



PREVALENCE OF INCOMPLETE IMMUNIZATION AND ASSOCIATED FACTORS AMONG CHILDREN AGED 12-23MONTHS IN KONTA SPECEIAL WOREDADA, SOUTHERN ETHIOPIA

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JIMMA, ETHIOPIA

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ABSTRACT

Background: Immunization is one of the most cost-effective and widely applied public health intervention to reduce morbidity and mortality among children and it will become more effective if the child can receive full course of recommended immunization doses. However, due to various reasons many fail to complete the full course of immunization. For instance, a total of 1109 measles cases and about 87 deaths were reported in the study area majorly among under 5 children in 2015-2016.

Objective: - The objective of this study was to assess the prevalence and to identify factors associated with incomplete vaccinations among children 12-23 months of age in Konta special Woreda, southern Ethiopia.

Methods: A community based cross-sectional study was conducted. First kebeles were stratified into urban and rural strata. Then, probability proportional to size sampling (PPS) technique for selection of rural kebeles and simple random for urban was applied. Finally, simple random sampling method was used to select the study participants. Data on 386 children (from 9 rural and 1 urban kebeles) aged 12–23 months' were collected by a pre-tested, interviewer administered questionnaire using trained nurses in Konta special district, Southern Ethiopia from February to April 2016. EpiData version 3.1 was used to enter data and analyzed using SPSS version 20. Bivariate and multivariable logistic regression analyses were employed to check for an association and to identify independent predictors of vaccination status of children respectively. Those variables with p-value < 0.05 were considered as significantly associated with the outcome variable.

Results: - The prevalence of incomplete immunization was 27.2% among children aged 12-23 months in Konta special district. Incomplete immunization was found less likely to happen in those household having 3 or more children (AOR=0.123, 95%CI:0.060-0.252) whereas more likely to occur in those children of mothers not attending ANC(AOR=2.11, 95%CI:0.108-0.293), not taking TT vaccination(AOR=2.31,95%CI:1.331-6.025), giving birth at home (AOR=3.42,95%CI: 1.064-2.042), not knowing the benefit of vaccination (AOR=1.25,95%CI: 0.158- 0.411), lack of knowledge about the age at which vaccination begin (AOR=1.40, 95% CI: 1.325- 5.822) compared to the reference categories.

Conclusions:- Maternal health service related factors like antenatal care, TTvaccination, place of delivery, number of children in the household, and knowledge related factors like not knowing the benefit of vaccination, age at which vaccination begins were independent predictors of incomplete vaccination. So mothers should be educated on utilization of maternal health services and awareness creation to improve knowledge which in turns increases the immunization status among children.

Key words: Incomplete vaccination, associated factors, 12-23months child, Southern Ethiopia.

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ACRONYMS

ANC: -----	Antenatal Care service
AOR: -----	Adjusted Odds Ratio
BCG: - -----	Bacilli Calmette Guerin
CI: - -----	Confidence Interval
DPT: -----	Diphtheria-Pertussis-Tetanus
EDHS: - -----	Ethiopia Demographic Health Survey
EPI: -----	Expanded Program of Immunization
HDA: -----	Health Development Army
HSDP IV: -----	Health Sector Development Plan IV
MDG4: - -----	Millennium Development Goal 4
MOH: - -----	Ministry of Health
NGO: - -----	Non-governmental Organization
OPV: -----	Oral Polio Vaccine
OR: - -----	Odds Ratio
PCV: -----	Pneumococcal Conjugate Vaccine
PNC: - -----	Postnatal Care service
SNNPR: - -----	South Nations Nationalities and Peoples Republic
TT: - -----	Tetanus Toxoid vaccination
VPD: - -----	Vaccine Preventable Disease
WHO -----	WorldHealthOrganization

1. INTRODUCTION

1.1 Background

Immunization describes the whole process of delivering a vaccine and the immunity it generates in an individual and population. It remains one of the most cost effective and important public health interventions for reducing child morbidity and mortality (1,2) and national child survival strategies in the country to reach diphtheria-pertussis and tetanus (DPT3) and measles vaccination coverage 90% in 2010 (3). Furthermore, it is presented as the key strategy to achieving the Millennium Development Goals (MDGs4) especially to reduce the child mortality (4) and proportion of children immunized against measles is one of the MDG indicators of health (5). Each year, immunization averts an estimated 2-3 million deaths every year in all age groups from diphtheria, tetanus, pertussis (whooping cough), and measles (6).

Thus World Health Organization (WHO) launched the Expanded Programme on Immunization (EPI) in 1974, to build on the success of the global smallpox eradication program and to ensure that all children in all countries benefited from lifesaving vaccines.

Following this, Ethiopian Minister of Health, EMOH, (in 1980) initiated the Expanded Program on Immunization (EPI), and later updated in 2007, with the objective of reaching 90% coverage among children under one year of age by the year 1990 (7,8).

The services are given free of charge in the public sectors (9). Immunization schedule for the ten EPI vaccines for children in Ethiopia strictly follows the WHO recommendations for developing countries, 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. Global goals and strategies related to specific disease control initiatives such as polio eradication, measles mortality reduction have been adopted in the national vaccination policy (10).

