy it is important to be noted that there are also other issues within the health system that can lead to sub-optimal vaccination uptake, In 2015, WHO listed a number of challenges faced by the African nations to reach full immunization, among the challenges included poor program management, poor service delivery, poor logistics and vaccine supply quality , inadequate advocacy and communication, insufficient capacity for health workers and lastly lack of enough sustainable funding for Expanded Programs of Immunization (EPI) (WHO, 2015).

Somalia with an estimated population of more than ten million has been suffering from tribal/antigovernment conflicts and persistent natural disasters for almost the last three

decades which have paralyzed and destroyed almost the health infrastructure in the country. Persistent insecurity severely restricts access of government and humanitarian staff to a significant portion of the country due to All shabaab and ISIS insurgent which caused despair to many inaccessible populations. Furthermore, for the last couple of years Somalia is hit by unprecedented droughts and floods which lead to famine and outbreak of diseases in the country.

Implement and expanding health programs in Somalia is the most complicated issues faced by the Government and its partners since a significant majority of Somalia is nomadic with constant move in search of water and pasture. The majority of Somali societies, around 50% are rural and nomadic pastoralist living in rural areas herding their livestock. They keep camels, goats, cows and sheep which they move from one area to the other in search for pasture and water (UNFPA, 2016). The basic herding groups are organized in a unique way, with their livestock, (goats, some cattle, and sheep) and a few burden camels to carry tents and other materials, The women and children are moved through areas where water and grass are available, residing for sometime according to the local condition.

Somalia health indicators are among the lowest in the world with under five-year children and maternal mortality rate of 146/1000 and 850/100000 respectively (WHO, UNICEF, 2016).

Despite the huge efforts and resources contributed by the Ministry of Health and its partners (WHO and UNICEF) in immunization program, still the vaccination coverage for Somalia is listed among the lowest with 62% of coverage rate for polio vaccine and even lower in hard to reach areas (WHO, UNICEF, 2016).

In 2013 and 2014 Somalia had two consecutive polio outbreaks; the 2013 incident, the outbreak of polio was initially identified from a two year-year-old baby girl in Mogadishu ending up with 194 cases. Through country-wide efforts by the Somali authorities supported by its partners WHO and UNICEF the 194 polio cases in 2013 was restricted to just five cases in Mudug region in 2014 (UNICEF, 2014).

Conducting immunization program in a community which a significant portion of it is in constant moves in search of pasture and water needs huge resource. An integrated human and animal vaccination campaign held by Puntland state (an autonomous state in Somalia) with its partners (WHO, FOA and UNICEF) in 19 October 2014 operationally amounted $ 6.20 per pastoralist child with Oral Polio Vaccine (OPV) and measles vaccine compared to only $ 0.60 per child in urban areas where children are vaccinated with polio vaccine alone (WHO, UNICEF, 2015).

Efforts need to be made to understand in detail the reasons for low vaccination coverage, as a first step towards improving the situation. Therefore, this study aims to fill this knowledge gap by investigating the facilitating factors and the barriers to vaccination uptake in Galkacyo district in Puntland, Somalia.

2. Methodology

Study setting and population

General view

Figure 1:-Map of the study area Galkacyo (Google)

Galkacyo district (figure 1) is the capital and one of the five districts of Mudug region of Somalia with estimated total population of more than 500,000. Is geographically located in the southern part of Puntland State of Somalia with 230 kilometers south of state capital Garowe; It is bordered by the Galmudug state to its southern, the Nugal region in the north, Jariban district in the East and Galdagob district and Ethiopia in West.

Galkacyo is the central and the midst point of Somalia resided by almost all the predominant pastoralist clans in Somalia.

Following the fall of Mohamed Siad Barre' regime in 1991, Galkacyo suffered through several years of civil war as rival clans sought to establish their power, resulting the split of the town in to two halves with the northern part controlled by Puntland and the southern part falling under the Galmudug Administration (OCVP, 2015). Despite the signing of a peace agreement in 1993, the city has continued to experience sporadic outbreaks of tribal and political violence to the current mainly in the country side with recently reports of clan clashes around Godod and Bitaale area.

The district has two public hospitals, three private hospitals and twelve health centers supported by the Ministry of health and its partners mainly WHO and UNICEF with a program named Joint Health and Nutrition Program (JHNP) implemented by Save the Children. JHNP is comprehensive multi-donor five year development program aimed towards helping Somalia achieve its Millennium Development Goal (MDG) on maternal and child health (UNICEF, 2015).

The study was carried out in three selective areas within the district namely Galkacyo, Bacadwayn and Bayra (see figure 1), the three areas have been chosen based on their residential difference from urban, semi-urban and rural respectively to include the perspective of different people within the district.

Galkacyo Town

Galkacyo is the main town of Galkacyo district with estimated Total population of 433,750 while the target population of five and less than five years is 86, 800 (MoH, Undocumented). It has one public and three private hospitals, six health centers which provide routine immunizations. There are also additionally 180 vaccination teams each containing three persons (one community mobilizer, one vaccinator and one recorder) which conduct campaigns for polio and other vaccines according to the Ministry of Health schedule.

Bacadwayn Village

Bacadwayn, a village situated at the north of main town (Galkacyo), is 49 kilometers away from the main town with an estimated total population of 32000 and an under five target populations of 7450 (MoH, Undocumented). It has one Public hospital and two health centers run by MoH Puntland and its partners (SSRC, Save the Children and UNICEF) which provide routine immunization. It has twelve vaccination teams that are involve in and took part in vaccination campaigns.

Bayra

Bayra, a village situated at the north-west of Galkacyo (district main town), is 27 kilometers away from the main town with an estimated total population of 4500 and an under five target populations of 700 (MoH, Undocumented). It has one health center which offers primary health care such as routine immunizations for mother and children. Bayra also has six vaccination teams which each constitute of one social mobilizer, one vaccinator and one recorder.

