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SCHOOL OF NURSING

IMMUNIZATION DROPOUT RATE AND ITS ASSOCIATED FACTORS AMONG CHILDREN AGED 15 – 23 MONTHS OLD AT SHASHAMENE CITY ADMINISTRATION, OROMIA, ETHIOPIA, 2023: A MIXED METHODS STUDY.

GEZAHEGN TILAHUN HAILU (BSc.)

HAWASSA, ETHIOPIA

NOVEMBER, 2023

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GEZAHEGN TILAHUN HAILU (BSc.)

ADVISORS:

MR. SHEWANGIZAW MEKONNEN (MSc, BSc, RN – ASS. PROFESSOR)

MR. EZEDIN MOLLA (MSc, BSc – LECTURER).

A THESIS REPORT SUBMITTED TO HAWASSA UNIVERSITY COLLEGE OF MEDICINE AND HEALTH SCIENCES, SCHOOL OF NURSING, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN PEDIATRICS AND CHILD HEALTH NURSING

NOVEMBER, 2023

DECLARATION

I hereby declare that this MSc thesis report is my original work and has not been presented for a degree in any other University, and all sources of material used for this thesis paper have been duly acknowledged.

GEZAHEGN TILAHUN HAILU			robsanwako755@gmail.com
Name of Principal Investigator	Signature	Date	Email address

Place: Hawassa University College of Medicine and Health Sciences, School of Nursing

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MR. SHEWANGIZAW MEKONNEN (MSC, BSc, RN – Ass. Professor)		
Name of Major advisor	**Signature**	**Date**
MR. EZEDIN MOLLA (MSc, BSc – Lecturer)		
Name of Co-advisor	**Signature**	**Date**

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We, the undersigned, members of the Board of Examiners of the final open defense by **Gezahegn Tilahun** have read and evaluated his thesis entitled "IMMUNIZATION DROPOUT RATE AND ITS ASSOCIATED FACTORS AMONG CHILDREN AGED 15 – 23 MONTHS OLD AT SHASHAMENE CITY ADMINISTRATION, OROMIA, ETHIOPIA, 2023: A MIXED METHODS STUDY", and examined the candidate. This is, therefore, to certify that the thesis has been accepted in partial fulfillment of the requirements for the master's degree.

Mr. Shewangizaw Mekonnen (MSC, BSc, RN – Ass. Professor)		
Name of Major Advisor	**Signature**	**Date**
Mr. Aklile Tsega		
Name of Internal Examiner-I	**Signature**	**Date**
Mr. Ephrem Geja (Ass. Professor)		
Name of Internal Examiner-II	**Signature**	**Date**
Mr. Abebe Tamirat		
Name of External examiner	**Signature**	**Date**
SGS Approval	**Signature**	**Date**

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ANC	Antenatal Care
AOR	Adjusted Odds Ratio
BCG	Bacillus Chalmette-Guerin
CF	Conversion Factor
CI	Confidence Interval
DCs	Data Collectors
DHS 2	Demographic Health Survey 2
DPT_3	Diphtheria Pertussis and Tetanus dose three
FGDs	Focus Group Discussions
FMoH	Federal Ministry of Health
GAVI	Global Alliance for Vaccine and Immunization
HBD_0	Hepatitis vaccine Birth Dose
HHs	Households
IPV	Inactivated Polio Vaccine
IRB	Institutional Review Board
KIs	Key Informants
MCV_1	First routine dose of Measles Containing Vaccine.
MCV_2	Second routine dose of Measles Containing Vaccine.
OPV_0	Oral Polio Vaccine at birth
OPV_1	Oral Polio Vaccine first dose
OPV_2	Oral Polio Vaccine second dose

OPV_3	Oral Polio Vaccine third dose
PCV_1	Pneumococcal Conjugate Vaccine dose one
PCV_2	Pneumococcal Conjugate Vaccine dose two
PCV_3	Pneumococcal Conjugate Vaccine dose three
PHC	Primary Health Care
SGS	School of Graduate Studies
SMS	Short Message Service
UHEWs	Urban Health Extension Workers
UNICEF	United Nations International Children Emergency Fund
WHO	World Health Organization

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ABSTRACT

Introduction: Immunization – proven tool for controlling vaccine preventable diseases and save lives of millions of children. However, most children in developing countries are not fully immunized and dropout rate is high compared to national cut – off points. Despite the vast study by Ethiopians and other scholars on immunization dropout rate, little is known about vaccine dropout and reasons for it throughout all regions. There are also discrepancies in dropout rate in different studies. Therefore, the study aimed to identify immunization dropout rate and its associated factors among children age 15 – 23 month old in Shashamene City administration, Oromia, Ethiopia, 2023.

Methods and Materials: A mixed methods community– based cross sectional study design was employed from May19 – June 28/2023. The sample size was calculated using single population proportion formula and with Epi-Info 7 software. Accordingly, a total of 434 study subjects were recruited to the study after considering a 10% non – response rate and 2 design effect. Four focus group discussions and 12 In-depth interviews were conducted for the qualitative study sampled purposively. The data were collected and entered into Epi-Data Version 4.6 and exported and analyzed using SPSS Version 25. A variable with P value less than 0.25 were transferred to multivariate logistic regression model and a P value less than 0.05 considered significant. The qualitative data collected, transcribed, coded, and analyzed using open code software and triangulation made accordingly.

Results: The overall immunization dropout rate from completion in the current study setting was found to be **11.5%** (95% CI = 0.084 – 0.154). Factors like missed vaccination schedule (AOR = 2.42; 95% CI = 1.110 - 5.296), availability of seat (AOR = 0.03; 95% CI = 0.011 - 0.068)), possession of immunization card (AOR = 0.43; 95% CI = 0.192 – 0.939) and accessibility of facility (AOR = 0.16; 95% CI = 0.057 – 0.430) were significantly associated with immunization dropout rate. The qualitative finding showed that load on vaccinators, shortage of antigens, loss of immunization card, and socio – economic routines contributed to high immunization dropout rate.

Conclusion: The immunization dropout rate was higher compared with the national cut of point (< 5%) and WHO reference (< 10%). Staff workload, respondent's forgetfulness, antigen shortages, lack of reminder systems, unavailability of seats and immunization card possession are main reasons contributed for vaccination dropout.

Key Words: Immunization, Dropout rate, Children, Oromia, Ethiopia.

1. INTRODUCTION

1.1 Background

Immunization is a proven tool for controlling and even eradicating disease, especially vaccine preventable diseases (VPDs) (Pediatrics 2020) and save lives of millions of children every year (Plotkin, Robinson et al. 2017).The program provide opportunities to promote integrated services and improve the overall health of recipient (Ms Jhilmil Bahl 2015). Globally, vaccines has had major effect on mortality reduction and have the power not only to save, but also to transform, lives – giving children a chance to grow up healthy, go to school, and improve their life prospects. Moreover, immunizations are among the most successful and cost-effective health interventions ever devised. They have reduced child deaths and disease prevalence radically. Immunization have enabled the eradication of smallpox, lowered the global incidence of polio by more than 99% and neonatal tetanus by 94% (Olivier Asselin 2016), and achieved dramatic reductions in illness, disability and death from measles, diphtheria, pertussis, hepatitis B, rotavirus, yellow fever and invasive bacterial causes of pneumonia and meningitis. They are predicted to continue to have an enormous impact on public health (Olivier Asselin 2016).

The current Ethiopian routine immunization schedule recommend 1 dose of BCG, OPV_0, HBDo birth dose, 3 doses of OPV, 3 doses of pentavalent vaccine (5 in 1), 3 doses of PCV, 1 dose of IPV (at 14^{th} weeks), 2 doses of Rota vaccine, and 2 doses of measles vaccine, making a total of 11 antigens after the introduction of Inactivated Polio Vaccine (IPV) and measles second dose(Addis Ababa 2015).

Immunization dropout rate compares the number of children who completed the immunization schedule for a selected vaccine to the total number who failed to finish the course. The cut –off point for immunization dropout rate as of WHO is 10% which is 5% in Ethiopian context (FMoH 2015, Ms Jhilmil Bahl 2015). A dropout rate of 5% or more indicates that the particular health facility has a utilization problem i.e. many people are not using the services in offer (Hailu, Fisseha et al. 2022).

Immunization coverage across Africa has greatly increased over the past decades, with corresponding reductions in disease mortality and morbidity. But, coverage rates in many

countries across the continent are far from national target and dropouts higher than the national cut – off point (de Figueiredo and Were 2019).

The Routine Immunization Programme in Ethiopia has shown progressive expansion since its inception in 1980. However, Expanded Program on Immunization (EPI) coverage stagnated between 83 – 86% for three successive years after 2010 with the key challenge – persistent low routine immunization coverage in pastoralist regions (WHO-Ethiopia 2015). In Ethiopia, an estimated 1.8 million children are missing out on life saving vaccines due to several factors, including conflict – related access constraints (UNICEF 2021).

Common reasons for vaccination dropout rate include too far place of immunization, long waiting time, child illness, being female child, fear of side effects, lack of awareness, provider being busy, unwelcoming attitude of vaccinators, and poor ANC follow up of mothers (Abebe, Wudu Kassaw et al. 2019, Ateudjieu, Yakum et al. 2020, Gawade, Gore et al. 2020).

1.2 Statement of the problem

Immunization program is for the control of vaccine preventable diseases among children and people of all ages that is most successful and cost effective public heath intervention available today in the world. However, most children in developing countries are not fully immunized. This may be due to utilization problem and disparity in the access of the lifesaving EPI vaccines to children in the world. Reaching most children in developing countries still remains as a challenge and there are more than three million vaccine preventable child deaths each year in the world today (FMoH 2015, Olivier Asselin 2016, Kenya 2018).

On top of these, countries in WHO Africa Region experience multiple public health emergencies (armed conflict, disasters and disease outbreaks) that trapped them from achieving the target for greater or equal to 90 % immunization coverage and dropout rate less than 10 % cut – off point (Chepkurui, Amponsah-Dacosta et al. 2021). According to WHO and UNICEF estimates, 22% (4.3 million) unvaccinated children globally are located in four countries of African Region including Ethiopia. In Ethiopia, vaccine preventable diseases are contributing substantially to under –five mortality even though there is encouraging progress in the EPI coverage after many years of stagnation with high dropout rates in contrast to objective of reaching 90% national and

80% in every district coverage as well as reducing penta$_1$ to $_3$ dropout rate to 2% nationally and less than 5% in all districts by 2020 (Meseret Zelalem 2021).

Mini EDHS Ethiopia 2019 revealed that data on vaccination coverage among children age 12-23 months who received specific vaccines at any time before the survey showed that only 4 out of 10 children (44%) have received all basic vaccinations at some time, and 40% received these vaccinations before their first birthday. Fifty-nine percent of children in this age group received a measles vaccination (MCV_1), and 19% received no vaccinations. Coverage rates decline for subsequent doses of these vaccines, with 61% of children age 12-23 months receiving the recommended three doses of DPT-HepB-Hib vaccine and 60% receiving all three doses of the polio vaccine. There is a 15 percentage-point dropout rate within this age group from the first to the third dose of the DPT-HepB-Hib vaccine and an 18 percentage-point dropout rate from the first to the third dose of the polio vaccine. Only 9 percent of children age 24-35 months received the second dose of the measles vaccine (EDHS 2021).

The Reaching Every District (RED) approach has been implemented in Ethiopia since 2004 in districts with poor immunization coverage and high dropout rates (Meseret Zelalem 2021). As a result, the coverage showed marked improvement. DPT_3 coverage increased from 52% in 2003 to 87% in 2014 (Office 2015). The variation in coverage among regions, however, is large. Now, the Reaching every district strategic approach is recast to Reaching Every Children/Community (REC) strategic approach in order to deal with inequities within districts. Democratization and decentralization of the health service has brought an opportunity for the EPI programme as the implementing bodies (woredas) are becoming more capable both administratively and economically to play a role in resource mobilization and allocation for immunization programmes in their respective areas. However, contributions for purchase of vaccines and injection materials by the regions and woredas have yet to be started which will help in combating high immunization dropout rate (Federal Ministry of Health 2015).

In Ethiopia, a multicultural and highly diversified country, many studies were conducted on childhood immunization regarding coverage, incomplete immunization, and complete immunization as well as defaulting from immunization and factors associated with these in general. However, studies on immunization dropout rates are inadequate throughout all regions and in Oromia in particular and in the current study area. Most studies showed that immunization

dropout rates are potential quality indicators but not sufficiently studied. There was inadequacy in study of dropout rates between $Rota_1$ to $Rota_2$ (Derso, Kebede et al. 2020), PCV_1 – PCV_3, OPV_1 to OPV_3, and even other vaccine types in a specified study area. Especially, BCG, OPV_1, PCV_1, $Penta_1$ and MCV_1 to MCV_2 dropout rates were not researched due to recent introduction of measles second dose as part of routine immunization since its launch on Feb, 2019 at Wolenchety Health Center, Bosete Woreda of Oromia Region (WHO 2018, Tessema, Kidanne et al. 2019, Zida-Compaore, Ekouevi et al. 2019).

Therefore; this study aimed to assess immunization dropout rates and associated factors in vaccine series among children aged 15 – 23 months old at Shashamene city administration, Oromia, Ethiopia, using mixed methods study.

1.3 **Significance of the study**

The result of this research is anticipated to give information regarding immunization dropout rate and associated factors in the study area since dropout rate is one of the markers of immunization service utilization, program continuity, and accessibility and availability of service. The findings of this study will be utilized to inform program managers working on vaccination services at various levels (kebele, health center, District, zonal, and regional) as to why children who began immunization services have not had full immunization for all vaccines.

The results of this study also offer significant insights for decision-makers to consider when developing future intervention strategies to lower dropout rates and boost vaccination service uptake, which will ultimately lead to higher vaccination coverage. Other researchers will also refer to the findings of this study and helpful for educational purpose.

2. LITERATURE REVIEW

2.1 **Immunization Dropout Rate**

Immunization dropout rate is the percentage of children who started receiving immunizations but never received all doses in the series, which will help discover potential coverage problem (Ms Jhilmil Bahl 2015). Dropout rate is a simple, effective way to monitor immunization service progress which compares the number of children who completed the immunization schedule for a selected vaccine to the total number who failed to finish the course. Whereas number of dropouts is the gap between cumulative total for first dose and cumulative total for last dose in the vaccination series. According to Federal Ministry of Health – Ethiopia immunization in practice training manual, dropout rate less than 5% reflects that there is good quality of utilization and greater or equal to 5% is poor quality of immunization utilization that regions with high base line dropout rate can use the 10% cut-off as of WHO recommendation (Addis Ababa 2015, Ms Jhilmil Bahl 2015).

