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Assessment of magnitude and factors associated with fullimmunization coverage in children aged 12-23 months in Addis Ketema sub-city, Addis Ababa, Ethiopia

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Table of content

Contents **page**

List of Tables

List of Figures

Abstract

Background: Child immunization is one of the most cost-effective public health interventions for reducing child morbidity and mortality. In order to control and eliminate the vaccine preventable diseases it is important to know the vaccination coverage and reasons for non-vaccination. Inadequate levels of immunization against childhood diseases remain a significant public health problem in resource-poor areas of the globe. Nonetheless, the reasons for incomplete vaccination and non-uptake of immunization services are vary from place to place. This study aimed at finding out the reasons for incomplete vaccination of children in 12-23 months of age in Addis Ababa, Addis Ketema Sub- city, Ethiopia.

Objectives: To determine full immunization coverage and the predictors that influence the complete immunization of children among 12-23 months of age.

Methods: Across-sectional community based study was conducted by using the revised 2005 WHO-EPI coverage cluster survey manual, from February 2013 to March 2013 in Addis Ketema Sub-City of Addis Ababa city administration.. A sample of 585 children between 12-23 months from 40 clusters in the sub-city were surveyed. Pre-tested structured questionnaire was used for data collection. Data were entered into computer using EPI-Info version 3.5.1 then bivariate and multivariate analysis was done using SPSS statistical software version 16. 0

Results Seventy three percent of the children in Addis Ketema sub-city were fully immunized. Occupation of the mother (AOR=0.22, 95% CI: 0.13,0.51), postnatal care follow up (PNC) (AOR=1.85, 95% CI: 1.10, 2.90) , knowledge about objective of vaccination (AOR=2.39, 95% CI: 1.01, 5.63), knowledge about start age of immunization (AOR=2.17, 95% CI: 1.26, 3.67), knowledge about number of session required to complete routine immunization (AOR=1.61, 95% CI: 1.09, 2.41), Place of delivery (AOR=2.26, 95% CI: 1.38, 3.67), were the independent predictors of full vaccination among children aged 12-23 months.

Conclusions. Women with health seeking behavior were found to have their children fully immunized. And also knowledge of mother about immunization of children and socio-demographic characteristics of mother had association with full immunization of children. Significant number (3.2%) of children in this survey had not been vaccinated at all. The low full immunization coverage documented in this study among children particularly for measles vaccination during routine EPI program was found low.

List of Acronyms

AAU	Addis Ababa University
ANC	Antenatal care
BCG	Bacilli Calmette Guerin
CDC	Communicable Disease Control
DPT	Diphtheria-Pertussis-Tetanus
EDHS	Ethiopian Demographic and Health Survey
EFY	Ethiopian Fiscal Year
EPI	Expanded Program of Immunization
GAVI	Global Alliance for Vaccines and Immunizations
HepB	Hepatite B
HiB	Hemophilaus Influenza type B
HSDP IV	Health Sector Development Program IV
IRB	Institutional Review Board
LMIC	Low and Middle Income Countries
MDG4	Millennium Development Goal 4
MOH	Ministry Of Health
PCV	Pneumococcal Conjugate Vaccine
PNC	Postnatal Care
REC	Research and Ethics Committee
RED	Reaching Every District
SNNPR	South Nation, Nationalities and Peoples Region
SPH	School of Public Health
TT	Tetanus Toxoid
UNAIDS	United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VPD	Vaccine Preventable Diseases
WHO	World Health Organization

1. Introduction

1.1 Background

Child immunization is one of the most cost-effective public health interventions for reducing child morbidity and mortality. The goal of immunization programs is to reduce the incidence of vaccine preventable diseases in children through high immunization coverage. One of the indicators used to monitor progress towards the achievement of MDG4 is immunization coverage (1, 2).

Around 2.5 million under-five deaths are averted annually by immunization against diphtheria, pertussis and tetanus (DPT) and measles. In 2010, over 19 million children did not get all three primary doses of DPT vaccination (3).

In Ethiopia the EPI program was started in 1980, routine immunization services have been provided to children under one year of age for the six vaccine preventable childhood diseases (tuberculosis, poliomyelitis, tetanus, diphtheria, pertussis and measles), and tetanus toxoid is given to women of childbearing age. The schedule for child immunizations is in accordance with the WHO recommended schedule for developing countries (4).

According to guidelines developed by the World Health Organization, children are considered fully vaccinated when they have received a vaccination against tuberculosis (BCG), three doses of each of the DPT and polio vaccines, and a measles vaccination by the age of 12 months. The pentavalent vaccine DPT-HepB-Hib, introduced in 2007, has replaced the previous DPT vaccine. This new vaccine protects against diphtheria, pertussis, tetanus, hepatitis B, and Haemophilus influenza type b. In Ethiopia, the vaccination policy calls for BCG vaccine given at birth or at first clinical contact, three doses of DPT-HepB-Hib vaccine given at approximately 6, 10, and 14 weeks of age, four doses of oral polio vaccine given approximately at 0-2, 6, 10, and 14 weeks of age, and measles vaccine given at or soon after reaching 9 months of age (5).

The federal ministry of health introduced a new vaccine into routine in infant immunization schedule nationwide with effect from September 2011. The new vaccine is the 10- valent pneumococcal conjugate vaccine (PCV) and administer at the same time with existing pentavalent vaccine at 6,10 and 14 weeks of age (6). Vaccination coverage in Ethiopia has increased markedly over the past ten years. The percentage of children age 12-23 months who were fully vaccinated at the time of the survey increased from 14 percent in 2000 to 20 percent in 2005 and 24percent in 2011. This coverage has high disparities among regions. For example at Addis Ababa is 79% and 9% at Afar region (5).

1.2. **Statement of the problem**

One of the eight MDGs that emerged from the Millennium Declaration calls for a drastic reduction in deaths among children under five years of age, specifically, a two-thirds drop in the under-five mortality rate between 1990 and 2015 (MDG 4). Most of the effort in achieving this goal focuses on developing countries, which account for over 90% of child deaths (7).

WHO has estimated that if all the vaccines now available against childhood diseases were widely adopted, and if countries could raise vaccine coverage to a global average of 90%, by 2015 an additional two million deaths a year could be prevented among children under five years old. This would have a major impact on meeting the goal to reduce child deaths (MDG 4) (7).

Yet despite extraordinary progress in immunizing more children over the past decade, in 2007, 24 million children – almost 20% of the children born each year – did not get the complete routine immunizations scheduled for their first year of life (7).

The progress in low- and middle-income countries (LMIC) in immunization coverage is slow nevertheless and DPT3 coverage in sub-Saharan Africa is estimated to be 60%. Of the estimated 27 million children that were yet to be reached with DPT3 vaccine,(9.9 million were in South Asia and 9.6 million in sub-Saharan Africa). So far, only 16% of LMIC countries are on track to achieve this goal, and none are on track in sub-Saharan Africa (8).

The EDHS 2011 report shows that overall, 24 percent of children aged 12-23 months were fully vaccinated at the time of the survey. While this represents a 19 percent increase from the level reported in the EDHS 2005, the percentage of children who are fully vaccinated remains far below the goal of 66 percent coverage set in the HSDP IV (MOH, 2010) (5).

Achieving the MDGs will not easy especially for sub-Saharan countries. The major barriers are: lack of political and financial commitment, poor management skills, and weak monitoring and information systems, absolute shortfalls in their workforce, a number of social factors and financial problems(7).

Assessing immunization coverage and factors associated with helps to evaluate progress in achieving program objectives and in improving service delivery. Such positive evidence is required for continuing support from donor-supported initiatives(9). The factors for full immunization were many and interwoven .The factors are differ from place to place. The aim of this study was to identify the predictors of full immunization of children among 12–23 months of age in Addis Ketema Sub-city and also such type of surveys were not done before in the sub-city so the survey result will serve as good data as a baseline.

2. **Literature review**

In Ethiopia, the vaccination policy calls for BCG vaccine given at birth or at first clinical contact, three doses of DPT-HepB-Hib (pentavalent) vaccine given at approximately 6, 10, and 14 weeks of age, four doses of oral polio vaccine given approximately at 0-2, 6, 10, and 14 weeks of age, and measles vaccine given at or soon after reaching 9 months of age (10).

2.1 **Global Immunization Coverage of children**

In 1980s, the global push to achieve Universal Childhood Immunization resulted in the establishment of national systems of immunization and rapidly rising immunization coverage (11). There are still millions of people who do not benefit from the protection that vaccination provides. Over 100 million children under one year of age are immunized every year with the required three doses of diphtheria-tetanus-pertussis (DTP) vaccine. However,24 million children are not being reached with vaccines: in 2007, over 10% of children under one year old in developing countries were not receiving even one dose of DTP vaccine, compared with 2% in industrialized countries. Most of these 24 million unimmunized or incompletely immunized children live in the poorest countries (7).

Overall, in the world the lives of an estimated 2.5 million children under 5 years old are saved each year as a result of immunization for vaccine-preventable diseases. An estimated 23.5 million infants did not receive three doses of combined diphtheria, pertussis and tetanus vaccine (DPT3) during 2008. Nearly a third of these children live in Africa, and 70 per cent live in just 10 countries (Ethiopia is one of from this countries) (12).

In 2010, over 19 million children did not get all three primary doses of DPT vaccination. Poor service delivery, parents who have low levels of education, and lack of information about immunization are major reasons for low coverage among children in slums as diverse as those of western Uttar Pradesh, India, and Nairobi, Kenya (3).

In Mukalla district, Hadramout governorate, Yemen 2006 a community-based survey data were collected from 210 children aged 12–23 months shows that: 82% were fully vaccinated, 12% were partially vaccinated, and 5% were not vaccinated. The coverage for OPV1 was 94.3%, OPV3 91.4%, measles 90%, and BCG 88.1%. Reasons for not vaccinating included lack of information (54%) and existence of obstacles (35%) (13).

Another Community-Based Cross-Sectional study done in Kampala Uganda, 2012 revealed that overall 77.2% of 821 children were fully vaccinated. Receipt of vaccinations ranged from 80.6% for measles to 99.0% for BCG vaccine. Overall, less than half 45.6%, of all children (374/821) received all vaccines within the recommended time ranges (14).

A multilevel analysis study done by using data available as of November 2011 from 24 Demographic and Health Surveys (DHS) conducted by the MEASURE DHS project between 2003 and 2010 in sub-Saharan Africa. The following factors remained significantly associated with the odds of being unimmunized: individual-level (child's age, polygamous family, mother's age, wealth index, mother's and father's education, media access, and maternal health seeking behaviors); community-level (place of residence and illiteracy rate); and country-level (fertility rate).Comparing of children of older mothers (i.e. 35 years or older), with children of younger mothers were more likely to be unimmunized (OR 1.22, 95% CI 1.09 to 1.36) (15).

2.2 **Vaccination Coverage of children in Ethiopia**

According to HSDP III report, in 2001 EFY pentavalent immunization coverage was 81.6%, measles immunization coverage was 76.6%, while the percentage of fully immunized children was 65.5%. HSDP III target has been already achieved for measles immunization coverage and percentage of fully immunized children.**(1)**The 2006 National EPI coverage survey report in Ethiopia indicates that BCG, DPT1, DPT3, measles and Fully Immunized Children coverage before the age of one year by card plus history was 83.4%, 84.3%, 66.0%, 54.3% and 49.9% respectively . At the time of survey, 70.6% of 12-23 months old children were vaccinated for DPT3 by card plus history. However, only 41.1% were genuinely vaccinated by card only before the age of one year (4).

Vaccination coverage in Ethiopia has increased markedly over the past ten years. The percentage of children age 12-23 months who were fully vaccinated at the time of the survey increased from 14 percent in 2000 to 20 percent in 2005 and 24 percent in 2011. The percentage who had received none of the six basic vaccinations increased from 17 percent to 24 percent between 2000 and 2005 and then decreased to 15 percent in 2011 (5).

2.3 **Factors influencing full immunization of children**

Different factors determine a child's complete vaccination status, depending on whether the child lives in an area with a low or high routine EPI coverage. Socioeconomic and demographic factors, maternal characteristics, child characteristics, knowledge of age begins, finishes and

session needed for immunization, knowledge of mothers on vaccination and vaccine preventable diseases, availability and accessibility of vaccination service, Antenatal care (ANC) follow up and TT status of mothers, factors associated with missed opportunities and Perception of mothers may influence complete immunization status of children.

2.3.1 **Socio-demographic factors**

Many surveys shows that Socio-demographic characteristics of mother/caretakers is determinant for full immunization status of children. Poor service delivery, parents who have low levels of education, and lack of information about immunization are major reasons for low coverage among children in slums as diverse as those of western Uttar Pradesh, India, and Nairobi, Kenya**(3)**A cross-sectional study done in Ambo district results indicates that, maternal socio demographic characteristics such as educational status, religion, occupation, place of residence and average monthly income and family size were the factors that have shown to increase completion of immunization among children aged between 12-23 months. But marital status and age of the mother did not show an association with the completion child immunization. Children whose mothers' were other religions rather than orthodox and protestant were 0.3(95% CI: 0.1, 0.69) times less likely to be fully vaccinated when compared with children of orthodox (16).

