

Vaccination Status and it's Determinants Among 12-23 Months Children in Ginnir District, East Bale Zone, Southeast of Ethiopia; Cross Sectional Study,2021



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Vaccination status and its determinants among 12-23 months children in Ginnir District, East Bale Zone, Southeast of Ethiopia; Cross Sectional Study, 2021.

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September , 2021

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## Declaration

I, the under signed, agreed to accept responsibility for the scientific ethical and technical conduct of the research thesis and for provision of required progress reports as per terms and conditions of the faculty of public health of Jimma university. Finally, all source of material used for this thesis report and all people and institution that gave support for this have been duly acknowledge.

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## Abstract

**Background** -In 2019, 19% of children in Ethiopia were non vaccinated and 38% are incomplete vaccinated. Achieving recommended vaccination coverage is challenging and outbreak of vaccine preventable disease (VPD) occurs in many parts of Ethiopia. Hence, the objective of this study is to investigate vaccination status and identify their determinants among 12-23-month age children in Ginnir district of East , Bale Zone

**Methods:** Cross-sectional study supplemented with qualitative study was conducted in Ginnir district from April 25-June10/ 2021. A total of 563 mothers of children 12-23-months were participated. Study participants were selected using computer generated random number. Sample was proportionally allocated to size of children 12-23 months in each kebele. Interviewer administered structured questionnaire was used to collect data using face to face interview. Epi – data version 3.1 was used for data entry and SPSS version 25 software was used for data analysis. Bi-variate and Ordinal logistic regression analysis was used to identify the determinants of vaccination status at P. value of less than 0.05. Seven in-depth interview and two focused group discussion was conducted and analyzed manually by coding.

**Result:** Of the total 563 children- 307 (54%) were fully vaccinated, 142(26%) were incompletely vaccinated and 114(20%) were not vaccinated. Poor knowledge on VPD [AOR=1.75; 95% CI: 1.22-2.51], poor knowledge on vaccination schedule [AOR=2.93; 95%CI: 2.00-4.29], negative attitude towards vaccination [AOR= 2.23; 95% CI:1.52-3.26], transportation incur cost [AOR=3.12; 95%CI: 2.08-4.69] ,not perceived benefits of vaccine [AOR= 1.79 ;95%CI ;1.23-2.63] ,not attending antenatal care [AOR=1.9 ;95%CI: 1.23-2.94, and health facility inaccessibility [AOR=3.29 ;95% CI: 1.96-5.57) were associated with non vaccination .

**Conclusion and recommendation:-** Poor knowledge about VPD and vaccine schedule , negative attitude , maternal health seeking behaviour during pregnancy were found risk factors of vaccination status . Improving mothers understanding about vaccine, VPD, vaccine schedule , and vaccination side effects is recommended . **Key word:** non vaccinated, in complete vaccination, 12-23 month, Ethiopia.

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## List abbreviation and acronyms

- AEFI - Adverse events following immunization
- BCG - Bacillus Calmette- Guirin
- CDC - Communicable disease control
- CI - Confidence Interval
- DPT - Diphtheria, Pertussis, and Tetanus
- EDHS - Ethiopia demographic and health survey
- EPI - Expanded immunization program
- HC - Health center
- HIV - Human Immuno virus
- HP - Health post
- IgG - Immunoglobulin G
- IgM - Immunoglobulin M
- IPV - Inactivated polio vaccine
- MCV - Measles containing vaccine
- OPV - Oral polio vaccine
- OR - Odds ratio
- REC - Reach every children
- SAGE - Strategic Advisory group of experts
- SIAs - Supplementary immunization activities
- UNICEF - United Nations children's education fund
- VPD - Vaccine preventable disease
- VVM - Vaccine vial monitor
- WHO - World health organization

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# 1. Introduction

## 1.1 Background of the study

Vaccination is the administration of agent-specific, relatively harmless, antigenic components that in vaccinated people can induce protective immunity against the corresponding infectious agent (1). Globally, vaccination coverage has grown rapidly and the number of available vaccines has much increased over the past 20 years(2). Universal immunization of children is crucial in reducing infant and child mortality(3). In low and middle income countries from 2011-2020, vaccines averted a total of 23.3 million vaccine preventable disease (VPD) related deaths (4).

In May 2012 Global Vaccine Action Plan (GVAP), endorsed a road map to avert million deaths by 2020 by addressing all eligible children with equitable access to vaccine regardless of any criteria(5). Today, over 100 million children under one year of age are taking immunization every year with the required doses of vaccine(6). Globally every year, more than 19.9 million children miss complete vaccination and many in 2017 13.3(69%) children receive no vaccines at all and 6.2(31%) are incomplete vaccinated(7).

Reaching every children is affected by low socioeconomic inequalities (the poor and uneducated) and geographical (rural remote and urban slums) (8). Failure to reach all children with vaccines is jeopardizing the massive efforts and funding being invested in expanding the use of now underused vaccines as well as in major disease-defeating drives such as eradicating polio, eliminating neonatal tetanus and reducing child deaths from measles (9).

To prevent this problem global vaccine alliance (GVAP) and united nations children emergency fund (UNICEF) develop strategic plan for 2018–2021 to achieve and sustain at least 90 % coverage of national and 80% at district level for all vaccines in the national program. Many of developing countries like Africa where access to health facility service and basic infrastructure is challenging it is hard to address low immunization coverage areas and the unprotected birth cohorts(7).

In Ethiopia National Immunization Programme (EPI) were established in the 1980s, and delivers service through static and outreach for hard to reach districts (10). According to EPI 2015-2020 the target group for now available vaccinations in Ethiopia are children under one year of age and women of reproductive age group. BCG, Measles, DPT-Hip-Hob or penta- valet, Rotavirus, Pneumonococcus vaccine, oral polio vaccine (OPV) and tetanus toxoid (TT) are now available and MCV2 is added to routine EPI in 2019 (11) (12). According to UNICEF 2018 report , in Ethiopia 852,384 children eligible for immunization were incompletely vaccinated or non vaccinated (7). According to EDHS 2019 in Ethiopia only 4 out of 10 children (43%) are fully immunized and 2 in 10 (19%) in this age group have not received any vaccinations at all(3).

In Ginnir district even though the coverage of fully vaccination was very low less than 64 %, there is a limited literature about the problem in the study area. There is also insufficient information about the reason behind not vaccinating or incomplete vaccinating in study area. Hence, purpose of the current study is to investigate the determinants of non- and incomplete vaccination among 12-23 month age children in Ginnir district.

## 1.2 Statement of the problem

Globally in 2018, the coverage of third doses of pentavalent, tetanus and pertussis was stagnant on 86 percent, by leaving behind 19.9 million children non vaccinated or incomplete vaccinated and they are vulnerable to vaccine preventable diseases(8). From the 19.9 children, 12.4 million (62%) found in ten countries and six of them are African countries like Ethiopia, DRC, and Nigeria. The coverage of third dose of DPT vaccine is low in Africa 72%, raised in western pacific region 97% in 2017 and in Latin America and Caribbean (LAC) ranges from 50%-80%(13) this resulted in large inequality (14).

Although vaccine rates are near to goal of 90% by 2020, VPDs are on the rise in the worldwide secondary to reasons with negative effects on herd immunity. Globally about 1.5 million deaths from each year and 30% death of less than five years is due to vaccine-preventable disease (7). In Africa ,VPDs were still account for the death of more than half a million children under five years of age every year in Africa – representing 56% of global V PD-related deaths(15). As of 17 November 2019, Democratic Republic of Congo reported 250,270 measles cases and 5110 measles related deaths which was directly related to non vaccination with MCV (16)(17).

As a result of challenges related to vaccination, only three countries continue to have endemic polio transmission free and no WHO region free of measles reported (14)(8). Gavi's strategy for 2016–2020 focused on achieving high coverage of DTP3 coverage  $\geq 90$  percentage at national and 80% at district level by improving equity and equality among geographic, wealth quintiles maternal education and vaccine demand(18). Overall, at the end of 2018 only 26% of the countries achieved the national DTP3 coverage of  $\geq 90\%$  and all district  $\geq 80\%$  coverage(15). As a result having homogeneous high coverage at the sub national and local levels is a bottleneck in the immunization program(14).

In African Region, almost 8.5 million children were unvaccinated or incompletely vaccinated almost as many as combined effect of other regions. In nine African countries, DTP3 coverage was below 60% in 2018 (8) . From 19.4 unvaccinated about 8.6 million (44%), of them live in 16 countries that are polio endemic and affected by conflict like Nigeria and Ethiopia (8). The region was failed to reach national coverage targets of MCV1. Nigeria, Ethiopia, and Democratic Republic of Congo (DRC) were among the home to 50% of the children not receiving MCV1 (17)

In western African countries there were an estimated 5,051,668 children who did not receive third dose of pentavalent vaccines in 2017, the equity and equality gap in this region is also greater than 20% for pentavalent3 and BCG vaccines (10)(16). According to a study conducted in south Ethiopia revealed, about 53.6% of the children get immunization service during immunization campaigns and lose routine child hood vaccinations(19).

In Ethiopia from children eligible for vaccination, only 43% were fully immunized and 19% have not received any vaccinations at all. About 38 % of children in Ethiopia were incompletely immunized according to EDHS 2019 (3)(20). Due to this low immunization coverage outbreaks are often occurring in different parts of Ethiopia with large attack rate and 15-20% case fatality rate reported in this country (21).

Different literatures conducted in different countries including Ethiopia and parts of Oromia region, found high percentage of incomplete vaccination (10-38%) , low percentage of fully vaccination (43-70%), high dropout rate from pentavalent first to third up to 45 % and BCG to measles vaccine 38-61% among children 12-23 months of age were identified(3) (20-27)(23) (24)(32). Over all many litterateurs only depend on the reasons of incomplete vaccination ,antigen specific reasons like not vaccinated with measles vaccine , defaulters between antigens. Regarding variable they used outcome variables of incomplete vaccination like sociodemographic factors and reasons of unvaccination like missed opportunity, lack of motivation , knowledge about vaccine and practice. Generally, these litterateurs did not include non vaccination as an outcome even though the problem is universal, specially in non developed countries like Ethiopia.

In Ginnir district even though the coverage of fully vaccination was very low , there is a limited literature about the problem in the study area. There is also insufficient information about the reason behind not vaccinating or incomplete vaccinating in study area. Hence, the purpose of this study is to investigate the reasons of non-and incomplete vaccination among 12-23 month children in Ginnir district. The study result adds information about contribution of outreach service, early starting of family planning and maternal training on integrated comprehensive maternal and child health on child vaccination.



### **1.3 Significance of the study**

The information obtained from this study is expected to fill gaps seen in availability of studies done on determinants of none and incomplete vaccination, which may vary among communities. The result of the study, will help to inform program managers to consider the important contributing factors for none and incomplete vaccination while planning to improve vaccination program. The study will contribute for effective utilization of vaccination by coming up with relevant, evidence-based recommendations for addressing issues related with non and incompleting vaccination. The study result will help the district, zonal health department, and regional health office to take proper measures of intervention on the factors that cause none and incomplete vaccination and reduce the incidence of vaccine preventable diseases in the study areas. Give baseline information for policy elite's, planners, and NGOs about the situation.

## **2. Literature review**

### **2.1 Overview of non, incomplete and fully vaccination**

The factors strongly linked with non-vaccination of children are young age level, mother empowerment, lower educational level (25). Individual and community-level factors accounted for about 82.1% of the variation observed for childhood non or incomplete vaccination. This could be justified by the regional differences in some background characteristics such as economic status, culture, and religion, health facility-related such as vaccine supply, accessibility, and availability of immunization services (23).

Incomplete vaccination is associated with postponing immunization date, long waiting time before immunization begin long distance to reach health center or hospital, missed opportunity, mothers occupation, poor knowledge about VPD and immunization schedule insufficient information, fear of side effect and many siblings (26).

According to study conducted in different parts of Ethiopia showed, the main contributing factors of incomplete and non-vaccinated are mother too busy (27%), knowledge on need of vaccination (22%), vaccinator not present (21%), schedule postponing (21%), unaware of the need of returning for next dose (19%), vaccine stock out (17%) and time or place vaccination service not known (16%). While vaccination time inconvenient 10% and vaccination place too far from local residence place are about (10%) (27).