In addition to protection against a range of diseases, vaccines also have social and economic benefits. However, for vaccines to be effective, routine immunization programmes must be undertaken regularly to ensure individual and community protection. Nonetheless, in many countries in Africa, vaccination coverage is low because governments struggle to deliver vaccines to the most remote areas, thus contributing to constant outbreaks of various vaccine-preventable diseases and increment in vaccination dropout (Songane 2018). Immunization coverage across Africa has greatly increased over the past decades, with corresponding reductions in disease mortality and morbidity. But, coverage rates in many countries across the continent are far from national target and dropouts higher than the national cut – off point. This incomplete coverage across Africa is still a major contributor to child mortality and morbidity (de Figueiredo and Were 2019).

The finding of a descriptive cross sectional study done in a West Cameron health district showed that the specific pentavalent$_{1-3}$ and the general BCG versus measles dropout rates were 14.1 and 50.0% respectively which were also much higher than the cut –off point (Ateudjieu, Yakum et al. 2020). According to a study done in Ghana on immunization dropout rate and data quality among children 12 – 23 months of age, routine administrative data was characterized by some

discrepancies like greater than 100% immunization coverage for each vaccines and high dropout rate (BCG – Measles = 31.5%) (Baguune, Ndago et al. 2017).

Of 23 countries that have not introduced MCV2 and which do not meet the pre-2016 introduction criteria, 20 are in Africa, and 19 are in the African region of WHO Both Ethiopia and Nigeria are among those with large populations of unvaccinated children, and are now Global Alliance for Vaccine and Immunization (GAVI) eligible for MCV2 introduction.

According to UNICEF Annual report of 2021, an estimated 1.8 million children in Ethiopia miss out on life saving vaccines (UNICEF 2021). As of Federal Ministry of Health – Ethiopia Health and Health related indicators, the national pentavalent1 to measles vaccination dropout rate was 11% which was high compared to the standard (EMoH 2020/21). According to EDHS 2016, there was a 20% dropout rate at the national level from $pentavalent_1$ to $pentavalent_3$ and 25% from OPV1 to OPV3. The proportion of children age 12 – 23 months with no vaccination was 16% by 2016 (CSA 2017). Mini EDHS 2019 showed that there was a 15% dropout rate with in the age group of 12 to 23 months from $pentavalent_1$ to $_3$ and an 18%dropout rate from the first to third dose of the polio vaccine. Only 9% of children aged 24 – 35 months received the second dose of measles vaccine (MCV_2) (EPHI 2021). As of a mixed methods study conducted in India, the immunization coverage was suboptimal with highly likely of having high dropout rate (Francis, Nuorti et al. 2021).

According to a cross sectional study using the modified WHO EPI cluster survey method conducted in pastoral and semi – pastoral regions in Ethiopia, BCG to Measles and $pentavalent_1$ to measles dropout rates were 10.1 and 14.1 percent respectively (Tessema, Kidanne et al. 2019). Moreover, BCG to measles vaccine dropout rate was 9.3% as of community based cross sectional study conducted in Shewa Robit Town, North Shewa Zone, Amhara Region, Ethiopia (Yehualashet, Nigussie et al. 2019). Some local factors of dropout rate are related with service delivery like infrequent sessions, missed opportunity, vaccine shortage, improper contraindication and community related factors like not being informed the immunization date, no active follow up of defaulter, session time conflict with family duties(BEYENE 2016).

The most populous country in the Horn of Africa, Ethiopia has seen slow increments in MCV_1 coverage, though the most recent WHO/UNICEF estimates are still short of 80 percent. The

country has a thin peripheral PHC infrastructure, strengthened by the recent deployment of thousands of female health extension workers (HEWs). Now introduced MCV_2 being eligible since 2019 that MCV_1 to MCV_2 dropout rate should be given emphasis (Biellik and Davis 2017). As of mixed community based cross sectional study done in Woldia Town, Northeast Ethiopia, the dropout rate was 9% for BCG to measles and 8.3% for $penta_1$ to measles which were higher than the national cut – off point 5% (Abebe, Wudu Kassaw et al. 2019).

In Ethiopia, the national $penta_1$ to $_3$ dropout rate was 8%. Oromia is highly populated and is in a better position in terms of human resources and health infrastructure. Yet; there are pockets of inaccessible areas in this region with high number of unvaccinated children and repeated vaccine preventable disease outbreaks such as measles indicating poor utilization and high dropout rates that needs to be addressed (MoH-Ethiopia 2021).

Community based cross sectional survey conducted in hard to reach pastoral and semi pastoral areas in Ethiopia revealed a dropout rate of 14.1% (Tessema, Kidanne et al. 2019). A similar study in Shewa Robit town, North Shewa Zone, Amhara Region, Ethiopia vaccine dropout rate was 9.3% (Yehualashet, Nigussie et al. 2019)which was almost similar with survey done in India with 9% dropout rate (Singh, Mishra et al. 2019). As of community based cross sectional study conducted in Anlemo District, Hadiya Zone, Southern Ethiopia, measles dropout rate was 24.1% which is high, Migori country, Kenya cross sectional review vaccine dropout rate 9.86% (Shikuku, Muganda et al. 2019)and a study of Eastern Ethiopia showed that the dropout rate between the first and third pentavalent vaccine was 17% (BEYENE 2016, Muluye, Oljira et al. 2022). Different articles contributed that the dropout rate remains higher than the WHO and National cut off point.

2.2 **Factors associated with immunization dropout rate**

2.2.1 Socio demographic related factors

A household survey conducted in Democratic Republic of the Congo among children aged 12 – 23 months revealed that residing in rural areas was associated with high vaccination dropout (AOR = 1.87; 95% CI = 1.12-3.14). A cross sectional study conducted in Kwanza division, Trans-nzoia district, Kenya revealed that age of respondent, marital status, level of education, employment status, and monthly income were significant factors associated with immunization

dropout (BRAMUEL 2016). In regards to place of residence, a descriptive cross sectional study done in North Central of Nigeria, the immunization coverage and dropout rate in urban community was better than that of the rural community (Adenike, Adejumoke et al. 2017). As of surveys conducted in five areas in Africa and including India, level of education, marital status, occupation of the respondent, place of residence, age of the care giver, distance from vaccination site, child sickness, sex of the child and economic status of the respondents were the predominant determinant factors for vaccine dropout rates (Phoummalaysith, Yamamoto et al. 2018, Tesfaye, Temesgen et al. 2018, Tessema, Kidanne et al. 2019, Yehualashet, Nigussie et al. 2019, Zida-Compaore, Ekouevi et al. 2019, Tegegne, Gidafie et al. 2021).

2.2.2 Child related factors

A study carried out among randomly selected mothers/caregivers of children aged 12–23 months discussed that being female child [AOR = 0.73, 95% CI: 0.52–0.95], and 18–20 month child [AOR = 1.6, 95% CI: 1.1- 2.4], were predictors of immunization dropout rate (Muluye, Oljira et al. 2022). Child sickness, child's immunization status and unavailability of the child on day of vaccination (BEYENE 2016, Adenike, Adejumoke et al. 2017, Singh, Mishra et al. 2019) were also significant factors to dropout rate.

2.2.3 Maternal/caregiver related factors

Community based cross sectional survey done in Hadiya Zone showed that measles vaccination dropout was 4.5 times more likely among mothers who did not follow ANC visit compared to their counterpart (AOR= 4.50; 95% CI: 2.1 – 9.8). In line with this study, other studies also revealed similar finding related to care giver factors (Ali 2018, Yehualashet, Nigussie et al. 2019, Muluye, Oljira et al. 2022). Fear of COVID – 19, lack of awareness about the health benefits of vaccination, mother's TT vaccination status and possession of immunization cards were other factors associated with the dropout rate (Baguune, Ndago et al. 2017, Tesfaye, Temesgen et al. 2018, Chanie, Ewunetie et al. 2021, Yezengaw and Ahmed 2022)

2.2.4 Service provider related factors

Clinicians or vaccinators being busy, behave unethical and unwelcoming were among factors to mention related to dropout of immunization (Butt, Mohammed et al. 2020).

2.2.5 Health care system and accessibility related factors

According to a study done in Nigeria using a mixed method study design, immunization utilization was influenced by interlinked community and health service issues (Akwataghibe, Ogunsola et al. 2019). Unavailability of seats (AOR = 7.30; 95% CI = 1.30-40.87) and non-compliance with the order of arrival (AOR = 3.42; 95% CI = 1.36-8.61) during vaccination in health facilities, and lack of a reminder system on days before the scheduled vaccination (AOR = 2.04; 95% CI = 1.28-3.24) were perceived significantly associated with high dropout rate (Kayembe-Ntumba, Vangola et al. 2022). Time to reach health facility, waiting time at health facility, structural and organizational aspects of health care systems and place of delivery were among the associated factors to immunization dropout rate (BEYENE 2016, Arat, Burström et al. 2019, Yehualashet, Nigussie et al. 2019, Tegegne, Gidafie et al. 2021). A community based cross- sectional study conducted in Debre Berhan Town, Ethiopia showed that distance from vaccination site (AOR = 4.67; 95% CI: 1.498 – 14.547) was associated factor for higher dropout rate and unsuccessful vaccination (Desalegn, Shiferaw et al. 2019).

Conceptual Framework

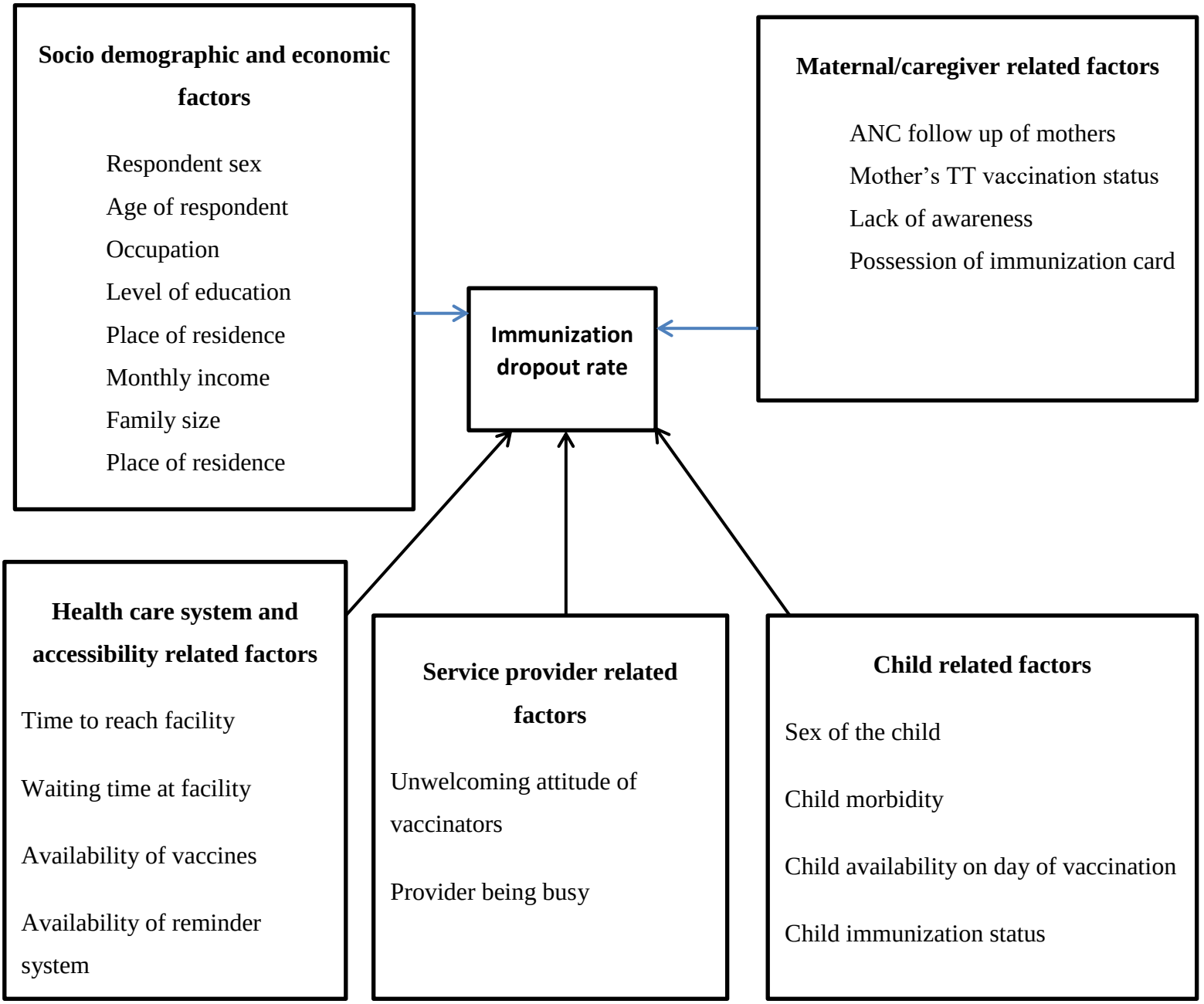

Figure 1: *Conceptual Framework of the study developed after reviewing different related literature, 2023 (Baguune, Ndago et al. 2017, Ali 2018, Abebe, Wudu Kassaw et al. 2019, Zida-Compaore, Ekouevi et al. 2019, Kassaw, Mariam et al. 2021, Kayembe-Ntumba, Vangola et al. 2022).*

3. OBJECTIVES

3.1 General Objective

To elicit immunization dropout rate and its associated factors among children aged 15 – 23 months old in Shashamene city administration, Oromia, Ethiopia, 2023.

3.2 Specific Objectives

- To determine immunization dropout rate among children aged 15 – 23 months old at Shashamene city, Oromia, May 19 – June 28, 2023.
- To identify factors affecting immunization dropout rate among children aged 15 – 23 months old at Shashamene city, Oromia, May 19 – June 28, 2023.

4. METHODS AND MATERIALS

4.1 **Study area and Study period**

The study was conducted at Shashamene city administration. Shashamene, a city with a variety of ethnic groups, was established in the second decade of the 20th century. It is situated in the West Arsi Zone of the Oromia National Regional State, about 250 kilometers south of Ethiopia's capital Addis Ababa. Geographically, the town is located between 70 11'09"N - 70 13'19" N latitude and 380 35'02"E - 380 37'05"E. It is found almost at the center of the zone.

The city is economically important and expanding quite rapidly compared to other towns of the region. This is perhaps due to its location as a crossroad and a junction point for most towns located in the southern part of the country. It serves as an international highway route connecting Ethiopia with Kenya. The town also lies within the Ethiopian Rift Valley and is close to the lakes – Langano and the Shala-Abiyata Park. The city was restructured with an independent authority from the rural Woreda by year 2003 and since then it has being governed by a town mayor. Currently, the city has seventeen (8 urban and 9 rural) kebeles. According to 2007 national census report, a total population for this town was 100, 454, of whom 50, 654 were men and 49, 800 were women. It had an estimated 208, 368 inhabitants in mid-2022 (Robinson 2016). As of Shashamene city report, currently, total population of Shashamene city estimated to be 394, 412 with population of children aged 15 – 23 months eligible for MCV2 about 12, 065.