While case control study done in Wonago district in south Ethiopia, May 2008 revealed that of the socio demographic characteristics of the respondents, only monthly family income was found to be predictor of defaulting. The other socio-demographic variables were not associated with of defaulting. Mothers or immediate caretakers who had monthly family income of 44–88 USD were 81.1% less likely to have defaulter children than mothers or immediate caretakers who had monthly family income below < 22 USD, (95% CI)= 0.430(0.20, 0.94) (17). Study done in rural Mozambique in 2001,factors such as mothers' age, marital status, schooling level, migration history, gender of the child, understanding of the importance of vaccination, and migration history of the mother showed no significant differences with respect to children with complete and incomplete vaccination status (18).

National EPI coverage survey report in Ethiopia, 2006 showed that educational status of mother, maternal occupation, and parity has significant association with child's immunization completion. but infants by sex were not significantly associated with DPT3 coverage. Mother's education was positively associated with vaccination coverage. DPT3 coverage was significantly different by maternal occupation. Governmental employees had higher immunization coverage

than housewives. Similarly infants born from mothers with lower parity had higher coverage than those with mothers of high parity. In the contrary in this survey in Tigray region there was no statistically significant difference in DPT3 coverage among 12-23 months children at the time of the survey by residence and by maternal education (4).

According to EDHS 2011 Survey report, child characteristics, family size, educational status of mothers/care takers and economic status of the family has an association on vaccine completion of children immunization. Vaccination coverage among children age 12-23 months, female children are slightly more likely to be fully vaccinated than male. First births are more likely to be fully immunized than births of order six and higher .Children whose mothers have secondary education are more likely to be fully immunized than those born to mothers with no education (57 and 20 percent, respectively). Similarly, highest wealth quintile are fully immunized, their child compared with lowest wealth quintile. There is a wide variation among regions in full vaccination coverage, ranging from 79 percent in Addis Ababa to 9 percent in Affar (5).

Study done in Kinshasa, 2008, the age of the mother does not matter. Whether she is young or old does not influence the immunization status of the child. The father's education and the mother's experience of an EPI-targeted disease in the family emerged as significant predictors of complete immunization of the child. (19)A study done in Bangladesh by analysis of the Bangladesh Demographic and Health Survey BDHS,2007 data shows that the mother's education was a very important predictor of the child's immunization coverage. A significant positive association was found between education and complete immunization of children (20).

A study done in a district of Istanbul in 2005, identified that there was no statistical association with full vaccination rate and gender and age of child, paternal employment status, use of primary health center or other centers for routine childhood immunizations and presence of health insurance. But the, paternal and maternal levels of education were found to influence whether children were completely vaccinated or non-vaccinated (21).

2.3.2 **Availability of Maternal and child health services**

ANC follow up and tetanus toxoid status of mother are factors association with completion of child immunization. A study done in Ambo district shows that, mothers who had ANC follow up during their pregnancy were (95%CI)=6.8(4,10) times more likely to vaccinate their children fully than who did not. But number of ANC follow up that has no association with full vaccination of children. In addition to this, children of mothers who ever took tetanus toxoid

vaccine were (95% CI)=4.9(3.1, 7.7) times more likely to be vaccinated than those who did not vaccinated. Doses of tetanus toxoid that mother took have significant association with completion of child vaccination of their children (16). Study done in Nairobi, Kenya, maternal attendance for antenatal and postnatal care was not significantly associated with fully vaccination in children (22). Study done in Bangladesh shows that full immunization of their children was significantly associated with mothers receiving TT injections and This association was strengthened as the number of doses increased (23).

Another case control study done in 2008 in Wonago district, South Ethiopia, identified that there was a significant association between utilization of postnatal care (PNC) service and completion of child immunization. Mothers who did not use PNC service after delivery of the child under study were 6 times more likely to have defaulter children than mothers who did use PNC services. Mothers who did not postpone vaccination schedule were 98% times less likely to have defaulter children as compared with mothers who ever postponed vaccination schedule (17).

2.3.3 **Availability and accessibility of vaccination service**

Study done in rural Mozambique in 2001, almost three quarters of the children had a complete vaccination status. Specific reasons for not being able to vaccinate their child were identified by mothers. These were: a) Reasons associated with health services delivery, including long waiting time, no personnel at the health facility, no vaccines available on the day, no information about the day for vaccination and no vaccination given due to child sickness; b) Forgetting the day of immunization ; c) Difficulties in accessing the health facility ; d) Mother's sickness on the day of vaccination; e) Migration; f) Concomitant treatment by a traditional healer; g) Other miscellaneous reasons (18).

Study done in Ambo district shows that children of households of no access to health facility which provides vaccination service were (95% CI) =0.02(0.003, 0.16) times less likely to be fully vaccinated than those of household have access to the vaccination service. Also children to be fully vaccinated are decrease as the walking time to reach health facility increase. But no significant difference between for those of takes more than one hour and no vaccination service near to their locality (16).

2.3.4 **Knowledge of mothers on vaccination and vaccine preventable diseases**

Study in Ambo district association of mothers' knowledge about vaccination and vaccine preventable disease with the completion of immunization is a factor. The results shows, children of mothers who heard about vaccination were (95% CI)=5.8(1.3, 25) likely to be fully vaccinated than those haven't heard. But the number of vaccine preventable disease known by the respondents did not show a significant association with completion of immunization by children.(16)

A study done in rural Nigeria,2006 maternal factors were most strongly associated with non-completion of vaccination; the most frequent was lack of awareness of the need for immunization. Satisfactory maternal knowledge on immunization (p = 0.006) were the only factors that were significantly associated with completion of vaccination. The estimates of the knowledge scores and maternal education were in opposite directions (9).

Similarly study in south Ethiopia, May 2008 – A case control study Mothers who had poor knowledge about the benefit of vaccines were 6 times more likely to have defaulter children than mothers who had good knowledge (17).

Ethiopian national survey indicates that unaware of need for immunization and unaware of need to return for subsequent doses was reasons given by parents or caretakers for not immunizing 12-23 months of children (4).

2.3.5 **Knowledge of age begins, finishes and session needed for immunization**

Study in Ambo district shows that children of mothers who know correctly age at the child should begin and finishes immunization were 2.4 and 3.3 times more likely to be fully vaccinated, respectively. Regards to session needed for immunization, shows that mother who know correct sessions needed for the immunization were 1.7 time more likely to complete child immunization (16). study done in Kinshasa, Democratic Republic Congo2008,Barely half of the mothers knew the schedule for BCG (52.3%) and measles (45.5%), and a third (32.3%) did not know the schedule for polio, implying that half of the mothers, should they had missed the BCG or measles vaccines, very likely would not had claimed for the child to receive these vaccines (19). Wonago district in south Ethiopia**,** May 2008 – A case control study Knowledge of mothers or immediate caretakers about schedule of vaccines had significant association with completion of immunization. Mothers who did know the schedules of vaccine were 3 times more likely to vaccinate their children fully than mother who didn't know vaccine schedule.(17)

2.3.6 **Child characteristics**

Association of child characteristics like sex of the child, place delivery and birth order of the child with completion of child is also a factor for completion of immunization. Male children were 1.64 times more likely to be vaccinated but, no significant difference between both sexes on completion of vaccination. But birth order of the child did not show significant association with the immunization status of children aged between 12-23 months (16).

According to EDHS 2011 Survey report, vaccination coverage among children age 12-23 months by background characteristics, female children are slightly more likely to be fully vaccinated (26 percent) than male children (23 percent). First births are more likely to be fully immunized (30 percent) than births of order six and higher (20 percent).(5)

2.3.7 **Perception of mothers as predictors of defaulting**

Wonago district in south Ethiopia**,** May 2008 – A case control study Perception of mothers/immediate caretakers of the children toward health institutions support had significant association with completion of child vaccination. Respondents who had negative perception toward health institutions support were 2.7 more likely to have defaulter children as compared to their counterparts (17). Awareness of immunization and its importance in protecting a child against diseases was universal, although most mothers could not tell exactly against which diseases. Mothers had positive attitudes towards immunization (98%). Coverage based on the immunization card, however, was as low as 37%, indicating a discrepancy between the high level of knowledge and positive attitudes, with the observed low immunization coverage (19).

2.3.8 **Factors associated with missed opportunities**

Study in rural Mozambique 2007,children with missed opportunities for vaccination were more likely to have an incomplete vaccination status than children without missed opportunities $P < 0.001$. Only 24 (13.9%) of the mothers could recall the reason for the missed opportunities: nine (37.5%) had a sick child, two (8.3%) were not aware of the need for immunization and 13 (54.1%) referred a lack of vaccines availability in the health facility (18).

Rural Nigerian 2011, study also examined a number of factors associated missed opportunities for vaccination and its associated risk factors. Maternal reasons for missed opportunities included sickness (24.5%), social engagement (30.4%), traveling (14.6%), long distance walking (11.5%), and complications from previous injections (19%) (24).

3. **OBJECTIVES**

3.1 **General objective**

- **To** Assess the magnitude and factor associated with complete immunization coverage in children aged 12-23 months in Addis Ketema sub-city, Addis Ababa city administration, Ethiopia

3.2. **Specific objectives**

- To determine full immunization coverage among children of aged 12-23 months
- To assess factors associated with full immunization of children aged 12-23 months

4. **Methodology**

4.1 **Study area and period**

The study was conducted in Addis Ketma Sub-City, one of the 10 sub-cities of Addis Ababa city government Addis Ketema sub-city is composed of 10 Woreda (district) administrations. It has an estimated population of 226971 (25). In the sub-city there are 3 government health centers, and private health facilities (2 hospitals, 11 higher clinics,17 medium clinics and 21 lower clinics). According to the Addis Ketema sub city Health Bureau annual report of July 2012, the physical health service coverage of the sub-city is estimated to be 100%. The sub city is densely populated with many slum areas. The area was highly mobile people (temporary inhabitants) found in the study area. Most of the populations residing in this sub-city leading their life by trade (25). The study was conducted from February, 2013 to March, 2013.

4.2 **Study design**

Community based cross-sectional study design was employed. Quantitative data was collected from mothers/caretakers who had children aged 12-23 months to assess the immunization status and factors affecting it in Addis ketema Sub-City, Addis Ababa City Administration.

4.3 **Source population**

All household with children of 12-23 months residing in Addis Ketma Sub-City.

4.4 **Study population**

The study population of this study was all children in the age group of 12-23 months of age living within eligible household randomly selected in the sub-City.

4.5 **Study participants**

Children of 12-23 months of age and their mothers/caretakers in the selected eligible households.

4.5 **Inclusion and Exclusion criteria**

Inclusion criteria.

- Households with at least one living child of aged between 12-23 months is eligible for the study.

Exclusion criteria

- If the mother of the child is unable to give enough information about her child and herself

4.6 **Sample size determination**

Sample size (n) was calculated based on the assumption of the proportion of fully immunized children aged between 12-23 months which is 79% for Addis Ababa City.(5) The survey used WHO-EPI regional cluster sampling, based on the latest WHO immunization Coverage Cluster Survey reference manual.(26). Based on these P= 75%, precision is ± 5% with 95% confidence level, design effect =2 and the sample of 40 clusters; 15 children per cluster should be surveyed. The total number of children to be surveyed is 40 x 15 = 600.

$$n = DE\frac{(z\alpha/2)^2 p\,(1-p)}{d^2} = \text{-----}600$$

where :

n: the minimum sample size

DE=design effect=2

Z:standardized deviation for the normal distribution; =1.96

p: proportion of fully immunized children aged between 12-23 months is 75%

d: expected margin of error (precision) =5%

Contingency= 5%

4.7 **Sampling procedure**

The 2005 WHO Immunization coverage cluster sampling method was used .In this research a cluster represent the former administrative demarcation called kebele now it is sub-woredas. To identify clusters first all kebeles in the area to be surveyed were listed with an up-to-date population data (the total kebeles in the survey area=47). Then cluster identification form to list all kebeles included in the immunization target area to be evaluated. This list was the sampling frame from which the sample is to be selected. A sampling frame is a list of kebeles found in survey area. A sampling interval was then determined by dividing total population by number of clusters. The first cluster was selected randomly. This was done by locating the community listed in which the cumulative population equals or exceeds the random number. For subsequent clusters, identify the community in which that cluster is located by adding the sampling interval to the running total of adding the sampling interval to the random number (26). From each cluster (40 clusters),15 households were selected, (this number of households were assigned

based on personal judgment) . In each cluster the first household was selected by randomly chosen (this was done by using a table of random numbers) from the list of the households. The subsequent households was selected according to the inclusion criteria, based on the principle of the next nearest household (that is after visiting the first household, the second household to be visited was the one that is nearest to the first. The nearest household is defined as the household reachable in the shortest time on foot from the household just visited. The nearest household need not be in direct line of vision or on the same side of the street or road. If there are two or more households equally near to the one just visited, the one on the immediate right to the one stands in the doorway of the house looking out was selected. In case of two or more children found in selected house, the youngest child was selected. Equal number of household were taken from each cluster.

To calculate a sampling interval, the total population to be surveyed was divided by the number of clusters yielding 5674.Following this a random number between one and the sampling interval ;which was 1511 was drown.

4.8. **Data collection procedure**

Quantitative data were collected from mother/caretakers of children aged 12-23 months old using structured questionnaire. Data collection was undertaken during the month of April 2013. The questionnaire was originally prepared in English and then translated in to Amharic and back to English to make the information easily understood by the data collectors and interviewees during interview and to gate consistence information. Information were collected on full immunization coverage in two ways: Mothers or caretakers were asked to show immunization cards for child and the dates of immunization were copied onto the questionnaire.