Vaccination Services

Despite being rated as one of the district with the best health services in Somalia, the district still experience major health setbacks including low immunization coverage with average of 61 percent (OPV=60%, PENTA=62%, BCG=64%, Measles=58%) (MoH, Undocumented). There are also persistent outbreaks of acute watery diarrhea/cholera, measles outbreaks, kidnapping of health workers, and most importantly being bordered with Jariiban, the last epicenter of 2013 and 2014 polio outbreaks in the region.

In its immunization program, the district health centers provide the basic vaccines of communicable diseases recommended by the WHO (OPV bivalent type, Measles, Pentavalent, BCG and TT for child bearing mothers) with an average coverage rate of 61 percent.

Two approaches are used to reach the community and increase uptake of vaccination, A facility health approach whereas vaccines are available and fixed at the health centers, this approach serves the communities/families that reside around the health center and have access to it; The second approach, the outreach campaigns serves those communities and villages which are unable to or fail to reach the health centers but reside within the health center catchment area.

During house-to-house vaccination campaigns held throughout the district normally for 7days (three days for Social Mobilization and four days for vaccination activities), two hundred and forty-eight vaccination teams, mainly with females are sent. Each team is made up of one vaccinator and one recorder, while each health centers has seven personnel with whom five are skilled health workers namely, Midwife, Midwife assistant, Qualified Nurse, Auxiliary Nurse and EPI/Nutritionist nurse, the other two being cleaner and guard.

Community Mobilizers (mainly female which mobilize communities) are renowned TBAs, selected mothers from the community which are sent three days earlier before the vaccination campaign starts, mainly to inform the community on the upcoming vaccination program, they also search for acute flaccid paralyze cases for polio cases surveillance.

Study Design

A phenomenological qualitative study was conducted using focus group discussions for convenient based selected parents from three settings in Galkacyo district (Galkacyo town, Bayra and Bacadwayn), and one-to-one interview for the health workers from the same settings in the district.

Method of Data collection

To meet the expected outcome of the study a total number of 6 focus group discussions for 8 parents and 15 one-to-one unstructured interviews for Health workers were conducted for this study.

Two FGD's each for 8 convenient based selected participants were conducted for each study site (Galkacyo, Bacadwayn and Bayra) see Table 1, one with only selected mothers and the other for a mixed parents (mother and father) combined together, While 5 one-to-one unstructured interviews were conducted for each study site (see Table 2).

Focus Group Discussion

Table 1:- The Number of the focus group discussions held in the study and the type participants involved.

Participants	**Galkacyo**	**Bacadwayn**	**Bayra**	**Total**
Mothers only	1	1	1	**3**
Mixed parents (father and mother	1	1	1	**3**
Total	**2**	**2**	**2**	**6**

One-to-one Interview

Table 2:- The number of One-to-one interview held and the type of participants involved.

Participants	**Galkacyo**	**Bacadwayn**	**Bayra**	**Total**
Doctor/clinical officer	1	1	1	**3**
Nurse	1	1	1	**3**
TBA	1	1	1	**3**
Vaccinator	1	1	1	**3**
Midwife	1	1	1	**3**
Total	**5**	**5**	**5**	**15**

Selection and Recruitment process

Study participants (parents and health workers) were convenient based selected from each setting. By consulting with the District health officer and the Ministries of health, the required participants (parents for FGDs) from each setting were selected with their diverse ideas on the situation considered. In one-to-one interview, one doctor or a clinical officer according to the availability, one nurse, one traditional birth attendant, one vaccinator and one midwife were selected from the health centers in each setting.

Data Collection Procedure and quality Management

Initially the interview and the focus group guides were prepared in English then translated into Somali (the native language) and back to English to make sure consistence (see annex 2 and 3). After finalized, the questionnaire was pre-tested using two focus group discussions and five one-to-one interviews and all the necessary rectification was made on the bases of pre-test. When the selected participants were invited full information about the study was given and a consent letter were signed requesting voluntary participation in the study (see annex 1). Averagely each focus group discussion took 60 minutes to last with the maximum time for the FGD being 80 minutes and the minimum time being 44 minutes while the one-to-one interview for health workers took averagely 21 minutes with maximum and minimum time being 31 and 9 minutes respectively.

The interviews (both FGD and one-to-one) were tape recorded and Somali language was used in the data collection.

Two FGD's with 8 participants each were conducted for each study site, one with only selected mothers, and the other conducted for both mothers and fathers combined together. In Galkacyo, the Focus group discussions were held in Mudug Regional health office hall, in Bacadwayn the focus group discussions were held in Bacadwayn Hospital hall, while at Bayra it was held within the only health center in the village. In each 5 one-to-one open interviews conducted in each study sites were held from different health centers. All the data were collected and taken by the researcher (initials) with a help of a facilitator in Focus group discussion.

Data analyzing

Thematic analysis technique was used to interpret and analyze data collected during this study.

All the recorded data for both the focus group discussion from the parents and one-to-one interview from the health workers was transcribed (in Somali). A code manual was then

developed with a set of a priori codes based on the literature review and pre-knowledge, but with additional codes subsequently included as they were inductively identified during initial readings of the data.

The responses of the parents and the health workers were then coded using Microsoft word font colors, with specific colors corresponding to different themes. With this completed, it was possible to identify all parts of the dataset relating to each theme, and to extract this material for further analysis. Since we had data from both parents and the health workers, we were able to triangulate the data and develop an understanding of the issues from the two different perspectives.

Finally, a narrative text was built for each theme, in English, supported by similar and contrasting views or experiences, and illustrated through relevant quotes.

Timetable for study

The timeline intended and scheduled for this study is Seventeen Months starting from January 2017 to May 2018; please see annex 4 bellow.

People Involved in the Study

This is a collaborative study jointly conducted by University of PUST Somalia and University Umea of Sweden by a program called Somali-Swedish Research Collaboration for health (SSRC), a program intended to build the capacity of Somali Universities in the health research methods. There are three people involved in this research, two mentors and one principle investigator who also acted as research coordinator and research data collectors as illustrated in table 4 below.

Table 4:-people involved in the study.