### **2.2 Determinant factors of non, incomplete and fully immunization**

#### **2.2.1 Socio-demographic factors**

The study conducted in Burkina Faso shows, high fully immunization coverage was associated with maternal education with 1.08 times more fully immunized compared with no formal education (28). Sixty-five percent of children whose mothers have more than secondary education been received all basic vaccinations compared with 34% of children whose mothers have no education. Coverage of all basic vaccinations is highest in Addis Ababa (83%) and lowest in Afar (20%) (3). Another study in Ethiopia also shows about two-thirds of the cases and the controls 70% and 63.8% were uneducated (29).

A study conducted in Burkina Faso shows, marital status and age of the mother were not associated with fully immunization coverage (28). This finding is contrary to the study conducted in Nigeria, maternal age was associated with full immunization of her child. Mothers between ages 25-34 and 35-44 were 2 times more likely to have their children fully immunized compared to mothers in the age group 15-24(30). Study done in Malaysia indicates, significant association between incomplete vaccination and maternal age. According to the age group, the mothers in the older group tend to have a higher percentage of defaulters(31).

According to the result of the study conducted in Nigeria showed, full immunization is associated with religion, out of the 56% Islam children in the study, only 25% of the children had received full vaccination. This means that Islam children were 0.18 times less likely to receive full immunization compared to children born by Christian mothers (30). Study done in Malaysia also indicates religion has association with incomplete immunization (32). According to study in India revealed children from Muslim families had poor vaccination outcomes, and those from Christian families were at increased risk for under vaccination(33).

About 57% of children living in urban areas have received all basic vaccinations compared to 37% in rural areas. According to EDHS 2019, the coverage was varied with geographical deference and the highest MCV1 prevalence was (94%) in Addis Ababa town, and lowest in Afar region (29%) (30). The distance to a health facility was a big problem in the three-fifth (60%) of respondent(23). This finding is contrary to a study conducted in Burkina Faso; fully vaccination was 78% in the rural study area and lower in urban areas (28).

According to a case control study conducted in Ethiopia, more than three-fourths (75.3%) of cases and less than half of 48.7% the controls' mothers had more than five family members (30). According to the result of a study done in Ethiopia, the odds of full immunization of children whose household heads were female were 42% lower than those of their counterparts (34).

### **2.2.2 Educational level of parents**

Study done in Nepal shows, proportion of incomplete immunization decreased with increasing educational level but the proportion of controls was high among educated caretakers(35). The study conducted in India was result shows large proportion (42%) of children who had mothers without formal schooling are incompletely vaccinated or non vaccinated(33). According to a

study conducted in Pakistan revealed education level in both father and mother showed higher proportion of full basic immunization(36).

Other study conducted in Canada states that, being having trade certificate, high school diploma or less education compared with university graduation was associated with higher odds of non-vaccination. Non-vaccination for measles was higher in children whose parents had a high school diploma, a trade certificate or less education two times as compared with university graduation(22). Other study conducted in Ethiopia showed that mother's educational status is not significant predictor of incomplete vaccination and fathers education is an independent predictor (37).

### **2.2.3 Caretaker**

According to study conducted in southwestern Ethiopia showed those children who get care by care takers other than their mother were 5.3 times more likely to default vaccination than those who get care from their mother (37). According to study conducted in another part of Ethiopia on KAP showed, 250(53%) of caregivers heard message related with vaccination completion and immunization was considered to be important to prevent dis-ease by 236(50%) mothers while 124 mothers (26%) believe it help for child health(30)..

Other study conducted in northeast of Ethiopia shows only 6.2% of children received all the four studied vaccine doses at their appropriate age. Nearly half (48.2%) of children didn't receive any of the four vaccine doses on time (38).

According to the result of study conducted in south Ethiopia shows only 87(50.3%) of the children were vaccinated starting from 6 week while other starts delayed. Twenty two (12.9%) of the children missed appointment day and 13 (50%) of respondent had interrupted vaccine program to unawareness about the need to return the next dose(19) .Another study in Ethiopian shows timely vaccination cover-age, for less than 12 months of age was: BCG 81%; Penta1 82%; Penta3 72%; measles 68%; and fully vaccinated 60% (27).

## 2.3 Reproductive health

### 2.3.1 Place of Delivery

According to the result of a study done in Nepal, children delivered at home were three times more likely to remain incompletely vaccinated than those born at a health institution, and the proportion of children delivered at home was much higher among incompletely vaccinated (35). A study conducted in India also revealed that under-vaccinated and non-vaccinated children had greater odds of having a non-institutional delivery compared with fully vaccinated children. More of fully vaccinated children are born in a health facility (33).

A study conducted in China and Nigeria shows that mothers who delivered at hospitals vaccinated their children more frequently as they received better immunization knowledge and awareness conferred by the obstetricians (39) and children born at any health facilities were 7 times more likely to receive full immunization than children born at a non-health facility (30).

A study conducted in Ethiopia indicates that only one-third (35.3%) of unvaccinated children are delivered at health institutions. About one-third of the fully vaccinated and unvaccinated (31.3% and 36.2%, respectively) had poor access to health care more than 2 hours (29). Another case control study conducted in Ethiopia also indicates that only one-third (35.3%) of cases or incompletely vaccinated preferred to deliver at health institutions (30) and giving birth at home were more than four times likely to result in incomplete vaccination than those who gave birth at health institutions (37).

### 2.3.2 Maternal ANC follows up

A study done in Ethiopia shows that from mothers who attended their prenatal care visit during their pregnancy, 34.7% of them incompletely vaccinated their children and 73% of them were fully vaccinated their children (29). Another study conducted in southwestern Ethiopia shows that those who had no ANC follow-up were more than eight times likely to default vaccination (AOR 8.3) (37).

Another study conducted in India on Predictors of incomplete, non-vaccination among children aged 12-36 showed that the number of ANC visits, and maternal receipt of TT

vaccine demonstrated a strong protective effect for no vaccination and under-vaccination of children (33). Study conducted in Pakistan also shows Women who attend ANC service only 1–2 times showed the lowest proportion of full immunization (41%)(36) .

Study done in Bangladesh states, the number of antenatal visits, an often-used proxy for access to care, was significantly associated with full vaccination; those without any visits had substantially lower full vaccination (71.6%) compared to those with four or more visits (88.5%). Women with more autonomy in healthcare decisions were more likely to have children who were fully vaccinated (86%) than those without autonomy (79%) (31).

### **2.3.3 Maternal PNC follow up**

According to a study conducted in southwestern Ethiopia, reviled respondents who do not have PNC visits were 4.2 times more likely to default vaccination schedules than those who have PNC visit(37). Other study conducted in the Tigray region of Ethiopia indicates, children born from mothers who had no PNC follow-up had five times more likely the odds of incompletely vaccinated than children born from mothers who had PNC follow-up (40).

### **2.2.4 Geographical deference**

According to EDHS 2019, community level characteristics and geographical boundary was a significant predictor of childhood MCV1 vaccination. Children who were live in Oromia, Afar, Gambella ,Somali and Harare regions were less likely to receive MCV1as compared to children lived in Addis Ababa(3). Study conducted in selected zone of Ethiopia result indicates that, the dropout rate was significantly affected by place and higher in Zone 3. The total dropout rate by card, history and registered between Penta1 and Penta3 was 10%, ranging from 3% in Yem to 43% in Zone 3. Likewise, the overall dropout rate for Penta1-measles vaccination was 9%, with average ranging from 0.6% in North Western to 23% in Zone 3(27).

In India, geographical deference had greater association with child incomplete vaccination and non vaccination. The percentages of fully vaccinated children in rural and urban India areas were 54% and 66% respectively(33). The same finding was reported from a study conducted in Bangladesh, fully vaccination was highest among urban residents (85.0%), followed by rural (82.7%) and non-local residents (78.4%) (31).

## **2.4 Health Facility Related**

According to the study conducted in China showed, the reasons for non-vaccinations of MCV1 and drop-outs of MCV2 included child's sickness, due to incompatible schedule of vaccination, the immunization clinic with working hours, and the overcrowded immunization clinic(39). Other study conducted in Nigeria resulted, about 132(41%) of study participants identified long waiting time is one of the reason why they have not been taking their child for immunization(41). Whereas study conducted in Malaysia result showed, waiting time was not a significant factor for childhood incomplete immunization(32).

According to study conducted in selected parts of Ethiopia revealed 28% of health facilities missed at least one EPI session in the past six months mainly due to unavailability of vaccines from a higher level 53%, the vaccinator was unable to attend sessions 26% and the vaccine not collected in a timely manner 11% of cases (22). Other survey revealed that 51% of reasons for failure were due to obstacles and 34% and 15% were due to lack of information and lack of motivation respectively(30). Other study in parts of Ethiopia reported vaccine vials not being opened for a small number of children reported in 9 out of 90 cases 10%. According study conducted in Nigeria showed about 45(14.1%) of the respondents gave safety of the vaccine as a reason for why they have not been assessing immunization(42).

According to study conducted on reasons for non or age-inappropriate vaccination in northeast Ethiopia result showed that, reason for early reception of measles vaccine was health workers' appointment before nine months of age to prevent open dose vial wastage (54.3%). Regarding dalliance 13% of delay and none, vaccination was due to insufficient number of children to open the measles vial. Other reasons include mothers/caregivers being too busy on appointment day (8.6%), forgotten vaccination appointment 23 (7%), inconvenient time or day of vaccination (6.1%) and others (4.6%)(28) .

## **2.5. Knowledge and Attitude about vaccination**

Study conducted in Ukraine indicates, in 2018 the country reported 125 /100 000 measles cases which was 48 times higher than the measles incidence in Europe. According to this study, 97% of study participants knew about measles vaccine but about 93% of the children are not vaccinated. About 26% of parents considered vaccine ineffective, 25% low quality and afraid of adverse effects of vaccine are the reasons of not vaccination(42).

According to study done in Nepal indicates caretakers with negative perception towards vaccinating sick child were three times likely to have non and partially immunized children than those with a positive attitude (19). Other study conducted in Canada resulted in, the main reasons for not having received vaccines were concerns about vaccine safety (56.4%) and philosophical or religious reasons (32.8% )(22).

According to the study conducted in Benin on reason of drop out from BCG to measles revealed, the adverse events following immunization (AEFI) were (90.2%) reason for drop out followed by fear of injection 44.35%. Out of the 510 mother's/caregivers, 88.38% knew that immunization is a means for child protection against VPD. More than half (57.45%) claimed that they know about the EPI target diseases and 82.55% had a low level of knowledge about the immunization schedule(26).

According to study conducted on routine Immunization Improvement Initiative in Ethiopia revealed women who received health information from health workers, relatives or friends, and media have good knowledge and showed a higher proportion of full basic immunization than those who did not(27).

According to study conducted in part of Ethiopia resulted, twenty-nine mothers of cases (32.2%) and 104 controls (57.8%) knew immunization beginning day of their children. Most 71 mothers of cases (78.9%) and 174 controls (96.7%) knew their next vaccinations schedule. Of mothers of cases 88 (91.1%) and 179 (99.4%) of controls were acquainted with the age when a child should complete immunization. Thirty-two mothers of cases (35.6%) and 111 controls (61.7%) were acquainted with the total number of sessions to complete child immunization. Out of the total, 23 mothers of cases (25.6%) and 127 controls (70.6%) scored above the mean score of 5.83 and were classified achieving satisfactory knowledge on child immunization(43).

Over all different literatures used in this study target on incomplete vaccination, limited variables like sociodemographic factors only and reasons of incomplete vaccination.



## 2. Conceptual framework of the study

Seasonal migration in socio demographic, mothers training on integrated maternal and child health, mother start using at six week after delivery and outreach activities in health service related are newly developed. The socioeconomic status, maternal health seeking behavior, child immunization history and service related are adopted from different literatures of the same objective (3)(20- 44).