There are two public hospitals, six public and one private health centers, eight urban health posts (providing posts outreach immunization services only) and nine rural health posts (offering both static and outreach EPI services) rendering immunization services in the city administration for estimated population of about 22, 521 by using CF = 5.71%,. The data was collected from May 19 – June 28, 2023.

4.2 **Study design**

This study utilized a Mixed-Methods Community Based Cross – Sectional Study design which involved the collection and analysis of both quantitative and qualitative data.

4.2.1 Quantitative component:

4.2.1.1 Population

Source population

The source population were all HHs having children aged 15-23 months old living in Shashamene city.

Study population

Study populations were HHs having children aged 15–23 months old in Shashamene city of randomly selected kebeles during data collection period.

4.2.1.2 Inclusion and exclusion criteria

Inclusion criteria

Households having children aged 15-23 months old living in Shashamene city for at least six months prior to the day of the study period were included.

Exclusion criteria

Those children – care giver pairs who are not mentally able and seriously ill to give consent during data collection were excluded.

4.2.1.3 Sampling

Sample size determination

The sample size for quantitative design was calculated using single population proportion formula, the following assumptions were taken. Assumptions: A 95% confidence level, margin of error 4% considering design effect 2 and the proportion of immunization dropout rate for all source was (9%) in a study conducted in Woldia Town, Northeast Ethiopia, 2018 (Abebe, Wudu Kassaw et al. 2019).

$$\mathbf{n= (Z\alpha/2)^2\ p\ (1\text{-}p)/d^2}$$

$$n = (1.96)^2\ 0.09(1\text{-}0.09)/\ (0.04)^2$$

$$n = 3.8416 * 0.0819/0.0016 = 196.6 \sim (197+10\%)\ \text{deff.}$$

$$n = (197+20) * 2 = \mathbf{434}$$

Where,

P = proportion of children who dropout immunization in a study conducted in Woldia Town, Northeast Ethiopia for BCG – measles was (9%) (Abebe, Wudu Kassaw et al. 2019)

d = margin of error=0.04

Z α/2 = confidence level required and Zα/2at 95% CI = 1.96

Deff = design effect is taken as 2

Adding 10% non- response rate and multiplying by design effect, the total sample size for objective one was determined to be **434**.

Sample size for objective two using Epi-Info 7 was calculated as follows: (Table 1)

Table 1: *Determined sample size for objective two of study on immunization dropout rate and its associated factors among children aged 15 -23 months in Shashamene city, Oromia, Ethiopia, 2023.*

S. No	Predictor variables	Power	Ratio of exposed to unexposed	% outcome in unexpected group	AOR	Total Sample Size	References
1.	Place of residence (rural vs. urban)	80	1	58.3	1.87	388	(Kayembe-Ntumba, Vangola et al. 2022)
2.	TT Vaccine received	80	1	64.8	2.35	252	(Chanie, Ewunetie et al. 2021)
3.	Ever receive advice from health workers	80	1	68.5	3.9	136	(Gebeyaw 2020)
4.	Place of delivery (home)	80	1	55.2	6.46	66	(Kassaw, Mariam et

							al. 2021)
5.	Waiting time, > 30 minutes	80	1	62.2	3.5	130	(Kassaw, Mariam et al. 2021)

No sample size determined for objective two is larger than sample size calculated for objective one. So, the final total sample size was determined to be **434** for the quantitative study.

Sampling technique

There are seventeen (17) kebeles in Shashamene city administration (8 urban and 9 rural kebeles). A multi-stage sampling technique was applied and sampling was done at kebele and HH levels. In the first stage, 6 (3 urban and 3 rural kebeles) out of 17 kebeles were selected by simple random sampling. Sampling frame of children aged 15 to 23 months in the selected kebeles was identified based on the enumeration of HHs done by woreda health office in collaboration with NGO (for office purpose) prior to data collection period. Then, households with children 15 to 23 months age were selected using systematic random sampling technique. The first HH was taken from the center of the selected kebele and collection of data from sampled study units took place every 8 HHs. Proportional sample allocation was done for each kebele (**Figure 2**).

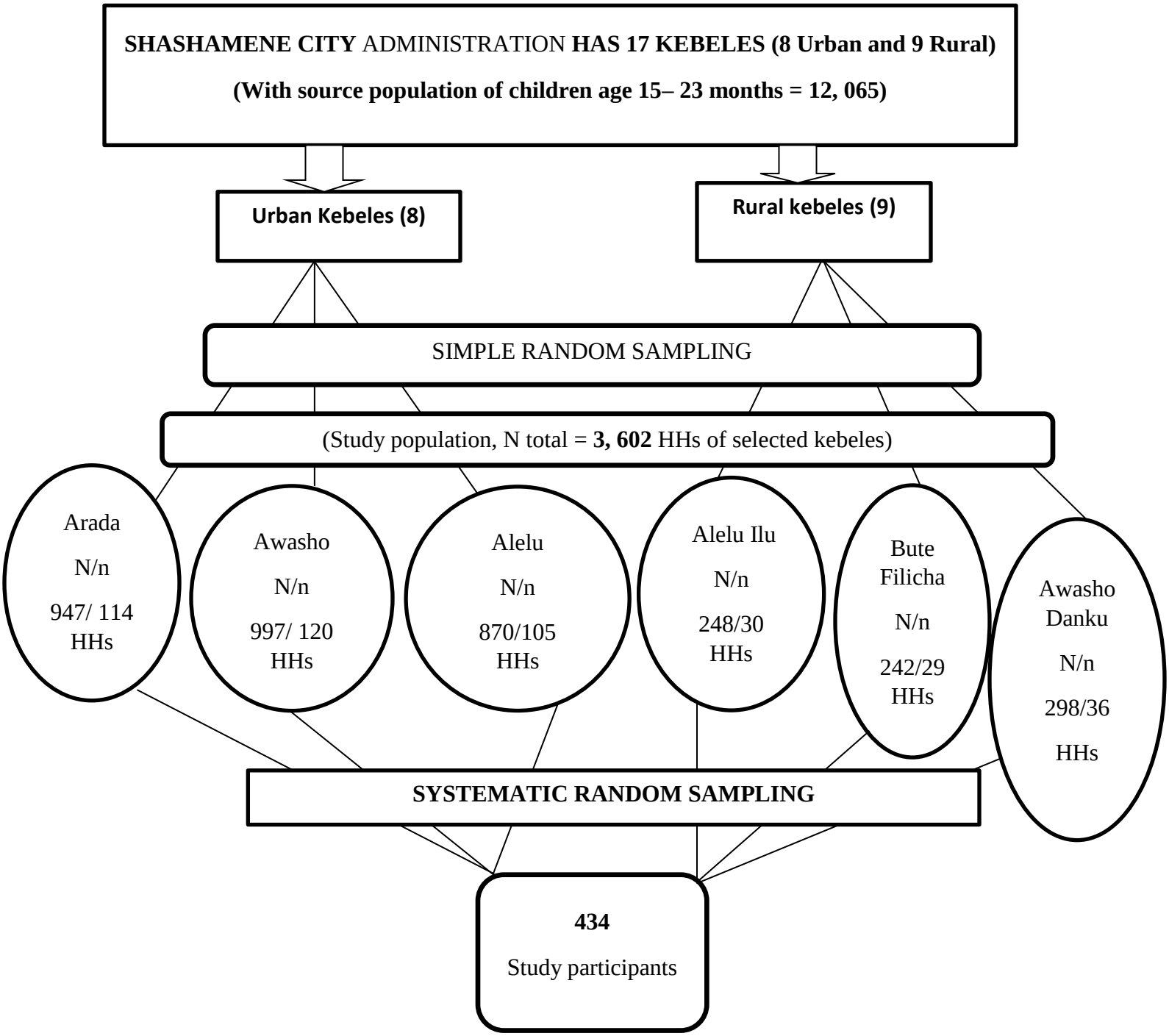

Figure 2: Sampling procedure for selecting study samples in Shashamene city administration, 2023.

4.2.1.4 Variables

- ***Dependent variable***

Immunization dropout rate.

- ***Independent variables***

Independent variables include socio demographic and economic factors like respondent sex, age of respondent, occupation, level of education, place of residence, monthly income, and family size; care giver/ mother's related factors like ANC follow up of mothers, mother's TT vaccination status, lack of awareness, possession of immunization card; child related factors like sex of the child, child morbidity, child availability on day of vaccination, child immunization status; service provider related factors like unwelcoming attitude of vaccinators, provider being busy; and accessibility related factors like time to reach facility, waiting time at facility and availability of vaccines.

4.2.1.5 Data collection and analysis

- ***Data collection instruments and procedures***

The data were collected through face to face interview using structured questionnaire adapted from previous literature (Kassaw, Mariam et al. 2021) and by reviewing the child vaccination card. The questionnaires contain five sections including socio – demographic and economic characteristics, child related factors, maternal health care utilization related factors, accessibility and facility related factors, and service provider clinician related factors. Four Diploma Nurses as data collectors and two BSc health professional supervisors were recruited based on a set of criteria, which includes knowing the local language, Afan Oromo, understanding of Amharic language as an option and previous data collection experience. During data collection in case if the house get closed /locked, revisiting was planned for three times and then if remain locked, next house was interviewed. The first household was selected randomly from the center of kebeles and the next every K value which is 8 HHs which was calculated from the total study population of each randomly selected kebeles until the desired samples were obtained for each kebele.

Within each household to be selected, only one mother/ caregiver with index child age between 15 – 23 months was selected for interview and in case of twins, one child will be selected by

lottery method and if more than 1 child eligible for data collection available the youngest child was considered. Mothers/caregivers were asked to show vaccination or immunization card of the study subjects and if no vaccination card, different questions were raised for mothers recall to know the immunization status of the child for each specific vaccines and vaccination histories including observation of BCG scar.

Data quality control measures

The questionnaire was prepared in English and translated from English to local language Afan Oromo and Amharic and then re-translated back to English by a linguist (noted expert) to check its consistency. The interview was conducted in Afan Oromo and or Amharic where applicable. Data Collectors were trained/oriented for one day by the investigator on the purpose of the study, data collection tools or instruments, how to take consent, how to select children from households, how to interview and extract information from vaccination card and the overall data collection procedures. Supervisors were also engaged in the training session.

Questionnaire was checked on daily basis for completeness during data collection and data were cleaned and coded before data entry. Data analysis was started by sorting and performing quality control checkup on field. Data were checked in the field by field team including the principal investigator to ensure that all the information were properly collected and recorded by maintaining proper communication, both within the team, as well as with the respondents. Before and during data processing, the information was checked for completeness. Before the actual data collection, the questionnaire was pretested on 5% of the total sample size at Negele Arsi town and amendments were made accordingly. The values of cronbach's alpha ranged between 0.73 and 0.87 for all sections of the tools that fulfilled reliability model assumptions. To ensure the free participation of men and women, participants were separated according to gender and age. Diversity was aimed and different stakeholders were interviewed in the various categories.

Quantitative data analysis:

Data were checked for inconsistencies, then data processing master sheet or template was prepared and the data were entered, categorized, coded, and summarized using Epi-data version 4.6 and exported to SPSS Version 25 for further analysis. Frequency and proportion were computed for description of study population in relation to socio demographic and other relevant

variables. Both bivariate and multivariate logistic regression analysis were done to see the association of each categories of each variable with the outcome variable. Variables that have p-value < (0.25) from binary logistic regression were analyzed in multivariate logistic regression. Hosmer and Lemeshow goodness of fit test was done to predict the outcome variable. Multicollinearity was done and VIF obtained closer to 1 which indicated that there was no assumption problem. Finally, statistical significance was disclosed at P – value < 0.05 with 95% confidence level to identify factors associated with immunization dropout rate. The results were presented in the form of tables, figures, summary statistics and text forms.

4.3 **Qualitative component:**

Focus Group Discussions (FGDs) and in-depth interviews were carried out. Focus Group Discussions (FGDs) took place with community members. Participants were separated according to gender and age – women of child – bearing age and older women (above 35 years); young men and older men.

For the FGDs, purposive sampling was employed. A total of 4 FGDs having 6 – 8 members for each were held with community men and women (n = 27). Adults who were care givers or involved in the immunization decision making relating to a child (or grandchild) were included in the discussions. Participants were recruited with the help of Urban Health Extension Workers (UHEWs). To ensure the free participation of men and women, participants were separated according to gender and age – young women of child – bearing and older women; young men and older men. Investigator ensured a blend of socio – economic groups during the sampling of participants and the FGDs were conducted until saturation of information achieved. Twelve in-depth interviews were carried out with frontline health workers, local government implementers, and UHEWs sampled purposively. The FGDs and in-depth interviews were used to explore the reasons for immunization dropout and the factors that contribute to it.

4.3.1 Qualitative data analysis:

FGDs and SSIs were audio-taped and transcribed. Data were analyzed using the word and excel sheet. An inductive approach and open thematic coding was used. Transcripts were read and coded using common themes and sub – themes according to the conceptual framework. A few

transcripts were coded to ratify the codes and themes/subthemes were identified. Analysis was conducted iteratively using a three – pronged approach: "noticing, collecting, and thinking".

4.3.2 Triangulation

Triangulation of data were carried out using quantitative and different qualitative methods to ask the same questions, and asking different types of respondents the same questions. This enabled the investigator to identify areas of agreement and disagreement between and within groups of respondents. Comparing and contrasting answers between different respondent groups were made. Weights in the qualitative analysis using the frequency of respondents' perceptions and agreements between different interviews and respondents were assigned.

4.4 Operational definitions

Immunization dropout – children who received initial vaccine (BCG) but not received last vaccine in vaccination series (MCV_2) (Kayembe-Ntumba, Vangola et al. 2022).

BCG to MCV_2 dropout rate: the percent of children vaccinated for BCG who does not receive MCV_2.

BCG - MCV_2 dropout rate, over all dropout rate: $(BCG - MCV2/\ BCG) * 100\%$ (Kassaw, A., et al. (2021).

High dropout rate– BCG – MCV_2, $Penta_1$ – $Penta_3$, and $Penta_1$ – MCV_2 dropout rate greater than or equal to 5% (FMoH 2015).

Low dropout rate – BCG – MCV_2, $Penta_1$ – $Penta_3$, and $Penta_1$ – MCV_2 dropout rate less than 5% (Addis Ababa 2015).

Fully vaccinated – a child who received all the vaccines in the routine immunization schedule before first year birth date (up to MCV_1) and up to MCV_2 within 15 – 18 months of age.(Addis Ababa 2015).

Completely vaccinated – a child taken all antigens with in age under 2 years of life.(Addis Ababa 2015).