SN	**Name**	**Title**	**Role**	**Address**
1	Mr. Mohamed Farah Abdullahi	Public Relationship officer, Researcher.	Research Coordinator, Principle investigator, Research Data collector.	Puntland University of Science and Technology (PUST), Galkacyo Puntland, Somalia
2	Dr. John Kinsman	Researcher and author at Umea University	Mentor	Centre for Global health research, Umea University

				Sweden.
3	Dr. Sadik Mohamud Aden	Medical Doctor and Medical Hospital Manager at UTHG,	Mentor	PUST, University teaching Hospital Galkacyo Somalia.

Ethical clearance

Ethical clearance letter was obtained from the Puntland University of Science and Technology (PUST) Research Ethical Committee Board (RECB). Permit and approval letter also was acquired from Mudug Puntland regional Health office in Galkacyo. After research participants was briefed on the study, their consent to participate in the study was obtained both as written and spoken consent and they were informed that to have the option to withdraw any time convenient to them. The names of study participants were anonymized throughout the study.

3. Result

Galkacyo district, an area with volatile and harsh situation for both the community and health workers faces a number of challenges that impede the full vaccination coverage in the immunization program. The data which took two months to be collected from participants (focus group discussions for parents and one-to-one interview for health workers) from the three settings (Galkacyo, Bacadwayn and Bayra) revealed a number of factors that have negative impact and hinders the effectiveness of the immunization program in the district.

Our analysis indicates that there are two broad categories of facilitating factors and barriers to vaccination in Galkacyo: factors related to the health system, and factors related to the community, in particular to parents. Here we present various issues in relation to these two broad categories, but note that several of the factors discussed are inter-related.

In our result there is no difference notified among the three settings.

Health system related issues

Despite the opportunity in the health system such as the integrated coordination among authorities and partners in immunization program (in which UNICEF and WHO assist the Ministry of Health in immunization program), resource and the availability of all recommended vaccines in the health centers (though sometimes ruptures/stock-outs) the data obtained reveals that the health system is still far from having capacity to reach the intended and projected immunization coverage rate of above 90 percent as recommended by the WHO. We

have found that vaccination uptake rates are reduced due to a number of health system related issues.

The areas identified by the interviewed participants in the health system that may impede the optimum utilization of immunization opportunities included poor social mobilization (awareness), hard to reach areas, attitudes of health workers, supplies and infrastructure, and missed parents or children during vaccination programs/campaigns. The following are the detailed information of each theme stated above;

a) Poor Social mobilization (awareness-raising)

Social Mobilization (activities intended to raise awareness) and communication is the main aid to promote and convince parents to engage in immunization programs. In 2013 Somali Ministry of human development and public service in Mogadishu initiated 5 strategic communication plans to promote the uptake of vaccinations in Somalia, the strategies focused on (i) advocacy, (ii) mass media/promotion, (iii) community engagement/social mobilization, (iv) behavior change/participatory communication, and (v) capacity building for health workers (WHO, 2013). A significant portion of the participants engaged in this study (both health workers and parents) believed that the social mobilization activities (awareness) are not adequate and enough to convince and mobilize the community/parents to vaccinate their children. During FGDs with the parents when asked where they got their information about vaccination, the following responses were received;

Table 5:- source of information and number of participants suggested

Source of information	**Parent's Suggested**
Social Mobilizers	21
Radio	12
Vaccinator	9
Mobile massages	1
Microphones mounted cars	4
Health centers/hospitals	19
TV	2
Community	1
No source of information	5

Some were concerned on the mode of awareness and the number of days mobilization done, while others also were alarmed by the number of social Mobilizers involved, claiming that they are too few to engage in a tough task like this. During social mobilization and house to house

visits, female majority community Mobilizers are sent, and only addresses mothers without the fathers being considered. This is due to either the social cultural nature of the local community by which the women always shy the contact with men or the health workers seeing the fathers being less important as the mothers always cares for and have contact with the child, Despite that, in Somalia the fathers exercises the total responsibility of the family and has the last decision in the family.

With the limited human resource especially in social mobilization, some of the participants interviewed were concerned by the three days recommended by the Ministry of Health (MoH) in mobilization of the community during campaigns which they believe to be too little to reach all in the intended community. A FGD mother participant told the following;

> *"Lack of knowledge leads the person not to vaccinate the child; the second reason is lack of public awareness by the community. If the people were told that these vaccines are preventive and enough information is given by trustful health professionals, I believe that the vaccination uptake will increase"*

b) Hard to reach areas and populations

Due to poor road infrastructure, the nature of Somali nomadic families which are in constant move in search of water and pasture, the limited resources and the security situation of the district pose threats to reaching these mobile and hard to reach communities for immunization in Galkacyo district. This concerned the participants interviewed as it is making it difficult for the health professionals to trace the families for vaccination. Galkacyo district is also prone to tribal and administrational conflicts which sometimes cause total halt of the health system activities and restrict movement of health workers, specifically to the country side where the nomadic societies live as it is a constant volatile area with constant reports of killings and clan revenges. One TBA from Bayra stated;

> *"The major problem we have here is the areas where cars cannot go; even we don't know where the people themselves are"*

When asked how they address to overcome these challenges, one health workers believed that, there is less that can be done to overcome to this issue, but only at least to reach those accessible. A female vaccinator from Bayra quoted;

> *"What can we do then? We only try to reach those we can reach"*

c) Attitudes and perceived knowledge of health workers

Positive attitudes and the knowledge of health workers/teams play an important role in the vaccination uptake in the health system. Some of the parents that participated in the focus group discussions were concerned with the professionalism/knowledge and the attitudes of the health workers/teams. They claimed that the health workers are not enough educated to promote immunization programs. Some of the attitudes of the health workers also sometimes encourage poor perception of vaccines in the communities. One mother from Bacadwayn referring to her perception of vaccines and what caused her hesitance told that in her childhood she used to see health workers pouring and dropping the polio vaccines under trees (a case significantly used to be reported in which health workers waste and pour vaccines to please their supervisors that they have reached their daily target population by showing empty ampoules) causing her to have concern on vaccination especially polio vaccines. Two mothers from Bacadwayn were saying;

> *"I believe that the vaccination is something that is not good, in my childhood when vaccines are brought to the villages, I used to see vaccines poured and dropping under trees when the people refuse to take it, from those days I still have suspect and I don't vaccinate my children"*

> *"It's the people that carry out the immunization programs that are not educated"*

d) Supplies and Infrastructure

Poor vaccine supplies and infrastructure pose threat to the effectiveness of immunization programs and generally to the health system of the district. Vaccine stock outs are common in Galkacyo district due to lack of cold chain in some health centers like Bacadwayn hospital and Bayra health center and/or the absence of specific vaccines like BCG. In Bacadwayn out of the three health centers including the hospital (constructed by the Islamic Relief) two have no cold chains to store and keep the vaccines but rely on the third health center supported by the Somali Red Crescent Society (SRCS) to get and store their vaccines. Bayra is the only health center that has no cold chain to store and keep vaccines. Poor supply management by health workers and the total lack of some specific vaccines are the main cause of vaccine stock-outs in the district.