If immunization cards were lost or if a vaccine had not been recorded on the card as being given, then the maternal report of immunizations was recorded. Presence of BCG scar was observed in surveyed infants. Ten data collectors (who are Bachelor degree holders on health) and three supervisors (senior Health professionals, (degree holders)) was recruited and training on the objective of the study and techniques of data collection for two days. All data collectors are expected to interview 15 HHs per day. The principal investigator was coordinated the overall activity of the study.

4.9. **Study variables**

4.9.1. **Dependent variable**

- Full immunization

4.9.2. **Independent variables**

- Socio demographic characteristics of mothers/caretakers (religion, age, occupation, educational status ,family size)
- Maternal and child health care services utilization(maternal TT, ANC follow up, PNC follow up)
- Time of travel to reach the nearest health facility
- Knowledge of mothers/caretakers (about vaccine and vaccine preventable diseases)
- Child characteristics (sex of child ,birth order ,place of delivery)
- Number of child ever born
- Experience of child death
- Family income

4.10**. Operational definitions**

Cluster: is the area that is covered by one kebele(the former Addis Ababa city administrative structure)

Defaulter :-if the child missed at least one of the recommended vaccines, he/she was considered as defaulter.

Full immunization is considered if the child took all the recommended vaccines with recommended doses including (a dose of BCG, 3 dose of pentavalent, 3 dose of polio and a dose of measles vaccine of one year.

Fully immunized child (FIC): A child who received 8 doses: a dose of BCG, 3 doses of Pentavalent and polio, and one dose of measles vaccines.

Fully immunized child with valid doses before the age of one year: a child who received valid doses of all the 8doses before the age of one year.

Immunization :-Similar to vaccination . in this research the word vaccination and immunization used interchangeably

Missed opportunities:- is defined as when a child in eligible age to be immunized comes into immunization service deliveries but he/she is not immunized for some reasons such as illness or unavailable of some antigens.

Partially immunized if a child taken at least one dose of vaccine

Vaccination :-administering of vaccines

Valid doses: Doses recorded in child cards, administered with proper spacing according to the national schedule, and, in the case of child immunization, administered when the child had reached the minimum age for the vaccine.

Vaccinated by card only: Only doses documented on immunization card

Vaccinated by card plus history: Both documented doses and doses reported by mother to be received is considered.

C**orrect age to begin immunization-** which is just after birth and six weeks after birth),

Correct age to complete immunization- 9 months and up to one year

correct session needed to complete child immunization- four and five sessions to complete immunization.

4.11**. Data Quality management**

Data quality was ensured through training of both data collectors and supervisors and pretesting of questionnaires. The principal investigator and the supervisor made day to day on site supervision during the whole period of data collection. Spot checking and reviewing the completed forms by supervisor and principal investigator on daily basis to maintain data quality. Proper categorization and coding of data and further, 5% of the collected information was checked by the principal investigators.

4.12. Data analysis

Data were entered and cleaned in Epi info 3.5.1 software and exported to SPSS version 16.0 statistical software for analysis . Data were presented using descriptive statistics in the form of frequency tables, proportions and appropriate graphs and charts. Bivariate analyses was done to see the crude relationship between independent variables and the outcome of interest. Variables that were significantly associated with full immunization at P-value of ≤0.05were entered into a multivariable logistic regression model to control for confounding effects of other variables and determine independent predictors of full immunization. Crude and adjusted odds ratio with their corresponding 95% confidence limits were used to determine the strength of association and statistical significance respectively.

4.13. Ethical consideration

Ethical clearance was obtained from the research and ethics committee (REC) of the School of Public Health AAU. Official letters was written by School of Public Health, to Addis. Ababa Health Bureau. Verbal Consent was obtained from the study respondents after giving information and thoroughly explaining on the aim of the study. Respondents were interviewed in their homes individually. Information obtained from respondents was not used in connection with their identification and confidentiality was assured.

4.14. Dissemination of findings

The finding of the study would primarily be presented to the school of Public Health as partial fulfillment of the degree of public health . Following that it would further be submitted to Addis Ketama sub city and Addis Ababa Health Bureau and respective. The findings also disseminated to different organizations that would have contributions to improve the immunization status of children.

5. RESULT

5.1 Socio demographic characteristics of the study population

Of the total of 600 calculated sample size 15 (2.5%) respondents were excluded due to inconsistency and incompleteness. Therefore, the final data analysis was made based on 585 eligible households making a response rate of 97.5%.

Age of respondents was ranged from 18 to 41 years with mean age of 29 ± 4.7years. Majority 531 (90.8%) of the mothers were married. Three hundred thirty eight (57.8%) were Orthodox Christian followed by Muslim 205 (35.0%).Two hundred thirty five (40.2%) and 228 (39.0%) had primary and secondary level of education respectively. Most of mothers occupation were housewives 277 (47.4%) followed by 89 (15.2%) government employee , 75 (12.8%) merchant, and63 (10.8%)were NGO employee,40(6.8%)daily laborer and41(7.0%) other (prostitute and baggers). Ethnicity was composed of Amhara 165(28.2%), Gurage 156 (26.7%), Oromo 93 (15.9%) and Selite 89 (15.2 %). (Table 1).

Table1 : - Socio-Demographic characteristics of the respondents, Addis Ketema sub-city, July, 2013.

Variables	Number (n=585)	percent
Marital status of the mother		
Single	20	3.1
Married	531	90.8
Divorced	18	3.1
Widowed	16	2.7
Educational status of the mother		
Illiterate	43	7.4
Read and write	79	13.5
Primary	235	40.2
Secondary and above	228	39.0
Occupation of the mother		
house wife	277	47.4
government employee	89	15.2
Merchant	75	12.8
daily laborer	40	6.8
NGO employee	63	10.8
Other	41	7.0
Ethnicity of the mother		
Orormo	93	15.9
Amhara	165	28.2
Tegre	54	9.2
Gurage	156	26.7
Selite	89	15.2
Other	28	4.8
Religion of the mother		
Orthodox	338	57.8
Muslim	205	35.0
Protestant	38	6.5
Other	4	.7
Age of mother (years)		
< 20	27	4.6
20-29	296	50.6
30-39	256	43.8
40-49	6	1.0
Educational status of the father		
Illiterate	27	5.1
Read and write	74	13.9
Primary	119	22.4
Secondary and above	311	58.6
Occupation of the father		
unemployed	15	2.8
government employee	119	22.4
Merchant	168	31.6
daily laborer	73	13.7
NGO employee	139	26.2
Other	17	3.2
Age of father (years)		
<26	20	3.8
26-35	282	53.1
36-50	222	41.8
> 50	7	1.3

Paternal socio-demographic characteristics, four hundred thirty (81%) of them attend primary school and above and majority of them were orthodox followers. One hundred sixty eight (31.6%) of them were merchants, 139(26.2%) of them NGO employee and 282 (53.1%) of the fathers age between 26-35 years.

5.2 **Family size, child ever born and experience of child death by the mothers**

The average family size of the study population was 4.21 ranging from 2 to 10. On average a mother had 2.2 children and a maximum of8. Majority of them351(60%) had 2-4 children and only 6(1.%)of the respondents had experienced child death.(Table 2)

Table 2: - Maternal health care utilization , distribution of family size, child ever born and alive to Mother, Addis Ketema sub-city, July, 2013.

Variables	**Frequency**	**Percent**
Family size		
<=2	22	3.8
3-4	351	60.0
>4	212	36.2
Child alive		
One	207	35.4
2-4	349	59.7
>4	29	5.0
Experience of child death		
Yes	6	1.0
No	579	99.0
Antenatal care follow-up	n= 585	
Yes	450	76.9
No	135	23.1
No of ANC Visit	n= 538	
One visit	12	2.1
Two visit	49	8.4
Three visit	85	14.5
Four visit	262	44.8
>four visit	42	7.2
Tetanus Toxoid immunization	n= 585	
Yes	411	70.3
No	174	29.7
No of TT received	**n= 411**	
One	14	3.4
Two	124	30.2
Three	141	34.3
Four	76	18.5
Five	56	13.6
PNC	n= 585	
Yes	375	64.1
No	210	35.9

5.3 **Antenatal care (ANC) follow up, postnatal health care (PNC) and TT status of mothers**

The maternal health care services utilization of respondents was, 450 (76.9%) of mothers had followed at least one ANC follow up during their pregnancy of the child and 262(44.8%) of them received four ANC visit and 42 (7.2%) greater than four visit. In addition, 411 (70.3%) of them ever took one or more doses of TT vaccine, from these 397(96.6%) took great or equal two doses and 375 (64.1%) took PNC service. (Table 2)

5.4 **Availability and accessibility of vaccination service**

Five hundred forty five (93.1%) of mothers /caretakers respond that they could reach the vaccination site within 30 minutes. 100% of the respondents were reported that they had access to the health facility that provides immunization services and majority of the reported 483 (82.6%) that they were access to health center followed by hospital 149 (25.5%), 100 (17.1%) were accessed to private health facility (here the summation need not be 100% because one can accessible for different health facility at the same time).

Table 3: - Vaccination service availability and accessibility, Addis Ketema sub-city, July, 2013.

variables	Frequency	Percent
Presence of health facility which gives vaccination service		
Yes	585	100
No	0	0
Types of health institution near to them		
Health center	483	82.6
Hospital	149	25.5
Private health facility	100	17.1
Average walking time to reach nearest vaccination services (hours)		
<0.25	261	44.6
0.25-0.5	284	48.5
0.5-1	36	6.2
>1	4	0.7

5.5 **Knowledge on vaccination and vaccine preventable diseases, source of information**

About (96%) mothers had heard about vaccination and vaccine preventable disease. The major sources of information for this information were from Health workers (n = 534, 91.3%), from Television (n=277,48.3%), radio (n = 208, 36.3%), friends (n = 63, 11%), school(n = 24, 4.2%), other (n = 9, 1.6%).Table 4 revealed that, 77.4% of parents knew that the objective of

vaccinating children was to prevent disease, while 4.3 % of parents said they had no idea about the objectives of vaccination; for others, 11.8% all vaccinations are to prevent specific diseases like poliomyelitis. Most mothers had more than half of them55.1% were generally know three to four about vaccine preventable diseases and only 10(1.7%) respondents knew all (8) target vaccine preventable diseases. From eight target vaccine preventable diseases, majority of the respondents (528/563 93.8%) knew measles followed by polio (543/563 96.6%), 175(31%) pertusis, 242(43%) tuberculosis and tetanus (403) 71.6% as vaccine preventable disease. In contrast to these, 22 (3.8%) of them did not know any vaccine preventable disease.

Table 4: - Respondents knowledge on vaccination and vaccine preventable disease,
Addis Ketema sub-city, July, 2013.

Variables	**Frequency**	**Percent**
Heard about vaccination and VPD	**n=585**	
Yes	563	96.2
No	22	3.8
Source of information about vaccination and VPD*	**n=573**	
Health workers	534	91.3
Radio	208	36.3
Television	277	48.3
Friends	63	11.0
School	24	4.2
Other	9	1.6
Objective of vaccination	**n=585**	
To prevent disease	453	77.4
To prevent one disease	69	11.8
For healthy child	38	6.5
Do not know	25	4.3
Other	0	0
Number of vaccine preventable disease know	**n=561**	
≤ 2	148	25.3
3-4	322	55.1
≥ 5	91	15.6

*VPD=vaccine preventable disease

Knowledge of mothers/care takers on age at which the child begins immunization, 497 (85%) said just after birth,26 (4.4%) of them after six weeks and 18(3.1%) said they do not know the age at which the child should begin immunization. Also on the session needed to full immunization majority of them answered , 307(52.5%) five session and 30 (5.1%) responded do not know. On age complete immunization 244 (41.7%) responded nine months and only 14 (2.4%) said do not know.

Table 5 : - Mothers' response to age the child begins, completes and session needed to complete child immunization, Addis Ketema sub-city, July, 2013.

Variables	Frequency	Percent
The age at which a child starts routine EPI services		
Just after birth	497	85.0
Six weeks after	26	4.4
Any time	25	4.3
After one year	15	2.6
Do not know	18	3.1
Other (	4	.7
No of sessions required a child to complete routine EPI services		
One	5	0.9
Two	23	3.9
Three	65	11.1
Four	94	16.1
Five	307	52.5
> five	61	10.4
Do not know	30	5.1
The age at which a child to complete routine EPI services		
9 month	244	41.7
One year, 10,month, 11 month	208	35.6
5 year	58	9.9
Other (2,3,4 years, 6 months)	61	10.4
Do not know	14	2.4

Before proceeding to analysis, the variables categorized into two groups, to the correct and incorrect; accordingly. 523 (89.4%)of respondent answered correctly for age begin immunization (which is just after birth and six weeks after birth),the age at which to complete immunization 452 (77.3%) of the respondent answered correctly (that is 9 months and up to one year) and 401(68.6%) of the respondents answered correctly for session needed (four and five sessions to complete immunization.)

5.6 **Characteristics of the child**

A total of 585 children of aged between 12- 23 months were included. The mean and median children's age for those included in the study was 17.33 and 17 months respectively. The numbers of male and female participants were approximately equal (49.2% and 50.8% respectively). Majority of children were born at health institution, while 81 (13.8%) of them at home and35.6% first birth, 30.8% second and 33.7% third and above birth orders

Table 6:- Characteristics of the study children aged between 12-23 months, Addis Ketema sub-city, July, 2013.