Incompletely vaccinated – a child who missed at least one vaccine dose in the vaccination series.(Ms Jhilmil Bahl 2015).

Unvaccinated – a child who did not take any one of antigens at all.(Ms Jhilmil Bahl 2015).

4.5 **Ethical consideration**

Ethical clearance was obtained from the Institutional Review Board (IRB) of Hawassa University College of Medicine and Health Sciences to obtain formal letter. To conduct this research, written official letter of cooperation from Hawassa University College of Medicine and Health Sciences School of Nursing was given to Oromia Regional Health Bureau and then the Regional Health Bureau wrote letter of support to Shashamene City Administration Health Office to access the study subjects having support letter to each selected kebeles. Informed voluntary verbal consent was obtained from each child – care giver pairs after explaining the objective of the study. Information revealing identification of study participants, especially their name, was not collected to maintain confidentiality.

4.6 **Result Dissemination plan**

The findings of this study will be presented and submitted to Hawassa University College of Medicine and Health Sciences, School of Nursing. A copy of the result of the study will be submitted to Shashamene City Administration Health Office and will also be communicated to other concerned organizations. The result of the study will be published on reputable international journal.

5. RESULTS

5.1 Quantitative Results

5.1.1 Socio-demographic Characteristics of Study Participants:

Overall, 434 children aged 15 – 23 months old with their mothers/care givers were recruited for the study. Nearly half of the children, 227(52.3%) were female while 207(47.7%) were male. About half, 223(51.4%) of the children were in the age range 19 – 23 months and the remaining 48.6% were between the age of 15 – 18 months. Three hundred thirty two, (76.5%) of the respondents reside in urban kebeles while 102(23.5%) of the study participants were living in rural kebeles of the city. Almost all, 96.3% of the respondents were married and mothers (95.6%) were the primary care givers of the children. Seventy (16.1%) of mothers were College /University graduates. More than half, 54.8% of mothers were house wife while only 17.3% of them were salary workers being government employee (**Table 2**).

Immunization status among children: More than eight out of ten children (82.5%) were completely vaccinated and 5.3% of them received no vaccine (**Figure 3**). With vaccine specific coverage of 82.3% for BCG; 74% for OPV_3; 74.2% for $Penta_3$; 71.7% for PCV_3; 77% for $Rotarix_2$ and 72.8% for MCV_2.

Mother /care giver related factors affecting immunization dropout

Among respondents, 382(88%) had followed ANC during pregnancy of index child with 86.2% TT vaccination history. There were 64(14.7%) mothers who gave birth at home. Majority of participants, 77.2%, did not visit facility for post natal care during their last baby delivery and about 27% of them missed vaccination schedule at P-Value = 0.000 (**Table 4**).

***Table 2**: Socio – demographic characteristics of mothers/care givers of study participants in Shashamene city administration, 2023, (n =434).*

Variable	Number	Percentage (%)
Sex of the child		
Male	207	47.7
Female	227	52.3
Age of the child		
15-18 months	211	48.6
19-23 months	223	51.4
Child birth order		
$\leq$ 2nd	144	33.2
$\geq 3^{rd}$	290	66.8
Number of children		
≤ 3	244	56.2
≥ 4	190	43.8
Family size		
< 5	245	56.5
5 – 10	175	40.3
> 10	14	3.2
Urban Kebele	332	76.5
Rural Kebele	102	23.5
Age of the mother		
< 20 years	27	6.2
20 – 29 years	238	54.8
30 – 39 years	153	35.3
$\geq$ 40 years	16	3.7
Marital status of mother		
Married	418	96.3

Divorced	8	1.8
Widowed	8	1.8
Primary care giver		
Mother	415	95.6
Father	8	1.8
Sister	4	0.9
Other *	7	1.6
Educational status (mother)		
Unable to read and write	25	5.8
Read and write	39	9
Primary (1-8)	162	37.3
Secondary (9-12)	138	31.8
College/University	70	16.1
Educational status (father)		
Unable to read and write	13	3
Read and write	28	6.5
Primary (1-8)	65	15
Secondary (9-12)	144	33.2
College/University	184	42.4
Occupation of mother		
House wife	237	54.6
Daily Laborer	33	7.6
Merchant	43	9.9
Government employee	75	17.3
Student	34	7.8
Other**	12	2.8
Occupation of father		
Daily Laborer	64	14.7

Merchant	114	26.3
Student	18	4.1
Government employee	173	39.9
Other***	65	15

**Grandmother, aunt, and older brother.*

*** NGO worker, receptionist.*

**** Driver, NGO worker.*

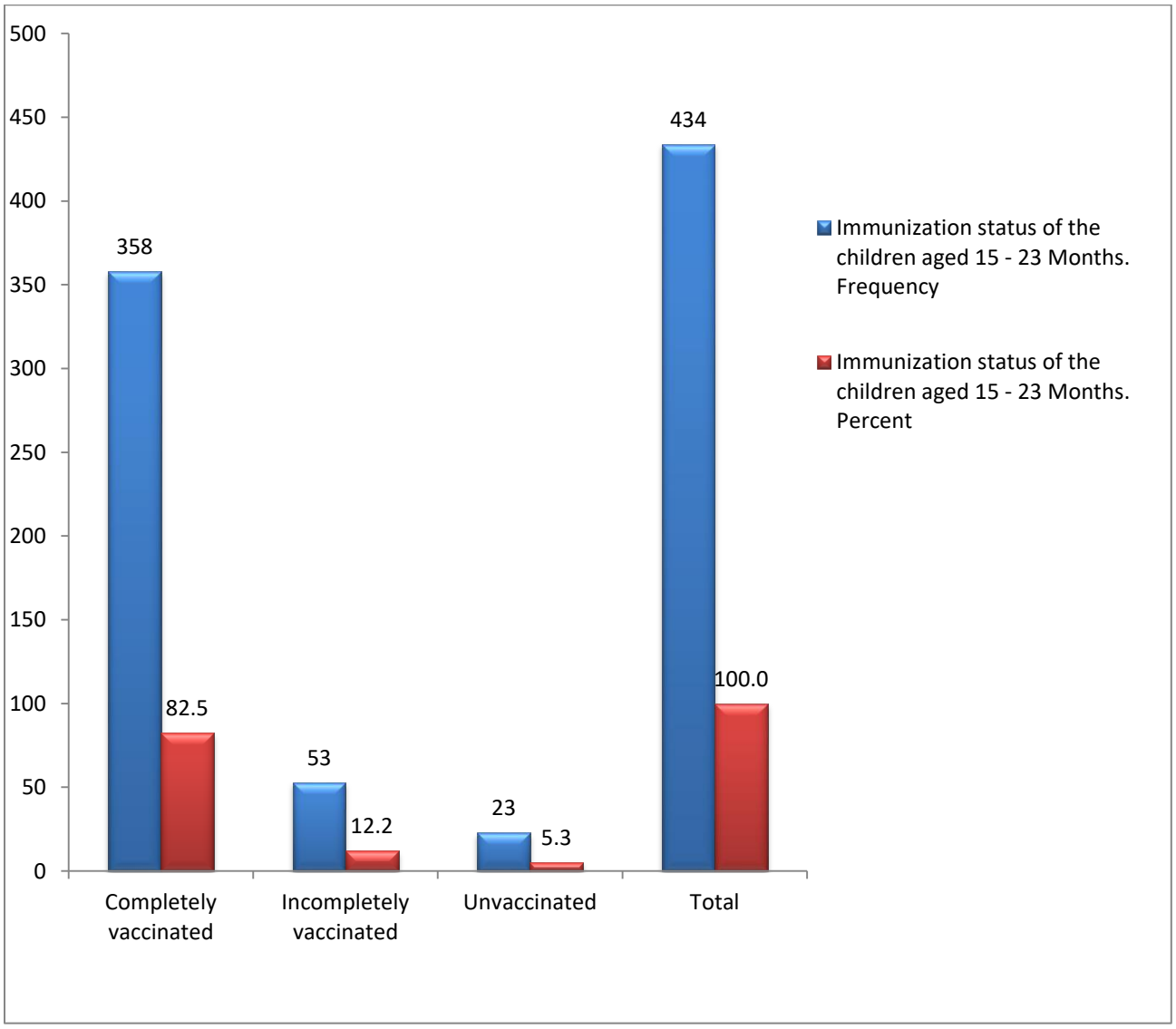

Figure 3: Immunization status among children aged 15 – 23 months by card plus history in Shashamene city administration, Oromia, 2023 (n =434).

***Table 3**: Mothers /care givers related factors, immunization dropout in Shashamene city, Oromia, 2023 (n = 434).*

Variable	Categories	No (%)
ANC follow up		
	Yes	382(88.0)
	No	52(12.0)
TT Vaccinated		
	Yes	374(86.2)
	No	60(13.8)
Place of delivery		
	Home	64(14.7)
	Health Institutions	370(85.3)
PNC Visit		
	Yes	99(22.8)
	No	335(77.2)
Missed vaccination schedule		
	Yes	117(27.0)
	No	317(73.0)

Immunization dropout rate:

The quantitative survey showed that BCG – MCV_2 dropout rates were 11.9% and 15.2% among children aged 15 – 18 months and 19 – 23 months respectively. The overall BCG – MCV_2 dropout rate was **11.5% (95% CI = 0.084 – 0.154)** in children aged 15 – 23 months old. OPV1 – 3, Penta1 – 3, PCV1 – 3, Rotarix1 – 2, MCV_1 –MCV_2 and Penta1 – MCV2 dropout rates were 6.9%, 5.9%, 9.3%, 2.1%, 8.9% and 7.6% respectively.

More than 80% of respondents are accessible to health facilities rendering immunization services out of which 37.6%, 32.5% and 10.8% are near to health center, hospital and health posts respectively. One hundred sixteen (26.7%) go on foot to facilities and about half of respondents (48.2%) replied that it takes them to reach facility about 15 – 30 minutes (**Figure 5**).

Respondent's perception towards providers and facility:

Order of arrival is respected as of 80.2% respondent's reaction and 24% replied that there were no seats in the health facility while visiting for vaccination. About 75% of respondents said that waiting time is more than one hour to get child shoot and there was no reminder system as

reported by 85.5% of them. Three hundred forty six (79.7%) of children possess immunization card (**Table 4**).

Reasons for immunization dropout

Main reasons for immunization dropout were being busy with socio –economic activities 69(35.8%), forgetting date of appointment 31(16.1%), fear of antigen side effects 24 (12.4%), and child sickness 18(9.3%) (**Figure 4**). A number of reasons were raised by participants that their baby may miss vaccination schedule. In the quantitative survey 69(15.9%) of respondents figured out that being busy in socio economic activity was reason for missing vaccines.

Table 4*: Perceptions of respondents towards Vaccine providers and facilities in Shashamene city, Oromia, 2023 (n = 434).*

Variable	Categories	No (%)
Availability of seat		
	Yes	329(75.8)
	No	105(24.2)
Arrival order respected		
	Yes	348(80.2)
	No	86(19.8)
Waiting Time		
	< 1Hr.	110(25.3)
	≥ 1Hr.	324(74.7)
Reminder system by providers		
	Yes	63(14.5)
	No	371(85.5)
Vaccine providers attitude		
	Negative	96(22.1)
	Positive	338(79.9)
Immunization card possession		
	Yes	346(79.7)
	No	88(20.3)

5.1.1 Factors affecting immunization dropout among children aged 15 – 23 months old:

Table 5 show predictors of immunization dropout in the Study area. In the binary multivariate analysis, factors found to be statistically significant with dropout were missing vaccination

schedule, availability of seat, immunization card possession and the accessible facility (Hospital). Children who miss vaccination schedule (AOR = 2.42; 95% CI = 1.110 - 5.296) are more likely to drop from the immunization schedule than their counterparts. Children attending facilities with seat (AOR = 0.03; 95% CI = 0.011 - 0.068) are less likely to dropout immunization schedule compared to children visiting facilities with no seat. Children who have an immunization card have a 57% lower odds of dropping out compared to those who do not have it (AOR = 0.43; 95% CI = 0.192 – 0.939). Similarly, children accessible and near to hospital have an 84% lower odds of dropping out immunization compared to those near to health post (AOR = 0.16; 95% CI = 0.057 – 0.430).

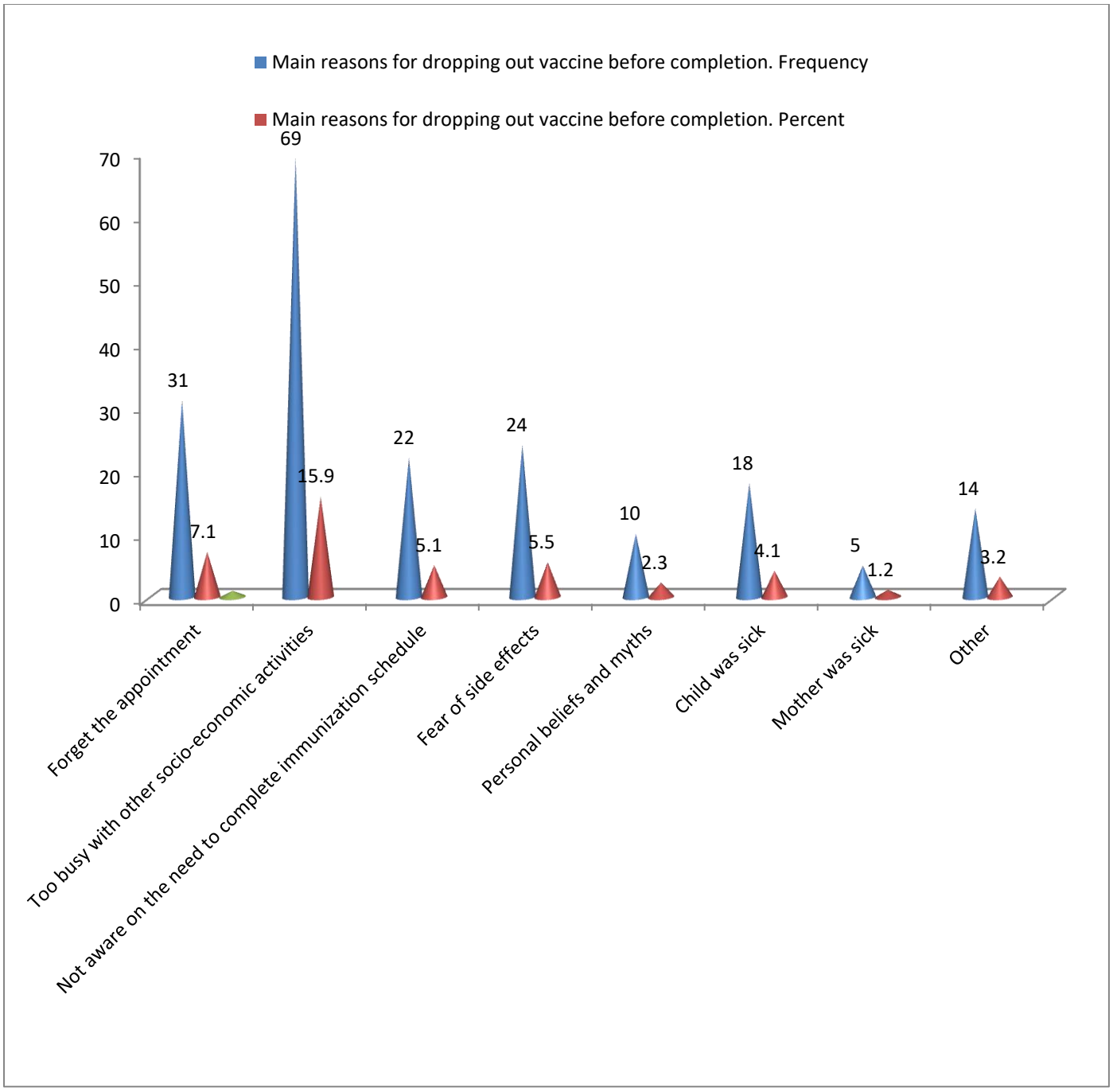

Figure 4: Reasons for dropout of immunization by respondents in Shashamene city, Oromia, Ethiopia, 2023.