Vaccines stock-outs in these areas (Bacadwayn and Bayra) take around three days to weeks to replenish from the main cold chain situated in Galkacyo. The head of the health centers prepares the order to the regional cold chain manager in Galkacyo through a District Health Officer (DHO).

In Galkacyo town, though all the health centers have their own cold chains, the health workers are complaining on lack of transportation to fetch vaccines from the main cold chains during vaccine stock outs.

Some of the participants also believe that the health workers are not enough to fulfill the gaps that exist especially on hard to reach areas.

A doctor from Bacadwayn and a nurse from Galkacyo said respectively;

> *"Sometimes it exists, even currently we have measles stock-outs therefore it exists, measles is just example"*

> *"Yes, we face challenges, to promote immunization program the challenges we face include lack of transportation, for example you need transportation when you are getting the vaccines from the cold chain. Sometimes occurs that we go to the cold chain, get the vaccines and come back by foot and provide the vaccines"*

e) Missed Parents/children

Incidence of missed children or parents during vaccination campaigns leads to low coverage rate and vacuum for virus prevalence which leads to failure to eradicate vaccine preventable diseases (VPDs). In Galkacyo district with huge resource and efforts invested by the Ministry of health is still challenged by the missed parents or children during vaccination campaigns. During house to house vaccination campaigns, some parents or children may not be available or are a way for may be to the markets or to the schools and relatives. To surmount this challenge of missed children and parents the ministry and its partners recommended house revisits of those children missed, though this doesn't apply to those children missed on the last day of campaigns. A female nurse from Bayra is quoted as sayings;

> *"The main challenge we have, being that, when you take the vaccine and go to the house you would end up discovering that the mother is a way or the child. When you try to vaccinate the child they will tell you that the father is away and should be waited, it just occurred this week during measles campaign"*

Community and parental issues

a) Community awareness

Despite the elimination of Polio in most countries, the community acceptance of vaccination has been endangered in some settings by rumor about assumed adverse side effects of polio

vaccine like the cases in Nigeria, in which anti-government insurgents spread rumors that Polio vaccines sterilize children. (WHO, 2000).

In our study a significant portion of interviewed participants believed that lack of information and low social mobilization (awareness and communication) in the district deters the effective implementation of vaccination programs. Majority of parents interviewed stated Social mobiliser as their source of information about vaccination, other source listed by the interviewed parents included; radios, mobile massages, microphone mounted cars, vaccinator, health centers, TV and also within the community members.

In Galkacyo district, poor communication by the health system in which it failed to engage and convince the community about the rumors leads to negative and bad perception on vaccination by the community whereas some believe that the vaccines contain HIV or sterilization agents taking an example on a Libya incident (a situation in which around 400 Libyan children was accidentally infected with HIV in a health care setting in 1998).

Some have little information on the available vaccines and immunization schedules in the district while some of the participants also worried about the adverse side effects of the immunization such as fever and swollen legs which they say they always experience when they vaccinate their children and don't know what causes it. A male doctor from Bacadwayn is quoted;

> *"Therefore, it can be summarized on lack of knowledge for the community and the poor social awareness; these two issues brought big challenges that sometimes hinder vaccine conviction"*

During focus group discussion when asked the participants/parents which source of information about vaccination they trust most to hear from, the following responses were given.

Table 6:- Source of information trusted and the number of participants that trust each source.

Source of information most trusted	**Total**
Doctor	13
Microphone	1
Social Mobilizers	16
Radio	1
All Health workers	15
Mobile massages	1

Community chairman	3
Any educated person	2
All the sources	1
Don't trust any source	4

b) Religious related factor

Low coverage and suboptimal uptake of vaccination is sometimes encouraged by the belief of the community that the vaccines are religiously sin and offense arguing the Allah (God) brings and relieves the diseases. Those that oppose vaccination also believe that the vaccines are from foreign infidel countries intended to fight against Muslim countries. Referring to the perception of the community to the vaccines a female Nurse from Galkacyo stated the following;

"Some of the people oppose and say that it is from infidel country and I believe in Quran"

c) Refusals (including with threats of violence)

According to interviewed parents a significant minority had negative perception on vaccination; and Almost half of the health workers interviewed and significant part of the parents interviewed during focus group discussion believed that the refusals are the main challenge of conducting the immunization program in Galkacyo district; Some say that they are susceptible to risks of being shot to death by some parents specially fathers due to these refusals during house to house vaccination campaigns. A female nurse from Galkacyo reiterated;

> *"The hardest day I had been that, one day while we were carrying the vaccine, a man which I am not sure if he was Al-shabaab or Alitixaad (Once, a Muslim political organization in Somalia) has taken gun for us"*

The data also reveals that the vaccine refusals depend on the perceived information about the vaccination by the community, the less information to the community as in the case in Galkacyo district the higher the vaccine refusals. A mother from Galkacyo and Bacadwayn stated;

"Those refuse vaccination complain lack of information about vaccination, if they have enough information they won't refuse"

d) Gender

Galkacyo district, a Muslim dominant community which the total responsibility of the family or the house falls on the fathers and he exercises the last decision for the family experience vaccine refusal from the fathers. A notably issue that emerged from the data reveals that mostly the fathers are the main refusals for vaccination programs. This may be due to the

female majority of Social Mobilizers that engages in social awareness that only targets the mothers during social mobilization activities (community awareness) in the districts without fathers being considered. This situation marginalized the fathers and deprived them of their right in the community to be informed and consulted on their children in immunization program which in turn provoked continued immunization refusals by the fathers. Referring to the challenges of conducting vaccination program a mother among FGD participants stated;