Variables	Frequency	Percent
Sex		
Male	288	49.2
Female	297	50.8
Place of delivery		
Health institution	504	86.2
Home	81	13.8
Birth order		
One	208	35.6
Two	180	30.8
Three and above	197	33.7

5.7 **Immunization coverage among children aged between 12-23 months**

Overall, 424 (72.5%) of 12-23-month-olds children had completed their entire series of immunizations on the day of the household survey. About 97% of children were ever took one or more doses of vaccines, the card retention rate was 260 (46%).

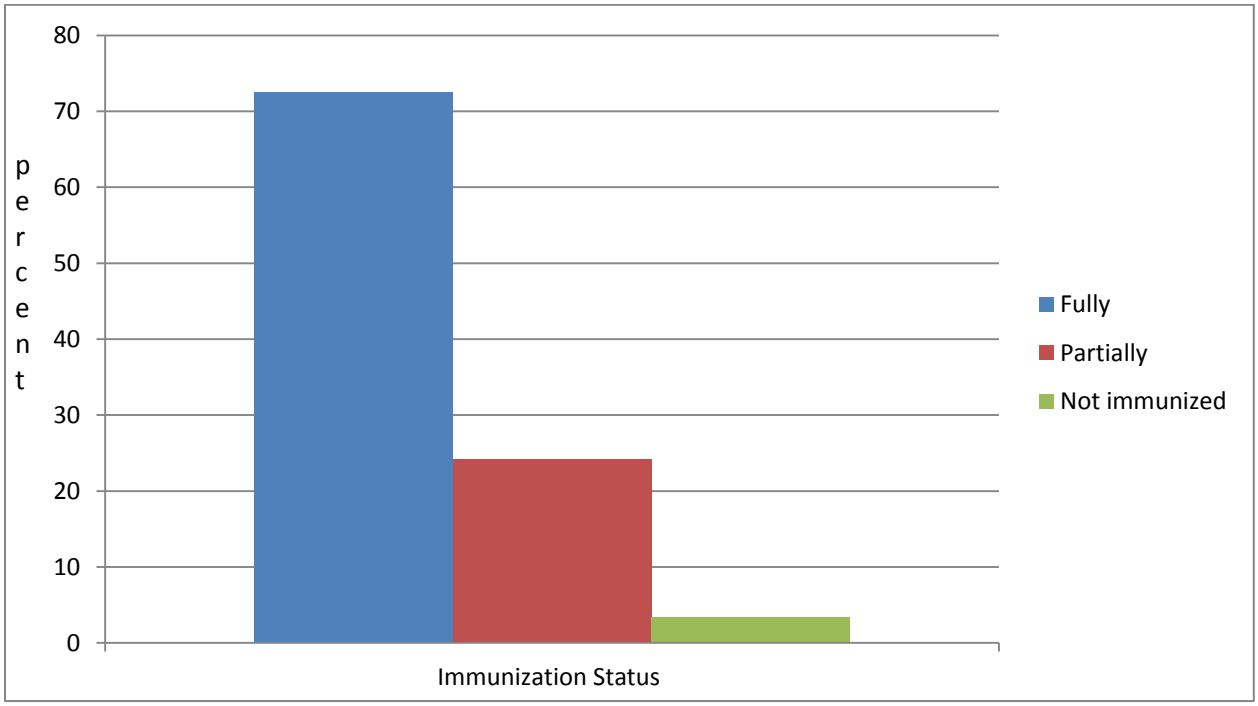

Figure 2:-Immunization status of the study children (card plus recall) aged between 12-23 Months, Addis Ketema sub-city, July, 2013.

5.8 **Immunization coverage by card plus maternal recall**

Combining the evidence of the cards and parents' history, vaccination coverage for BCG, OPV3, Penta3 and measles, was 95.7%, 83.2%, 83.4% and 77.1% respectively. Immunization coverage for children who had a card was less than overall coverage for each vaccine.

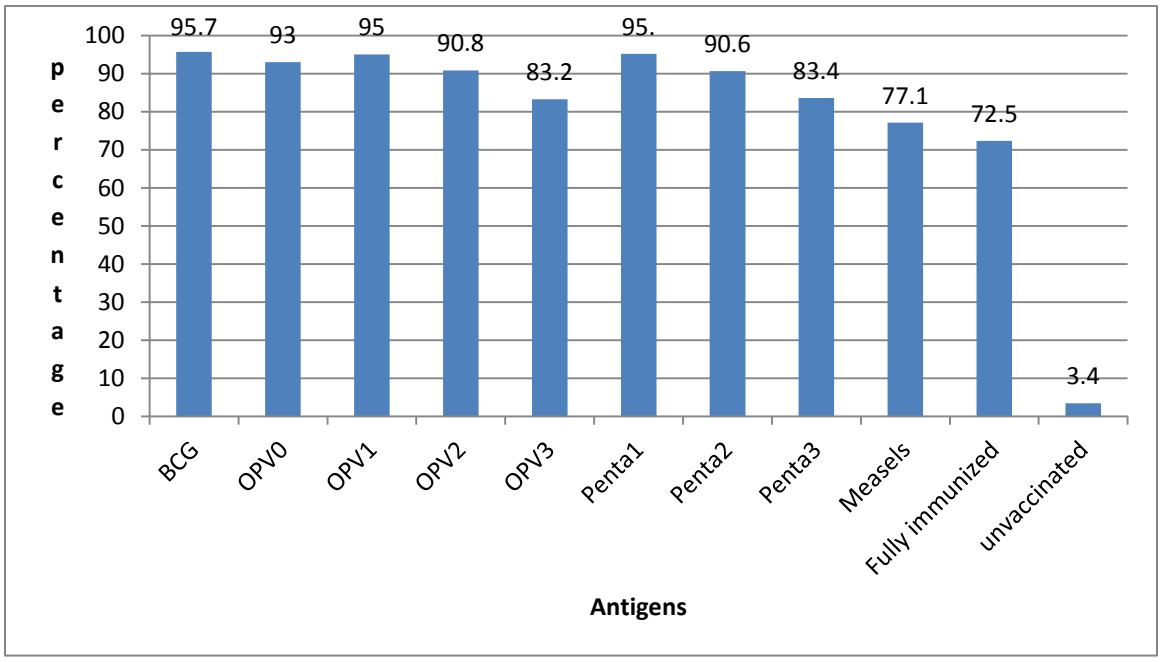

Figure-2:-Immunization coverage of 12-23 months of age children according to the vaccination card and history, Addis Ketema sub-city, July, 2013.

Coverage by card only was calculated by taking those who have immunization card as denominator. The card retention rate was 46%. Based on this penta 3 coverage was 81%, measles 71.9% and fully vaccinated was 68.1%

Table-7:- Immunization coverage of 12-23 months of age children according to the vaccination card only, Addis Ketema sub-city, July, 2013.

Variables	Frequency	Percent
Vaccines		
BCG	243	93.5
OPV0	237	91.2
OPV1	231	88.8
OPV2	220	84.6
OPV3	211	81.0
Penta1	231	88.8
Penta2	219	84.4
Penta3	211	81.0
Measles	187	71.9
Fully vaccinated	177	68.1

5.9 **Factors affecting completion of immunization**

In this study factors associated with completion of child immunization were also assessed separately. These factors include socio demographic characteristics of mothers and child, maternal health care utilization, health care availability and accessibility and knowledge of mothers on vaccination and vaccine preventable disease were included in the analysis. Factors associated with child completion of immunization was seen using logistic regression.

5.9.1 **Socio-demographic characteristics of mothers**

Socio-demographic characteristics of mother/caretakers were first factors assessed for their association with the completion of immunization using both bivariate and multivariate analyses. Results from bivariate analysis of the socio demographic characteristics of the respondents, only maternal occupation was found to be predictor of defaulting. The other socio-demographic variables such as (Marital status of the mother, Educational status of the mother, Ethnicity of the mother, Religion of the mother Age of mother, Monthly income of the family) were not associated with completion of immunization among children aged between 12-23 months. Mothers or immediate caretakers whose occupation categorized under **Other** were 41 (7%). By taking housewife as a reference, those responses categorized under Other (prostitute and baggier) were 0.26 times less likely fully vaccinate their children. Maternal occupation had retained its significance after adjusting other socio-demographic characteristics [OR=0.22 (95%CI: 0.1,0.5)]. (Table- 8)

Table 8: - Completion of immunization among children aged between 12-23 months by socio demographic characteristics of mother, Addis Ketema sub-city, July, 2013.

Variables	Fully vaccinated		COR(95% CI)	AOR(95% CI)
	Yes	No		
Marital status of the mother				
Single	11(1.9)	9 (1.5)	1	
Married	387(66.2)	144 (24.6)	2.19 (0.89,5.41)	NI
Divorced	13(2.2)	5 (0.9)	2.13 (0.52,8.31)	NI
Widowed	12(2.1)	4 (0.7)	2.50 (0.56,10.31)	NI
Educational status of the mother				
Illiterate	26 (4.4)	17 (2.9)	1	NI
Read and write	55 (9.4)	24 (4.1)	1.5 4 (0.67,3.34)	NI
Primary	175 (29.9)	60 (10.3)	1.91 (0.91,3.80)	NI
Secondary and above	167 (28.5)	61 (10.4)	1.79 (0.9,3.49)	NI
Occupation of the mother				
House wife	212 (36.2)	65 (11.1)	1	1
Government employee	66 (11.3)	23 (3.9)	0.88 (0.51,1.50)	1.85(1.00,3.23)
Merchant	51 (8.7)	24 (4.1)	0.65 (0.4,1.10)	1.81(1.00,3.27)
Daily laborer	28 (4.8)	12 (2.1)	0.72 (0.3,1.45)	2.17 (1.00,4.45)
NGO employee	47 (8.0)	16 (2.7)	0.92 (0.51,1.73)	1.74 (0.91,3.34)
Other	**19 (3.2)**	**22 (3.8)**	**0.26 (0.10,0.51)***	**0.22 (0.13,0.51)**
Ethnicity of the mother				
Orormo	69 (11.8)	24 (4.1)	1	
Amhara	119 (20.3)	46 (7.9)	0.90 (0.54,1.63)	NI
Tegre	42 (7.2)	12 (2.1)	1.22 (0.56,2.74)	NI
Gurage	114 (19.5)	42 (7.2)	0.94 (0.45,1.67)	NI
Selite	61 (10.4)	28 (4.8)	0.76 (0.39,1.44)	NI
Other	18 (3.1)	10 (1.7)	0.63 (0.31,1.49)	NI
Religion of the mother				
Orthodox	248 (42.4)	90 (15.4)	1	
Muslim	145 (24.8)	60 (10.3)	0.87 (0.58,1.31)	NI
Protestant	27 (4.6)	11 (1.9)	0.89 (0.41,1.90)	NI
Other	3 (0.5)	1 (0.2)	1.09 (0.13,10.63)	NI
Age of mother				
< 20 year	17 (2.9)	10 (1.7)	1	
20-29 year	228 (39.0)	68 (11.6)	1.97 (0.89,4.45)	NI
30-39 year	174 (29.7)	82 (14.0)	1.25 (0.50,2.81)	NI
40-49 years	4 (0.7)	2 (0.3)	1.18 (0.23,7.64)	NI

N.B *significant , CI- Confidence Interval and (NI- Not Included)

Of the socio demographic characteristics of paternal characteristics of the respondents, all paternal characteristics had no association with full immunization of children.

Table 9: - Completion of immunization among children aged between 12-23 months by socio demographic characteristics of father, Addis Ketema sub-city, July, 2013.

Variables	**Fully vaccinated**		**COR (95% CI)**
	Yes	**No**	
Educational status of the father (n= 531)			
Illiterate	16 (3.0)	11 (2.1)	1
Read and write	52 (9.8)	22 (4.1)	1.63 (0.67,4.11)
Primary	85 (16.0)	34 (6.4)	1.72 (0.67,4.10)
Secondary and above	234 (44.1)	77 (14.5)	2.1 (0.91,4.70)
Occupation of the father (n= 531)			
unemployed	11 (2.1)	4 (0.8)	1
government employee	88 (16.6)	31 (5.8)	1.03 (0.33,3.51)
Merchant	124 (23.4)	44 (8.3)	1.03 (0.26,3.39)
daily laborer	54 (10.2)	19 (3.6)	1.03 (0.30,3.63)
NGO employee	101 (19.0)	38 (7.2)	0.97 (0.29,3.24)
Other	9 (1.7)	8 (1.5)	0.41 (0.11,1.79)
Age of father (n= 531)			
<26 years	17 (3.2)	3 (0.6)	1
26-35 years	217 (40.9)	65 (12.2)	0.59 (0.23,2.13)
36-50 years	149 (28.1)	73 (13.7)	0.36 (0.14,1.27)
> 50 years	4 (0.8)	3 (0.6)	0.24 (0.03,1.57)

The association of completing vaccination of children with family size, child ever born to mother, and experience of child death by mother were assessed by bivariate analysis shows that, these variables do not have significant association with completion of vaccination. (Table 10).

Table 10: - Completion of immunization among children aged between 12-23 months by family size and child ever born, Addis Ketema sub-city, July, 2013.