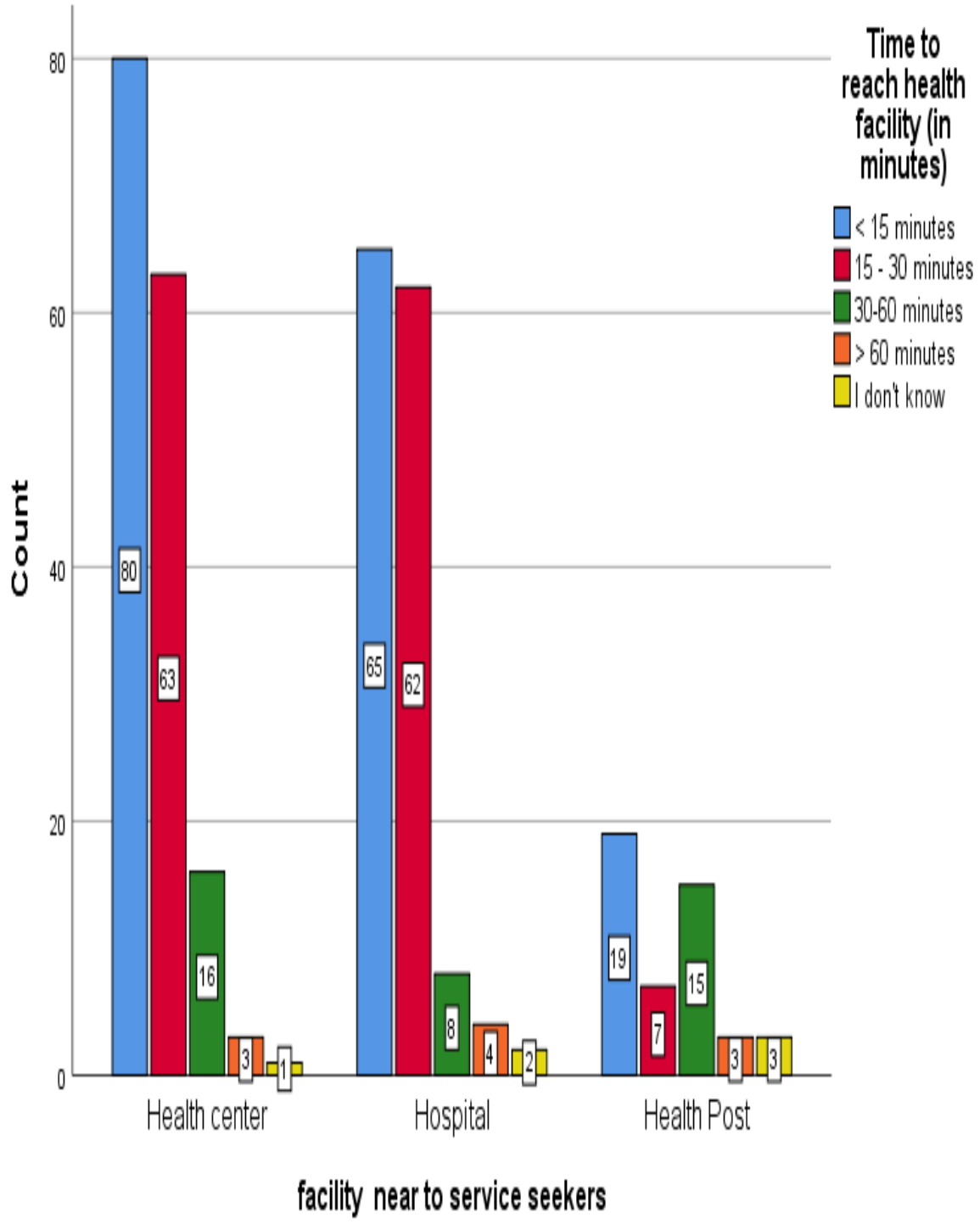

Figure 5: Facilities nearest to service seekers and time it take to reach, Shashamene, Oromia, 2023.

Table 5*: Bivariate and Multivariable logistic regression analysis of factors affecting immunization dropout in Shashamene city administration, Oromia, 2023 (n = 434).*

Variables	Dropout		COR (95% CI)	AOR (95% CI)
	Yes	No		
	No (%)	No (%)		
Place of residence				
Urban Kebele	55(12.7)	277(63.8)	0.645(0.376 – 1.109)	2.071(0.779 – 5.504)
Rural Kebele	24(5.5)	78(18.0)	1	1
ANC Follow up				
Yes	60(13.8)	322(74.2)	0.324(0.173 - 0.607)	0.451(0.158 - 1.288)
No	19(4.4)	33(7.6)	1	1
Missed vaccination schedule				
Yes	37(8.5)	80(18.4)	3.028(1.824 -5.029)	2.424(1.110 - 5.296)
No	42(9.7)	275(63.4)	1	1
Vaccine providers attitude				
Negative	25(5.8)	71(16.4)	1.852(1.078 - 3.180)	0.709(0.287 - 1.748)
Positive	54(12.4)	284(65.4)	1	1
Seat available				
Yes	26(6.0)	303(69.8)	0.084(0.048 - 0.146)	0.028(0.011 - 0.068)
No	53(12.2)	52(12.0)	1	1
Order of arrival respected				
Yes	51(11.8)	297(68.4)	0.356(0.207 - 0.610)	2.140(0.876 - 5.230)

No	28(6.5)	58(13.4)	1	1
Waiting time				
< 1 Hr.	14(3.2)	96(22.1)	0.581(0.312 – 1.084)	0.973(0.315- 3.008)
≥ 1Hr.	65(15.0)	259(59.7)	1	1
Immunization card possession				
Yes	40(9.2)	306(70.5)	0.164(0.096 – 0.280)	0.425(0.192 – 0.939)
No	39(9.0)	49(11.3)	1	1
Accessible Facility				
Health Center	26(7.4)	137(39.0)	1.483(0.760 – 2.893)	0.908(0.384 – 2.147)
Hospital	16(4.6)	125(35.6)	0.335(0.162 – 0.693)	0.156(0.057 – 0.430)
Health Post	17(4.8)	30(8.5)	1	1

5.2 Qualitative Results

Based on the qualitative data, the following key themes and subthemes emerged. **Figure 6** encapsulates the overall barriers and reasons accentuated by respondents for immunization dropout rate. It further depicts vaccine users current immunization associated factors and their accessibility to the proposed antigens and providers revolving factors that could drastically reduce immunization dropout in our setting.

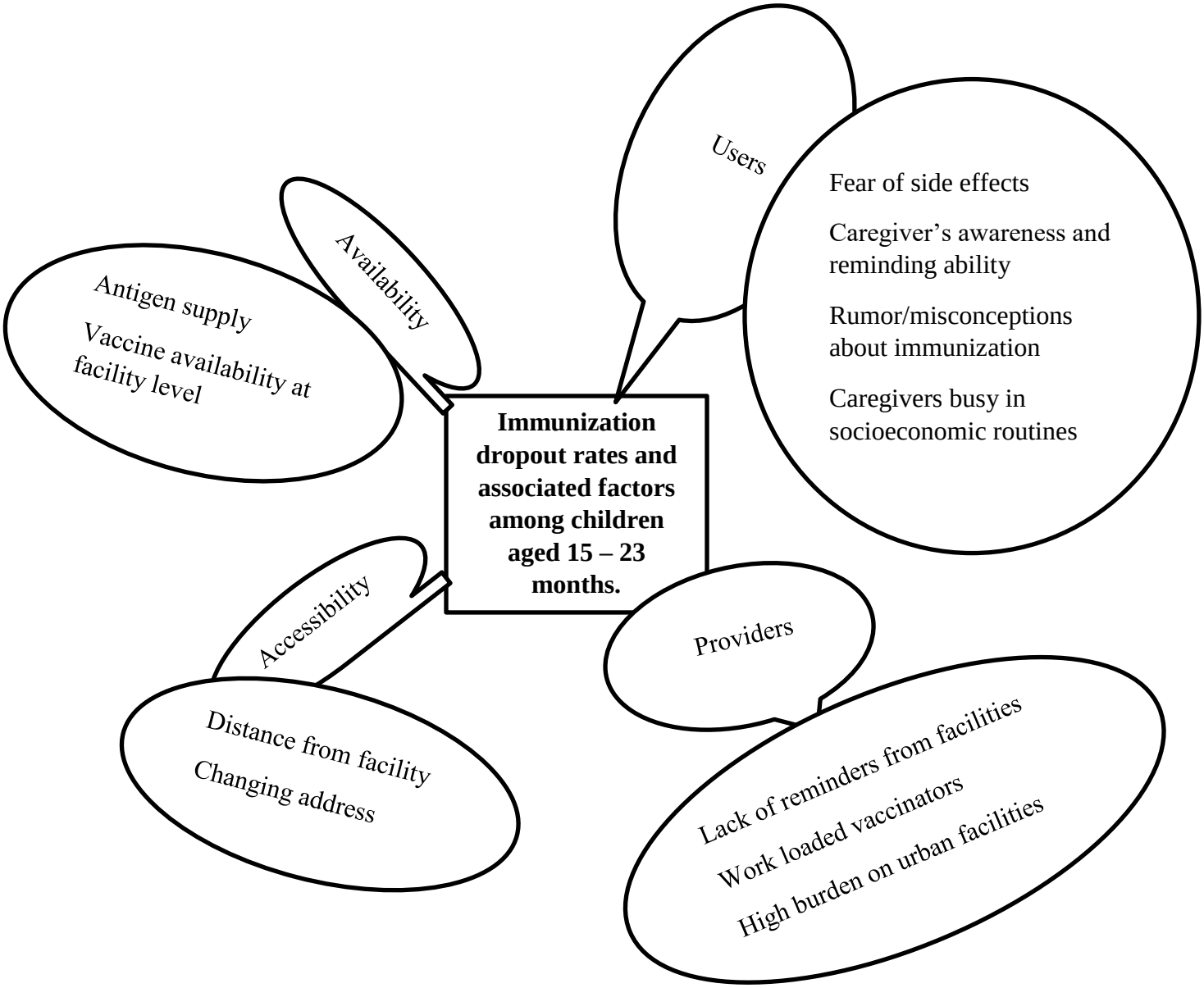

Figure 6: Perceptions of caregivers towards immunization dropout in children aged 15 – 23 months old in Shashamene city, Oromia, 2023.

Table 6 presented the representative quotes for each theme that emerged from the qualitative data. While discussing the immunization dropout and contributing reasons, the majority of respondents believed that immunization is ultimately important to lower probability of acquiring vaccine targeted diseases. They perceived that immunization also lowers healthcare costs and enables children enjoy their prospect life.

Others replied that there are some rumors /misconceptions related to vaccination like fear of undesirable side effects and unusual manifestations. Further to understand barriers to reducing immunization dropout and reasons for vaccine dropout, respondents were asked about some technical and socioeconomic challenges they faced while visiting healthcare facilities for immunization services. Burden those urban healthcare providers and urban facilities have mainly highlighted by participants. Concerns like shortage of antigens, distance from facilities, waiting time and lack of reminder systems given emphasis. Unavailability of seats during immunization session to accommodate caregivers was among the reasons for increased immunization dropout.

Staff work load was one of the reasons for children to fail to complete vaccination contributing to dropout as it was emphasized by some key informants. Participants were asked whether they do have problem of awareness on the benefits of vaccination that is a potential contributor to vaccine dropout. The majority of respondents reported that there was forgetfulness about immunization schedule due to busy life in activities of daily routines acknowledging the importance of need for reminder systems. Other caregivers complained that there were poor card management systems at facility level and vaccination staff does not guide on the alleviation of the post-vaccine side effects at each visit; instead, information is given at the first visit only.

Participants perceived that service providers get busy because of load that service seekers become many and they even get back home without getting injection. Distance from facility, lack of awareness, work load, shortage of antigens, fear of side effects, changing address and rumors on vaccines were some of the major reasons for vaccine dropout as stated by almost all SSIs participants.

Additionally, while sharing their views related to immunization dropout, the interviewees focused on major areas, including the perceived barriers to immunization and immunization related decision – making. They acknowledged that there are pocket areas where even children

may not get vaccinated. To avoid any inconvenience and dissatisfaction at the client's end, at every visit, counseling is crucial. Few suggested that vaccine supply should be given attention to ensure and sustain immunization utilization.

Table 6: Example of themes, quotes and recommendations from the qualitative study.

	Themes	**Quotes**
I:	Antigen shortages and unavailability of vaccines to needy children.	Younger man figured out that… "*I myself was there to get my child vaccinated, nurses unwelcome mothers, why this date? Where is your card? No antigen today, and the like, antigen will not be opened today, I felt bad…,*" (younger man, Bute Filicha kebele). *"Sometimes there is problem of antigen supply and there is shortage of vaccines" (YFSP, Awasho H/C)* *"The big thing…smiling, there was shortage of antigens that sometimes vaccines are unavailable. Mothers seeking injections come and go back home without getting their children vaccinated." (Health Extension Supervisor, Alelu Cluster)*
II:	Service users distant from healthcare facilities and changing address	*"Mothers come from rural distant area where there is no transportation means" (UHEW, Awasho Danku Health Post)* "*As per our facility, mothers come from distant surroundings which are not convenient for transportation; previously health posts were not giving immunization service at rural kebele level" (EPI Focal. Arada H/C)* *"Distance from facility matters" (Head of Awasho H/C)*
III:	Caregivers lack of awareness, fear of side effects, forgetting appointment dates, being busy in other socio-economic activities	*"I remember…, it was during my third child vaccination schedule that my baby get shocked after antigen shoot…oh it was horrible since then to go for vaccination" (older woman, Alelu kebele).* *"Sometimes our ladies are busy in daily routines that they may forget time and date of appointment. That is why children may not finish their vaccines. As you all knows, our residents engage in business activities… that is why so" (older man, Arada Kebele).*
IV:	Absence of reminder systems from	*"Vaccinators busy that they provide the injections for*

providers, work load on vaccinators and high burden on urban facilities	*many children per session that we wait longer than expected to get the service," (younger woman, Awasho Danku kebele).* *The other is load on providers, mothers come and stay longer and even go home child unvaccinated." (Vaccinator, Awasho Health Center)* *"There is workload and burden on health workers and facilities. This is due to urbanization and shortage of man power" (head of H/C, Abosto).* *"… I personally recommend health education on the benefits of vaccination and improving awareness of the mass at community level. No staff training given timely to update provider's skill and knowledge that should be given emphasis, antigens should also be available to the needy ones…"* (Vice head, Awasho Health Center).