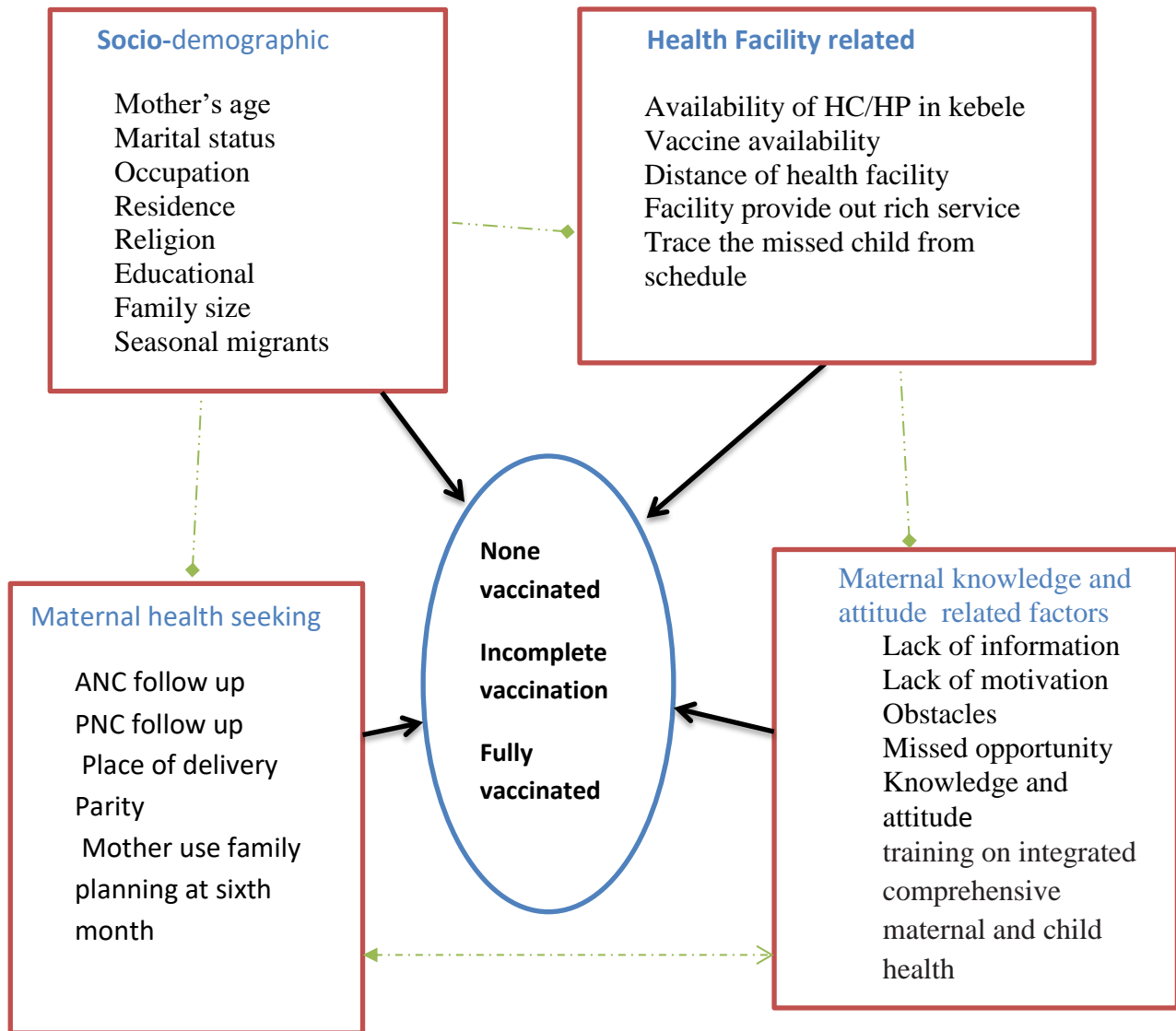


Figure 1 Adopted conceptual frame work of the study

### **3. Objective**

#### **3.1 Objective of the study**

- To determine magnitude of non-vaccination and incomplete vaccination and to identify determinants of non vaccination and incomplete vaccination in 12-23 month age children in Ginnir district , Bale Zone, Southeast of Ethiopia 2021

#### **3.2 Specific objective**

1. To determine maginitude of vaccination status among 12-23 months children in Ginnir district of East Bale Zone.
2. To identify determinants of non and incomplete vaccination among 12-23 months children in Ginnir district of East Bale Zone.

## **4. Methods and Materials**

### **4.1 Study Area**

The study was conducted in Ginnir district Bale Zone, Southeast Ethiopia. Ginnir district is one of the districts of Bale zone and geographically located at 7°8'0''North, 40°42'0''East. Ginnir is bordered on the south by the Gastro River that separates it from Goro, on the west by Sinana on the northwest by Gasera and Gololcha, on the Northeast by Sewena, and on the East by Raytu. Ginnir district is located at 502.1km distance from Addis Ababa. The total population of the district is 148,886 according to demographic and health survey in 2020 and about 4466 were children 12-23-month age. Ginnir has an estimated population density of 59.8 people per square kilometer. The district has about 55 local rural administrative Kebele structured into 35 kebeles. Regarding health-related facilities, the district has 31 health posts and 8 health centers.

### **4.2 Study Design and Period**

Community based cross sectional study supplemented by spontaneous qualitative study was conducted from April 25- June 10/2021

### **4.3 Source Population**

#### **4.3.1 For quantitative part**

All Mothers /caretakers who have children aged 12-23 months, and those who reside for six months in Ginnir Woreda, was considered as source population of the study.

#### **4.3.2 Qualitative part**

Focal persons of EPI at woreda and health centers, health extension workers, mothers/care takers of non and incompletely vaccinated children aged 12-23 months and community members.

### **4.4 Study population**

#### **4.4.1 For quantitative part**

Mothers/caretakers with children aged between 12-23 months, those who reside for six months in selected kebeles and fulfill sample-recruiting criteria of the study was considered as study population.

#### 4.4.2 For qualitative

Mothers of children between 12 and 23 months that non or incomplete vaccination, EPI focal persons at woreda and health centers and health extension workers were included in the study

### 4.5 Criteria for Inclusion and Exclusion

#### 4.5.1 Inclusion criteria

Mother /caretaker who had children with age range of 12-23 months and live for six months in Ginnir district was included in the study regardless of their child vaccination status

#### 4.5.2 Exclusion criteria

Mother/caretaker who had no children with age range of 12-23 months were excluded

### 4.6 Sampling size and Technique

#### 4.6.1 Sample size determination

Sample size were calculated for all objectives of the study using Epi-info version 7 software. For the first two specific objectives, proportion of non-vaccinated and incomplete vaccination the following parameters were considered: total source population of 12-23-month age in the study area in 2020, expected proportion of non- and incomplete vaccination and margin of error and design effect.

**Table 1 Sample size calculation for objective number one and two of the study using population survey.**

S. no	Variable	CI	Proportion	Margin of error	Design effect	Sample size	Non response 10%	Total	Reference
1	Proportion of incomplete vaccinated	95	18.5	4	1.5	503	50	553	(30)
2	Proportion of non-vaccinate	95	19	4	1.5	512	51	563	(4)

**Table 2 sample size calculation for objective two and three of the study using double population proportion**

For objective three	CI	Power	Out come in unexposed	AO R	DE	10 % Non response	Total	Referen ce
Place of delivery	95	80	53.1%	2.3	1.5	220	330	(32)
Attended ANC for this pregnancy	95	80	42%	2.13	1.5	244	366	(32)
Maternal occupation	95	80	23.8%	2.5	1.5	192	288	(56)
Mother education level	95	80	53%	2.29	1.5	222	333	(32)

Finally, the large sample size is selected from all. The variable selected is proportion of non-vaccinated children among 12–23-month age with 19 percent (4) from table (1) and the sample size is 563.

For qualitative part 7 key interview among EPI focal persons at woreda, health center and health extension was conducted. At community level 2 FDG conducted with selected mothers/care takers and community members.

#### **4.6.2 Sampling technique**

Ginnir district has 32 rural kebeles. The names of kebeles are listed with their population. To implement multistage sampling 10(32%) kebele were selected from 32 kebeles by simple random technique. Survey was conducted in the selected kebeles to get sample frame of house holds who have children from 12-23 months. Twenty heads of health development army who are able to read and write the local language was conduct the survey of children with out their vaccination status in the Gare (goti). Then the lists from Gares are combined together to form sample frame of children in the age range of 12-23 month in the kebele. Then study units were selected by computer generated simple random sampling. The total sample size was proportionally allocated to each kebeles depending on the total number of children with in the age category. For qualitative part of the study, one EPI focal person from woreda, three EPI

focal persons from from health centers with high non -or incomplete vaccination percentage in the kebele, three health extension workers based on non or incomplete vaccination percent in kebele, two FDG was conducted with mothers of non , incomplete and fully vaccinated children of 12-23 month age group and community members. About 8 participants were participated in one FGD and totally 16 persons participated in FGD conducted in selected kebele based on number on non or incomplete vaccination percentage. Except mothers were selected based on their child vaccination status, all participants was selected possessively.

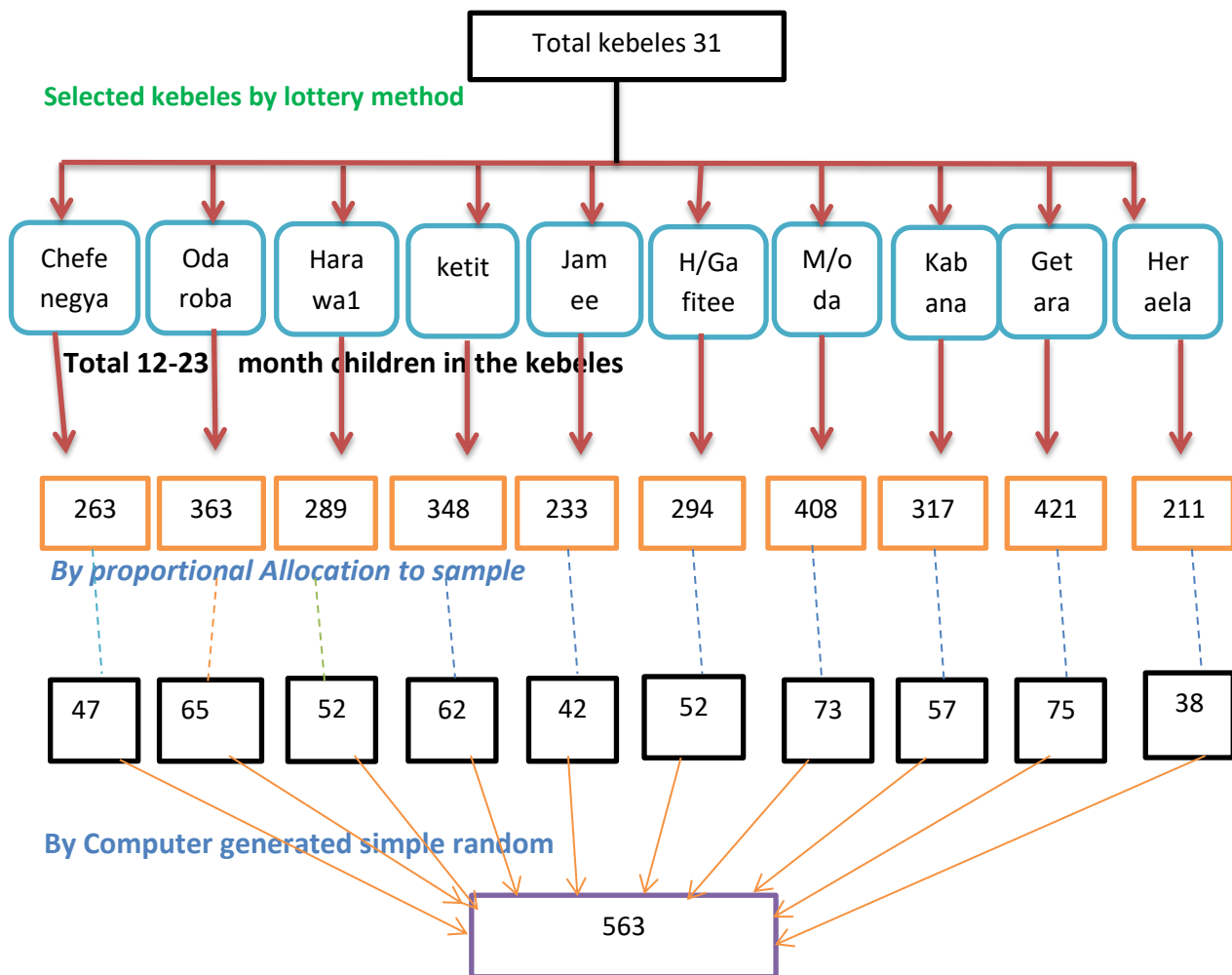


Figure 2 Schematic presentation, showing multi stage sampling of the study

#### 4.7 Data collection method and tool

Interviewer administered structured questionnaire adopted from different literature's of the same objective was used to collect the data. The questionnaire consisted of six sections that cover

socio - demographic questions, child immunization history, health service-related questions, knowledge questions, reason of non-vaccination and mother health utilization related questions. After possible modification was made to answer, the objectives of the study the questionnaire was translated to Afaan Oromo local languages for data collection and then back translated into English to ensure consistency. Two days training was given to two health officers or BSC nurses to supervise the daily data collection process and ten diploma holder nurses to collect data of risk factor of incomplete vaccination. After training the pretest was conducted on 20 children in two kebeles that were not included in the study. The data was collected through face-to-face interviews with the mothers/caregivers and through a review of the immunization cards. Source of information for vaccination was immunization card, history from mother/care taker, and completion certificate. The immunization status of the child was collected based on crude doses given by card plus /or history during the survey time (57). If there were two eligible children in one household, information were taken only for the youngest one because it provides the most recent information (57).