Variables	Fully Vaccinated		COR (95%CI)
	Yes	No	
Family size			
Two	11 (1.9)	11 (1.9)	0.41 (0.22,1.01)
3-4	262 (44.8)	89 (15.2)	1.2 (0.81,1.83)
>4	150 (25.6)	62 (10.6)	1
Child alive			
One	159 (27.2)	48 (8.2)	1
2-4	246 (42.1)	103 (17.6)	0.72 (0.52,1.13)
>4	18 (3.1)	11 (1.9)	0.49 (0.21,1.13)

5.9.2 **Antenatal care(ANC)follow up, TT status of mothers and PNC follow up**

In this study ANC follow up Tetanus Toxoid status of mother and PNC follow up are the second factors assessed for their association with completion of child immunization. By multivariate analysis PNC follow up status showed a significant association with completion of vaccination among children aged between 12-23 months. Mothers who had followed ANC during their pregnancy of the selected child for this study were [COR=1.63 (95% CI: 1.08, 2.5)] times more likely to vaccinate their children fully than who did not. But number of ANC follow up that mother had took has no association with full immunization of children. In addition to this, children of mothers who ever took tetanus toxoid vaccine were [COR=1.59 (95% CI: 1.09, 2.3)] times more likely to be vaccinated than those who did not vaccinated. Doses of tetanus toxoid that mother took have no significant association with completion of child vaccination of their children. But both ANC follow up and TT vaccination status of the mothers were not shown significant association by multivariate analysis. Mothers who had PNC follow up were significant association with completion of child vaccination. Mothers who had PNC follow up [COR=2.08 (95% CI: 1.4, 3.0)] times more likely fully vaccinate their children than those who don't have The association of these factors was also assessed by using multivariate logistic regression analysis. It showed that only PNC follow up had significantly associated with the completion of vaccination by adjusted odds ratio of [AOR=1.85(95% CI: 1.1,2.9)]. (Table 11)

Table 11: - Completion of immunization among children aged 12-23 months by ANC follow up and TT status of mothers, Addis Ketema sub-city, July, 2013.

Variables	Fully Vaccinated		COR (95%CI)	AOR (95%CI)
	Yes	No		
Antenatal care follow-up (n=585)				
Yes	**336 (57.4)**	**114 (19.5)**	**1.63 (1.08,2.53)***	1.29(0.63,2.68)
No	87 (14.9)	48 (8.2)	1	1
No of ANC taken (n=450)				
One visit	8 (1.8)	4 (0.9)	1	
Two visit	37 (8.2)	12 (2.7)	1.54 (0.43,6.01)	NI
Three visit	62 (13.8)	23 (5.1)	1.35(0.38,4.92)	NI
Four visit	198 (44.0)	64 (14.2)	1.55 (0.53,5.31)	NI
>four visit	31 (6.9)	11 (2.4)	1.41 (0.44,5.56)	NI
Tetanus Toxoid immunization (n=585)				
Yes	**309 (52.8)**	**102 (17.4)**	**1.59(1.09,2.31)***	1.16(0.61,2.20)
No	114 (19.5)	60 (10.3)	1	1
No of TT received (n=411)				
One	12 (2.9)	2 (0.5)	1	
Two	91 (22.1)	33 (8.0)	0.46 (0.11,2.16)	NI
Three	99 (24.1)	42 (10.2)	0.39 (0.1,1.78)	NI
Four	68 (16.5)	8 (1.9)	1.42 (0.33,7.45)	NI
Five	39 (9.5)	17 (4.1)	0.38 (0.13,1.91)	NI
PNC(n=585)				
Yes	**288 (49.2)**	**82(14.0)**	**2.08 (1.42,3.01)***	**1.85(1.10,2.90)***
No	135 (23.1)	80(13.7)	1	

5.9.3**Availability and accessibility of vaccination service**

The associations of health care availability and accessibility with the completion of vaccination also seen by using bivariate analysis. Children of households of access to health facility which provides vaccination service were 100%. The time taken to reach health facility to get vaccination service for children by foot was no significant association with full immunization of children. (Table12)

Table 12: - Completion of immunization among children aged between 12-23 months by health care availability and accessibility, Addis Ketema sub-city, July, 2013.

Variables	Fully Vaccinated		COR(95%CI)
	Yes	No	
Presence of health facility which gives vaccination service			
Yes	423 (72.3)	162 (27.7)	
No	0	0	
Average walking time to reach nearest vaccination services			
< 15 minute	197 (33.7)	64 (10.9)	1
15-30 minute	194 (33.2)	90 (15.4)	0.70 (0.45,1.03)
30-1hour	28 (4.8)	8 (1.4)	1.14 (0.45,2.64)
>1 hour	4 (0.7)	0	0
Mother who bring sick child for vaccination			
Yes	289 (49.4)	97 (16.6)	1.45 (0.88,2.13)
No	134 (22.9)	65 (11.1)	1

5.9.4 **Knowledge of mothers on vaccination and vaccine preventable diseases**

Association of mothers' knowledge about vaccination and vaccine preventable disease with the completion of immunization was the other factor assessed in this study. The results from bivariate analysis shows, children of mothers who heard about vaccination with full vaccination of child immunization has no significant association.. The number of vaccine preventable disease known by the respondents did not show a significant association with completion of immunization by children. After adjusting all other factors, those who answered correctly about objective of vaccination is still remain significant association with full immunization of children. (Table13).

Table 13: - Immunization completion of children aged between 12-23 months by the knowledge on vaccination and vaccine preventable disease, Addis Ketema sub-city, July, 2013.

Variables	Fully Vaccinated		COR (95%CI)	AOR (95%CI)
	Yes	No		
Heard about vaccination and VPD				
Yes	410 (70.1)	153 (26.2)	1.86 (0.8,4.4)	NI
No	13 (2.2)	9 (1.5)	1	
Objective of vaccination (585)				
To prevent diseases	**336 (57.4)**	**118 (20.2)**	**2.76 (1.22,6.30)***	**2.39(1.01,5.63)***
To prevent one disease	48 (8.2)	21 (3.6)	1.93 (0.67,5.03)	0.52(0.12,3.34)
For healthy child	26 (4.4)	12 (2.1)	1.83 (0.61,5.20)	3.54(0.67,18.33)
Do not know	13 (2.2)	11 (1.9)	1	
Number of vaccine preventable disease know(n=561)				
≤ 2	99 (17.6)	49 (8.7)	1	
3-4	240 (42.8)	82 (14.6)	1.45 (0.89,2.15)	NI
≥ 5	71 (12.7)	20 (3.6)	1.76 (0.91,3.23)	NI

5.9.5. **Knowledge of age begins, finishes and session needed for immunization**

The associations of mothers' correct knowledge on age at which immunization begins, finish immunization and session needed to complete immunization were seen using bivariate and multivariate analyses after categorizing the responses into the correct and incorrect answer for the immunization schedules. Both analyses, i.e. bivariate and multivariate, show that at 95% CI the correct knowledge of age at begin and number of session needed to be vaccinated are related to fully vaccination status of children. Children of mothers who know correctly age at which the child should begin were [AOR= 2.17 (95% CI of 1.26, 3.67)] times more likely to be fully vaccinated than who do not know. Similarly mothers of children who know correctly number of sessions required to complete child immunization were [AOR=1.61(95% CI of 1.09, 2.41)] times more likely to be fully vaccinated than who do not know. Regards to correct age to complete immunization, bivariate analysis shows that no significant association. (Table 14)

Table 14: - Immunization completion among children aged 12-23 by knowledge of mothers on age begin, finish and session needed for complete immunization, Addis Ketema sub-city, July, 2013.

Variables	**Fully Vaccinated**		**COR (95%CI)**	**AOR(95%CI)**
	Yes	**No**		
Know the correct age at which a child starts routine EPI services				
Yes	**388 (66.3)**	**135 (23.1)**	**2.22 (1.33,3.78)***	**2.17(1.26,3.67)***
No	35 (6.0)	27 (4.6)	1	1
Know the correct No of sessions required a child to complete routine EPI services				
Yes	**303 (51.8)**	**98 (16.8)**	**1.65(1.11,2.43)***	**1.61(1.09,2.41)***
No	120 (20.5)	64 (10.9)	1	1
Know the correct age at which a child to complete routine EPI services				
Yes	336 (57.4)	117 (20.0)	1.45 (0.90,2.34)	NI
No	87 (14.9)	45 (7.7)	1	

5.9.6 **Child characteristics**

Association of child characteristics like sex of the child, place of delivery and birth order of the child with completion of child immunization were another variable assessed by this study. From these variables place of delivery was showed that significant association with completion of immunization by both bivariate and multivariate analysis. Children those born in health institution were[OR=2.26 (95% CI: 1.4, 3.7)] times likely to be fully vaccinated than those who born at home (Table 15).

Table 15-:- Immunization completion among children aged between 12-23 month by characteristics of the child, Addis Ketema sub-city, July, 2013.

Variables	Fully Vaccinated		**Odds ratio (95%CI)**	
	Yes	No	Crude	Adjusted
Sex				
Male	218 (37.3)	70 (12.0)	1	NI
Female	205 (35.0)	92 (15.7)	0.72 (0.53,1.02)	NI
Place of delivery				
Health institution	**377 (64.4)**	**127 (21.7)**	**2.26 (1.38,3.67)***	**2.31(1.38,3.76)***
Home	46 (7.9)	35 (6.0)	1	
Birth order				
First	160 (27.4)	48 (8.2)	1.46 (0.94,2.31)	NI
Second	126 (21.5)	54 (9.2)	1.02 (0.72,1.6)	NI
Third and above	137 (23.4)	60 (10.3)	1	

5.10. **Reasons for vaccination failure among partially or unvaccinated children**

The respondent who were not completing and not vaccinated their children asked for reasons of failure. From the reasons given for not completing immunization majority of the respondents 64.8% categorized under Other (I forgot the appointment date, I changed my place of residence, illnesses of children, postponing immunization and poor welcoming of health workers) , 23.2% of them said they do not know whether to come back for subsequent doses, 10.6% lack of awareness on the importance of vaccination (Figure-3).

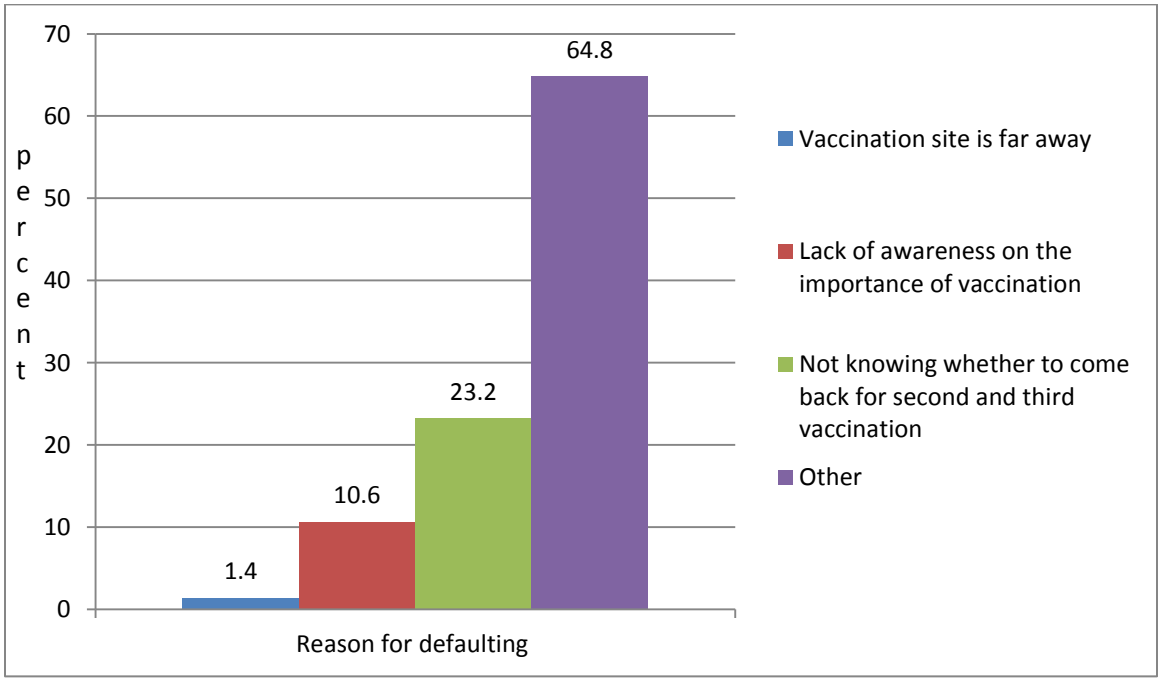

Figure 3:- Reasons given by mothers for defaulting from completing children's immunization, Addis Ketema sub-city, July, 2013

In addition to this, reasons for not immunized their children were also asked the respondents whose children were not vaccinated. Among the reason given23.8% of the respondents believed that vaccination was harming their children,23.8% of them lack of awareness about vaccination , 9.5% of the respondents do not give any specific reason, 9.5% said vaccination have no use for the children and 19.0% of them fear of side effect. (Figure 4).