6 DISCUSSION

This study determined immunization dropout rate and its associated factors among children aged 15 – 23 months in Shashamene, Oromia Regional State using mixed methods design. In the results, high dropout rate of immunization identified among study subjects in the survey that comprised 11.5% of BCG – MCV_2 dropout rate. The MCV1 – MCV2 dropout rate was also high that it comprised 8.9% contributing to the increment of overall dropout. This is also revealed by FGD participants that they consider as if they finish the vaccine series after 9 months of measles first dose injection that contributed to missing of measles second dose. This finding is higher than the national and WHO cut – off points (Ms Jhilmil Bahl 2015, CSA 2017). This may imply that it is due to the recent introduction of measles second dose that users are not fully familiar and may even forget the appointment date because of longer time gap between the first and second doses of measles injection. Shortage of vaccines, lack of awareness about the benefits of immunization, rumors and fear of side effects and staff workload were some of the reasons for dropout increment as it highlighted by respondents from the qualitative study. As noted by Awasho Health center vaccinator key informant; "*there is high workload in our facility that mothers coming for vaccination may not get service,"* emphasizing the need for adding working staff.

And in fact it is also due to burden on urban health facilities due to urbanization and increment of service users in the catchment area to fully trace defaulters, distance from facility also contributed, and forgetting appointment date matters in completion of immunization to reduce dropout. Older man from Arada Kebele quoted as "*our ladies are busy in daily routines that they may forget appointment of vaccination.*" Moreover, this report is higher than the finding in Woldia town, Northern Ethiopia 9% (Abebe, Wudu Kassaw et al. 2019), Areka town, Southern Ethiopia 4.7% (Robera and Lema 2019), Techiman Municipal, Brong – Ahafo Region of Ghana 5.6% (Baguune, Ndago et al. 2017), and 2019 – 20 Gambia Demographic and Health Survey 7% (Ntenda, Sixpence et al. 2022). This might be due to utilization problem and accessibility issues in pockets of the city. However, it was lower than the previous studies conducted in Abobo District 25.8% (Kassaw, Mariam et al. 2021), in the emerging regions of Ethiopia 17.53% (Debie and Lakew 2020) and in the Rural Health Training Centre affiliated to the medical college in Maharashtra, India 16.3% (Gawade, Gore et al. 2020). The reason might be due to health service

setup and variation in setting and the deployment of urban health extension workers to offer maternal and child healthcare services in the country at grass root level.

In the present study, care givers and health service related factors like missing vaccination schedule, unavailability of seats in facilities, possession of immunization card and accessibility to health facilities delivering immunization services contributed to immunization dropout. Children who miss vaccination schedule are 2.4 times more likely to dropout compared to their counterparts (AOR = 2.42; 95% CI = 1.110 - 5.296). This result is similar with finding in Southwest Ethiopia (Kassaw, Mariam et al. 2021). This is due to the cumulative effect of missing vaccination schedule on the overall dropout of immunization and enhancement of forgetfulness in the succeeding vaccination session.

According to report of this study, unavailability of seat during immunization session was associated with dropout (AOR = 0.03; 95% CI = 0.011 - 0.068). The qualitative finding also acknowledged this result as younger woman from Awasho Danku remarked as "*there is long waiting time in the facility even without getting seat, no adequate space for getting rest*." This is in line with study done in Democratic Republic of the Congo (Kayembe-Ntumba, Vangola et al. 2022). This is explained as that mothers /caregivers who offered seat during vaccination session would feel well served and can understand that they may tolerate waiting longer time to stay to get the service.

Mothers who possess immunization card are less likely to dropout compared with those who do not possess it (AOR = 0.43; 95% CI = 0.192 – 0.939). This is agreed with studies done in the Gambia (Ntenda, Sixpence et al. 2022) and Lome (Zida-Compaore, Ekouevi et al. 2019). A possible explanation for this finding might be mothers who do not possess card may forget appointment and couldn't remind when to visit vaccination service. Similarly, mothers/ care givers near to hospital are less likely to dropout as compared to those near health post (AOR = 0.16; 95% CI = 0.057 – 0.430). This is consistent with prior research on immunization dropout (Wale Tegegne, Kassie Gidafie et al. 2021). The possible reason is that service providers in hospital setup are relatively knowledgeable and skill full compared to health workers in health post to manage immunization activities and expected to better advice on the benefits of its utilization and also need for completion. In the qualitative assessment, burden/ work load on

urban facilities, shortage of antigens, loss of immunization card, and socio – economic routines of service users supported the quantitative findings and contributed to high dropout rate and low utilization of immunization services. Unique to qualitative finding, respondents strictly emphasized the need for reminder system ahead of vaccination due date as notion windup by a remark made by younger women from Alelu Kebele; "*the healthcare providers should remind as by SMS or other means not to miss vaccine schedule*."

6.1 Strengths and Limitation of the Study

This study is not without limitations. The conclusion drawn in this study could be generalized to all children aged 15 – 23 months old in Ethiopia owning to the use of relatively representative samples and the supplementation of qualitative design to give more insight to the reason and factors for immunization dropout. However, the current study utilized a cross-sectional study design thus causal and temporal inferences cannot be drawn. The findings of qualitative study are prone to bias from the design point of view.

7 CONCLUSION AND RECCOMMENDATIONS

7.1 Conclusion

The overall immunization dropout rate was higher than the national cut off point (< 5%) and WHO Reference (< 10%). Variables significantly associated with immunization dropout rate were:

Missed vaccination schedule: High dropout rates suggest health system failures to successfully deliver repeated doses.

Unavailability of seats: This was identified as a compounding barrier that eventually tips the scales in favor of abandoning the vaccination cycle.

Immunization card possession: Children without an immunization card were more likely to experience dropout.

Facility accessible to service users: Poor access to services was identified as a course of low coverage of the first set of recommended vaccines.

Reasons identified using qualitative data contributing to immunization dropout include:

Burden on facilities – due to increased urban population, the increment of service seekers do not match with working staffs.

Distances from health care facilities – some users are relatively far from healthcare facilities to access service.

Shortage of antigens – Vaccine supply contributes to the success of immunization process and declines its dropout.

And lack of awareness, forgetfulness because of life routines, changing address, rumors and fear of side effects, staff workloads, and lack of reminder system.

7.2 Recommendations

To address the high dropout rate of immunization, we recommend the following key points and stakeholders:

Improve Awareness and Education: HEWs and EPI focals at the health care institutions should increase community awareness about the importance of immunization and the

potential consequences of dropout. Conduct targeted educational campaigns to address misconceptions and provide accurate information about vaccines.

Strengthen Vaccination Schedules and Reminders: FMoH or Regional Health Bureau should implement systems to ensure that caregivers receive timely reminders about vaccination appointments. This can include SMS reminders, or home visits to remind caregivers about upcoming vaccinations.

Enhance Accessibility and Convenience: Zonal and Woreda Health Offices should improve the accessibility of immunization services at the Health Center and Health post. Ensure that facilities have adequate seating arrangements to accommodate caregivers during immunization sessions.

Strengthen the Immunization Card System: Immunization service providers at all levels should promote the use and possession of immunization cards by caregivers. Provide clear instructions on how to keep and maintain the card, and emphasize its importance in tracking and ensuring complete immunization.

Address Health System Challenges: Health policy makers at FMoH and regional levels should address the burden on urban health facilities due to urbanization and increased service users by strengthening the capacity of health facilities and increasing the number of healthcare providers. Ensure an adequate supply of vaccines to prevent shortages.

Strengthen Data Management and Information Systems: Zonal, District and Health institution leaders and EPI focals should improve DHS2 data analysis, and use of immunization data to inform decision – making and program planning. Timely and accurate data can help identify areas with high dropout rates and guide targeted interventions.

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ANNEXES

Annex I: Information Sheet

The Research Title: Immunization dropout rate and its associated factors among children aged 15 – 23 months old at Shashamene city administration, Oromia, Ethiopia, 2023: A Mixed Methods study.

Name of the Investigator: Gezahegn Tilahun.

University Name: Hawassa University.

Introduction: The aim is to clear about the purpose of the research, data collection procedures and get permission to conduct the research.

Purpose of the research project: To assess the Immunization dropout rate and its associated factors among children aged 15 – 23 months old at Shashamene city administration, Oromia, Ethiopia, 2023

Procedure: In order to achieve the objective of the study, information which is necessary for the study will be taken from 15 – 23 months old children mother or care giver and child immunization card.

Risks: It will not inflict any harm on the study subjects as it can be carried out based on the ethical principles of under taking research. The name or any other identification information will not be collected or recorded on the questionnaire and all information that will be taken kept strictly confidential and in safe place. The information retrieved will only be used for the study purpose.

Benefits: There is no direct benefit that the study participants obtain but the investigation will be utilized by care providers, program planners and policy makers to improve the health condition and livelihood of the participants and child and general population at country or regional level.

Confidentiality: The information collected will be kept confidential and it will not be revealed to anyone except the investigator and kept in key or locked system with computer password.

Person to Contact: The research study was reviewed and approved by IRB of Hawassa University College of Medicine and Health Sciences, School of Nursing. If you have any concern or question you may contact the principal investigator with the following addresses:

Gezahegn Tilahun (Principal Investigator)

Institution: Hawassa University College of Medicine and Health Sciences, School of Nursing

Mob. Cell: 0911982037/0964661202

Email: gezetilahun2012@gmail.com or robsanwako755@gmail.com

Questionnaire serial No: ----------

Annex II: Consent form

Dear respondent, my name is _____. We are working to assess Immunization dropout rate and its associated factors among children aged 15 – 23 months old. This study tries to identify factors contributed to immunization dropout rate of your child. I am one of the data collectors and I am asking you some questions about yours and your child's vaccine utilization. Would you please cooperate in responding the following questions? Your participation indirectly contributes in improving the problem of vaccination in your communities and your children's.

Your response never be exposed to any party without your consent and it is possible not tell your name and the interview take only 20 minutes. There is no obligation to participate in the study. You have full right to refuse participation, refrain during interview and decline from answering to some or more of the question if you don't like to answer them.

I have been briefly informed about the study and clearly understood the objective of the study.

So I here approve my consent with my signature to take part in the study.

Signature _____ Date _____

Interviewer's name _____ Supervisor's name _____

Signature _____ Signature_____

Annex III: English version Questionnaire

S. No	Variables	Categories/ response	Skip
Part I: Socio – economic and demographic characteristics of study participants			
101	Age of the child in months	_____	
102	Sex of the child	1. Male 2. Female	
103	Family size	_____	
104	Number of children in family	_____	
105	Birth order of the child	_____	
106	Place of residence	1. Urban kebele 2. Rural kebele	
107	Age of the mother/ care giver by years	_____	
108	Marital status of mother	Single Married Divorced Widowed	

109	Primary care giver of the child	1. Mother 2. Father 3. Sister 4. Other, specify _____	
110	Educational status of mother	1. Unable to read and write 2. Read and write 3. Primary (1 – 8) 4. Secondary (9 – 12) 5. College /University	
111	Educational status of father	1. Unable to read and write 2. Read and write 3. Primary (1 – 8) 4. Secondary (9 – 12) 5. College /University	
112	Occupation of Mother	1. House wife 2. Daily laborer 3. Merchant 4. Government employee 5. Student	

		6. Other, specify _____	
113	Occupation of Father	1. Daily laborer 2. Merchant 3. Student 4. Government employee 5. Other, specify_____	
114	Family monthly income by ETB.	_____	
Part II: Mothers related questions			
201	Have you followed ANC during your last pregnancy?	1. Yes 2. No	If no, skip to Q203
202	If yes, how many times?	_____	
203	Have you ever been vaccinated TT?	1. Yes 2. No	If no, skip to Q205
204	If yes, how many times?	_____	
205	Where did you deliver your last baby?	1. Home 2. Health institution	

206	Have you visited health facility for PNC?	1. Yes 2. No	If no, skip to Q208
207	If yes, how many times?	_____	
208	Have you missed the child vaccination schedule?	1. Yes 2. No	If no, skip to Q 301
209	If yes to Q208, why?	1. Being sick 2. Child get sick 3. Fear of COVID – 19 4. Forget date of appointment 5. Other, specify _____	
Part III: Respondents perception on the organization of vaccination in the facilities			
301	Vaccine providers attitude	1. Bad and unwelcoming 2. Good and welcoming	
302	Is a seat available during vaccination?	1. Yes 2. No	
303	Is order of arrival respected during vaccination?	1. Yes 2. No	

304	How long you wait during vaccination in the facility?	1. < 1 hr. 2. 1 or more hr.			
305	Is there reminder system on days before the scheduled vaccination?	1. Yes 2. No			
Part IV: child vaccination dropout status					
401	Does your child have a vaccination Card?	1. Yes 2. No			If no, fill Q402 by asking mother.
402	If yes, ask to show the card and copy the vaccination data from the card including date vaccine given.	Put a tick (✓) if received and a cross (X) if not received			
		Vaccine taken	Yes	No	
		OPV_0			
		BCG			
		OPV_1			
		$Penta_1$			
		PCV_1			
		$Rotarix_1$			

		OPV_2			
		$Penta_2$			
		PCV_2			
		$Rotarix_2$			
		OPV_3			
		$Penta_3$			
		PCV_3			
		MCV_1			
		MCV_2			
		IPV			
403	What is the immunization status of the child?	1. Completely vaccinated 2. Incompletely vaccinated 3. Unvaccinated			
404	Based on the question Q402 above did the child dropout follow up before receiving all recommended vaccine?	1. Yes 2. No			If no, skip to Q501.
405	If "Yes" to Q403 above, what was your main reason for	1. Forgot the appointment 2. Too busy with other socio-			

	dropping out of the immunization schedule before completion?	economic activities 3. Not aware on the need to complete immunization schedule 4. Fear of side effects 5. Personal beliefs and myths 6. Child was sick 7. Mother was sick 8. Other, specify _____	
Part V: Health care system and accessibility related factors			
501	Is there any health facility nearby that provides vaccination service?	1. Yes 2. No	If no, skip to Q503.
502	If yes to the above question which facility is near to you?	1. Health Center 2. Hospital 3. Health post 4. Private clinic 5. Other. Specify _____	
503	What means of transport do you use when taking your child	1. Walking 2. Motor cycle	

	for immunization services to the health facility?	3. Taxi 4. Public bus 5. Other, specify _____	
504	How long does it take you to reach health facility in minute?	1. < 15 minutes 2. 15 – 30 minutes 3. 30 – 60 minutes 4. > 60 minutes 5. I don't know	
505	Do vaccinators advice on child vaccination?	1. Yes 2. No	If no, skip Q506
506	If yes, on what area they advise?	1. Importance of immunization 2. Side effects 3. Importance of completion 4. Health risks associated with dropout of vaccines 5. Other, specify _____	

THANK YOU!