In the 2011 WHO estimate of the global DPT3 coverage among children aged <12 months, was 85% ranging from 71% in African region to 96% in western pacific. However, approximately 18.7 million eligible children did not complete the 3-dose series; among them, 11.5 million (61%) did not receive the first DPT dose, and 7.2 million (39%) started, but did not complete, the

3-dose series (*11, 12, 13*). Despite substantial progress continues to be made, many children particularly those in less developed countries remain at risk of vaccine preventable diseases which makes achieving high and equitable coverage a challenge in low income countries like Ethiopia (*14, 15*).

1.2 STATEMENT OF THE PROBLEM

Vaccine preventable diseases (VPDs) have been reported to account for around 1.5 million (29%) of global under five mortality per annum (*16*). In 2011, nearly 107 million infants (83%) worldwide received at least 3 doses of DTP vaccine; however, approximately 22.4 million failed to receive 3 doses, leaving large numbers of children susceptible to vaccine-preventable diseases and death (*17*). Nearly 8.4 million received at least 1 DTP dose, but dropped out before completing the 3-dose series (*18*). One out of five infants worldwide does not receive 3 life-saving doses of the diphtheria, tetanus and pertussis vaccine (*19*).

In 2013 an estimated 84%, ranging from 75% in the WHO African Region to 96% in the Western Pacific and European regions, representing 112 million of infants worldwide were vaccinated with three doses of diphtheria-tetanus-pertussis (DPT3) containing vaccine.

Whereas globally, the number of children under one year of age who did not receive DPT3 was approximately 18.7 million in 2014, 21.8 million (16%) in 2013, 22.8 million in 2012 and 22.4 in 2011. Close to 70% of these children live in ten countries, i.e. Democratic Republic of Congo, Ethiopia, India, Indonesia, Kenya, Mexico, Nigeria, Pakistan, Viet Nam and South Africa (*20, 21*).

Although immunization coverage is increasing globally, 76% in 1990 and 84% in 2013, many children around the world especially in developing countries still left without fully immunization or unvaccinated.

Findings in different African countries like Cameroon, Kenya and Mozambique indicated that the prevalence of incomplete immunization among children of aged 12-23 months were 14.1% (95%CI: 10.7, 17.6), 22%, and 28.2% respectively (*22, 23*).

According to demographic health survey (EDHS) report among children age 12-23 months, 24 % were fully vaccinated, 66 % of children had received the BCG vaccine and 56 % had received

the measles vaccine. Indicating that around 61% were partially immunized and 15% of children did not receive any of the recommended vaccines.

Vaccination coverage is more than twice as high in urban areas as in rural areas (48% versus 20%). Coverage increases with mother's education; 57% of children whose mothers have secondary education were fully vaccinated compared with 20% of children whose mothers have no education (24). About 1million children were estimated to be unvaccinated (25) and 16% under-five mortality has been attributed to vaccine preventable diseases in Ethiopia (26). similarly, the proportion of children's aged 12-23 month who were not fully vaccinated in different districts ,for instance in Kombolcha district (2010) ,Ambo (2011), Arbaminch zuria (2014) and Wonago (2009) was 24.2%,23.7 %, 20.3% and 41.7% respectively (27,28,29).

Barriers identified or factors associated with incomplete immunization (vaccination) from EDHS 2011, Ethiopian EPI survey of 2012 and literatures from other different settings include:- lower parental education (30–33), gender of the child (31), place of delivery and mothers received a postnatal Check-up after 2 months of birth (31,34,35), occupation, marital status, age and parity (32,33,36), mothers Knowledge about child immunization (29,31,44,45), place of delivery and antenatal care (ANC) attendance (33,34,39), tetanus toxoid vaccine, place of residence, women's decision making autonomy, number of under-five children in the household, proximity to health facilities, awareness and source of information were the major factors identified (30,41) .

Worldwide about 29,000 children under the age of five die every day, mainly from preventable causes. Every year around 8 million children in developing countries die before they reach their fifth (5th) birthday; mainly during the first year of life (29, 44). Of these deaths in 2008, a bigger proportion occurred in sub-Saharan Africa (4.4 million) and South Asia (2.8 million) compared to Latin America, the Caribbean (0.2 million), and industrialized countries (0.1 million) (45). Countries including Ethiopia are aiming to achieve vaccination coverage of $\geq 90\%$ nationally and $\geq 80\%$ in every district by the year 2020. Reports indicated the percentage of children who are fully vaccinated remains far below the goal set in the fourth(4th) Ethiopian health sector development plan (HSDP IV) (47,49). Many children in Ethiopia do not get the benefits of immunization. Consequently, frequent measles outbreak and high child morbidity and mortality rate in the country are among the consequences of low immunization coverage (46, 50).

An Ethiopian child is 30 times more likely to die by his or her fifth birthday than a child in Western Europe (54). Ethiopia placed sixth among the countries of the world in terms of child death; about 472,000 Ethiopian children die each year before their fifth birthday. Most of these deaths occur from few preventable and curable diseases and conditions (55).

For example, from 2010–2011, a total of 9,756 measles cases were reported in Ethiopia; more than three fourth of it occurred among children age <5 years. These Cases occurred predominantly in unvaccinated children's. Particularly, Keffa was one of the zones experienced a large measles outbreak between October 2011 and February 2012 where over 3,000 measles cases were confirmed and thousands of unimmunized children registered in the Zone (50,51).