> *"The first challenge not to vaccinate the children is the father of the family that refuses; this is one of the reasons why they say we are not vaccinating"*

e) Perceived quality of Vaccine

Concern on the quality of the vaccines exists among Galkacyo communities, some participants interviewed shared the worries about the vaccines expiry dates and its quality control questioning if the vaccines are controlled for their qualities. Referring to the challenges in conduction vaccination in Galkacyo and beliefs by community in the immunization program a nurse from Bacadwayn said;

> *"Sometimes they ask you who have tested the quality of the vaccines, what is injected to these children are diseases, there are such people that think like that but they are not many"*

Other significant participants have bad perceptions on vaccination, believing that the vaccines contain HIV or Sterilization agents that treat the health and well-being of their children. Referring to the frequently held campaigns in Mudug region to contain the Polio virus prevalence from 2014 to 2016, a mother from Bacadwayn suspected that the recurring campaigns contain HIV as stated in the following quote;

> *"I am so suspected of these recurring vaccinations campaigns, even healthier (already vaccinated) child are vaccinated, I have bad perception of it, I think it contains AIDS that is the reason I oppose".*

When you consider above quote from the Bacadwayn mother when saying "even healthier (already vaccinated) child are vaccinated", you will ascertain that the mother has also less information on the importance of immunization program and that it is intended to prevent the communicable diseases for the healthier children. This is consistent with the section (a) in both parts (health system related issues and community/parental related issues).

f) Individuals promoting resistance to vaccines

Spread of rumors also contribute to the sub-optimal uptake of vaccination in the district, one of the vaccinators from Bacadwayn was complaining on some people that demand jobs in the immunization program, and if they don't get that opportunity to work they spread rumors among the communities such as that only one tribe are involved in the vaccination program or work with it. Referring to the challenges faced in conducting the immunization program a female nurse from Bacadwayn said;

> *"Among the challenges include, give me job, there is some people that demand jobs from the immunization program, and if they don't get it spread rumors and say only her tribe are involved in the vaccination".*

4. Discussion

This study aims to determine the factors, both health system related and community/parental related that contribute to the sub-optimal uptake of vaccination in Galkacyo district. Galkacyo is a district with persistent tribal and administrative conflicts and with an average immunization coverage of 61%. Additionally it is one of the districts of Mudug region that experienced the last epicenter of Polio outbreak in Somalia and east Africa region. The gained knowledge may contribute to alleviate the poor immunization coverage of the district.

The study, a Phenomenological qualitative study using focus group discussion for parents and one to one interviews for health workers in Galkacyo district is first kind to be conducted in Galkacyo and generally the Puntland state (an autonomous state in north eastern part of Somalia). Despite the opportunities in the health system, such as the integrated coordination among authorities and partners in immunization program, resource, availability of all recommended vaccines in the health centers, the data obtained reveals that the health system is still not having the capacity to reach intended and projected immunization coverage rate of above 90 percent by the WHO. Furthermore, the community in Galkacyo district is not prepared to utilize the important immunization program in the district due to bad perception of and beliefs on content of immunization program, they deem the vaccination as something that risk the lives of their children.

The study identified a number of complicated factors that contribute to the sub-optimal uptake of vaccination and hinder the full uptake of vaccination in the district. It identified Issues that related to the health system and Community/parent. The findings of this study are consistent with a number of different studies conducted worldwide. A research conducted by WHO in 2015 stated almost the same factors as this study and listed a number of challenges faced by the African nations to the full uptake of vaccination. Among the challenges were poor program

management, poor service delivery, poor logistics and vaccine supply quality, inadequate advocacy and communication, insufficient capacity for health workers and last, lack of enough sustainable funding for EPI programs (WHO, 2015).

Taking the different themes in turn, we have found that the social awareness (Social mobilization) in the district was found to be low and unsuccessful to engage and include all the community into not only to the immunization activities but also the other health interventions such as WASH, breastfeeding and family planning. Though the participants/parents listed different source of information about vaccine information, except the social mobilizers, others are listed by significantly minor participants/parents (out of 48 parents interviewed 12, 9, 1, 4, 2, 1, suggested radio, vaccinator, mobile massages, microphone mounted cars, TVs and Community as their source of information respectively). This shows that these sources of information contributes less in informing the community due to either that they are not managed well or not expanded and invested as sources of information for immunization program. Still Social Mobilization (community awareness) conducted by around 248 female majority social mobilizers and normally held three days prior during the vaccination campaigns seems that they are not enough to reach the vast Galkacyo community. With the estimated population of around 500,000 which are dispersedly scattered in urban and rural areas only those three days is not enough. Also, the study reveals that the most reliable persons such as medical doctors, community and religious leaders are not involved in the program while the community preferred to hear from them. Specially doctors as suggested by a significant number of the participants. The social mobilization (community awareness) is important to convey information to the public and parents regarding in immunization schedules, significances of vaccines and preventable diseases to increase uptake and at the same time to confront the vaccine resistance.

Weak commitment to social and community awareness by the district health system has contributed to lack of information and knowledge by the communities/ parents about the district immunization programs. Specially fathers who culturally and religiously excise the total responsibility of the family and the children, have poor information/knowledge regarding immunization schedules, available vaccines, preventive diseases, and adverse side effects of vaccinations which lead to vaccine objection and refusal by the parents. A literature review made by the European Centre for Disease Prevention control (ECDC) and produced by World Health Communication Associates while recording the determinants of vaccine hesitance, recorded twelve times (lack of information) for the cause of vaccine hesitance and refusal (ECDC, 2016).The same study also reveals that the determinants of vaccines hesitance are bad perception and feelings by the community on vaccination such that they are unsafe by causing dangerous diseases or contain sterilization agents intended to reduce the world population which is also a case issue identified in our study (ECDC, 2016).