### **For qualitative part of the study**

The semi-structured interview guide were used for key in-depth interviews with key informants and FGD guide line was used to conduct FGD with selected mothers of 12-23 months children and community members. The instrument is prepared in English and after possible modification final version was translated to local language (Afaan Oromo) for data collection. Before conducting the interview, explanation and elaboration of the need to do the key interview and FGD was made and the participants was asked for their willingness to participate. Interview and discussion was done with one modulator, one note taker and one recorder including the principal investigator. Open-ended questions were used in semi structured format and probing was done to explore the problems in-depth. The Interviews was conducted at workplaces of the EPI focal persons and health extension workers and the FGD was conducted at kebele level. Interviews was take an average of 30 min and FGD 1-1:30 hour. All the information was tape recorded and field notes was taken.

## 4.8 Study Variable

**Dependent variable:** Vaccination status.

### **Independent variables**

#### **1. Socio-demographic**

- Care taker of the child
- Mother/Care taker's age
- Marital status
- Residence place
- Occupation
- Religion
- Educational
- Family
- seasonal migrants

#### **2. Child related variables**

- Child age in month
- Sex
- Mother /care
- vaccination status
- Birth order

#### **3. Reason for non/incomplete vaccination**

- Lack of information
- Lack of motivation
- Obstacles
- Missed opportunity

#### **4. Knowledge and attitude toward vaccination**

- Knowledge about vaccine preventable disease
- Knowledge about vaccination schedule
- Attitude towards vaccination
- Mothers training on integrated comprehensive maternal and child health

#### **5. Health facility related**

- Availability of health facility)
- Type of health facility,
- Means of transportation to facility
- Transportation means incur cost
- Distance from home
- Health facility provide outreach service



- HEW visit home in case a child is defaulted (trace)
- Health worker give advice about vaccination

**6. Mother’s health utilization related**

- Parity
- Antenatal follow-up
- Place of delivery
- Postnatal visit
- Family planning use

**7. Interview question**

- Distance
- Missed opportunity
- Lack of information
- Lack of motivation
- Shortage of supply
- Cold chain problem

**4.11 Measurements**

To calculate vaccination status (non, incomplete and fully vaccinated) of the study participant the formula of crude coverage was employed

$$\frac{\text{No of children with vaccine status}}{\text{Total number of children the study}} \times 100 = \% \text{ children with vaccination status}$$

**Knowledge about vaccine-preventable diseases (VPD’s)** – Twelve vaccine preventable disease was asked and correct answers were given score one and incorrect answers score 0. Those respondents who were knew 8(66.6%) or more VPD, s was considered to have good knowledge about vaccine preventable disease .

**Knowledge about vaccine schedule-** Eight vaccine schedule knowledge questions was asked and correct answers was given score one and incorrect answers score zero. If they knew greater than 5(62.5%) or more schedule considered as good knowledge about vaccine schedule, if not considered as poor knowledge about vaccine schedule.

**Attitude-** Eleven attitude related questions used to measure vaccine related attitude of mothers. Measured based on agreement scale (Like rt- scale) to know the feeling of the respondents about vaccination (strongly agree-strongly disagree) type. The middle neutral category was omitted to force respondents to make a choice. Those respondent who know less than mean (3.3869) was classified as having negative attitude other wise positive attitude

#### **4.12 Operational Definition of Terms**

**Non-vaccinated** -Non-vaccinated is defined as children who did not receive any vaccine recommended by the national EPI schedule by before first birthday.

**Incomplete vaccinated-** Fewer than all doses recommended in the national immunization schedule, but at least one immunization (57).

**Fully vaccinated** A child aged 12-23 months who received all currently recommended vaccines (one dose of BCG, three doses of Pentavalent, three doses of OPV (excluding OPV0 which provides at birth), three doses of PCV, two doses of Rota-virus vaccine, and one dose of measles vaccine) any time before the data collection was taken as fully vaccinated (34).

**Vaccinated-** children will be considered as vaccinated when they took at least one dose of the vaccines (4).

**Perceived benefits of vaccination** –mother/ Caretakers who will be aware of vaccine can prevent the disease for which the child is vaccinated (38).

**Vaccine hesitancy;** refers to delay in acceptance or refusal of vaccines despite availability of vaccine service (58).

**Missed opportunity for vaccination (MOV):** Any situation in which a child has contact with a health facility and is not administered a vaccine that they are eligible to receive at the time their visit.

**Fear of side effects**-Caretakers who will have a fear of even for one vaccine among BCG, Pentavalent, OPV, and Measles will be placed in the category of having fear. The child may not be immunized with the vaccine for which the caretaker fears of having side effects (38).

#### 4.13 Data Quality Management

The questionnaire was pretested in two adjacent kebeles on the same study population for face validity, content validity and internal consistency before data collection and the possible amendment was made. Data collectors and supervisors was received training prior to data collection. Supervisors were supervise the data collection process daily for completeness. The principal investigator made close supervision to ensure the completeness and quality of data. Appropriate key informants were selected for in-depth interview. To keep trust worthiness of the qualitative study; peer debriefing, and member checking were conducted

#### 4.14 Strategies to minimize bias

- Recent surveyed sample frame was taken
- Probability sampling was used
- Training was given to supervisors and data collectors
- Double data entry verification was conducted
- Missed values were identified and labeled

#### 4.15 Data processing and Analysis

Collected data was entered and cleaned on Epi-data version 3.1 software by double data verification and exported to SPSS version 25 software for analysis. Descriptive analysis such as mean, standard deviation for continuous variables, and frequency, and percentage for categorical variables were used to summarize and explain characteristics of the independent and dependent variables and socio demography of the study participant. The dependent variable was ordered in to non-vaccinated, incomplete vaccinated and fully vaccinated. Fully vaccinated was used as a base line reference or as a highest level and non vaccinated as lower rank. Multicollinearity among independent variables (mothers attitude, knowledge about VPD, knowledge about vaccination schedule ,place of delivery ,PNC and transportation in incur cost) was evaluated by testing VIF for variables and no multicollinearity observed . Variables with a p-value of less than 0.25 was selected from the bi variate analysis. Because the outcome variable has, three-outcome , ordinal logistic regression was used to determine the predictors of vaccination status. All tests

of significance were based on  $p < 0.05$  level and confidence interval of 95%. Adjusted odds ratios (AOR) with 95% confidence intervals (CI) were calculated to interpret the predictor variables. The Model goodness of fit is also significant at P-value of 0.164 and Pseudo R-square 0.48.

#### *For qualitative*

The recorded interview was transcribed to the local language and then translated to English for analysis, and then checked and re-checked for consistence. Manual data analysis conducted by employing thematic analysis method. Review of field notes and repeated listening were conducted to be familiar with the recorded data. Data was then breakdown into discrete parts, closely examined and compared for similarities and differences. Themes and sub themes were developed from the data. The themes or categories was refined and the final set were used for presenting the findings. The finding were triangulated with finding from the quantitative part of the study.

#### **4.16 Ethical clearance**

Ethical clearance and official letter needed for this study was obtained from Jimma University ethical review board committee. Official letter from Jimma University was submitted to East Bale Zone Health Department. To assure the legality of this study official letter were written from Zonal health department to Ginnir health office. At individual level after explaining the objective of the study briefly, they were asked for verbal informed consent to conduct data collection. Confidentiality of the study participants was assured that information obtained is only used for study purpose and not disclosed or used for another purpose. Those mothers of non vaccinated or incomplete vaccinated children were advised to vaccinate their children.

#### **4.17 Dissemination of findings**

The result of the study will be presented to Jimma university school of public health. The finding will also share to Bale Zone Health office, Ginnir health office, and relevant stack holders. To be help other scientific community in the rest of the world as reference the finding will be published on peer review journal.

## **5. Result**

### **5.1 Socio demographic characteristics**

A total of 563 mothers/care takers with their 12-23 months children were participated in this study from the selected kebeles which makes the response rate 100 percent. The greatest number 117(20.3%) of mothers were found with in age category of 25-29. The mean age of the study participants is 29.99 and Standard deviation is 8.32. Regarding occupation of mothers the greatest numbers 342(61%) of them are house wife's and 357(63.4) of the study participants religion were Muslims. From the total about 432(78%) of the study participants were reside in rural areas of the district. Regarding educational status of the mothers about 219 (39%) of the mothers have no formal education. Of the total 178(33%) had a large family size of 5-10 members. About 173(31%) of the study participants experience seasonal migration within 2 years for farming and grassing.

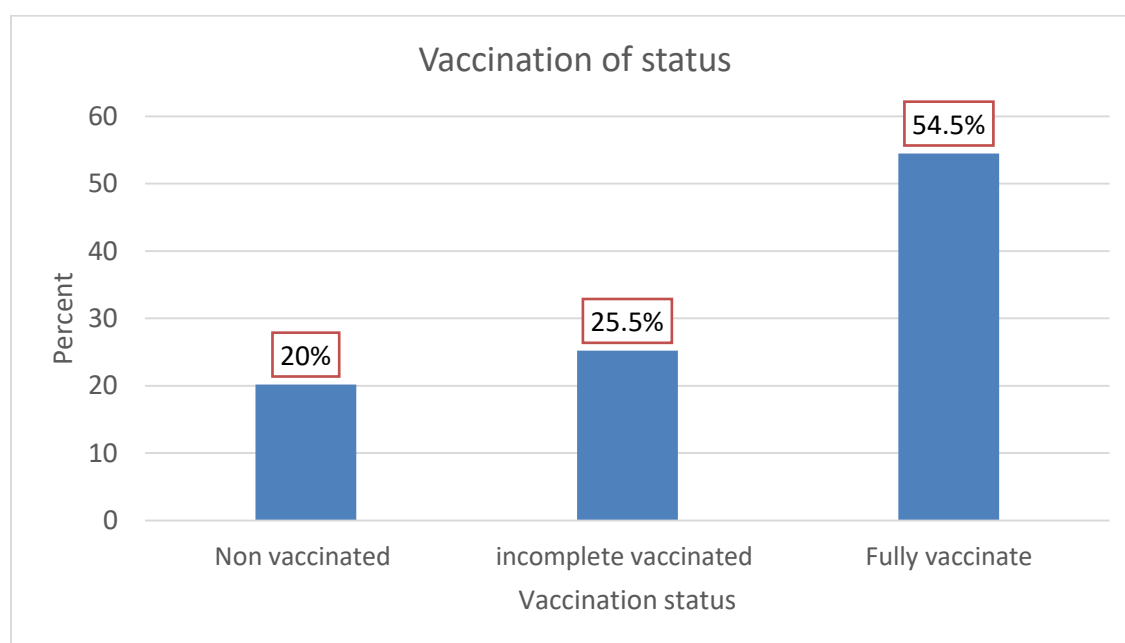
Table 3 Socio demographic characteristics of mothers/care takers on determinants of vaccination status among children aged 12-23 months ,Ginnir district southeast Ethiopia 2021

S.NO	Variable	Response	Number	Percent
1	Child care taker	Mother	291	51.7
		Child guard	72	12.8
		Grand Mother/Father	200	35.5
2	Marital Status of Mother	Single	77	13.7
		Married	421	74.8
		Widowed	48	8.5
		Divorced	17	3.0
3	Educational status	No formal education	219	38.9
		Primary (1-8)	254	45.1
		Secondary (9-12) and above	90	16.0
4	Religion	Muslim	357	63.4
		Orthodox	161	28.6
		Protestant	45	8.0
5	Family size	1 – 5	376	66.8
		6 – 10	187	33.2
6	Mothers Occupation	House wife	342	60.7
		Farmer	55	9.8
		Merchant	46	8.2
		Government employee	53	9.4
		Self-employee	67	11.9
7	Seasonal Migration in 2years	Yes	173	30.7
		No	390	69.3
8	Type of Migration	Father and mother	0	0.0
		All family	95	100.0
9	Residence area	Rural	432	76.7
		Urban	131	23.3
10	Age of the mother	15-19	77	13.7
		20-24	92	16.3