Epidemiological investigations of recent outbreaks of vaccine preventable diseases have indicated that incomplete immunization was the major reason for the outbreaks. Similarly in the study area, konta Special woreda, a total of 1109 measles cases and about 87 deaths were reported majorly among under 5 children in 2015-2016. Despite this, no study has been done before in the study area to dig out the prevalence and associated risk factors of incomplete immunization. So that conducting this study would minimize this research gaps and draw attention to the largely unexplored factors that might be associated with incomplete vaccination. Therefore, the aim of this study was to determine the prevalence and identify factors associated with incomplete immunization among children of aged 12-23 months in konta special woreda, Southern Ethiopia to generate data that could be used for better planning and strengthening of the routine immunization service.

1.3 Significance of the study

Information obtained from this study is expected to fill gaps seen in availability of study done on factors with vaccination incompleteness. The findings from this study could also help to inform program managers and health professionals to consider for system strengthening by continuous and integrated supportive supervision and community mobilization while planning to improve vaccination program. Similarly, it might also contribute to work on those identified factors that made children not to complete their vaccination status.

Besides this, it adds some knowledge up on the existing information towards the community. Consequently, results from this study might guide program managers on how to improve vaccination coverage and via to reduce the occurrence of vaccine preventable diseases in the study areas and other parts of the country with similar challenges.

Likewise, the result of this study could also be used as a baseline information for further studies in that area and provide important information for woreda health planners and other concerned bodies to enable them provide proper health services to these segments of the population and the community at large.

2. LITERATURE REVIEW

2.1 OVERVIEW OF INCOMPLETE IMMUNIZATION

According to 2013 estimates from WHO and UNICE, approximately 21.8 million eligible children did not receive 3 doses of DTP3; among them, 9.6 million (44 %) started, but did not complete, DPT 3-dose series (52, 53).

Despite the fact that Africa has made remarkable progress in immunization services, large numbers of children remain unvaccinated and under-vaccinated. The performance of routine immunizations in the African Region has stalled during the last decade for the majority of vaccine delivered-antigens. According to a 2013 immunization data report, vaccine coverage was 75 %; and Ethiopia has the second largest number of incompletely vaccinated children from the region, next to Nigeria (53).

Based on the Ethiopian Demographic and Health Survey (EDHS) 2011 report, 15 % of children in Ethiopia haven't received any vaccinations, and 56 % were vaccinated against measles. The coverage level of penavalent 3 was 44.3 %, as assessed by card and history. This is a significant improvement compared to EDHS 2005 performances. However, the full immunization rate is only 24 % and penavalent 3 coverage in many regions of the country is below 80 % (63). Multiple studies demonstrate that the EPI schedule in Ethiopia is not completed as planned (31, 62).

2.2 STATUS OF INCOMPLETE IMMUNIZATION AMONG CHILDRENS OF AGED 12-23 MONTHS

The estimated 2013 global DPT-3 coverage among children aged <12 months, which is a key indicator of immunization program performance was 75 % in the World Health Organization (WHO) African Region, and 84 % worldwide . Whereas in 2014 it was 86%, ranging from 77% in the WHO African Region to 96% in the Western Pacific Region, and representing 115.2 million vaccinated children. Approximately 18.7 million eligible children did not complete the 3-dose series; among them, 11.5 million (61%) did not receive the first DPT dose, and 7.2 million (39%) started, but did not complete, the 3-dose series. Estimated global coverage with BCG, polio3, and MCV1 were 91%, 86%, and 85%, respectively. During 2014, a total of 129 of 194 WHO member states achieved $\geq 90\%$ national DPT-3 coverage; of those that report, 57 achieved

≥80% DPT3 coverage in every district. National DPT3 coverage was 80%–89% in 30 countries, 70%–79% in 20 countries, and <70% in 15 countries. Among the 18.7 million children who did not receive 3 DPT doses during the first year of life, 9.3 million (50%) lived in 5 countries (India (22%), Nigeria (12%), Pakistan (6%), Indonesia (5%) and Ethiopia (4%) whereas 11.4 million (61%) lived in 10 countries (57, 58).

A cross-sectional study conducted in some African countries, south Sudan in 2009(37) and Cameroon in 2013(23) shows the prevalence of incomplete immunization were 31% and 14.1% respectively. Similarly a community based cross-sectional studies conducted in different parts of Ethiopia like Ambo(29),Mecha (31),LayArmacho district(34),Wonago of SNNPR(29),Arbaminch zuria woreda(62) ,and in Hosanna town(40) indicates that the prevalence of incomplete immunization among children's of aged 12-23 month were 40.3%,49.1%,21.67%,41.2%,20.3%,and 63.98% respectively. Another study in Somalia region of Jigjiga town shows 38% of children's didn't receive 3 successive dose of DPT or penavalent vaccination in 2011 (30).

2.3 FACTORS ASSOCIATED WITH INCOMPLETE IMMUNIZATION AMONG CHILDREN'S AGED 12-23 MONTHS

Socio-demographic related characteristics

Socio-demographic factors like maternal education, residence, number of children in the house, proximity of health institution, sex of children and residence of mother shows significant association with incomplete immunization as a Studies conducted in Cameroon(2013), Jigjiga(30), Giligil gibe(41), and Hosanna town(40). A study conducted in Giligil gibe shows that Children are less likely to be fully vaccinated if there were three or more under-five children in the household (OR= 0.45, 95% CI, 0.21-0.96) compared with children living in households with only one under-five child. Children with mothers who had completed secondary education were 1.77 times more likely to be fully immunized compared with children whose mothers had no formal education (41). Similarly, Study done in Nigeria reveals that Children of mothers that had secondary and tertiary education are 2 times more likely to be fully immunized than those children whose mothers had primary or no formal education. Also, children of mothers that were employed by government were 2.3 times more likely to be fully immunized than those that are not working with the government (42).