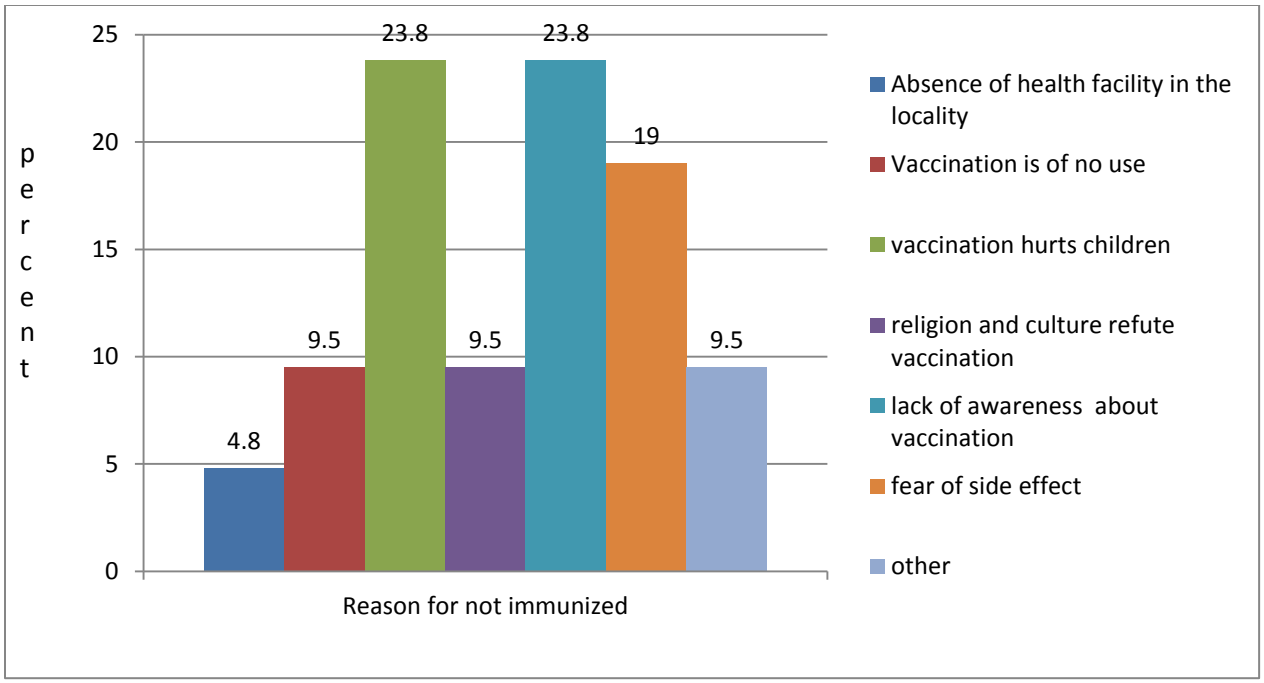

Figure 4:- Reasons given by mothers for not vaccinating their children, Addis Ketema sub-city, July, 2013.

Independent predictors of full immunization

In the final logistic regression model, occupation of the mother, postnatal care follow up (PNC) knowledge about objective of vaccination, knowledge about start age of immunization ,knowledge about number of session required to complete routine immunization, Place of delivery were identified as independent predictor full immunization.

6. Discussion

This study was conducted in a heterogeneous community to assess the coverage of immunization and factors associated with full immunization of children aged between 12-23 months old residing in Addis Ketema sub-city, Addis Ababa city government, Ethiopia. The interviewed mothers were from low to high economic status and the educational status vary from low or no educational up to higher educational level. Determinants of receipt of vaccination completion are complex and interwoven. This study identified several reasons affecting childhood immunization status. Of these, socio demographic factors and maternal health care utilization were reasons for incomplete immunization status of children.

Immunization coverage was assessed using the availability of vaccination card and maternal recall

All the study participants had access to immunization services routinely at health institutions. However, more than a quarter of children did not complete the recommended immunization schedule. Full immunization coverage in this study (72.5%) was lower by (6.2%) as compared to a survey conducted at nationwide in the country (EDHS,2011) (5). These differences may be due to the methods employed by the two surveys are different. In the EDHS sample size was not determined for each region based on the regional DPT3coverage, and sample size was not calculated using the currently WHO recommended precision level. This may have contributed to differences. It is also lower than that of the national EPI cluster survey report in Ethiopia ,2006 full immunization coverage 86.6% (4).

From the total interviewed households, 260(46%) them able to show the vaccination card. From these 93.5% of children took BCG vaccines and 68.1% had taken all the recommended immunization. The immunization coverage for BCG, Penta, and OPV was above 80%. But the measles vaccine/ antigen coverage was lower than from other antigens.

Socio demographic characteristics

Of the socio demographic characteristics of the respondents, only maternal occupation was found to be predictor of full immunization. The other socio-demographic variables including family size, age of the mother, monthly income of the family, ethnicity, religion, parity, family size and educational status were not associated with full immunization status of children. A study done in Ambo Woreda, West Shewa Zone of Oromia Regional State, based on the bivariate analysis, occupation of the mother showed significant association with the immunization status of the children (9). And also research done in urban Bangladesh, maternal occupational status has an association with full immunization of children (27).

There was no evidence to support that sex of child and birth order had any impact on full immunization of children in this study. In some societies with cultural discrimination against female children, boys have a greater chance to be vaccinated. Research done in urban Bangladesh had revealed that sex and birth order had an association with child immunization status (27).

Marital status and age of the mothers were not seen to be associated with the completion of child immunization. Study done in south Ethiopia also shows that marital status and age of mothers/care takers were not associated with full immunization of children (17).

The immunization coverage for measles vaccine was lower than other antigens (BCG, Penta, and OPV). A number of children do not return for measles vaccine and this makes the coverage rate for this antigen to be lower than others. The lower coverage for measles antigen may be due to the long interval between the third dose of penta/OPV and measles may result the mother to forget to come back to take this antigen .

Maternal health service utilization

There was significant association between utilization of maternal and child health care services and completion of child immunization. Antenatal care (ANC) ,Postnatal care (PNC) follow up and TT status of the mother showed a significant association with the child immunization status by bivariate analysis.

Mother who had followed ANC during her pregnancy was 1.63 times to complete vaccination than who do not have. Those mothers who had TT vaccination during their pregnancy 1.59 times to complete immunization. Research done in Mali also shows that maternal vaccination status during pregnancy was associated with full vaccination of the child (29). But the number of ANC follow up and number of TT doses that the mother received had no significant association. This is consistence with the study done in Ambo worda, and Nigeria (9,16). This may be due to in one contact health professionals may give enough information about the importance of vaccination and the other reason may be the community respect/practice more the words of health professionals.

And also there was a significant association between utilization of postnatal care (PNC) service and completion of child immunization. Based on bivariate and multivariate analysis, mothers who use PNC service after delivery of the child, was more likely to complete the immunization of children than mothers who had not visit for PNC services. This research is consistent with other researches. Study done in south Ethiopia, and Ambo district also show that mothers who had PNC follow up had more likely to complete child immunization than who don't have (9) and also Kenya (28).A multilevel analysis done in sub-Saharan Africa shows that ,mothers with health seeking behaviors were less likely to have children that were unimmunized [OR= 0.54 (95% CI: 0.53, 0.56)] (30).

Place of delivery showed an association with child immunization status. Child borne in a health facility were 2.26 times more likely to complete vaccination than children born at home, which was consistent with studies from other places**.** Study done in Mozambique, Nigeria and Kenya shows that, home delivered children had higher risk of not completing vaccination (9,18,28)**.** Hence, the increase in the proportion of deliveries within health facilities will also lead to a better effective coverage of the EPI.

All the study participants had access to immunization services at health institution (accessibility in terms of average walking time to nearest health facility) did not have a significant association with the immunization status of the children which is similar with study done in south Ethiopia and Nigeria (9,17).

Knowledge of Mother about the objective of child immunization had an association with full immunization of children. In the contrary study done in Ambo worda, knowledge about objective of vaccination had no association, this is may be mother going to vaccinate their child if they felt that it was good, in addition it can be social influence (9). Lacks of awareness about immunization contribute to low immunization coverage in Ethiopia (31).

The findings of this study also indicate that lack of knowledge on vaccination and vaccine preventable disease, and age at the child begins and finishes the immunization, and is related with the immunization status of children aged 12-23 months. Mother those not heard about vaccination and vaccine preventable disease were less likely to vaccinate their children. But, there is no significant difference in completion of immunization. This indicates that, those who have no information are not begun the immunization for their children. Mother who know correctly the age at which the child begins immunization are more likely to finish immunization of their children than those who did not know correctly. These finding is consistence with the study in other place of Ethiopia (16).

Reason for not immunizing and not completing the course of vaccination

The reasons for non-vaccination and for dropping out, according to those responsible for the children, are presented in Table 20 and 21. The reasons for not vaccinating their children were due to lack of awareness about vaccination , believing that vaccination hurts children and fear of side effect and also the reasons for not completing the course of vaccination were mostly due to forgetting of immunization appointment date (especially for measles vaccine this is because of the gap between the third dose of Penta| OPV longer) lack of information, illnesses of children and postponing immunization. Study done in Nigeria, Mali shows that, Maternal factors were most strongly associated with non-completion of vaccination; the most frequent was lack of awareness of the need for immunization (9,29). Study done in south Ethiopia had identified that maternal knowledge about immunization was one of the major reasons for defaulting (17). Similarly, a facility based study conducted in Nigeria showed that the most common reason given by respondents for defaulting of child immunization were illnesses of children and postponing immunization (9). The major reasons (lack of awareness of the need for immunization) adduced for failure to be fully vaccinated are as reported from Niger.

7. Conclusion and Recommendation

7.1 Conclusion

The significant predictors of full immunization found by multivariate analysis such as knowledge, maternal service utilization and socio-demographic characteristics of mother had association with full immunization of children. Occupation of the mother, postnatal care follow up (PNC) knowledge about objective of vaccination, knowledge about start age of immunization, knowledge about number of session required to complete routine immunization, Place of delivery were the independent predictors. Significant number (3.2%) of children in this survey had not been vaccinated at all.

The other reasons found in this study for not fully immunized were Lack of awareness on the need of subsequent doses, poor or inadequate information-sharing by health providers were the other reasons for not fully immunizing. The low full immunization coverage documented in this study among children particularly for measles vaccination during routine EPI program was found low. Women with health seeking behavior were found to have their children immunized

7.2 Recommendation

Based on the findings of the survey, the following recommendations have been made.

- Health workers were seen to be a potential source for disseminating information relating to the immunization program in this community. The sub-city should emphasize in strengthening of communication, education and information skills of the health providers is an important step for improving immunization status of children and to reduce the dropout rates.
- The sub-city should strength defaulters tracing mechanism using urban health extension program workers by creating referral linkage with health facilities.
- Opportunities for promoting immunization and conducting home visits to identify those in need of immunization and those who default are promising strategies for improving full immunization coverage of children.
- The government prepare programs targeting mothers of lower socio-economic status such as those who are beggars, prostitutes etc.

- Awareness concerning delivery at health facilities should also be created among the community as this is associated with higher likelihood of childhood immunization.
- Systematic reviews relevant to childhood immunization programs in sub-Saharan Africa show that parent reminder and recall systems and mass media interventions have the potential to increase immunization coverage. Verbal, video, or provider-delivered communication tools may also increase parents' understanding, especially if the tools are structured, tailored and interactive. In addition, interventions to promote interaction between the community and health services may build trust and generate awareness and understanding of vaccination issues among parents
- Health facility that provide EPI services should strengthening of continuous staff motivation, regular supervision and continuous monitoring and evaluation to detect declines in vaccination coverage very early.

8. Strengths and limitations of the Study

8.1. Strengths

- Selecting children aged between 12-23 months, which measures the recent immunization program performance and those complete the immunization, also may reduce the recall bias.
- The mothers/caretakers of children who have the correct information on the child's immunization history were interviewed.
- Degree holders were used as data collector
- Careful collection of data by using of WHO immunization cluster survey procedure

8.2. Limitations

- Immunization coverage by report of mother may under/over report the immunization coverage because mothers may not remember doses that child took due to recall bias is a constraint to obtaining a very accurate assessment of immunization coverage.
- Qualitative method was not included to answer why question
- Being cross sectional study, does not show the temporal relationship (cause effect relationship).
- Not able to assess coverage of recently added PCV vaccine due to problems with supply chain management.
- The timeliness of the vaccination was not evaluated in this study as mothers recall was considered to be too poor.

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10. Annexes

Annex I: Study information sheet and Consent form

Questionnaire on Assessment of magnitude and factor associated with full immunization coverage in children aged 12-23 months in Addis Ketema sub-city

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

Confidentiality and consent

Information sheet

Dear respondent, my name is _____. We are working to assess factors affectingcomplete immunization status of children in this woreda. This study tries to identify which factors are contributed to full immunization status of your child and if the child not immunizedor not complete why.

I am one the data collectors and I am asking you some questions about yours and your child's immunization status. Would you please cooperate in responding the following questions? Your participation indirectly contributed in improving the problem of immunization 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.

Would you be willing to participate in the study? Agree_____ Disagree----------

We thank you in advance for taking your time to answer our questions.

Consent form

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_____Signature____Date of interview_____

Supervisor's name_____ Signature_____Cluster number----------

If you need additional information you can contact Principal investigator;

Name Demeke Tolera Tel. No 0913 18 64 73

Annex II: Questionnaire in English version

Guiding Principles: For most questions, possible answers are listed. Following the instructions and fill the answers accordingly. Questions should be asked as they are Correctly, Observe if needed. Listening carefully, Circle answer sheets exactly what the respondents answered.