	25-29	117	20.8
	30-34	104	18.5
	35-39	89	15.8
	40-44	84	14.9

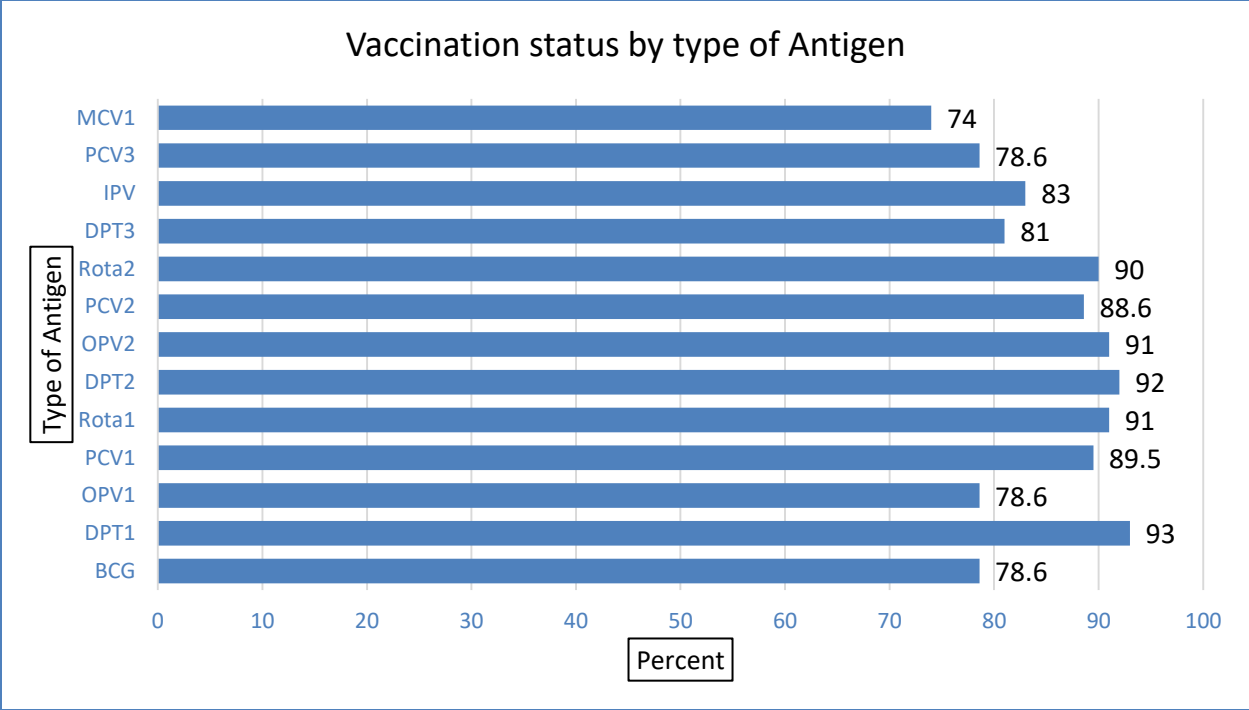
## 5.2. Vaccination Status of the Children

Data collected based on child immunization cards 372(66%), medical records 77(14%) and mothers' recall 114(20.2%) . From 563, 12-23 months children, 307(54.5%) of them were full vaccinated by routine immunization program. The rest 142(25.5%) were incomplete vaccinated and 114(20.2%) of them were non-vaccinated by routine immunization program



**Figure 3 Vaccination status among 12-23 months age children in Ginnir district East Bale Zone**

From the total about 449(79.7%) of 12-23 months children were vaccinated with at least one dose of route provided vaccine. From those vaccinated, 353(78.6%) of them were vaccinated with BCG and 409(90%) vaccinated with oral polio vaccine one. Of the total 353 (78.6%) and 333(74%) were vaccinated with third dose of PCV-3. About 116(26%) of the children 12-23 had no vaccination history with measles containing vaccine first dose (MCV1) at 9-12 months of age.



**Figure 4 Type of vaccine antigen and coverage among children 12-23 months age in Ginnir district of East Bale Zone**

**5.3. Reason of non vaccination and incomplete vaccination**

**Lack of information about vaccine**

From the total of incomplete and non vaccinated children 126(22.4%) of them were not vaccinated due to lack of information about vaccination. From which 35(28%) were miss vaccination due to unaware of the need of immunization, 33(26%) were unaware of the need of subsequent doses of vaccination .

**Lack of motivation**

From 67 mothers/caretakers whose their children were not vaccinated due to lack of motivation 32(48%) were due to fear of side effect, 19(28%) were postponements of vaccine schedule and 16(24%) were due to no faith in vaccination.

**Obstacle Encountered**



Regarding obstacles about 188(35%) of mothers encountered obstacles to vaccinate their children of which, 100(53%) were due to far distance from vaccination site, 34(18%) due to long waiting time at vaccination center and 35(18%) due to inconvenient time of vaccination.

### **Missed opportunity**

About 178(69%) of the non or incomplete vaccinated child's mother/care taker reported missed vaccination opportunity. Regarding type of missed opportunity about 77(43%) of them were reported limited time of vaccination, 40(22%) of them reported not vaccination day, 42(23%) reported vaccine and supply shortage and 7(4%) of them were reported vaccinator absent

### **5.4. Risk factors of non vaccination and incomplete vaccination**

Regarding geographical difference the highest number of non vaccinated and incompletely vaccinated children resides in rural areas of the district 90(21%) and 115(27%) respectively. High number of non vaccinated and incompletely vaccinated children were observed among single mothers 26(34%) and 24(31%) respectively . About 249(59%) of fully vaccinated children were observed among married mothers .

Children of parents who had no formal education were more likely to be non vaccinated and incompletely vaccinated 45(20%) and 53(24%) respectively . Regarding maternal occupation self employed mothers children were likely to fully vaccinated 36(54%). Children of parents who had history of seasonal migration with in two years were more likely to be non vaccinated 47 (27%) and incompletely vaccinated 43 (25%) compared to those who had no history of seasonal migration.

**Table 4 Socio demodraphic risk factors of non vaccination and incomplete vaccination among children 12-23 moths in Ginnir district of East Bale Zone**

Variable	Category	Non vaccinated N(%)	COR(95%CI)	Incpcom- pletely Vaccinated N(%)	COR(95%CI)	Fully vacci nated N(%)
Place of residence	Urban	24(18)	1	27(21)	1	80(61)
	Rural	90(21)	1.32(.78-2.21)	115(27)	1.50(.91-2.45)	227(52)
Mothers marital Status	Single	26(34)	11.5(1.40-95.30)	24(31)	2.66(.75- 9.38)	27(35)
	Married	77(18)	3.71 (.47-28.99)	95(22)	1.14(.360-3.63)	249(59)
	Widowed	10(21)	6.31(.71-55.81)	19(40)	3.0(.81-10.98)	19(40)
	Divorced	1(5.9)	1*	4(23.5)	1*	12(71)
Mothers Religion	Muslim	67(19)	1.29(.53- 3.12)	98(17.5)	1.1(.535-2.28)	192(54)
	Orthodox	40(25)	1.66(.66-4.16)	32(20)	.77(.35-1.72)	89(55)
	Protestant	7(16)	1	12(27)	1	26(58)
Mothers Age	Age of mother	114(20)	.98(.96-1.01)	142(25)	1.02(.99-1.04)	307(54)
Educational status of the mother	Secondary +	19(21)	1	26(30)	1	45(50)
	Primary (1-8)	50(20)	.84(.44-1.57)	63(25)	.77(.439-1.36)	141(55)
	No formal education	45(20)	.88(.46-1.66)	53(24)	.758(.42-1.35)	121(55)
Family size	5-10	44(21)	1.02(.65-1.58)	53(25)	.96(.64-1.45)	117(55)
	1-4	70(20)	1	89(25)	1	190(54)
Occupation status of the mother	House wife	64(19)	1.08(.52-2.25)	84(25)	.78(.42-1.43)	193(57)
	Farmer	13(23)	1.51(.59-3.90)	15(26)	.96(.42-2.21)	28(50)
	Merchant	12(26)	1.70(.64-4.50)	11(24)	.86(.34-2.12)	23(50)
	Gr'nt employee	14(26)	1.69(.66-4.31)	12(23)	.80(.33-1.91)	27(51)
	Self-employee	11(16)	1	20(30)	1	36(54)
Seasonal Migration	NO	67(17)	.52(0.33-.082)	99(25)	.85(.55-1.32)	224(57)
	YES	47(27)	1*	43(25)	1	83(48)

(\* ) Significant at P-value less than 0.25

From the total of non vaccinated children 58(20%) were males and 149(54%) of fully vaccinated children were females. Regarding birth order children who were born in the forth above level

were more likely to incomplete vaccinated 56(29%) and children who were born between 1-3 stage were more likely to fully vaccinated 203(55%).

Children whose their care giver was grand mother or father were more likely to non vaccinated and incomplete vaccinated 45( 23%) each . Children whose their caretaker was mother were more likely to be fully vaccinate 158 (55%) compared to those whose their caretaker were grand mother or father

**Table 5 children related risk factors of non vaccination and incomplete vaccination among 12-23 months children in Ginnir district east bale zone**

Variable	Category	Non-Vaccinated N(%)	COR(95%CI)	Incpcom-pletely Vaccinated N(%)	COR(95%CI)	Fully vaccinated N(%)
Sex of the child	Male	58(20)	1*	72(25)	1	287(55)
	Female	56(20)	.97(.63-1.50)	70(26)	.94(.63-1.40)	149(54)
Birth of Order of the child	4+	36(18)	.90(.56-1.42)	56(29)	1.27(.84-1.91)	104(53)
	1-3	78(21)	1	86(23)	1	203(55)
Caretaker of the child	Child guard	11(15)	.76(.36-1.60)	22(31)	1.18(.65-2.14)	39(54)
	Grand Pa/Ma	45(23)	1.11(.70-1.76)	45(22.5)	.86(.55-1.34)	110(55)
	Mother	58(20)	1	75(26)	1	158(54)

(\*) Significant at P-value less than 0.25

Regarding parents knowledge about vaccine preventable disease 56 (18%) of non vaccinated and 80(52%) of incompletely vaccinated children parents had poor knowledge about vaccine schedule . About 38(11%) of non vaccinated and 39(14%) of incompletely vaccinated children parents had good knowledge about vaccination schedule of their children. Regarding mothers attitude about vaccine , 45(17%) of non vaccinated and 42(16%) of incompletely vaccinated children mothers had negative attitude towards vaccinating their children. Highest number of

mothers who had positive attitude about immunization had high probability of fully vaccinating their children 183(68%).

**Table 6 Knowledge and attitude relate risk factors of non vaccination and incomplete vaccination among children 12-23 months in Ginnir district of east bale zone**

Variable	Category	Non-Vaccinated N(%)	COR(95%CI)	Incom- pletely Vaccinated N(%)	COR(95%CI)	Fully vaccinated N(%)
Knowledge about VPD	Poor	56(23)	1.72(1.12-2.67)	80(32)	2.31(1.54- 3.46)	110(45)
	Good	58(18)	1*	62(20)	1*	197(62)
Knowledge of vaccine Schedule	Poor	76(27)	3.73(2.37-5.89)	103(36)	4.93(3.18-7.64)	107(37)
	Good	38(14)	1*	39(14)	1*	200(72)
Attitude	Negetive	69(23)	4.72(2.94-7.59)	100(34)	3.15(2.08-4.76)	124(42)
	Positive	45(17)	1*	42(15.6)	1*	183(68)
Perceived benefits	No	38(43)	5.52(3.47-8.78)	26(29)	1.83(1.19-2.80)	25(28)
	YES	76(16)	1*	116(24)	1*	282(59)

(\*) Significant at P-value less than 0.25

Regarding acceptability of health facility that provide immunization service 48 (54%) non vaccinated and 20 (27%) of incompletely vaccinated children live in area where health post or health center were not present .About 45 (39%) of non vaccinated and 27 (23%) of incompletely vaccinated children live in the area of greater than 41 minute walk from the nearest health facility that provide vaccination service. Non vaccination and incomplete vaccination were high among those who get immunization service from health post 76 (22%) and 102 (30%) respectively . Only 25(9%) of non vaccinated and 46 (16%) of incomplete vaccinated child parents did not use other transportation method and the rest use other means of transportation to reach health facility for vaccination service.