Proximity to health facility, measured by the time taken to reach to the nearest health facility, was associated with full vaccination. Children from households living within a 60-minute walking distance from any health facility were more likely to complete vaccination schedules than those located farther than a 60-minute walking distance (**41**).

Similarly, the result in Giligeligibe reveals that male children were more likely than female children to be fully vaccinated (**41**). This is consistent with the study done in Lay Armacho district of North Gondar (AOR = 1.80, 95% CI: 1.26, 2.6). Another study conducted in Mechakel woreda, East Gojam zone (**39**) indicated that mothers who had more than 3 children were 3.550 times more likely to have their child incomplete vaccination status compared to mothers who had one child (AOR = 3.550, 95% CI: 1.315-9.583). Studies in Jigjiga district, South Darfur state of Sudan, Lay Armacho, and Mecha of North west Ethiopia show that children's whose mothers are from urban area more likely to be vaccinated compared to their counterparts (AOR = 2.04, 95% CI = 1.33-3.13), (OR = 3.72, 95% CI: 1.7-2.97), (AOR = 1.82, 95% CI: 1.15-2.80) and (AOR = 2.401, 95% CI: 1.011-5.705) respectively (**31, 34, 37**).

Literatures in Wonago, southern Ethiopia, and Sinana district reveal that monthly income of parents was also significantly associated with incomplete immunization (**29,33**). Studies done in Kenya Nairobi and Cameroon resulted in that children's of mothers whose with age younger are less likely to vaccinate their children compared to the older ones (**38**).

Health service utilization characteristics of mother

From health service utilization characteristics of mother, low utilization of PNC, ANC, TT vaccination during pregnancy, and place of delivery were the major predictors associated with incomplete immunization of children of aged 12-23 months. For example a study done in Mechakel woreda of East Gojam (**39**) shows that place of delivery (AOR = 4.133, 95% CI: 2.263-7.475), no ANC service utilization (AOR = 2.549, 95% CI: 1.312- 4.955), no PNC visit (AOR = 2.512, 95% CI: 1.184- 5.330) significantly association with the childhood immunization status.

Additional study done in Hosanna district, and Jigjiga revealed that Tetanus toxoid (TT) vaccination status is significantly associated with the fully completion of vaccination of children by adjusted odds ratio of 1.271 (AOR 95 % CI: 1.083- 1.565) and 2.43 (95% CI: 1.56- 3.770) respectively (**30, 40**).

Similarly findings about low utilization of ANC service in South Darfur and Cameroon and non-uptake of PNC in Mozambique, Kenya Nairobi and Pakistan shows the presence of a strong association with incomplete childhood immunization coverage (22, 23).

A study in Giligigibe (41) revealed that Women's participation in household decision making were associated with both completion of childhood vaccination and receiving at least one vaccination. Children were 1.35 times more likely to be fully vaccinated if their mothers participated in all household decisions than if they did not participate in all household decisions.

Study done in Pakistan (2006-07) indicated that the chances of incomplete immunization were high for children of mothers who had no access to information (OR = 2.16; 95% CI: 1.79-2.61) (61).

Knowledge of mothers on vaccination

Maternal knowledge on the importance of vaccination, knowledge of the age of vaccine starts and completes, knowledge that the number and type of disease the vaccine prevents, were also another important predictor of incomplete immunization as resulted in different literatures.

A cross-sectional study conducted in LayArmacho district of North Gondar (34) shows that mothers who were able to know the number of sessions needed for immunization were three times more likely to fully vaccinate their children than mothers who were not able to know the sessions of immunization (AOR = 2.8, 95% CI : 1.89- 4.17). Full immunization status of children was three times higher among mothers who were able to know the age at which a child will be fully immunized compared to those who were not able to know (AOR = 2.9 ,95% CI : 2.02- 4.26). Similarly the study done in Ambo district (28) revealed that mother knowledge on age at which the children vaccination begin (AOR= 2.9, 95% CI: 1.9-4.6) and completes immunization (AOR= 4.3, 95% CI: 2.3-8) and mothers who have good (31) knowledge on vaccination (AOR=2.131, 95% CI: 1.076- 4.217) were significantly associated with complete immunization status of children.

Knowledge of mothers about the benefit of immunization and number of vaccine preventable disease known by the respondents were associated with fully immunization of children (64). Mothers' that have poor knowledge were AOR = 0.594 (AOR, 95% CI: 0.394- 0.894) times less likely to fully vaccinate their child than mothers that have good knowledge.

Missed opportunities

Studies in rural Mozambique (2007) indicated that 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 (**59**).

Rural Nigerian 2011, study also examined a number of missed opportunities for vaccination and its associated 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%) (**60**).