I- Background information

1.1. Child birth date /day, month ,year/ ----------

Or Age of child in months_____

1.2. Sex of the child 1= male 2= female

1.3. How many children do you have?

1.4. Number of children's older siblings_____

1.5. Family size_____

1.6. Mother's age _____

1.7. Father's age----------

1.8. Mother's marital status

1= single 4= divorced

2= married 5= widowed

3= separated

1.9. Mothers educational status

1=illiterate 3= grade ----------

2=read and write

1.10. Fathers educational status

1=illiterate 3= grade ----------

2=read and write

1.11. Number of children ever born by the mother_____

1.12. Number of children alive _____

1.13. What is occupation of the mother

1= House wife4= daily laborer

2=government employee 5=NGO employee

3=merchant 6= others, specify_____

1.14. What is occupation of the father

1= unemployed 4= daily laborer

2=government employee 5=NGO employee

3=merchant 6= others, specify_____

1.15. How much is your family monthly income per month? _____

1.16. Ethnicity of the mother

1=Oromo3=Tegere 4=Gurage

2=Amhara5= Selete 6=Others

1.17. What is mother's religion?

1=orthodox 3= protestant

2= Muslim4= other specify_____

1.18. What is father's religion?

1=orthodox 3= protestant

2= Muslim 4= other specify_____

II- Access to vaccination service

2.1. Is there any health facility which vaccination service near to you?

1=Yes 2=No

2.2. If yes to above question which health facility is near to you?

1. health center 3 .private clinic

2. hospital

2.3. Time taken to reach health facility (by foot)?

1. Less than 15 minutes 3. 30-1hour minute

2. 15-30 minutes 4. > 1 hour

III-Maternal Health care service utilization

3.1. Have you attended antenatal care during your last pregnancy?

1= Yes 2= No

3.2 . If yes, how many times did you attend? _____

3.3. Have you received tetanus vaccination during your last pregnancy?

1=Yes 2= No

3.4 . If yes, how many injections did you received? _____

3.5. Where did you deliver this baby?

1= at home 3=other_____

2= at health institution

3.6. Did you have postnatal care follow up after delivery?

1=Yes 2= No

IV-Questions on immunization

4.1. Do you mention the objective of vaccinating a child?

1=to prevent the disease 4=don't know

2=for specific disease 5=other, specify _____

3=for healthy child

4.2. Do you heard about vaccination and vaccine preventable disease?

1=Yes 2=No

4.3. If yes to above question, from where do you heard about the vaccination and vaccine preventable disease?

1=Radio 4=from school

2=Television 5=Health personnel

3= from friends/peers 6=other, specify _____

4.4. How many vaccine preventable diseases do you know?_____

1. Measles 5. Diphtheria
2. Tetanus 6. Polio
3. Pertusis 7. Hepatitis b
4. Tuberculosis 8. Homophiles influenza b

4.5. How many vaccination sessions are needed for a child to be fully protected?

1= one 4= Four

2 = two 5 = five

3= Three 6= don't know

4.6. Do you tell me the age at which the child begins immunization?

1= just after birth 4=after one year

2= six weeks after birth5= I don' know

3=any time 6=other specify_____

4.7. At what age the child should complete immunization? _____

4.8. Do you think vaccination will make your child sick?

1= Yes 3= don't know

2=No

4.9. Do you bring a sick child for vaccination?

1=Yes 2=No

4.10. Does your child take any vaccination?

1=Yes 2=No

4.11. Do you have a card where vaccinations are written down?

1= Yes 2= No

4.12. Copy the immunization data from the card.

Vaccine taken	Day	Month	Year
BCG			
OPV0			
OPV1			
OPV2			
OPV3			
Pentavalent1			
Pentavalent2			
Pentavalent3			
Measles			
Fully immunized before 1 years of age			

4.13. Please tell me if the child had any of the following vaccinations

4.14. A BCG vaccination against tuberculosis, that is, an injection in the arm or shoulder that usually causes a scar ?

Yes____ No_____

4.15. Does the child have a BCG scare on his/her upper left arm? Observe Yes__ No ___

4.16. Polio vaccine, that is, drops in the mouth?

Yes_____ No_____

4.17 If yes how many times was the polio vaccine given _____

4.18. Was the first polio vaccine given in the first two weeks after birth or later?

Yes_____ No_____

4.19. A pentavalent vaccination, that is, an injection given in theleft thigh?

Yes_____ No_____

4.20. If yes how many times Pentavalent vaccination is given? _____

4.21 .A measles injection that is, a shot in the arm at the age of 9 months or older to prevent him/her from getting measles?

Yes_____ No_____

4.22. Immunization Status of the child

1 Not immunized

2 Partially immunized

3 Fully immunized

If the child does not receive any vaccination ask the following

4.23. What are the reasons for the not receiving any vaccine? If the child has not received any vaccine yet

A. Absence of health facility in the locality

B. Vaccination is of no use

C. Vaccination hurts children

D. Religion and culture refute vaccination

E. Lack of awareness about vaccination

F. Fear of side effect

G. Others

If the child default vaccination ask the following

4.24 . What are the reasons for defaulting? If child is a defaulter)

A. Vaccination site is far-away

B. Vaccination time is inconvenient

C. vaccinators not present

D. Lack of awareness on the importance of vaccination

E. Not knowing vaccination time and site

F. Not knowing whether to come back for second and third vaccination

G. Others

Thank you

Annex III: Study information sheet and Consent form in Amharic version

<u>መጠይቅ</u>

በአዲስከተማ ክ/ከተማእድሜያቸው ከ 12-23 **ወር የሆናቸውን ህጻናት የመደበኛ ክታባት ያጠናቀቁ ህጻናት ሽፋን ምን ያክል እንደሆነና ያሉ ተያያዥ ምክንያቶች ምን እንደሆኑ የዳሰሳ ጥናት ለማካሄድ የተዘጋጀ መጠይቅ**

የመጠይቅቁጥር----------

የጥናቱመግለጫ

ሰላም ጤና ይስጥልኝ ስሜ----------**ይባላል፡፡በዚህ ክ/ከተማ ውስጥ መደበኛ የህጻናት የክትባት ያጠናቀቁ ምን ያክል እንደሆነና ያሉ ተያያዥ ችግሮች ምን እንደሆኑ ለመለየት ነው፡፡ ጥናቱ የትኞቹ ነገሮች/ ምክንያቶች ህጻናት መደበኛክትባታቸውን እንዳያጠናቅቁ ምክንያት የሚሆኑትን ለይቶ ለማወቅና ልጅዎ ክትባት ካልተከተበ/ካላጠናቀቀ ምክንያቱ ምንእንደሆነ ለማወቅ ነው፡፡ እኔ ለዚህ ጥናት መረጃ ከሚሰበስቡ ሰዎች አንዱ ስሆን አንዳንድ ጥያቄዎች ስለእርሶና ስለልጆ የክትባት ሁኔታ እጠይቆታለሁ፡፡ ለመጠይቆቹ መልካም ፍቃዶ ከሆነ ይተባበሩኛል? የእርሶ ትብብር በተዘዋዋሪ በህጻናት ክትባት ዙሪያ ያሉትን ችግች በመፍታት የክፍለከተማውንና የራሶን ልጅ የክትባት ሁኔታ ለማሻሻል አስተዋጽኦ ያደረርጋል፡፡**

እርሶ የሚሰጡን መልስ ከእርሶ ፈቃድ ውጪ ለማንኛውም ሰው ግልጽ አይሆንም፡፡ስሞትንም አለመናገር ይችላሉ፡፡መጠይቁ የሚፈጀው ጊዜ 20 **ደቂቃ ብቻ ነው፡፡በጥናቱ ላይ እንዲሳተፉ ማንም አያስገድዶትም፡፡ በጥናቱ ላይ ያለመሳተፍ ሙሉ መብት አሎት፤ማቋረጥና የማይፈልጉትን ጥያቄዎች ያለመመለ ስመብት አሎት፡፡**

በጥናቱ ላይ ለመሳተፍ ፍቃደኛ ኖት? አዎ---------- **አይደለሁም**----------

በመጀመሪያ ለጥያቄያችን መልስ ለመስጠት ጊዜህን/ሽን ስለሰጠኽን/ሽን እናመሰግናለን፡፡

Annex IV : Questionnaire in Amharic version

የመግባቢያቅጽ

ስለጥናቱ አላማ በአጭሩ በግልጽ አስረድቾታለሁ እናም በጥናቱ ለመሳተፍ ፍቃደኛ ከሆኑ በፊርማዎት ያረጋግጡልኝ

ፊርማ----------ቀን----------

መጠይቅ ያደረገው ሰው ስምና መለያ ቁጥር ---------- ፊርማ ----------

መጠይቅ የተደረገበት ቀን ---------- 2005ዓ.ም

የሱፐርቫይዘ ርሥም---------- ፊርማ ----------

ቡድን (ክለስተር)ቁጥር----------

ለተጨማሪ መረጃ ከፈለጉ አቶ ደመቀ ቶሌራ በስልክ ቁጥር 0913-18-64-73 መጠየቅ ይችላሉ

የመጠይቅአሞላልመመሪያ

ለአብዛኛዎቹ መጠይቆች መልስ ሊሆኑ ይችላሉ ተብለ የታመነባቸው አማራጮች በዝርዝር ተቀምጠዋል።ስለዚህ መጠይቁቹን የሚከተሉትን መመሪያዎች በመከተል መጠየቅና መልሱን ማስፈር አስፈላጊ ነው።

- **እያንዳንዱ ጥያቄ መጠይቁ ላይ እንደሰፈረው በትክክል መጠየቅ አለበት።**
- **መታየት ያለባቸው ቦታዎች ካሉ በትክክል መታየት አለባቸው።**

ተጠያቂዎች የሚሰጡትን መልስ በትክክል ማዳመጥና ለተሰጡት መልሶች ከተቀመጡት አማራጨች በበለጠ የሚመሳሰለውን በመምረጥ የክብ ምልክት መደረግ አለበት።

ሀ .ቅደመታሪክሁኔታ

1.1. **የህጻኑ/ኗ የትውል ድቀን(ቀን---------- ወር--------ዓ.ም---------ወይም የህጻኑ እድሜ (በወር)--**

1.2. **የህጻኑ/ኗጾታ**

1 = **ወንድ** 2 = **ሴት**

1.3. **ስንት ልጆች አሎት**

1.4 **ስንተኛ ልጆዎ ነው----------**

1.5. **የቤተሰ ብብዛት----------**

1.6. **የእናትየዋ እድሜ----------**

1.7 **የአባትየው እድሜ**……..

1.8. **የእናትየዋ የጋብቻ ሁኔታ**

1 = **ያላገባች** 4 = **የፈታች**

2 = **ያገባች** 5 = **ባሏየሞተባት**

3= **የተለያየች**

1.9. **የእናትየዋ የትምህርት ሁኔታ**

1 = **ያልተማረች** 3 = **የደረሱበት የት/ትደረጃይገለጽ----------**

2 = **ማንበብናመጻፍ**

1.10. **የአባትየው የትምህርት ሁኔታ**

1 = **ያልተማረ** 3 = **የደረሱበት የት/ትደረጃይገለጽ----------**

2 = **ማንበብናመጻፍ**

1.11. **እናትየዋ የወለደቻቸው ልጆች ብዛት----------**

1.12. **በህይወት ያሉ ህጻናት ብዛት----------**

1.13. **የእናትየዋ ስራ ምንድን ነው**

1 = **የቤት እመቤት** 4 = **የቀን ሰራተኛ**

2 = **የመንግስት ሰራተኛ** 5=**የግል ድርጅት ሰራተኛ**

3 = **ነጋዴ** 6 = **ሌላ ከሆነ ይገለጽ----------**

1.14. **የአባትየው ስራ ምንድንነው**

1 = **ስራ የሌለው** 4 = **የቀን ሰራተኛ**

2 = **የመንግስት ሰራተኛ** 5=**የግል ድርጅት ሰራተኛ**

3 = **ነጋዴ** 6 = **ሌላ ከሆነ ይገለጽ----------**

1.15.የቤተሰቡ የወር ገቢ ስንት ነው? ----------

1.16. የእናትየዋ ብሄር

1 = ኦሮሞ 3 = ትግሬ 4= ጉራጌ

2 = አማራ 5 = ስልጤ 6=ሌላ

1.17. የእናትየዋ እምነት

1 = ኦርቶዶክስ 3 = ፕሮቴስታንት

2 = ሙስሊም 4 = ሌላ

1.18.የአባትየው እምነት

1 = ኦርቶዶክስ 3 = ፕሮቴስታንት

2 = ሙስሊም 4 = ሌላ

ለ/ <u>የክትባት አግልግሎት በተመለከተ</u>

2.1. በአቅራቢያችሁ የክትባት አገልግሎት የሚሰጥ የጤና ድርጅት አለ ?

1 = አዎ 2 = የለም

2.2. መልሱ አዎ ከሆነ የትኛው የጤና ተቋም

1 = ጤና ጣቢያ 3 = የግል ጤናድርጅት

2 = ሆስፒታል

2.3. ጤናድርጅቱ ለመድረስ ምን ያህል ደቂቃ ይፈጃል (በእግር)

1 = ከ 15 ደቂቃ በታች 3 = ከ30- 60 ደቂቃ

2 = ከ15-30 ደቂቃ 4 = ከአንድ ሰአት በላይ

ሐ/ እናቶችና ህጻናት ጤና አገልግሎት በተመለከተ

3.1. ይህንን/ችንቨ ልጅ ነብሰጡር በነበሩበት ወቅት የቅድ መወሊ ድክትትል ነበሮት?

1 = አዎ 2 = አልነበረኝም

3.2. መልሱ አዎ ከሆነ ለምን ያክል ጊዜ ተከታትለዋል?----------

3.3. ይህንን/ችን ልጅ ነብሰጡር በነበሩበት ወቅት የመንጋጋ ቆልፍ ክትባት ወስደዋል/ተከትበዋል?