Concerns and negative perceptions by the parents (vaccination decision marker) on immunization is also catalyzed and promoted by individuals promoting vaccines resistance within the community for the sake of personal financial gains such as to work on immunization programs or that their cars hired during vaccination campaigns, and if their demands are not met spreading rumors such that the vaccines contain HIV/AIDS and sterilization agents while reminding the Libya accident, another technique used by these group of people is that they sympathize their tribe members that the immunization program is conducted and controlled by a rival tribe members. This finding is consistent with one conducted by UNICEF in 2000 to study anti-vaccination rumors in East Africa that have caused reduction of vaccination uptake in these countries (UNICEF, 2000).

Social-cultural and the religious factors also exist within Galkacyo communities which are 100% Muslim community. In Galkacyo district there is some Muslim sects which usually oppose the vaccination programs for religious reasons which sometimes cause VPD outbreaks like measles outbreak in Ceelgardi (a small village near Bacadwayn) in 2014. These minority communities believe that the vaccinations are haram (illegal) and sin to prevent the diseases; they believe that it is also sin to prevent God's will. Also arguments exist that the vaccines are from infidel foreign countries that are enemy to Muslims which have hidden agendas such as sterilization and spread of dangerous diseases within Muslim communities. These challenges identified are well documents in different studies conducted in India and Nigeria. In India the spread of these religious based rumors has resulted in the spread and increase of Polio cases in Utter Pradesh into 1242 cases out of 1600 total cases reported in that country in 2001 (UNICEF, 2013). The Polio vaccine that was boycotted in northern Nigeria in 2003 by chairman of supreme council of sharia, Dati Ahmed resulted from the concern and belief that the Polio vaccine is intended for sterilization of Muslims in northern Nigeria which is the same as cases in this study identify (Larson et al., 2011)

Another finding of this study shows that the community is much concerned with the quality and the effectiveness of the vaccines used, while questioning who has controlled the quality of the vaccines, suspecting that these vaccinations are outdated and expired. Others also argue that there is no trustworthy part that checked these vaccines for their quality and safety since the central government of Somalia collapsed in 1991. They also caution that these vaccines may contain dangerous and harmful ingredients such HIV and sterilization agents as stated above. This finding also exists and is consistent with other studies regionally (WHO, 2015).

Another finding of this study indicates that the nomadic life style and hard to reach areas/communities pose threats to the coverage of the immunization program in Galkacyo district. Nomadic societies of Galkacyo district are in constant move for search of pasture and water for their herds and it is difficult to trace them. Another prime challenge contributing to

this is the security issue of the district which is volatile with relentless and constant clan clashes and revenges which occur on daily basis on the country side of Galkacyo district especially around Bitaale and Godod area. Currently while I am writing this, the recently security issue reported from these areas were a road ambush by militia which caused the death of three persons including a sick boy and his father and severely wounded a pregnant woman who were heading to Galkacyo town for medication on 20th September 2017 around Gacnofale area in Galkacyo district. There were numerous other revenge and clan clashes that followed this incident with that last ones being 22nd and 26th October confrontation between militias around Bitaale that caused around 10 deaths and 30 wounds. These clashes sometimes lead to administrative conflicts which spread to the main town (Galkacyo) and cause total halt of all systems, including the health system. Two Polio National Immunization days in October and November in 2015 and 2016 respectively, were postponed due to two wars that broke between the two regional administrations (Puntland and Galmudug).

Another notably issue that contributed to this apart from the security, is the resources constraint faced by the Puntland ministry of health, to expand the immunization program. Other studies have shown similar findings as hard to reach area/community and nomadic life styles as a challenge to the immunization coverage (Kiptoo et al., 2015). Also this situation identified in our findings is similar with the situation in Angola during the post conflict situation when a vast area was unreachable due to poor infrastructure and security (Fekadu et al., 2016). (Gaspar et al., 2000).

The study also unveils that poor attitudes and lack of enough skills/knowledge and trainings among health workers also contribute to the challenge for immunization coverage. The community has no trust on the health workers during vaccination, concerning their perceived knowledge and training, especially those working on vaccination campaigns due to their inability to convince them on the program or low information they themselves are exposed to. Apart from poor training an additional factor that contributed is the insufficiency of the staff required to reach the community. Another issue is their attitudes that sometimes may encourage the community to abstain from vaccination. There are many studies which relate to this finds and is consistent with findings in Somalia, Nigeria and Mali (Aden et al., 2017), (Renne, 2006) (WHO, 2009).

The missed children or parents during vaccination in both routine immunization and during campaigns are more common in Galkacyo district which contribute to the low coverage for immunization as the study reveals. The last Polio National Immunization Days (NID) campaign conducted in 21st -24th May 2017 had a total number of 48 missed and absent children reported. The reasons for missed children in vaccination campaigns typically are for mainly two reasons; the absence of the child due to being in school or at relatives, and the second being

the absence or lack of the consent of the responsible caregiver. These missed children are very difficult to solve by the health workers, especially those reported on the last days of the activities. While in routine immunization at fixed health centers the factors contributing to reasons for missed children included the long distance of the health center and the waiting time/lining in the health centers. Our study is consistent with one conducted in rural Nigerian in 2011 for reasons for incomplete vaccination and factors for missed opportunities (Abdulraheem I. S et al., 2011).

The study also identifies that the health system infrastructure and the vaccine supplies in the district have effect on the coverage rate of the immunization program. Some of the health centers (Bacadwayn Hospital and Bayra) have no cold chains for vaccine storages and relied on other health centers or the regional cold chain situated at Galkacyo town. The vaccine supplies stock-outs also exist in Galkacyo district where vaccines break for a while and take time to replenish. Studies done earlier including one conducted in Banaadir Region of Somalia in 2017 shows that there is a relationship between health system infrastructures, vaccination supplies and the vaccination coverage (Aden et al., 2017), (WHO, 2015).