**Table 7 Health facility and service related risk factors of non vaccination and incomplete vaccination among children 12-23 months in Ginnir district east bale zone**

Variable	Category	Non-Vaccinated N(%)	COR(95%CI)	Incpcomp letely vaccinated N(%)	COR(95%CI)	Fully vaccinated N(%)
Presence of health facility for EPI service	NO	48(54)	10.43(5.8-18.75)	20(27)	2.35(1.22-4.52)	20(23)
	YES	66(14)	1*	122(26)	1*	287(60)
Type of HF neer to them.	Health Post	76(22)	1.81(1.15 -2.84)	102(30)	2.31(1.50-3.55)	161(47)
	Health center	38(17)	1*	40(18)	1*	146(65)
Distance from the nearest health facility	41+min	45(39)	3.94 (2.32 - 6.69)	27(23)	1.36(.788 -2.35)	47(39)
	2140min	27(17)	1.27(.73- 2.21)	42(27)	1.14(.72 - 1.81)	87(56)
	>20min	42(15)	1*	73(25)	1*	173(60)
Means of transportation to health facility	By Car/ motor	65(36)	9.76(5.65-16.85)	78(39)	6.36(3.99-10.15)	57(28)
	Hoarse	24(31)	5.7(2.94 -11.06)	18(23)	2.32(1.21-4.45)	36(46)
	Walk	25(9)	1*	46(16)	1*	214(75)
Transportation Incur cost	No	23(8)	8.56 (5.1- 14.36)	52(18)	3.74 (2.46 -5.69)	210(74)
	YES	91(33)	1*	90(32)	1*	97(95)
HW provide advice on vaccination	No	42(34)	4.12(2.47-6.87)	43(35)	3.07(1.875.03)	38(31)
	YES	72(16)	1*	99(22)	1*	269(61)
HF provide out reach	NO	98(22)	1.64(.90-2.98)	112(25)	1.00(.61-1.63)	242(53)
	YES	16(14)	1	30(27)	1	65(59)
HF traced missed child	NO	7(5)	.10(.04.233)	27(18)	.37 (0.23-0.60)	118(78)
	YES	107(26)	1*	115(28)	1*	189(46)

(\* ) Significant at P-value less than 0.25

The highest percentage of non vaccination 48(31%) and incomplete vaccination 51(33%) was observed among those who had not heard information about vaccination. Having exposure of long time waiting at health facility during child vaccination increase the probability of non

43(23%) and incompletely vaccinated 46(25%). The highest percentage of non vaccinated and incompletely vaccinated were observed among parents who had no training on maternal and child health care 94(31%) and 94(31%) respectively.

**Table 8 Risk factors of incomplete and non vaccinated children among 12-23 months children in Ginnir district East Bale Zone**

Variable	Category	Non Vaccinated N(%)	COR(95%CI)	Incpmp letely Vaccinated (%)	COR(95%CI)	Fully vaccinated N(%)
Ever heard about vaccination	No	48(31)	.30(.19-.49)	51(33)	.39(.25-.62)	56(36%)
	YES	66(16)	1*	91(22)	1*	251(61.5)
Long time waiting during last immunization	NO	71(19)	.740 (.47-1.16)	96(25)	.93(.61-1.43)	212(56)
	YES	43(23)	1	46(25)	1	95(57)
Child vaccinated during last out reach	NO	110(22)	3.31(1.15-9.56)	123(24)	.78(.42-1.42)	274(54)
	YES	4(7)	1	19(34)	1	33(59)
Trained on maternal and childcare	NO	94(31)	8.29(4.85-14.18)	94(31)	3.45(2.27-5.25)	111(37)
	YES	20(8)	1*	48(18)	1*	196(74)

(\*) Significant at P-value less than 0.25

#### 5.4. Factors associated with non-vaccination and incomplete vaccination

All variable observed having association with non or incomplete vaccination status of children 12-23 months in Ginnir district in bi variate analysis (with p-value less than 0.25) were interred in to Ordinal logistic regression to identify factors associated with non or incomplete vaccination status.

The odds of being unvaccinated was by factor 3.29 and 3.12 highier in kebele where there is no health facility and those who pay for transportation to health facility respectively, when compared with complete vaccination.

The odds of being unvaccinated was by factor 1.75 and 2.93 higher in those mothers with poor knowledge on vaccine preventable disease and vaccine schedule respectively, when compared with mothers of children with complete vaccination.

The odds of being unvaccinated was by factor 1.91 and 1.51 higher among those mothers who did not attend ANC and did not start using family planning within two months of last delivery respectively, when compared with mothers of children with complete vaccination.

The odds of being unvaccinated was by 2.23 and 1.79 higher among those mothers with negative attitude and not perceived benefits of vaccine respectively, when compared with mothers of children with complete vaccination

Table 9 Factors independently associated with non and incompletely vaccinated status among children 12-23 months age, Ginnir District, Southeastern Ethiopia 2021

Variable		Unvaccinated N(%)	Incomplete vaccinated N(%)	Fully vaccinated N(%)	AOR(95% CI)	P- Value
Transportation incurred	No	23(8)	52(18)	210(74)	3.12(2.08-4.69)	0.01
	Yes	91(33)	90(32)	97(95)	1	
Knowledge about VPD	Poor	56(23)	80(32)	110(45)	1.75(1.22-2.51)	0.01
	Good	58(18)	62(20)	197(62)	1	
Knowledge of vaccination schedule	Poor	76(27)	103(36)	107(37)	2.93(2.00-4.29)	0.01
	Good	38(14)	39(14)	200(72)		
Attitude towards vaccination	Negative	69(23)	100(34)	124(42)	2.23(1.52-3.26)	0.01
	Positive	45(17)	42(15.6)	183(68)	1	
Presence of Health facility	No	48(54)	20(27)	20(23)	3.29(1.96-5.57)	0.01
	Yes	66(14)	122(26)	287(60)	1	
Perceived benefits of vaccine	No	38(43)	26(29)	25(28)	1.79(1.23-2.63)	0.01
	Yes	76(16)	116(24)	282(59)	1	
Attending ANC	No	44(38%)	48(36%)	43(32%)	1.91(1.23-2.94)	0.01
	YES	70(16%)	94(22%)	264(62%)	1	
Family planning	No	65(29%)	69(31%)	90(40%)	1.51(1.03-2.23)	0.04
	Yes	49(14%)	73(21%)	217(64%)	1	
<b>Note -Significant at P -value of &lt; 0.005</b>						

### 3. Discussion

This study attempts to assess determinants and vaccination status among children aged 12-23 months, in Ginnir district East Bale. From the total of 563, 12-23 months children, 54.5% of them were full vaccinated, 25.5% were incomplete and 20.2% were non-vaccinated by routine immunization program. Poor knowledge on vaccine preventable disease, poor knowledge on vaccination schedule, negative attitude towards vaccination, transportation incur cost and not attending antenatal care and not using family planning within two months of delivery, not perceived benefits of vaccine and inaccessibility of health facility were associated with non vaccination status of the children 12-23 months in Ginnir district.

Fully vaccination coverage of the district was very low while number of non vaccinated children was high. This finding is comparable with the finding of study conducted in Wonago district of southern Ethiopia (45). It is also consistent with study conducted in local studies in Ethiopia and Afghanistan (46) (47)(48). Conversely delivering the recommended vaccines to those who need them most, it will play a significant role in achieving the health and equity objectives. However, addressing all children in every district with routine childhood vaccination and achieving homogeneous high vaccination coverage helps in elimination and eradication of vaccine preventable diseases (49).

Also finding of qualitative supports “...*We identified Abayi area for out reach but know we do not provide out reach service in identified area because the current security situation is not good and to travel with motor bicycle it costs around 400 ETB,. It is impossible to provide out reach service like before and we appoint them to vaccinate their child at adjacent health facility but they didn't come*”.

About one third of the children in the district did not vaccinated with Penta valent 3 and MCV1. This finding is comparable with survey conducted in Ethiopia(27). This finding is in contrary compared to national EPI strategic plan of to achieve routine immunization coverage of at least 90% and 80% for antigens at national and district level respectively(11). This result indicates that there is a problem in vaccine service utilization which results in increased number of dropouts in subsequent doses.



Penta one to measles dropout rate was 19% and 15 percent for Penta one to three. Which indicates the coverage decrease with a subsequent dose of vaccine. Not inline with national and WHO recommendation, only less 10 percent of drop rate is tolerable (11). Vaccination with universal immunization of children against 6 common vaccine preventable disease is very crucial in reducing infant morbidity and mortality (3). Which could be due to mother's in compliance and appointment gap between each dose leading mothers to forget the subsequent doses.

*Supported by qualitative finding ..... "Many children default every month; we did not know what is the reason behind why children in our catchment are defaulting from vaccination..... may be... it is due to fear of vaccine side effect or gap in information about immunization but they vaccinate their children simply by looking each other and better if we avert this trend by advising mothers but we have a gap on advising on routine child hood immunization " .*

Regarding reasons for non-or incomplete vaccination reported by mothers 28% were due to absence of awareness in immunization need and 26% due to fail to recall need of returning for subsequent doses of vaccine. The result of this study is complementary with the finding of local studies conducted in Ethiopia (19) (47). This finding implies that there is a problem in providing advise for mothers/caretakers about vaccination and vaccine schedule by health workers.

*'.....After vaccination the child get high grade fever and cry over night which worsen many mothers in our kebele including me, so I'm not interested in the next vaccination schedule" .* Supported by the finding of study conducted in sinana district, children develop fever and unusual behavior for three days after vaccination that frustrates the family, I never go again to vaccinate my child (50). This implies parents who had no dilemma and claim about vaccine side effect were stick to vaccination schedule(51) .

About 178(69%) of the non or incomplete vaccinated child's mother/care taker reported missed opportunity , of which 23% reported vaccine and supply shortage. This finding is consistent with the result of study conducted in Arbagona Ethiopia, vaccine stock out were the major problem identified for incomplete vaccination of children among 12-23 moths (52)(53). However, linking health facilities with communities to improve access, increasing system efficiency, integrating delivery of other interventions at the time of vaccination, so clients receive a

continuum of vaccination service according to their need over time and other services which minimize the chance of missed opportunity (49)(53).

In line with study conducted in Nigeria(41) ,about 18% of mothers report their children were not vaccinated due to long waiting time and inconvenient time of vaccination at vaccination centers . However , Ethiopian national EPI guide line recommends vaccination should be provided on daily bases to reduce waiting time and improve utilization access(11).

Only 50% of health centers and 32% of health posts found in the district had functional solar or electrical fridge. So, shortage of vaccine is common at many health posts and health centers because , those with factional fridge serve the adjacent health facility by storing vaccine. Long travel distance up 60km, and shortage in logistic were also the main problem to transport vaccines to facilities from district health office. Supported by meta-analysis in Ethiopia about 45% of health post and 2 % of health centers reported absence of refrigerator for vaccine store which leads to vaccine stock out (58)

*Supported by qualitative finding .... “From the total of 33 health posts and 8 health centers only 4 health centers and 14 health posts had function solar fridge. So, shortage of vaccine is common at many health posts and health centers because those with functional fridge serve the adjacent facility for storing vaccine”.*

*.....” Vaccination schedule is inconsistent in our kebele and this problem was raised from the people of our kebele during kebele level meeting, when we ask health extension workers, they said we have no fridge in our health post, we have to wait until the antigen transported from health center, which is not supplied in timely manner and that resulted in frequent postponements of vaccination schedule”.*

About 178(69%) of the non and incompletely vaccinated child’s mother/care taker reported missed vaccination opportunity like limited time of vaccination service, today is not vaccination day, vaccine and supply shortage and absence of a person in charge of providing vaccine service . Consistent when compared with study conducted in Mozambique(59). This indicates that there were no consistency in service time ,day and vaccine supply at lower level like health center.