Conceptual Frame Work (developed from different reviewed literatures)

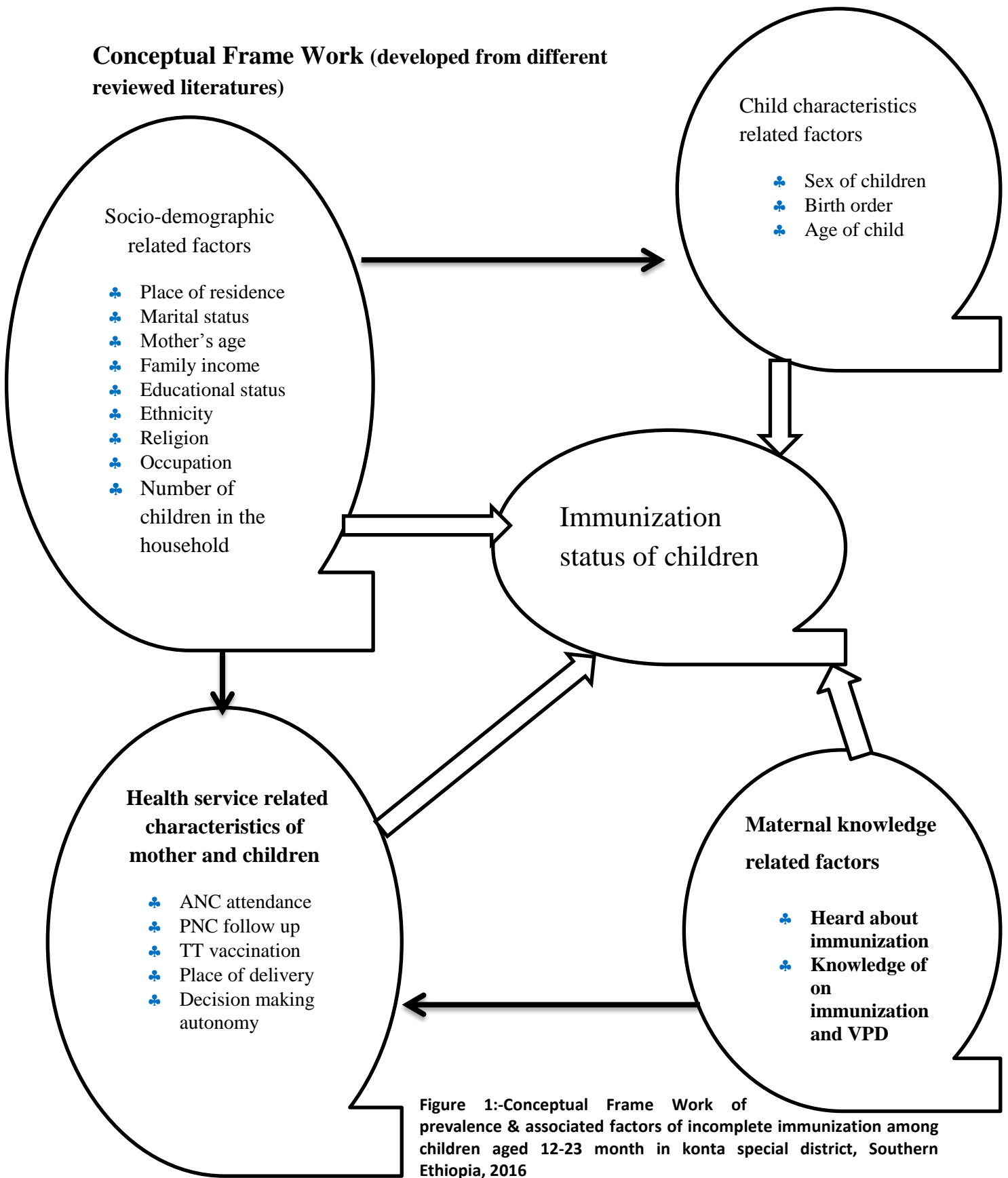


Figure 1:-Conceptual Frame Work of prevalence & associated factors of incomplete immunization among children aged 12-23 month in konta special district, Southern Ethiopia, 2016

3. OBJECTIVE

3.1 GENERAL OBJECTIVE

To assess the prevalence of incomplete immunization and identify associated factors among children aged 12-23 in Konta Special woreda, Southern Ethiopia, February- April 2016

3.2 SPECIFIC OBJECTIVE

- ♣ To assess the prevalence of incomplete immunization among children's aged 12-23month in the study area.
- ♣ To identify factors associated with incomplete immunization among children's aged 12-23month.

4. METHODS AND PARTICIPANTS

4.1 Study Area and period

The study was conducted in Konta special woreda, Southern Ethiopia, which is one of the four special woreda in SNNPR. It is located in 464 KM away from the capital of Ethiopia (Addis Ababa), 372 kms away from the regional city Hawassa and 110 kms away from Jimma zone.

The district had 22,000 households and a total projected population of 113,972 of which 56,555 are males and 57,237 are females. The number of under-five and under-two year children are 17,763 and 5826 respectively according to 2007 Ethiopia CSA report. The district is divided into 4 urban and 42 rural Kebele's. It has a total of one primary hospital, 3 health centers and 42 health posts. The weather condition consists of 40% kola, 6% Dega and 54% woinadega. It is bounded by East Dawuro zone, West Kafa zone, North Jimma zone and South of Gamo Gofa zone.

The study was conducted from February to April 2016.

4.2 Study design

A community based cross-sectional study was employed.

4.3 Population

4.3.1 Source Population

All children aged 12 to 23 months with their mothers residing in Konta Special district.

4.3.2 Study Population

Selected children aged 12 to 23 months with their mothers/care givers living in the district.

4.3.3. Study Unit

Children aged 12-23 months.