The most significant finding of the present study was that during vaccination programs, the majority of vaccine refusals are due to that the fathers who culturally and religiously exercise the total responsibility and the decision of the family and the children. This is a result of that the majority of community mobilizer that engages in Social awareness target only the mothers during social mobilization activities (community awareness) in the district without fathers being considered. This happens because in Somalia, a prominent Muslim people, the women are not religiously allowed to have contact with a non-related man or move without chaperone; this led to the avoidance of these female majority mobilizers to men/fathers while only targeting the mothers that have less authority in permitting vaccination on the children. During the house to house vaccination campaigns many refusals are recorded in which mothers complain that the fathers don’t allow their children to be vaccinated. This situation and discrimination has contributed to the vaccine abstaining and rejection by many mothers which otherwise could have been vaccinated if the father was approached and convinced to vaccination. Though gender discrimination issues in immunization has been identified in many studies done globally where male children are favored to female children which can be exemplified by those identified in Ethiopia and Bangladesh (Kassahun et al., 2015). But this finding is first to identify different form of discrimination that occur among parents but not among children.

Suggested ways forward

A number of strategies are needed to alleviate the immunization coverage for Galkacyo district which may have implications on the current strategy and policy of the immunization program.

Investment is needed in Social mobilization (community awareness) especially those sources which have been already identified by the study as low, (radio, posters, mobile messages, megaphone mounted, community engagement and vaccinators). In Social mobilization the number of mobilization days must be increased, especially during campaigns. Increasing the social mobilizers and the mobilization days would decrease the missed opportunities in vaccination. Involvement of medical and clinical doctors in immunization program will also aid in the vaccine confidence by the community to counter the vaccine misconceptions, the study showed that significant participants/parents are confident with the doctors to hear their information related to immunization. Also, all community elites such as professionals, religious and community leaders including traditional leaders must participate in community communication since they are well respected within the community. This can be reached through sensitization meetings, health sessions and social media communication by these elite community groups on Polio, Measles, WASH, breastfeeding and other key health interventions.

Intervention must include male social mobilizers in the program to sensitize and mobilize the fathers during vaccination programs as they are identified as the main refusals on the immunization by the study. Special consideration must be given to this intervention as the study reveals that vaccine information least reaches the fathers due to non-contact between majority female community mobilizers and fathers. Other approaches include holding special sensitization meetings to fathers, Mosque declaration and announcement during the Juma sermons (during Friday prayers) which is important gathering for Muslim communities, drawing and educating the clan leaders (Nabadoonada) to share and sensitize their follow men about the Polio and other VPDs. Furthermore, a sensitization package of key massages targeting fathers should be developed. Also local Imams should be trained, their trust and confidence in vaccination specially Polio need to be initiated, and informed on the Polio eradication status of both their district and the global to facilitate and take part in social mobilization of the district. Maintaining and establishing good and strong working relationships with local Imams would facilitate the social acceptance of the immunization program since they are credible source of information for the community.

The Capacity and the Knowledge of the health workers need to be increased especially the frontline health workers. The knowledge and the attitude of health workers and health care providers have a significant relation to the vaccine acceptance in the public. A trained staff with improved communication and information skills will support parents to understand to vaccinate their children and many missed opportunities would be avoided and/thus would contribute on immunization coverage alleviation.

Ministry of health and its partners need to put emphasize on vaccine supplies and ensure the availability of all intended vaccines in the district. Furthermore, though imperative progress has

been made in the vaccine infrastructure, the infrastructure such as the cold chain of the remaining health center in the district need to be installed to avoid vaccine stock outs.

Hard to reach and nomadic related problems need special consideration and jointly collaboration between stakeholders from the community which are well versed with the situation to Puntland ministry of health and its partners. Drawing of clan elders and nomadic Scouters which are familiar with the environment will contribute the identification of nomadic families and their seasonal movement. Also, huge resources need be invested in hard to reach nomadic societies such as transportation, incentives and supplies.

The peace building initiatives by the office of the United Nation mission in Somalia which have been active for the last two years need to be supported and drawing to the other stakeholders into the program to stabilize the district which been severing recurring tribal and administrational conflicts.

As this research is first kind to be conducted in Galkacyo district as well as Puntland state of Somalia; it has contributed much in determining the perception of Galkacyo public specially parents about the vaccination programs in the district. It has also emphasized the challenges faced by the health system in the district to alleviate the immunization coverage rates which are too low despite the resource spent. Therefore, it can be used by the government health institutions and its partners as well as academic institutions in the country to understand the background of the Galkacyo health system for decision making and also further development by academic institutions.

With the availability of financial resource, the dissemination of this qualitative study will take place at four proposed levels:

- Community

Community meeting will be held in Galkacyo district (main town) while collecting people from the villages in the districts specially study settings to share with the conclusion of the study that took more than one year to be finalized. This will be also an opportunity for them generally to aware the overall objective of the study as well as the health challenges and risk they are exposed to which need to be addressed.

- Stakeholders

Puntland Ministry of health has contributed much resource and efforts to deal with public health issues specially Immunization for the last fifteen years but still the gap and the challenges exists due to lack of detailed and scientific information on the real situation.

Therefore meeting will be held with national and regional governmental health officials together with main partners (WHO, UNICEF etc.) to share with the result of the study. This will aid them to understand the background of the Galkacyo health system specially immunization programs for decision making.

- Academic institutions

The Somali chaos for the last decades has significantly ruined the education system in the country. This not only affected the quality of the education but also destructed the research culture of Somali universities. During the dissemination of the study, the study will be shared with the Somali Universities, and a number of copies will be allocated to their libraries for reference and further refinement by the other students that are pursuing health science. Also a number of other copies will be allocated to public libraries in main towns of Puntland states.

- Publication

Through Some Swedish Universities that are member of Somali-Swedish research collaboration, it is planned that this study to be publicized in international health journals. As public health challenges have not limited to specific borders, this will be an opportunity for us to share and communicate our evident health challenges with international community in helping bring changes though financial and technical support.

Strengths and Shortcomings of the study

This study is the first kind to be conducted in Galkacyo district to identify those factors that hinder the full coverage of vaccination in the district; this is a milestone achievement that would pave ways for both the authorities and interested stockholders/partners to understand the context and situation of immunization program of the district during intervention and decision making. A focus group discussion for parents and one-to-one interview was used as data collection methods to include the perspective of all relevant actors in the program, and generated results that are crucial to be considered to aid in alleviating the vaccination coverage not only in Galkacyo district but also in Somalia.