1 = አዎ 2. አልተከተብኩም

3.4. መልሱ አዎ ከሆነ ስንት ጊዜ ተከትበዋል----------

3.5. ይህንን/ችን ልጅ ነብሰጡር በነበሩበት ወቅት የት ነው የተገላገሉት/ የወለዱት

1 = ቤት 3 = ሌላ----------

2 = ጤናድርጅት

3.6. ይህንን/ችን ልጅ ከወለዱ በዋላ የድህረ ወሊድ ክትትል አድርገው ነበር

1 = አዎ 2 = አልነበረችም

ሐ/ ክትባትበተመለከተ

4.1.ህጻናትን ማስከተብ አላማው ምንእንደሆነ ይጥቀሱ

1 = በሽታ ለመከላከል 4 = አላውቅም

2 = አንድ በሽታ ለመከላከል 5 = ሌላ ከሆነ ይጠቀስ----------

3 =ለጤነኛ ህጻናት

4.2. ስለክትባትና በክትባት መከላከል ስለምንችላቸው በሽታዎች ሰምተው ያውቃሉ?

1 =አዎ 2 = አላውቅም

4.3. ጥያቄ ቁጥር 4.2 መልሱ አዎ ከሆነ መረጃውን ከየት ሰሙ?

1= ከራዲዮ 4 = ከትምህርት ትቤት

2 = ከቴሌቪዥን 5 = ከጤና ባለሙያ

3 = ከጓደኛ 6 =ከሌላ

4.4.በክትባት ከምንከላከላቸው በሽታዎች መካከል ምን ያህሉን ያውቃሉ (ይጥቀሱ)

1 = ኩፍኝ 5 = ዲፕተሪያ

2 = መንጋጋ ቆልፍ 6 = የልጅነትልምሻ

3 = ትክትክ 7 = የጉበት በሽታ

4 = የሳምባ በሽታ 8 = ኢንፍሉይንዛ

4.5. አንድ ህጻን ክትባት ጀምሮ እስኪጨርስ ስንት ጊዜ መመላለስ አለበት?

1 = አንድ 4 = አራት

2 = ሁለት 5 = አምስት

3 = ሶስት 6 = አላቅም

4.6. አንድ ህጻን በስንተኛ ውእድሜ ክትባት መጀመር አለበት?

1 = ልክ ከተወለደ በኋላ 4 = ከአንድአመትበኋላ

2 =ከሥድስት ሳምንት በኋላ 5 = አላውቅም

3 = በማንኛውም ጊዜ 6 = ሌላይገለጽ----------

4.7አንድህጻን በስንተኛ ውእድሜው ክትባት ማጠናቀቅ አለበት?----------

4.8. ክትባት ልጁንሊያሳምምብኝ ይችላል ብለው ያስባሉ?

1 = አዎ 2 = አላስብም 3 = አላውቅም

4.9. ልጆ ቢያመውም ለክትባት ይወስዱታል/ የታመመ ልጅ ለክትባት ይወስዱታል?

1 = አዎ 2 = አልወስደውም

4.10. ልጆ ክትባት ወስዶ ያውቃል?

1 = አዎ 2 = አልወስደውም

4.11. የህጻኑ የክትባ ትካርድ አለ?

1 = አዎ 2 = የለም

4.12. የጥያቄ ቁጥር 32 መልሱ አዎ ከሆነ ከካርዱ ላይ ያለውን የክትባት መረጃይ ገልብጡ

Vaccine taken	Day	Month	Year
BCG			
OPV0			
OPV1			
OPV2			
OPV3			
Pentavalent1			
Pentavalent2			
Pentavalent3			
Measles			
አንድአመትሳይሞላውክትባትአጠናቋል? አዎ/ አይደለም			

የህጻኑ የክትባት ካርድ ከጠፋ/ ከሌለ እናትየዋን ህጻኑ ከታች የተዘረዘሩትን ክትባቶች እንደወሰደ ጠይቅ/ቂ

. ህጻኑ የሚከተሉትን ክትባች ወስዶ እንደሆን ትነግሪኛለሽ?

4.13. /BCG/ የሳምባ በሽታን የሚከላከል፣ ማለትም በመርፌ ክንድ/ትከሻ ላይ የሚሰጥ ሲሆን የተወጋበት ቦታ ጠባሳ ይተዋል?

1 አዎ 2 የለም

4.14 የሳምባ በሽታን የሚከላከል ክትባት/BCG vaccination/ በክንዱ ላይ ጠባሳ መኖርአለ መኖሩን ተመልከት

1 አለ 2 የለም

4.15. /Polio vaccine/ የልጅነት ልምሻን የሚከላከል ማለትም በአፍ ላይ ጠብ የሚደረግ?

1 አዎ 2 አልወሰደም

4.16 መልሱ አዎ ከሆነ ስንት ጊዜ ተከትቧል----------

4.17. የመጀመሪያው የልጅነት ልምሻን/Polio vaccine/ የሚከላከል ክትባት የወሰደው በተወለደ በመጀመሪያዎቹ ሁለት ሳምንታት ነው?

1 አዎ 2 አይደለም

4.18. ጸረ አምስት ክትባት /pentavalent vaccination/ ማለትም በመርፌ በግራ ጭን ላይ የሚሰጠውን ክትባት ወስዷል?

1 አዎ 2 አልወሰደም

4.19. መ ልሱ አዎ ከሆነ ስንት ጊዜ ይህን ንክትባት ወስዷል----------

4.20. .የኩፍኝ ክትባት ማለትም በዘጠነኛው ወር ወይም ከዘጠኝ ወር በኋላ በክንድ ላይ የሚሰጥ አንድ መርፌ ወስዷል?

1 አዎ 2 አልወሰደም

4.21. የህጻኑ የክትባት ሁኔታ ምን ይመስላል?

1. ክትባት ከነጭራሹ ያልከተበ
2. በከፊል የተከተበ
3. መ·ሉ በመ·ሉ የተከተበ/ ያጠናቀቀ

<u>ህጻኑ ምንም አይነት ክትባት ወስዶ የማያውቅ ከሆነ የሚከተለውን ጠይቅ</u>

4.22. ህጻኑ ያልተከተበበት ምክንያት ለምንድን ነው

1 = በአቅራቢያ ጤናድርጅት ስለሌለ
2 = ክትባት ምንም ጥቅም ስለሌለው
3 = ክትባት ሌጂን ስለሚጎዳብኝ
4 = እምነትና ባህላችን ስለማይፈቅድ
5 = ስለክትባት ግንዛቤ ስለሌለኝ
6 = የጎንዮሽ ጉዳቱን ስለፈራው
7 =ሌላ----------

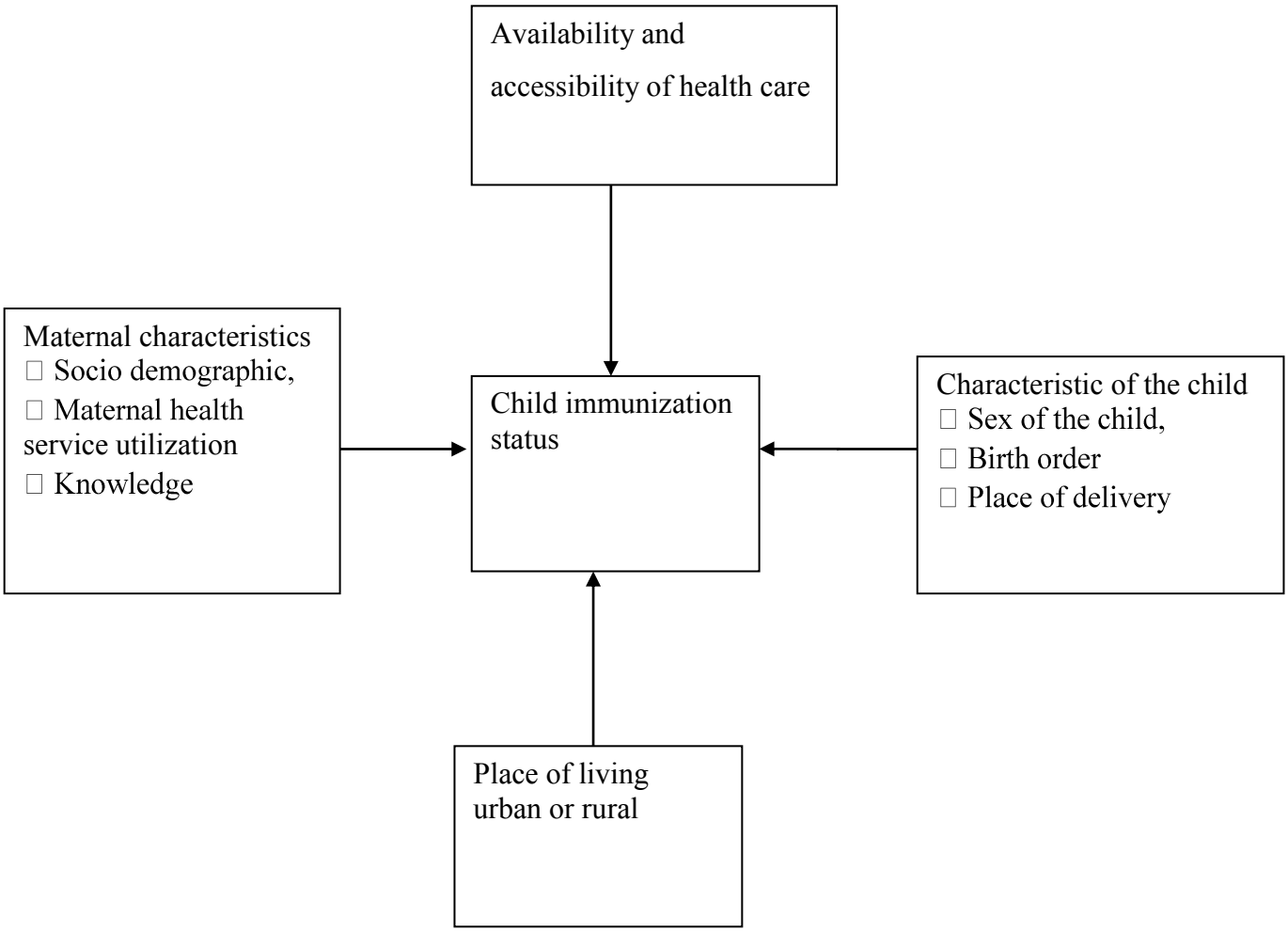
<u>ህጻኑክትባቱንአቋርጦከሆነከሆነየሚከተለውንጠይቅ</u>

4.23. ህጻኑ ክትባቱን ያቋረጠበት ምክንያት ምንድን ነው? (ክትባት ያቋረጠ ከሆነ)

1 = የክትባት ጣቢያው ሩቅ ስለሆነ
2 = የክትባት ሰአቱ አመቺስ ላልሆነ
3 = የከታቢዎች አለመኖር
4 = ስለክትባት ጥቅም ግንዛቤ ስለሌለኝ
5 =የክትባት ሰአቱንና ቦታውን ስለማላቅ
6= ለሁለተኛና ለሶስተኛ ጊዜ ተመልሼ መምጣት እንዳለብኝ ስላላወቅኩ
7 = ሌላ ----------

አመሰግናለሁ

ANNEX:V: Conceptual Framework



Source- Belachew Etana. Factors Affecting Immunization Status of Children Aged 12-23 Months in Ambo Worda, West Shewa Zone of Oromia regional State. 2011.

Annex VI: Immunization coverage survey sampling frame and clusters

No	worda	Kebele	Population	Cumulative population	Cluster numbers
1	01	17	4311	4311	1
		18	6452	10763	2
		19	3214	13977	3
		22	6213	20190	4
		23	5013	25203	5
2	02	15	5291	30494	6
		16	4543	35037	
		20	5655	40692	7
		21	5829	46551	8
3	03	13	6455	52976	9,10
		14	7810	60786	11
		24	6123	66909	12
		25	8612	75521	13,14
4	04	01	4958	80479	
		08	4759	85238	15
		17	4428	89666	16
		24/10	4742	94408	17
		26	3623	98031	18
5	05	06	5635	103666	19
		13	5412	109078	
		14	5422	114500	20
		22	3314	117814	21
6	06	23	2142	119956	
		24	4642	124598	22
		25	3942	128540	23
		31	6142	134682	24
		33	6143	140825	25
7	07	29	6495	147320	26
		30	6657	153977	27
		32	8782	162759	28,29
		34	5697	168456	30
8	08	03	4941	173397	31
		04	4406	177806	32
		06	2289	180095	
		09	3393	183488	33
		10	4558	188046	
		11	2538	190584	34
		12	2541	193125	
9	09	18	3021	196146	35
		19	2677	198823	
		20	3598	202421	36
		21	3155	205576	
		27	2987	208563	37
		28	4562	213125	38
10	10	02	4364	217489	39
		05	4765	222254	
		08	4717	226971	40
	Total		226971		
Sampling interval			226971/40= 5674		
Random number			1511		

DECLARATION

I, the undersigned, declared that this thesis is my original work, has not been presented for a Degree in this or any other university, and that all sources of materials used for the thesis have been fully acknowledged.

NAME Demeke Tolera

SIGNITURE: _____

PLACE: ADDIS ABABA UNIVERSITY, ETHIOPIA

DATE OF SUBMISSION: _____

This thesis has been submitted for examination with my approval as University advisor

NAME Dr. Alemayehu Mekonnen (MPH)

SIGNATURE _____

DATE _____