4.3.4 Inclusion and Exclusion criteria

Inclusion criteria:

Households with at least one living child aged between 12-23 months were eligible for the study. And who lived in the selected kebele for at least 9 months.

Exclusion criteria:

Mothers/care givers who were severely sick and unable to respond during data collection period and those who were unable to recall the vaccines given to their child when no card available were excluded.

4.5 Sample size determination

The required sample size for the study was determined using a single population proportion formula with the following assumption: Margin of error 5%, Significance level at 95%CI, design effect (DEFF) of 1.5 and Proportion of incomplete immunization of children 12-23month of Arbaminch Zuria district (20.3 %) (P=0.203) (62). This gives a sample of 373. Since the total number of children's aged from 12-23month in the district is, 5826, population correction formula was used.

Sample size determination formula

$$n = \left[\frac{(Z\alpha/2)^2 p (1 - p) DEFF}{d^2} \right]$$
$$n_o = \frac{[(1.96)^2 * 0.203(1-0.203)] * 1.5}{(0.05)^2} = 373$$

Therefore, $n = n_o / (1 + n_o / N) = 351$

Adding 10% non-response the total sample size was 386.

Where:

n: the minimum sample size

Z: standardized deviation for the normal distribution at 95%CI; =1.96

p: proportion of incomplete immunization of children aged between 12-23 months = 20.3%

d: margin of error =5%

DEFF:-Design Effect=1.5

4.6 Sampling technique/ procedure

Stratified two stage sampling technique was employed. First the Kebeles in the district was stratified into urban and rural settings. From 46 kebeles 20% (for each stratum) of the kebeles was included in the study. A total of 10 kebeles, 9 from rural and 1 from urban was selected. Probability proportional to size sampling (PPS) technique for rural kebeles and simple random for urban was used.

Justification for sampling technique: Simple random for urban was due to their homogeneity in vaccination status and PPS for rural was because of its provision of more information than a sample selected with equal probability and tendency to include more of larger clusters (units) than an equal probability sampling in which small and larger unit have the same chance of selection.

Therefore, to select this 9 rural kebeles first all of the rural (42) kebeles was listed down with their respective population size. Then cumulative sum of population size for each kebele was calculated. Then sampling interval (SI) was calculated by dividing the total rural population in 42 kebeles by the number of selected kebeles. Then, choose random start number between 1 and SI. Finally the next consecutive kebeles was selected by adding the sampling interval to the random number (Table 1).

Steps: Choose a random number between 1 and the SI. This is the Random Start (RS).

The Random Start (RS). The first cluster to be sampled contains this cumulative population (Column C). [Excel command =rand()*SI]

Calculate the following series: RS; RS + SI; RS + 2SI; RS+ (d-1)*SI.

Then to select the study units, family folder of health post (containing health data of every family in each kebele) was used to identify mother with eligible children, the address where they live and other necessary information from the kebele health post for each kebele. And for mothers with eligible children but who were not registered in the family folder, oral report of health extension workers was used to include while sampling. Equal number of children's for each rural kebele was allocated. Finally, after all mothers with eligible children of study in each kebele were identified, simple random sampling method was used to select the study participants. For households with more than one eligible child, the index child was included randomly in the study.

Table 1: shows sampling procedure of 42 rural kebeles using probability proportional to size sampling in Konta Special woreda, Southern Ethiopia, 2016.

S/ No	A Name of Kebele/Custer	B Population size (12-23month)(a)	C Cumulative sum	D Kebele sampled	E Prob 1	F Individuals per kebele sampled (c)	G Prob 2	H Overall weight (BW)
1	Chaka bocha	145	145	68	25%	38	26%	15
2	Dupa kecha	69	214					
3	Duka zale	56	270					
4	Buba damota	87	357					
5	Chare	133	490					
s6	Opas lashe	165	655	653	28%	38	23%	15
7	Koda maji	114	769					
8	Genji genet	36	805					
9	Shita shasho	95	900					
10	Medigotera	104	1004					
11	Yora	166	1170					
12	Cheta	207	1377	1238	35%	38	18%	15
13	Chebera	137	1514					
14	Serri	50	1564					
15	Kutta	32	1596					
16	Ginba agare	128	1724					
17	G/woidie	39	1763					
18	Offashtera	145	1908	1823	25%	38	26%	15
19	Shetachara	146	2054					
20	Gada shanbera	79	2133					
21	Bake sada	164	2279					
22	Albe agare	134	2431	2408	23%	38	28%	15
23	Bitseti Tsenga	129	2560					
24	Meda yeja	147	2707					
25	Mareka godi	89	2796					
26	Woba yamala	108	2904					
27	Woshi dalba	130	3034	2994	22%	38	29%	15
28	Gada gari	82	3116					
29	Keribela	103	3219					
30	Kecha roba	154	3373					
31	Chida shawura	136	3509					
32	Kirara	301	3810	3578	51%	38	13%	15
33	Bakeferda	214	4024					
34	Mojo	172	4196	4163	29%	38	22%	15
35	Dalba gent	76	4272					
36	Dalba alfa	199	4471					

37	Tolka	147	4618					
38	Koysha lome	143	4761	4748	24%	38	27%	15
39	Konta koysha	192	4953					
40	Oshika agare	66	5019					
41	Oshika dencha	111	5130					
42	Koysha dila	135	5265(b)					

Note: - **SI=585**, Random start number was **68**

Probability of Each Cluster Being Sampled (Prob 1) (Column E).