On the other hand, due to financial and time constraint the sample size of the study is small to represent the vast population of the district or give rich findings. Also, there is lack of available prior research studies on this topic conducted in Galkacyo or Puntland State as well as reliable health indicators in the context such as vaccination coverage's. Another limitation is that the research was conducted by only one author and that means the objectivity of the study is not 100% due to the work load of the study especially during data analyze and interpretation.

Lastly, as this being an exploratory study there are a number of key issues that need greater detailed exploration in subsequent work which have not been covered in depth in this case.

5. Conclusion

Galkacyo district, a security prone and volatile district situated at the midst of Somalia and bordered by two Somali federal states of Puntland State of Somalia and Galmudug administration, and additionally bordered with the last Polio outbreak epicenter (Jariban District) in Somalia is susceptible to Polio and other VPDs outbreaks due to low immunization coverage.

The factors that contribute to the Sub-optimal uptake of vaccination in the district can be categorized in to two, a health system related issue and community parental issues.

For Galkacyo health system, the Poor social mobilization, hard to reach areas/population, attitudes and perceived knowledge of health workers, supplies and infrastructure and lastly the missed parents/child during vaccination campaigns are the issues identified during the study, While the prominent emerging factors of community related issue included the community awareness, religious related factors, refusals, gender, perceived quality of vaccines and individuals promoting the resistance of vaccines.

Puntland Ministry of Health and its partners need to invest Social mobilization activities to abstain future financial loss due to outbreaks situation by drawing all local stakeholders from parents to community leaders including traditional and religious leader into the program.

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Lastly, I want to thank and appreciate the research participants both the parents and the health workers of Galkacyo district for their honorable time they sacrificed to participate this research project.

Thank you all.

Annexes:-

Annex 1:-Client Consent letter

Hello, I am Mohamed Farah Abdullah working on a research project jointly implemented by the Puntland University of Science and Technology and The University of Umea specially Centre for Global Health Research with a program called a Somali-Swedish Research Collaboration. We are conducting a study on the factors contributing the suboptimal uptake of vaccination in Galkacyo district. The study tries to scientifically unveil the contributing factor of low Immunization coverage rate on immunization programs held in the district. By listening to people with these experiences specially parents and health worker in the district, we hope to find that factors contributing these challenges as well as what could be done to improve and alleviate the immunization coverage rate.

You have been selected because we felt that your participation and your views will be contributive on understanding the factors contributing the sub-optimal of vaccination in Galkacyo district. Your participation in the FGD/interview and in every aspect of the study is completely voluntary and no rights or benefits incurred except refreshment of tea and water during the FGDs.

The survey will take about averagely 30-60 minutes. If some questions are difficult or make you uncomfortable, we can skip them. However, we will appreciate it if you can answer all the questions. However, you may also ask me to clarify any questions if you don't understand them, and you may decide to stop the interview at any time. Finally, all of the information that you provide for the study will be kept completely confidential. Your responses to our questions

are identified only by number, never by name. If you have questions or concerns after we are finished, you may contact me on Tell: - +252907752417.

Do you have any questions about the survey? Would you be willing to participate in our study?

Participant

Name _____

Date _____

Signature _____

Or thumbprint if appropriate

Annex 2:- Focus Group Discussion Questions

OPEN/start Question (Ice Breaker)

Let's start, as you know last time in 2013 and 2014 we had Polio outbreak in Somalia generally, especially in Mudug region which Galkacyo is one of its five districts, So Let's have each person just say a word or two about what he knows about these outbreaks.

Key Questions

1. What are your perceptions and feelings about vaccination as general?
   a. Are there specific vaccines that you are more concerned than other?
   b. Have you heard of any bad experiences in relation to any particular vaccines?
2. Thinking particularly of polio vaccine, as you know the immunization coverage of our district is very low, what do you think are the main obstacles to having children vaccinated in our district?
3. What do you think makes it possible for those parents who do manage to get their children vaccinated against polio, to do so?
4. What are your sources of information regarding vaccination?
5. Which source of information do you trust or you don't trust? Why?

6. How do you think can immunization program improved and people convinced in vaccination specially polio vaccine?

7. What are your biggest unanswered questions or concerns about immunization?

Annex 3:- One-to-one Interview Questions for health workers.

Opening: - As we have talked earlier, I am here to conduct the interview to know and investigate the perceptions and feelings of health workers to suboptimal uptake of vaccination rejection in Galkacyo district. Please don't hesitate to ask me to clarify any questions that you may not understand, but please try to give us a detail answers on these questions. Thanks

1. Please explain how the immunization program of your area is conducted?

2. What are the vaccines/antigens available in your area? Do you ever have stock-outs of vaccines? If so, please give details of how long these last, what you do to address them, etc.

3. What do your community in this area belief in Vaccination?

4. What are your feelings and perceptions about vaccination uptake in your area? What do you think are the main factors that facilitate and that reduce uptake in this community?

5. What are the main challenges that you face in conducting vaccination program in your area? Please give details and explain how you try to overcome these challenges.

6. Overall, what, if anything, do you think could be done to improve uptake?

7. Can you share with us any special events you remember in the past either positive or negative that relate to vaccination and that may reflect people's views about vaccination in the community?

8. Where do you get your information about vaccines from? Do you trust the vaccines yourself, or do you have doubts about some of them? Details.

Annex 4:- Timetable of the research Activities.

SN	Month	Planned activities	Remarks
1	January 2017	Research Proposal Writing	
2	Mid-January 2017	Researches permit approval l from the Mudug Regional Health office and PUST University Research Ethical Committee.	
3	February 2017	Contacting and informing the research participants, Piloting the Data Collection at the University Teaching Hospital	
4	March-May	Signing the consent letter, Data Collection	
5	June-July	Data analyses	
6	August-September	Data interpretation	
7	October 2017	Mid-term Review	
8	October-December 2017	Report writing	
9	January 2018	Finalize Report writing	
10	May-2018	Submission of the Report	
11	May and June 2018	Presentation of the Report	

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