*Supported by .... “It is impossible for us to travel two-three hours for vaccination, here I have 3 children none of them were vaccinated because of both health post and health center are very far to get vaccination service”.*

Poor knowledge about vaccination schedule increases the odds of being non and incomplete vaccination. The finding of this study is consistent, compared to studies conducted in Gondar, Gambela and northern Ethiopia(40) (54) (55). Which implies good knowledge about vaccination schedule encouraged parents to fully vaccinate their children, monitor whether vaccination had been completed or incomplete (52)(54) (56)

Children of parents who had poor knowledge about vaccine preventable disease, were increased odds of being non and incomplete vaccination. Our finding supports the result of study conducted in Ambo Ethiopia(57). Other researches shows that, children of mother who knew that vaccination is used to prevent vaccine preventable disease were more likely to be fully vaccinated(57) (52). Which implies parents who were aware of some basic facts about vaccine preventable disease worried that their child can get disease if not fully vaccinated(56)(51)(55)

Children of parents who had undesirable attitude on vaccination increase the odds of incomplete and non vaccination 2.31 and 2.11 times. The result of this study supports the result of studies conducted in Ethiopia, negative perception about benefits of vaccination increase chance of incomplete vaccination(52) and also hinders mothers from vaccinating their children(58). Because mothers who had miss consumption about vaccination had high chance to incomplete vaccinate their children and it implies discussion with mothers/ care takers about vaccine side effect and benefit can change their mind set.

*Supported by qualitative finding .... “After vaccination the child get high grade fever and cry over night which worsen many mothers in our kebele including me, So I’m not interested in the next vaccination schedule to vaccinate my child”.*

Those who pay transportation fee to travel to health facility for vaccinating their children were more likely to incompletely and non vaccinate their children compared to those who do not pay for transportation to travel to health facility. This is possibly because one health post serve up to three kebeles, those mothers out of the kebele in which health post found in may travel up 1:30 hour. This result implies that poor accessibility to of vaccine service and no outreach service to

reach pocket areas in the district. However parents who reside in kebele where health facility provide outreach for communities residing beyond 5 km from the static health facilities and did not pay transportation were more likely fully vaccinate their children(11). The geographical accessibility of health facilities has been found to motivate immunization uptake(56).

*“...We vaccinate our children when health extension workers come to give vaccine through home to home or when we take our children to health center for treatment purpose because as you know we are not educated or we have no information about vaccination schedule. If they advise on when and why to vaccinate , I can follow exactly what they advised me”*. This finding supports the finding of local study result, we do have problem with providing a quality health information that can change our clients. The information we deliver does not cast out miss the problem with vaccine schedule and did not change behavior . In line with study conducted in Ethiopia (19).

Children of mothers who had no history of ANC check were more likely to be non vaccinated. This finding supports the result of study conducted in Malawi and Indonesia, children born from mothers who had no postnatal care had higher chance of being incomplete and non vaccinated(59). Not consistent with the result of compared to study conducted in Benin (26). However those mothers who attend ANC check up had the probability to be convinced by health workers to link their newborn baby to immunization unit so as to be vaccinated at health facility. The result also implies that improving quality of post natal care attendance resulted in improving child vaccination (52)(60).

*Supported by qualitative finding .....” many mothers missed focused post nata and antenatal care on which we deliver information about new baby care including vaccination of the children. In addition, we provide vaccine service monthly and it’s impossible to deliver information about benefits of vaccinating their children, vaccine schedule and other because we are over burdened by providing service”*

Being from mothers who did not perceived benefits of vaccination were more likely to be non vaccination compared to those from those who perceived in benefits of vaccine. The current finding is consistent compared to study conducted in Cameroon, having mother/care taker of negative attitudes towards vaccination increases the likely hood of non-vaccination(58). Having

a positive perception about vaccination were strongly associated with fully vaccination of the children (51). This finding shows there is a problem in promoting benefits of childhood vaccination and advising mothers or care takers of the children prior or after vaccination.

### **Limitation and strengths of the study**

As the study is cross sectional it is prone to recall bias and social desirability biases on variables like reporting child immunization status and reasons of non or incomplete vaccination. Hence they social desirability result in false report of vaccination status, reason of non and incomplete vaccination and over estimate the finding. And unable to recall the resulted in under estimation of vaccination status and risk factors. So to minimize recall bias vaccination card was used and the participant were blinded to avoid social desirability bias. The current study used large sample size which helps to generalize the study finding. Used recently conducted survey in the selected kebeles to address all eligible children in the district. The study also try to include both program and service related factor's. The study try to address the determinant factors of incomplete and non vaccinated which is very helpful to intervene specifically for each.

#### **4. Conclusion**

Fully vaccination coverage of the district was very low compared to the expected immunization coverage of 95% of the birth cohort must be vaccinated with a universal vaccine-preventable disease like tuberculosis, diphtheria, whooping cough (pertussis), tetanus, polio, and measles. The drop rate between pentavalent one and measles vaccine of the district were very high compared to the national standard

Poor mothers' knowledge about VPD, vaccine schedule, negative attitude towards vaccination, absence of health facility that provide EPI service, and paying for transportation to travel to health health facility for immunization , not perceiving in benefits of vaccination, not attending ANC, and were associated with non-vaccination. However, defaulter tracing is very mandatory in the EPI program it was not conducted by visited health posts and health centres.

Though mothers complained about the distance of vaccination sites, health centres and health posts did not prioritize distance as a factor for non/incomplete vaccination, outreach service was not conducted by facilities in the district to reach every child.

The mother reported that missed opportunities like, unavailability of vaccines at the facility, today is not vaccination day and limited hours of vaccination service and a person in charge providing vaccination service was absent, distance from a health facility was a problem that leads to incomplete or non vaccinated their children identified qualitatively.

According to in-depth interviews with EPI coordinators and health extension workers, insufficient availability of vaccine cold chain at health centres and health posts were a major problem for vaccine stock out at health facilities. However the availability of cold chain was not sufficient it is impossible to maintain the non-functional refrigerators because the spare part was not on the market and no budget line for maintenance, both at the health facility and district health office.

## 5. Recommendation

Routine childhood vaccination coverage of the district needs to be improved in the district because to attain herd immunity and for interruption of vaccine-preventable disease transmission in the community, an adequate number of eligible children (95%) must be immunized for that disease through full vaccination of routine immunization

### **Health facilities**

In the district should consider improving mothers/ caretakers understanding about the vaccine, vaccination schedule, vaccine-preventable diseases, vaccination schedule, and vaccination side effects through providing advice of mothers which result in greater awareness about vaccination which in turn increases acceptance and demand for childhood vaccinations. Maternal reproductive health-related services like conducting ANC visits and using family planning with in recommended time should be encouraged by health workers in the district. Hence they advise on all packages of information about child health and improve the intimacy of mothers with health workers what decrease unwanted fear of service.

- **District health office**

The district should promote childhood vaccination, the benefits of each vaccine, and related side effects after vaccination are very important to increase the carry out of the negative attitude among mothers or caretakers of the children.

Better coordination and planning on how to address hard to reach areas or kebeles in the district, monitoring the implementation is mandatory. About 22 kebeles of the district have no health post or health centre and the district must improve the distribution of health facilities to access immunization services. The district must also monitor the implementation of conducting outreach services, defaulter tracing mechanisms at the facility level.

Health facilities in the district should have a defaulter tracing mechanism, conduct defaulter tracing of missed children from their next appointment and clearing the problem is crucial to avert the incomplete vaccination. Regarding the accessibility of service, health facilities in the district, better to provide the EPI service both in static and outreach to address every child in the district.

Since supply and cold chain availability is the backbone of the EPI program it is better if all packages of vaccine-related supplies are availed at all points of vaccination sites especially at the health post level

*A 54 years district EPI coordinator stated .....” I’m very saddened with the current EPI program because of the false report from health posts and the weak engagement of political leaders in the health system to correct the issue of false reports is problematic. so, it is better to take action on this because there are around 27 paralyzed children in Ginnir district and one is confirmed polio, and it is happened because of non or incomplete vaccination of the children with polio vaccine”.*

- **Stakeholders in the district**

Insufficient presence of cold chain at facility level were the main factor for shortage of vaccine at health post and health centre, solving this issue should be planned as a priority problem for the government, partners and NGO’s working on EPI program to reach every child in the district.

Supply of different spare parts to maintain the non-functional fridges in the district expected from stakeholders and NGO’s in the district

- **National and regional**

Region and national should consider fridge distribution and health facility accessibility to solve the complaints of mothers about distance.

It is necessary to continuously work on the creation of awareness of the positive effects of immunization both at the national and regional levels using multimedia.



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## 8.2 . Information sheet and informed consent form

Jimma University

### Informed Consent Statement

My name is \_\_\_\_\_

We are conducting a study on determinants of incomplete vaccination and no vaccination in Ginnir district with Jimma University. We are interviewing randomly selected mothers and caretakers that have children aged 12-23 months to assess determinants for non and incomplete vaccination. For this purpose, certain questions that are thought to be important will be asked. You are kindly required to respond to these questions. We want to assure you that your answers will strictly kept secret. We will also do not keep a record of your name or address. Participation in this survey is voluntary and you have the right to refuse participation at any time or not to respond to questions that you are not willing to answer. However, your honest answers to these questions will help us in identifying predictors of non or incomplete and improve vaccination service in the future. We would appreciate your help in responding to these questions, and the interview will not take more than 30 minutes.

Information sheet

01. Are you willing to participate in the study? Yes \_\_\_\_\_ No \_\_\_\_\_

02. Selected Household having children age 12-23 months      1) yes      2) No-

03.Study area: - Woreda/Town----- Kebele-----house number-----

04:- Day / Month / Year of interview (EC):------

## Annex III Questionnaire

### Part one sociodemographic variables

1	Residency	1. urban 2. rural
2	Child's caretaker	1. mother 2. grand parent 3. other
3	What is Marital status of caregiver	1. Single 2. Married 3. Divorced 4. widowed
4	What is Caretakers' age (years)	_____
5	What is educational status of parents	1. No education 2. Primary [1–8] 3. Secondary [9–12] 4. College and above
6	Religion	1. Muslim 2. Orthodox 3. Protestant 4. Wakefata
7	Family size	-----
8	Occupation	1. House wife, 2. Daily laborer, 3. Farmer, 4. Merchant, 5. Self-employ, 6. Government Employee, 7. Others
	Seasonal migration related	

Item	Question	Response	Remark	Skip
9	In the last 2 year, have any members of this household gone to live or work somewhere else for part of the year? (Sleeping away from home for more than one month)	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> <li>99. Do Not Know</li> </ol>	2-> Skip to 201	
10	If yes, how many times?	<ol style="list-style-type: none"> <li>1. Once</li> <li>2. 2-3 Times</li> <li>3. 4 or More Times</li> <li>99. Do Not Know</li> </ol>		
11	If yes, what was the duration of the longest trip?	_____		
12	Who went?	<ol style="list-style-type: none"> <li>1. Everyone in the Household</li> <li>2. One Adult Only</li> <li>3. Two or more Adults</li> <li>4. Children Only</li> <li>5. A Mix of Adults and Children</li> <li>99. Do Not Know</li> </ol>		
13	What was the purpose of the trip?	<ol style="list-style-type: none"> <li>1. To Work</li> <li>2. With cattle's</li> <li>3. To Visit Family</li> <li>4. For Leisure Or Holiday Or Vacation</li> <li>5. Other, Specify Below</li> <li>99. Do Not Know</li> </ol>	Any thing but _____	
14	Other, please specify	Free text		