Prob 1= (a x d) ÷ b

a= Cluster population

b= Total Population

d= Number of Clusters

Probability of each individual being sampled in each cluster (Prob 2) (Column G), for each of the sampled clusters

Prob 2= c / a

a= Cluster population

c= Number of individuals to be sampled in each cluster Calculate the overall basic weight of an individual being sampled in the population.

The basic weight (BW) is the inverse of the probability of selection.

BW=1/ (prob 1 * prob 2)

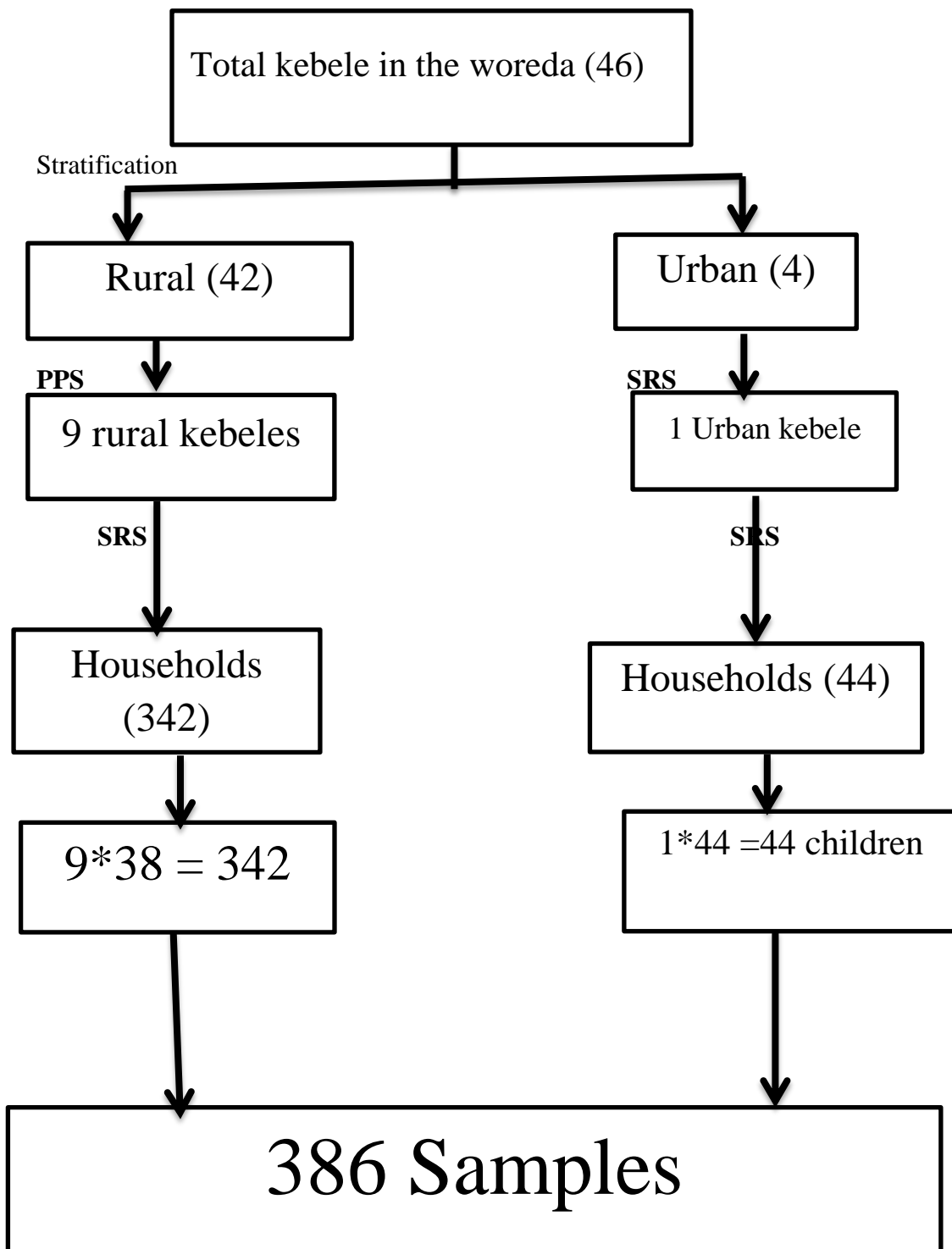


Figure 2:- Schematic presentation of the sampling procedure

4.7 Data Collection Tools and procedure

Data were collected using a structured questionnaire adapted from a previous studies, Ethiopian EPI survey of 2012, Demographic health survey of Ethiopia (DHS) 2011 and other reviewed literatures. It was originally prepared in English and then was translated to Amharic and it was checked for its consistency by back translation to English by different individuals.

An interviewer administered structured Amharic version questionnaire was used to collect the data from primary respondents (mothers /care givers of the children's).

Information on vaccine status was collected in two ways: (1) from vaccination cards shown to the interviewers and (2) from mothers' verbal reports. For those who had cards available, the interviewer had copied the vaccines given and vaccination dates directly onto the questionnaire and when there was no vaccination card available for the child, the respondent were asked to recall the vaccines given to her child and other probing questions have been provided. Finally, mothers/caregivers who were unable to recall the vaccines given to her child when no card available was excluded from the study.