Tools for qualitative study

KIs – Questions

1. Why children dropout immunization?
2. What are the major reasons for immunization dropout in children?
3. What do you think will reduce parents trust in the health system for utilization of

FGD – Questions

1. Your opinion on child immunization.
2. What do you want to address about immunization dropout?
3. Would you kindly share your child immunization experience?
4. How is facility setup and providers attitude?
5. Your general comment on antigens availability and accessibility.
6. What are the barriers to reducing immunization dropout rate?
7. What are the challenges to utilization of immunization in children?
8. What are major reasons for vaccine dropout?

DABALATAA

Dabalata I: Waraqaa Odeeffannoo

Mata duree Qorannichaa: Sadarkaa talaallii addaan kutuu fi sababoota isaa waliin walqabatan daa'imman umuriin isaanii ji'a 15 – 23 gidduutti bulchiinsa magaalaa Shashamene, Oromiyaa, Ethiopia, 2023: Qo'annoo wal maka bu'uura godhate.

Maqaa Qorataa: GazzahanyXilaahun.

Maqaa Yuunivarsiitii: Yuunivarsiitii Hawaasaa.

Seensa: Kaayyoon waa'ee kaayyoo qorannichaa qulqulleessuu, adeemsa odeeffannoo walitti qabuu fi qorannicha gaggeessuuf hayyama argachuudha.

Kaayyoon pirojektii qorannichaa: Daa'imman umuriin isaanii ji'a 15 – 23 ta'an irratti addaan kutuu Talaallii fi wantoota kanaan walqabatan madaaluu bulchiinsa magaalaa Shashamene, Oromiyaa, Itoophiyaa, 2023.

Adeemsa: Kaayyoo qorannichaa galmaan ga'uuf odeeffannoon qorannichaaf barbaachisaa ta'e daa'imman ji'a 15 – 23 haadha ykn kunuunsituu fi kaardii talaallii daa'imaa irraa ni fudhatama.

Balaa: Qajeelfama naamusaa qorannoo gaggeessuu irratti hundaa'uun raawwatamuu waan danda'uuf dhimmoota qorannichaa irratti miidhaa tokkollee hin geessisu.

Faayidaa: Faayidaan kallattiin hirmaattonni qorannichaa argatan hin jiru garuu qorannichi haala fayyaa fi jireenya hirmaattotaa fi daa'immanii fi ummata waliigalaa sadarkaa biyyaatti ykn naannootti fooyyessuuf kennitoota kunuunsaa, karoorsitoota sagantaa fi qaamolee imaammata baasan kan itti fayyadamu ta'a.

Iccitii: Odeeffannoon walitti qabame iccitii ta'ee kan eegamu yoo ta'u, qorataa malee nama kamiifuu kan hin mul'anne yoo ta'u, jecha icciitii kompiitaraa waliin sirna furtuu ykn cufame keessatti kan eegamu ta'a.

Nama Qunnamtii Qabu: Qorannoon kun Boordii Gamaagamaa (IRB) Yunivarsiitii Hawaasaa Kolleejjii Fayyaa fi Saayinsii Fayyaa, Mana Barumsaa Narsiitiin gamaaggamamee raggaasifameera.

GazzahanyXilaahun (Qorataa Muummee)

Dhaabbata: Yuunivarsiitii Hawaasaa Kolleejjii Fayyaa fi Saayinsii Fayyaa, Mana Barumsaa Narsii

Mobaayila: 0911982037/0964661202

Imeelii: gezetilahun2012@gmail.com ykn robsanwako755@gmail.com

Gaaffii tartiiba Lakk: ----------.

Dabalata II: Unka hayyamaa

Kabajamaa deebii kennituu/kennaa, maqaan koo _____ jedhama. Daa'imman umuriin isaanii ji'a 15 – 23 ta'an irratti saffisa Talaallii addaan kutuu fi wantoota kanaan walqabatan madaaluuf hojjechaa jirra. Qorannoon kun wantoota daa'ima keessanii talaallii addaan kutuuf gumaachan adda baasuuf yaala. Ani namoota daataa walitti qaban keessaa tokko waanan ta'eef waa'ee itti fayyadama talaallii keessanii fi daa'ima keessanii gaaffii tokko tokko isin gaafachuuf jira. Gaaffiiwwan armaan gadii deebisuuf tumsa ni gootaa? Hirmaannaan keessan al-kallattiin rakkoo talaallii hawaasa keessanii fi ijoollee keessanii fooyyessuu keessatti gumaacha qaba.

Deebiin kee hayyama kee malee gonkumaa qaama kamiifuu hin saaxilamin maqaa kee himuu dhiisuun ni danda'ama, waliin dubbiinis (interviewnis) daqiiqaa 20 qofa fudhata. Qorannicha irratti hirmaachuuf dirqamni hin jiru.Hirmaannaa diduu, yeroo gaaffii fi deebii of qusachuu fi gaaffii tokko tokkoo fi isaa ol deebisuu yoo hin jaallanne deebii kennuu diduu mirga guutuu qabda. Waa'ee qorannichaa gabaabinaan kan naaf beeksise yoo ta'u, kaayyoo qorannichaas sirriitti hubadheera. Kanaaf ani qorannicha irratti hirmaachuuf hayyama koo mallattoo kootiin raggaasiseera.

Mallattoo _____ Guyyaa _____

Maqaa gaafataa _____ Maqaa supparvaayizaraa _____

Mallattoo _____ Mallattoo_____.

ANNEX IV: Afan Oromo Version Questionnaire

S. Lakk	Jijjiiramoota	Ramaddiiwwan/ deebii	Irra darbuu
Kutaa I:Amala hawaas – dinagdee fi dimogiraafiihirmaattota qorannichaa			
101	Umurii daa'imaa (ji'aan)	_____	
102	Saala daa'imaa	1. Dhiira 2. Dubartii	
103	Baay'ina maatii	_____	
104	Baay'ina ijoollee maatii keessatti	_____	
105	Tartiiba dhaloota daa'imaa	_____	
106	Bakka Jireenyaa	1. Ganda Magaalaa 2. Ganda Badiyyaa	
107	Umurii haadha/ kunuunsituu waggaadhaan	_____	
108	Haala gaa'elaa haadha	1. Qulqulleettii /qeenxee 2. Gaa'ela kan qabu 3. Hiikaa /kan hiikte 4. Haadha manaa irraa du'e	

109	Kunuunsa jalqabaa daa'imaa	1. Haadha 2. Abbaa 3. Obboleettii 4. Kan biroo, _____ ibsi .	
110	Haala barnootaa haadha	1. Dubbisuu fi barreessuu dadhabuu 2. Dubbisuu fi barreessuu 3. Sadarkaa tokkoffaa (1 – 8) 4. Sadarkaa lammaffaa (9 – 12) 5. Kolleejjii /Yuunivarsiitii	
111	Haala barnoota abbaa	1. Dubbisuu fi barreessuu dadhabuu 2. Dubbisuu fi barreessuu 3. Sadarkaa tokkoffaa (1 – 8) 4. Sadarkaa lammaffaa (9 – 12) 5. Kolleejjii /Yuunivarsiitii	
112	Hojii haadha	1. Haadha manaa	

		2. Hojjettuu guyyaa guyyaa 3. Daldaltuu 4. Hojjettuu mootummaa 5. Barattuu 6. Kanneen biroo, _____ __ ibsi	
113	Hojii abbaa	1. Hojjetaa humnaa 2. Daldalaa 3. Barataa 4. Hojjetaa mootummaa 5. Kan biroo, ibsi_____	
114	Galii maatii ji'aan (Qarshii Itiyoophiyaan)	_____	
Kutaa II:Gaaffilee haadhawaliin walqabatan			
201	Yeroo ulfaa kee isa dhumaa kunuunsa yeroo ulfaa hordofteettaa?	1. Eeyyee 2. Lakki	Yoo lakki ta'e gara gaaffii 203tti darbi
202	Eeyyee yoo ta'e, yeroo meeqa irratti argamte?	_____	

203	Talaallii TT (farra tetaanesii) fudhattanii beektuu?	1. Eeyyee 2. Lakki	Yoo lakki ta'e gara gaaffii 205tti darbi
204	Yoo eeyyee ta'e, yeroo meeqa?	_____	
205	Daa'ima kee isa dhumaa eessatti deesse?	1. Mana 2. Dhaabbata fayyaa	
206	Dhaabbata fayyaa kununsa dhahumsa boodaaf daawwattaniittuu?	1. Eeyyee 2. Lakki	Yoo lakki ta'e gara gaaffii 208tti darbi
207	Yoo eeyyee ta'e, yeroo meeqa?	_____	
208	Sagantaa talaallii daa'immanii irraa haftanii beektuu?	1. Eeyyee 2. Lakki	
209	Yoo eeyyee ta'e Q208, maaliif?	1. Dhukkubsachuu 2. Daa'imni dhukkubsatee/ttee 3. Sodaa COVID – 19 4. Guyyaa beellama	

		dagachuu 5. Kanneen biroo, _____ ibsi	
Kutaa III: Ilaalcha deebii kennitoonni gurmaa'ina talaallii dhaabbilee keessatti			
301	Ilaalcha dhiyeessitoota talaallii	1. Hamaa fi simannaa hin qabne 2. Gaarii fi simannaa bareedaa	
302	Yeroo talaallii teessoo ni jiraa?	1. Eeyyee 2. Lakki	
303	Yeroo talaallii tartiiba dhufaatii ni kabajamaa?	1. Eeyyee 2. Lakki	
304	Yeroo talaallii dhaabbaticha keessatti yeroo hangamii eegdu?	1. Sa'aatii 1 gadi. 2. Sa'aatii 1 caalaa ykn walqixa.	
305	Guyyoota talaallii beellamame dura sirni yaadachiisaa jiraa?	1. Eeyyee 2. Lakki	
Kutaa IV: Haala talaallii daa'immanii addaan kutuu			
401	Mucaan keessan Kaardii talaallii qabaa?	1. Eeyyee 2. Lakki	Yoo lakki ta'e haadha

<table>
<tr><td></td><td></td><td colspan="3"></td><td>gaafachuun gaaffii 402 guuti.</td></tr>
<tr><td rowspan="2">402</td><td rowspan="2">Yoo eeyyee ta’e kaardii agarsiisuu gaafadhuu fi daataa talaallii guyyaa talaallii kenname dabalatee kaardii irraa waraabuu.</td><td colspan="3">Yoo fudhatame mallattoo ( ) yoo hin arganne immoo (X) kaa’i.</td><td rowspan="2"></td></tr>
<tr><td>Talaallii fudhatame</td><td>Eeyyee</td><td>Lakki</td></tr>
<tr><td></td><td></td><td>OPV_0</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>BCG</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>OPV_1</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>$Penta_1$</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>PCV_1</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>$Rotarix_1$</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>OPV_2</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>$Penta_2$</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>PCV_2</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>$Rotarix_2$</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>OPV_3</td><td></td><td></td><td></td></tr>
</table>

		Penta$_3$			
		PCV$_3$			
		MCV$_1$			
		MCV$_2$			
		IPV			
403	Sadarkaa talaallii daa'imaa maali?	1. Gutummaan kan talaalame/te 2. Walakkeessaan kan talaalame/te 3. Kan gonkumaa hin talalamiin			
404	Gaaffii Q402 armaan olii irratti hundaa'uun daa'imni addaan kute talaallii gorfame hunda osoo hin fudhatiin hafeera?	1. Eeyyee 2. Lakki			Yoo lakki ta'e, gara gaaffii 501 darbi.
405	Yoo "Eeyyee" ta'e gara Q403 armaan olitti, sababni guddaan sagantaa talaallii osoo hin xumuramin addaan kutuuf maali ture?	1. Beellama dagachuu 2. Sochii hawaas-dinagdee birootiin garmalee qabamuu 3. Gabatee talaallii xumuruu barbaachisuu irratti quba			

		dhabuu 4. Sodaa miidhaa cinaa 5. Amantii dhuunfaa fi sheekkoo 6. Mucaa dhukkubsatee ture /turte 7. Hati dhukkubsattee 8. Kan biroo, _____ ibsi.	
Kutaa V: Sirna eegumsa fayyaa fi wantoota dhaqqabummaa wajjin walqabatan			
501	Dhaabbanni fayyaa naannoo sanatti tajaajila talaallii kennu jiraa?	1. Eeyyee 2. Lakki	Lakki yoo ta'e gara 503 tti darbi
502	Gaaffii armaan olii kanaaf eeyyee yoo ta'e dhaabbati kamtu sitti dhihoo jira?	1. Giddugala Fayyaa/buufata fayyaa 2. Hospitaala 3. Keellaa fayyaa 4. Kilinikaa dhuunfaa 5. Kan biro, ibsi_____ _	

503	Yeroo daa’ima keessan tajaajila talaalliidhaaf gara dhaabbata fayyaa geessu geejjibaa akkamii fayyadamtu?	1. Miillaan deemuu 2. Saayikilii mootoraa 3. Taaksii 4. Otobusii ummataa 5. Kan biroo, _____ __ ibsi .	
504	Daqiiqaadhaan dhaabbata fayyaa ga'uuf yeroo hangamii sitti fudhata?	1. < Daqiiqaa 15 2. 15’ – Daqiiqaa 30 3. 30’ – Daqiiqaa 60 4. > Daqiiqaa 60 5. Hin beeku	
505	Talaallii kan kennan talaallii daa’immanii irratti ni gorsu?	1. Eeyyee 2. Lakki	Lakki yoo ta’e gaaffii 506 irra darbi.
506	Yoo eeyyee ta'e naannoo kam irratti gorsu?	1. Barbaachisummaa talaallii 2. Miidhaa cinaa 3. Barbaachisummaa xumuruu 4. Balaa fayyaa talaallii	

		addaan kutuun walqabatee dhufu 5. Kanneen biroo,_____ibsi.	