Part two: child related questions

202.	Sex of the child	1. Male 2. Female	
203.	age the child in month	_____	
204	Birth order of the child	_____	
205	Does the child start vaccination	Yes No	
206	Does your child take vaccination card	Yes No	If no continue with history
207	May I see the immunization card		
<b>Instruction : Thick ✓ if vaccinated and × if Not vaccinated</b>			
207	BCG an injection in the arm or shoulder that usually causes a scar	<input type="checkbox"/>	
208	OPV , about two drops in the mouth to prevent polio	OPV zero dose	<input type="checkbox"/>
		OPV1	<input type="checkbox"/>
		OPV2	<input type="checkbox"/>
		IPV injection in the arm	<input type="checkbox"/>
208	DPT an injection given in the thigh	DPT1	<input type="checkbox"/>
		DPT2	<input type="checkbox"/>
		DPT3	<input type="checkbox"/>
209	PCV an injection in the thigh	PCV1	<input type="checkbox"/>
		PCV2	<input type="checkbox"/>
		PCV3	<input type="checkbox"/>
210	Rota liquid in the mouth to	Rota1	<input type="checkbox"/>
		Rota2	<input type="checkbox"/>



	prevent diarrhea			
211	MCV an injection in the arm to prevent measles	MCV1	<input type="checkbox"/>	
		MCV2	<input type="checkbox"/>	
212	Vaccination status	1. Non vaccinated	<input type="checkbox"/>	
		2. Fully vaccinated	<input type="checkbox"/>	
		3. Fully vaccinated	<input type="checkbox"/>	
213	Reason of incomplete vaccination		If fully vaccinated jump to question 301	
213.1	Lack of information	1. Unaware of need for immunization 2. Unaware of need to return for 2nd or 3rd dose 3. Place and/or time of immunization unknown 4. Fear of side reactions 5. Wrong ideas about contraindications 6. Other		
213.2	Lack of motivation	1. Postponed until another time 2. . No faith in immunization 3. Rumours(bad information) 4. Other		
213.3	Obstacle	1. Place of immunization too far 2. Time of immunization inconvenient 3. Vaccinator absent 4. Vaccine not available 5. Mother too busy 6. Family problem, including illness of mother 7 . child ill –not brought 8 child ill brought but not given		

		immunization 9. Long waiting time 10. Other	
<b>Missed opportunity related questions</b>			
<b>214</b>	Have you ever requested vaccination service for this child and been refused?	1. Yes 2. No	Skip to 301 if no
<b>215</b>	If so, why didn't they vaccinate the child?(missed opportunity)	<ol style="list-style-type: none"> <li>1. The doctor or nurse said it couldn't be done because the child was sick</li> <li>2. There were no vaccines, or there were no syringes or some other supply needed for vaccination</li> <li>3. It was not a vaccination day</li> <li>4. The person in charge of vaccination was not there</li> <li>5. We didn't have the vaccination card with us</li> <li>6. The visit was not in the vaccination day</li> <li>7. The hours and days for vaccination are limited</li> <li>8. Other Specify _____</li> </ol>	

### Part 3 Knowledge about Vaccination

Num mb	Questions	Responses	Code
301	Do you heard or seen about vaccination and vaccine preventable disease?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
302	If yes to above question, from where do you heard about the vaccination and vaccine preventable disease? (Multiple response possible)	<ol style="list-style-type: none"> <li>1. Community members</li> <li>2. Health workers at health facility</li> <li>3. Health extension workers</li> <li>4. Radio</li> <li>5. newspaper</li> <li>6. Kebele administrator paper</li> <li>7. Other government official</li> <li>8. others (specify)-----</li> </ol> <p>99=No response 88=I don't know</p>	
303	What messages have you heard about vaccinations? (Multiple response possible)	<ol style="list-style-type: none"> <li>1. About campaigns (e.g. dates, target group)</li> <li>2. Importance of routine vaccination</li> <li>3. Where to get routine vaccination</li> <li>4. Age to get routine vaccination</li> <li>5. Return for the next doses of the routine vaccination</li> <li>6. About new vaccines (pneumococcal/rotavirus vaccines)</li> <li>7. Other, specify -----</li> </ol> <p>99=No response 88=I don't know</p>	
Perceived benefit questions			
304	Do you believe that immunization can prevent all the childhood killer diseases	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
305	Do you think immunization is best for your children	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
306	Do you support immunization programme	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
307	Are all your children immunized	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
Knowledge questions			
308	Do you mention the benefit of vaccinating a child? (Multiple response possible)	<ol style="list-style-type: none"> <li>1. to prevent the disease</li> <li>2. For specific disease like (measles, pneumonia, diarrhea, tetanus, Tb, polio, pertussis, diphtheria, influenza, hepatitis )</li> </ol>	encircle

		3. for child health 4. other, specify----- 99=No response 88=I don't know	
209	What vaccine preventable diseases do you know? Multiple answer question	1. Measles 2. Diphtheria 3. Polio 4. Tetanus 5. Pertussis 6. Hepatitis b 7. Homophiles influenza b 8. Pneumonia 9. diarrhea 10. Tuberculosis 99=No response 88=I don't know	
310	Do you tell me the age at which the child begins vaccination?	1. <b>At birth</b> BCG , OPV zero 2. <b>At six week</b> DPT <sub>1</sub> ,OPV <sub>1</sub> ,PCV <sub>1</sub> Rota <sub>1</sub> 3. <b>At tenth week</b> DPT <sub>2</sub> ,OPV <sub>2</sub> ,PCV <sub>2</sub> Rota <sub>2</sub> 4. <b>At fourteenth week</b> DPT <sub>3</sub> ,OPV <sub>3</sub> ,PCV <sub>3</sub> 5. <b>At Nine month</b> ; Measles 1 6. <b>At 18 month</b> ;measles 2	
311	How many vaccination sessions needed child to be fully protected?	_____	
312	At what age the child should complete vaccination.	_____	

### Attitude related questions

Please tell me to what extent you personally agree with them using the scale from 1 to 5, where 1 that you fully agree with it and 5 means that you do not agree with any claim at all, <i>only Single answer per row</i>		Strongly Agree	Agree	uncertain	disagree	Strongly disagree	Don't know
309	Vaccine against VPD cause other diseases	1	2	3	4	5	99
310	Combination vaccines are only marketing trick , not effective	1	2	3	4	5	99
311	The vaccines given in this area has lower quality.	1	2	3	4	5	99
312	The quality check of the imported vaccines is not good enough	1	2	3	4	5	99

213	It is better to wait for the child to be older and to strengthen, and then Vaccinate it.	1	2	3	4	5	99
314	All VPD diseases are essentially Harmless	1	2	3	4	5	99
315	The diseases that are mandatory to vaccinate against are mild diseases.	1	2	3	4	5	99
316	There is no real danger of an outbreak of the vaccine preventable Diseases in Ginnir	1	2	3	4	5	99
317	Modern medicine can more easily cure diseases that can be prevented by the vaccine than it can cure unwanted consequence of vaccination	1	2	3	4	5	99
318	Too many vaccines are given to the children and this will lower my child's immunity	1	2	3	4	5	99
319	It is better for the child to overcome the disease and thus strengthen immunity, rather than being vaccinated	1	2	3	4	5	99
320	Only the first dose of vaccine is important, other doses (re-vaccination) are optional.	1	2	3	4	5	99

## Part 4 Reproductive health related

S.n	Questions	Responses	Code
401	Do you attend antenatal care during your last pregnancy	1) Yes 2) No	If no go to quest 403
402	If yes, how many times did you/she attend?	_____	
403	Where did the mother deliver her child?	1. Home 2. Relative/Neighbor 3. Health Post 4. Health Center/Hospital 5. Private or NGO Facility 6. 6.Otherspecify_____	
404	Did the mother of the child attended post natal care	1. Yes 2. No	
406	Did the mother start FP usage at 6week after delivery	1. Yes 2. No	
406	Parity status measured by the number of children	_____	

## Part 5 Health facility related

s.no	Questions	Responses	Code
501	Is there any nearby health facility that provides vaccination service?	1. Yes 2. no	If skip to 503
502	If yes to above question which health, facility is near to you?	1. health center 2. hospital 3. health post 4. private clinic	
503	What means of transportation do you usually use to come to this facility?	_____	
504	if the above answer is by any transportation means does it incur you any cost	1. Yes 2. No	
505	How long does it take you to reach nearby health facility in minutes?	_____	
506	Did the health worker give you	1. Yes	

	advice about vaccination?	2. No	
507	If yes to above question what were the area of advice?	<ol style="list-style-type: none"> <li>1. Importance of routine vaccination</li> <li>2. Importance of complete vaccination</li> <li>3. Age to finish routine vaccination</li> <li>4. Return for the next doses of the routine vaccination</li> <li>5. About new vaccines (pneumococcal/rotavirus vaccine)</li> <li>6. other, specify -----</li> </ol> <p>99=No response 88=I don't know</p>	
508	Was there long waiting time during last vaccination session?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
509	Does this health facility give vaccination program around this area(OUT RICH)	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	If no skip to 511
510	Does your child was vaccinated any type of vaccine during outreach in his schedule	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
511	Does the health workers trace children missed from schedule	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
511	Are you trained on integrated maternal and child health	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
512	Do you got the training on the topic of immunization	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	
513	Do you got training on part of child health	<ol style="list-style-type: none"> <li>1. ye s</li> <li>2. No</li> </ol>	

For qualitative part of the study

### **Part 1. Key Informant In-Depth Interview Guide Line**

Name of the interviewer \_\_\_\_\_

We are Master's Degree students from Jimma University. As part of our academic requirements, we are expected to conduct a research on public health problems. And we are going to conduct a study in Ginir district on the reason of non-vaccination and challenges in EPI program. Thus, this interview is prepared for this purpose to get appropriate information on the problems and related challenges in the woreda and selected kebele.

The information that we will obtain using this interview will be recorded and used only for research purpose and also, we need to assure you that confidentiality of your response will be kept. The study has no risk to you and your family members but has mild discomfort and time consuming. Therefore, we politely request your cooperation to participate in this interview. You do have the right not to respond at all or to stop in the meantime, but your input has great value for the success of our research question.

**Thank you for your cooperation!**

*In depth interview guide developed for EPI focal persons and health extension workers*

#### **Part I: General Information**

Position (responsibility) \_\_\_\_\_

Work experience in the area \_\_\_\_\_

#### **Part II: Socio-demographic information**

1. Age: \_\_\_\_\_

2. Sex: \_\_\_\_\_

3. Educational status and qualification \_\_\_\_\_

#### **Part III. EPI focal persons and health extension workers**

How your facility provides EPI service, static, out rich or both?

Do you provide vaccination services daily or provide scheduled service and why?

Do you provide information about vaccination and VPD to mothers?

Do you have followed up/tracing mechanism to address non or incomplete vaccinated child?



What are the challenges related to vaccination supply, cold chain, manpower, work days?

What are the problems raised by the community?

What solution do you suggest to overcome the problem from government and community side?

## **PART 2: focus group discussion**

### **FGD INTERVIEW GUIDE**

Thank you for your willingness. We are interested to explore the problem related to non and incomplete vaccination problem in your Kebele. This is important for identification of problems and appropriate intervention. We have a few socio-demographic questions before we start with the interview.

**Purpose:** The Major objective of the current FGD will be exploring reason of non and incomplete vaccination in Ginir district, Bale zone, Ethiopia. 2020

#### **Methods:**

##### ***Participants***

Written permission will be obtained from Ginir district

Purposive sampling will be used to select respondents.

Three FGD will be conducted

FGD group will consists: 4-10 participants

Principal investigator and two data collectors will lead the discussion; being 1 facilitator, 1 Recorder/reporter and 1 environmental harmonizer

#### **Procedures to Conduct FGD Setting**

Ground rules:

Assuring participant consent

Switch off/silent mobile if any

Privacy of participants ideas

Introducing time of discussion to be 2:00 – 5:00 minute only

The FGD will be conducted for 30min-3hrs

## 2. Individual Interaction:

Letting participants to know each other and with data collectors

Giving codes for participants

Provoking participants

## 3. Briefing the objective of the FGD

## 4. Discussion: conducting the discussion

## 5. Ending: assuring the participants to be free from any emotionality (if any)

### **Setting**

FGD sessions was takes only single day

FGD discussion was carried out at the Kebele Office.

The discussions was carried out with selected individual.

### ***Recruiting Participants***

Kebele leader was contacted to discuss regarding the FGD

The facilitator, reporter and Environmental Harmonizer was introduce themselves and establish conducive environment for the discussion.

The facilitator was introduce the purpose of the focus group discussion.

Participants was reminded that the reporter was take Audio and taking notes.

Confidentiality and anonymity was discussed.

Participants were assured that there was no right or wrong answers and no judgment on their views.

Participants were encouraged to speak up to ensure the clear idea, probed further

### **Materials Needed**

Letter of permission from Ginir district

Selection of places to conduct FGD

Note pad or white paper and pen: optional

Tea coffee ceremony

Recorder

## **FGD Guide**

The FGD guides wasl guide data collectors for quality of the discussion

### **Guiding Questions for FGD**

#### **Part 2 mothers and community members**

- How do you explain about incomplete/ non vaccination is kebele?
- Is there vaccine supply problem occurred?
- Not opening a 10-dose vial unless more children arrive, Vaccine stock outs
- Bad experiences with health post staff,
- Feelings of discrimination
- Demand side factors fear of side effect (injection, bad roomers)
- Hesitancy around vaccination
- Feel the health post distance is too far
- What is your attitude against vaccination?
- What do you suggest to improve vaccination of the child from community and government?