GALATOOMAA!

መግለጫዎች

አባሪ I: የመረጃ ወረቀት

የምርምር ርዕሱ-የክትባት ቅነሳ ፍጥነት ዕድሜያቸው ከ 15 – 23 ወር የሆኑ በሻሻማ ከተማ አስተዳደር ኦሮሚያ ፣ ኢትዮጵያ ፣ 2023፤ በቅልቅል መንገድ ጥናት ላይ የተመሠረተ ።

መርማሪው ስም፤ ገዛህኝ ጥላሁን

የዩኒቨርሲቲ ስም፤ ሃዋሳ ዩኒቨርሲቲ

መግቢያ፤ ዓላማው ስለ ምርምር ፣ የመረጃ አሰባሰብ ሂደቶች ዓላማ ግልፅ ማድረግ እና ምርምርውን ለማካሄድ ፈቃድ ማግኘት ነው.

የምርምር ፕሮጀክቱ ዓላማ፤ ከ 15 – 23 ወር ዕድሜ ባሉ ሕፃናት መካከል የክትባት ቅነሳ ፍጥነት እና ተጓዳኝ ሁኔታዎችን ለመገምገም በሻሻማኔ ከተማ አስተዳደር ፣ ኦሮሚያ ፣ ኢትዮጵያ ፣ 2023።

ሥነ-ሥርዓቱ፤ የጥናቱን ዓላማ ለማሳካት, ለጥናቱ አስፈላጊ የሆነው መረጃ ከ 15 – 23 ወር ዕድሜ ያላቸው ልጆች እናት ወይም ተንከባካቢ እና የልጆች ክትባት ካርድ ይወሰዳል.

አደጋዎች፤ ምርምርን በሚወስዱ የሥነ-ምግባር መርሆዎች ላይ በመመርኮዝ ሊከናወን ስለሚችል በጥናቱ ርዕሰ ጉዳዮች ላይ ምንም ጉዳት አያስከትልም። ስም ወይም ሌላ ማንኛውም የመታወቂያ መረጃ በመጠይቁ ላይ አይሰበሰብም ወይም አይመዘገብም። እንዲሁም በጥብቅ ሚስጥራዊ እና ደህንነቱ በተጠበቀ ሁኔታ የሚወሰድ መረጃ ሁሉ ይጠበቃል። የተመለሰው መረጃ ለጥናቱ ዓላማ ብቻ ጥቅም ላይ ይውላል።

ጥቅሞች፤ የጥናቱ ተሳታፊዎች የሚያገኙት ቀጥተኛ ጥቅም የለም ፣ ግን ምርመራው ለእንክብካቤ አቅራቢዎች ጥቅም ላይ ይውላል። የተሳታፊዎች ፤ የልጆች እና አጠቃላይ ህዝብ በሀገር ውስጥ ወይም በክልል ደረጃ የጤና ሁኔታን እና የኑሮ ሁኔታን ለማሻሻል የፕሮግራም እቅድ አውጪዎች እና የፖሊሲ አውጪዎች ይጠቀሙበታል።

ምስጢራዊነት፤ የተሰበሰበው መረጃ ሚስጥራዊ ሆኖ ይቀመጣል። ከተቆጣጣሪው በስተቀር ለማንም አይገለጥም። በቁልፍ ወይም በተቆለፈ ስርዓት ከኮምፒዩተር የይለፍ ቃል ይቀመጣል።

ሐላፍነት የምወስድ አካል፤ የምርምር ጥናቱ በ ሀዋሳ ዩኒቨርሲቲ የሕክምና እና የጤና ሳይንስ ኮሌጅ ፣ የነርስ ትምህርት ቤት ተገምግሞ ፀድቋል። ምንም ዓይነት አሳሳቢ ወይም ጥያቄ ካለዎት ዋና መርማሪውን በሚከተሉት አድራሻዎች ማነጋገር ይችላሉ።

ገዛህኝ ጥላሁን (ዋና መርማሪ)

ተቋም፤የሃዋሳ ዩኒቨርሲቲ የሕክምና እና የጤና ሳይንስ ኮሌጅ ፣ የነርሶች ትምህርት ቤት

የስልክ ቁጥር: 0911982037/0964661202

ኢሜል: gezetilahun2012@gmail.com ወይም robsanwako75@gmail.com

የመጠይቁ ተከታታይ ቁጥር ----------

አባሪ II-የተስማሚ ቅጽ

ውድ መልስ ሰጭ ፣ ስሜ _____ ይባላል። ዕድሜያቸው ከ15 – 23 ወር የሆኑ ሕፃናት መካከል የክትባት ማቋረጥ ፍጥነት እና ተጓዳኝ ሁኔታዎችን ለመገምገም እየሰራን ነው። ይህ ጥናት ለልጅዎ የክትባት መጠን እንዲጨምር አስተዋጽኦ ያደረጉ ሁኔታዎችን ለመለየት ይሞክራል። እኔ ከመረጃ ሰብሳቢዎች አንዱ ነኝ እናም ስለ እርስዎ እና ስለ ልጅዎ የክትባት አጠቃቀም አንዳንድ ጥያቄዎችን እጠይቃለሁ። የሚከተሉትን ጥያቄዎች ለመመለስ እባክዎን ፈቃደኛ ኖት? ተሳትፎዎ በተዘዋዋሪ በማህበረሰቦችዎ እና በልጆችዎ ውስጥ የክትባት ችግርን ለማሻሻል አስተዋፅ ያደርጋል።

የእርስዎ ምላሽ ያለእርስዎ ስምምነት ለማንኛውም ፓርቲ ወይም ሰው በጭራሽ አይጋለጥም እናም ስምዎን መናገር አይጠበቅም። ቃለ መጠይቁ 20 ደቂቃ ብቻ ይወስዳል። በጥናቱ ውስጥ የመሳተፍ ግዴታ የለም። መመለስ የማይፈልጉ ከሆነ ተሳትፎን እምቢ ለማለት ፣ በቃለ መጠይቅ ወቅት የመቆጠብ እና ለአንዳንድ ወይም ከዚያ በላይ ለሚሆኑ ጥያቄዎች መልስ ከመስጠት መቆጠብ ይችላሉ።

ስለ ጥናቱ በአጭሩ ተነግሮኛል እናም የጥናቱ ዓላማ በግልጽ ተረድቻለሁ:: ስለዚህ በጥናቱ ለመሳተፍ ፈቃደኝነተን በፊርማዬ አረጋግጣለሁ።

ፊርማ _____ ቀን _____

የመረጃ ሰብሳቢ ስም _____ ተቆጣጣሪ ስም _____

ፊርማ _____ፊርማ_____

Annex V: Amharic Version Questionnaire

ተራ ቁጥር	ተለዋዋጮች	ምድቦች / ምላሽ	ዝለል
ክፍል 1-የጥናት ተሳታፊዎች ኢኮኖሚያዊ እና ስነሕዝባዊ ባህሪዎች			
101	የልጅ ዕድሜ (በወራት)	_____	
102	የልጅ ጾታ?	1. ወንድ 2. ሴት	
103	የቤተሰብ መጠን	_____	
104	በቤተሰብ ውስጥ የልጆች ብዛት	_____	
105	የልጁ የልደት ቅደም ተከተል	_____	
106	መኖርያ ቦታ	1. ከተማ ቀበለ 2. ገጠር ቀበለ	
107	የእናቱ ዕድሜ / የእንክብካቤ ሰጪበአመታት	_____	
108	የእናት የጋብቻ ሁኔታ	1. ነጠላ/ያላገባች 2. ያገባች 3. ፍቺ 4. መበለት/ባል የሞተባት	

109	የልጁ የመጀመሪያ እንክብካቤ ሰጪ	1. እናት 2. አባት 3. እህት 4. ሌላ፣ይግለጹ _____	
110	የእናት የትምህርት ሁኔታ	1. ለማንበብ እና ለመፃፍ የማትችል 2. ማንበብ እናመጻፍ የምትችል 3. የመጀመሪያ ደረጃ (1 – 8) 4. ሁለተኛ ደረጃ (9 – 12) 5. ኮሌጅ / ዩኒቨርሲቲ	
111	የአባት የትምህርት ሁኔታ	1. ማንበብ እና መፃፍ የማይችል 2. ማንበብ እና መጻፍ የምችል 3. የመጀመሪያ ደረጃ (1 – 8) 4. ሁለተኛ ደረጃ (9 – 12) 5. ኮሌጅ / ዩኒቨርሲቲ	
112	የእናት ሥራ	1. የቤት እመቤት 2. ዕለታዊ የጉልበት ሰራተኛ 3. ነጋዴ	

		4. የመንግስት ሰራተኛ 5. ተማሪ 6. ሌላ፣ይግለጹ _____	
113	የአባት ሥራ	1. የጉልበት ሰራተኛ 2. ነጋዴ 3. ተማሪ 4. የመንግስት ሰራተኛ 5. ሌላ፣ይግለጹ _____	
114	የቤተሰብ ወርሃዊ ገቢ (በብር)	_____	
ክፍል2-ከእናቶች ጋር የተዛመዱ ጥያቄዎች			
201	በመጨረሻው እርግዝናዎ ወቅት የእርግዝና እንክብካቤን ተከታትለዋል?	1. አዎ 2. አይ	ካልሆነ፣ወደ ጥያቄ ተተ203 ዝለል
202	አዎ ከሆነ ስንት ጊዜ?	_____	
203	ተታነስ ክትባት (በእርግዝና ጊዜ የምሰጥ) ወስደዋል?	1. አዎ 2. አይ	ካልሆነ፣ወደ ጥያቄ 205 ዝለል
204	አዎ ከሆነ ስንት ጊዜ?	_____	
205	የመጨረሻ ልጅዎን የት ወለዱ?	1. ቤት	

		2. የጤና ተቋም	
206	ከወሊድ በሃላ እንክብካቤ የጤና ተቋም ጎብኝተዋል?	1. አዎ 2. አይ	ካልሆነ፣ወደ ጥያቄ 208 ዝለል
207	አዎ ከሆነ ስንት ጊዜ?	_____	
208	የልጆች ክትባት መርሃ ግብር አመለጠዎት?	3. አዎ 4. አይ	
209	ለ Q208 አዎ ከሆነ፣ለምን?	1. መታመም 2. ልጅ ታመመ 3. የ COVID- 19 ፍርሃት 4. የቀጠሮ ቀን ረሱ 5. ሌላ፣ይግለጹ _____	
ክፍል3-በመገልገያዎች ውስጥ የክትባት አደረጃጀት ላይ ምላሽ ሰጭዎች ግንዛቤ			
301	የክትባት አቅራቢዎች አመለካከት	1. መጥፎ አቀባበል 2. ጥሩ አቀባበል	
302	በክትባት ወቅት መቀመጫ ይገኛል?	1. አዎ 2. አይ	
303	በክትባት ወቅት የመምጣት	1. አዎ	

	ቅደም ተከተል ይከበራል?	2. አይ			
304	በተቋሙ ውስጥ ክትባት በሚወስዱበት ጊዜ ምን ያህል ጊዜ ይጠብቃሉ?	1. ከ 1 ሰአት በታች 2. 1 ሰአት/ ከዛ በላይ			
305	ከታቀደው ክትባት በፊት ባሉት ቀናት ውስጥ የማስታወሰ ስርዓት አለ?	1. አዎ 2. አይ			
ክፍል4:የልጆች ክትባት መቋረጥ ሁኔታ					
401	ልጅዎ የክትባት ካርድ አለው?	1. አዎ 2. አይ			ካልሆነ እናት በመጠየቅ ጥያቄ 402 ን ይሙሉ.
402	አዎ ከሆነ ካርዱን ለማሳየት እና የተሰጠውን የክትባት ቀን ጨምሮ ከካርዱ የክትባት መረጃውን ለመቅዳት ይጠይቁ::	ምልክት ከተቀበሉ (✓) እና ካልተቀበሉ (X)ን ምልክት ያድርጉ			
		የተወሰደ ክትባት (ቀን)	አዎ	አይ	
		OPV_0			
		BCG			
		OPV_1			

		$Penta_1$			
		PCV_1			
		$Rotarix_1$			
		OPV_2			
		$Penta_2$			
		PCV_2			
		$Rotarix_2$			
		OPV_3			
		$Penta_3$			
		PCV_3			
		MCV_1			
		MCV_2			
		IPV			
403	የልጅ የክትባት ሁነታ	1. ሙሉ የተከተቤ 2. በከፍል የተከተቤ 3. ያልተከተቤ			
404	ከላይ በጥያቀ ቁጥር 402 ላይ በመመስረት ልጁ የታዘዘውን ክትባት ሳያጠናቅቅ ቀርታል?	1. አዎ 2. አይ			ለ 404 አይ ከሆነ ወደ 501 ዝለል

405	አዎ ከሆነ ዋናዉ ምክንያት ምን ነበር?	1. የቀጠሮ ቀን መርሳት 2. በለላ ስራ መያዝ 3. ግንዛበ እጦት 4. የጎንዮሽ ጉዳት ፍራቻ 5. የግል አመነታ 6. ልጁ ታሞ 7. እናት ታማ 8. ለላ ካለ ይግለጹ _____	
ክፍል 5፡ ጤና ተቋምና አቅርቦትን በተመለከተ			
501	በአቅራብያዎ ክትባት አገልግሎት የምሰጥ ጤና ተቋም አለ?	1. አዎ 2. አይ	አይ ከሆነ ወደ 503 ዝለል
502	አዎ ከሆነ ምን የምባል ተቋም?	1. ጤና ጣብያ 2. ሆስፒታል 3. ጤና ከላ 4. የግል ክልንክ 5. ሌላ፣ይግለጹ _____	
503	ጤና ተቋም ለመሀድ	1. በእግር	

	ትራንስፖርት መገልገያ ምን ይጠቀማሉ?	2. ሞቶር ሳይክል 3. ታክሲ 4. የህዝብ ባስ 5. ሌላ፣ይግለጹ _____	
504	ጤና ተቋም ለመድረስ ምን ያህል ግዘ ይወሥድቦታል?	1. ከ15 ደቅቃ በታች 2. ከ15 – 30 ደቅቃ 3. ከ30 – 60 ደቅቃ 4. ከ60 ደቅቃ በላይ 5. አላውቅም	
505	ከታብዎች ምክር ይሰጣሉ?	1. አዎ 2. አይ	ለ 505 አይ ከሆነ 506 ዝለል
506	አዎ ከሆነ በምን ዙርያ?	1. የክትባት ጥቅም 2. የጎንዮሽ ጉዳት 3. የማጠናቀቅ ጥቅም 4. የማቋረጥ ጉዳት 5. ሌላ፣ይግለጹ _____	

አመሰግናለሁ!

DEDICATION

- This thesis is dedicated to children of Land of Origin /Oromia in particular/ who lost their precious life due to vaccine targeted diseases.