Six diploma Nurses were recruited for data collection. They were able to hear and speak Kontigna, Amharic and English. They were trained intensively for two days on data collection instruments, on how to ask and fill the question, selection criteria of households and children, and how to approach the mothers/caretakers. Two BSC nurses and the principal investigator supervised, assisted interviewers and collected filled questionnaires every day and checked for consistencies and completeness. The principal investigator had coordinated and supervised the overall data collection process too. Only one respondent was interviewed per household. For households that were not present during data collection, 3 attempts were made to reach the respondent and it was dropped 3 attempts and the next nearest household was selected.

4.7.1 Data Quality Assurance

As much as possible attempts was done for questions to suite the local setting and was first prepared in English language and later translated to Amharic language and retranslated back by other translator to English to compare the consistency. Prior to the actual data collection, the questionnaire was pre-tested on other similar population taking 5% of the total sample and necessary modifications were made.

Data collectors were trained for two days on the study instrument and data collection procedure. During the actual data collection process, supervisors were cross checked the data on randomly selected 5% of study units every day for consistency and completeness.

After data collection, each questionnaire was given a unique code by the principal investigator. The principal investigator had prepared the template and entered data using Epi Data version 3.1 then exported to SPSS version 20.0. Frequencies were used to check for missed values and outliers.

4.7.2 Data Processing and Analysis

The collected data were cleaned, edited and entered into Epi-Data 3.1 and analyzed using SPSS version-20 statistical software. Descriptive statistics such as frequencies, percentages, mean, and standard deviation were used to summarize the data. P-value<0.05 were considered significant for all the independent variables to be a factor of dependent variable.

Bivariate analysis was carried out primarily to check for an association between exposure variables and childhood immunization status at p-value <0.05. Variables with p-value ≤ 0.25 were a candidate for multiple logistic regression models.

In the multivariable analysis, backward stepwise logistic regression at p-value ≤ 0.05 was applied to identify independent predictors of incomplete childhood immunization. The goodness of the model was assessed whether the required assumptions for the application of multivariable logistic regression was fulfilled and showed that the model adequately fits the data (Hosmer and Lemeshow test as the P - value = 0.41).

4.7.3 Study Variable

Dependent Variable

- ♣ Immunization status

Independent Variables

- ♣ Socio Demographic variables (Age of mother, Religion, Ethnicity, Education status of the mother and her partner, Family size, marital status, place of residence Family income, occupation, &sex of child).

- ❖ Maternal and child health care services utilization(maternal TT, ANC follow up, PNC follow up, place of birth, heard about immunization, birth order,parity,time taken to reach the nearest health facility, missed opportunity)
- ❖ Maternal Knowledge on vaccination (about vaccine and vaccine preventable diseases)

4.8 Operational Definition

Full immunization:- if the child took all the recommended vaccines with recommended doses (a dose of BCG, 3 dose of penavalent, Polio and PCV, 2dose of Rota and a dose of measles vaccine) by the age of one year.

Fully immunized child (FIC): A child who received all dose of the above vaccines:

Missed opportunities: missed opportunity for immunization is to mean, when an eligible child missed an opportunity of the service for any reasons during outreach session while HEWs are visiting the village's to provide the service.

Incomplete/partially immunized: - a child who missed at least one dose among the recommended vaccines(a dose of BCG, 3 dose of penavalent, Polio and PCV, 2dose of Rota and a dose of measles vaccine by the age of one year).

Unvaccinated: - a child who does not receive any dose of the recommended vaccines.

4.9 Ethical issues

Prior to data collection, ethical clearance was obtained from Research and Ethics committee of Jimma University, College of Health sciences. Written permission letter was produced from Woreda Health Office and each kebele administrative in the study area. During data collection, each respondents was informed about the objective, scope and expected outcome of the research, and at the same time informed verbal consent was taken from each respondents. Anyone who is not willing to participate was excluded from the study; and respondents who were interested to avoid specific questions or discontinue the interview were allowed to do so. In order to establish anonymous linkage, only the codes, not the names of the respondents, were registered on the questionnaire. During training of data collectors and supervisor, ethical issues were addressed as important component of the research.

4.10. Dissemination of the findings

The result of the study will be presented to Jimma University (JU) College of Health sciences. Subsequently, attempts will be made to present it on the annual and biannual meetings of, woreda health office, SNNPR health bureau and other meetings in the region concerned with expanded program of immunization (EPI). Reports will be submitted to Jimma University College of Health sciences, Konta special woreda health office, and SNNPR health bureau and to other stalk holders (IFHP, save the children who is working in the woreda). Finally, efforts will be made to publish in scientific journal.

5. Result

5.1 Socio-demographic characteristics of respondents

In this study 378 (97.9%) mothers of children aged 12-23 months participated. Among the interviewed mothers, immunization cards of 255 (67.5%) of their children were confirmed.

Majority (342, 90.5%) of the care takers of the children were mothers and around 254 (67.2%) had age of above 19 years with mean age of 23.4 (SD=4.12).

Most of the mothers of the children's were kanta (78.2%) by ethnicity, Orthodox (57.1%) by religion, married (79.1%), housewife (66.9%) by occupation and rural (88.4%) residents.

Eighty five (30.9%) children who had defaulted their vaccination status were from mothers of monthly family income less than or equal to 500 Ethiopian Birr. And the median monthly family income was 300 Ethiopian Birr. Among the children, about 248 (65.6%) were males. Of 103 children who did not complete their immunization, males accounts for 51 (13.4%) females accounts for 52 (13.8%). And about 291 (77%) of the children were born in the birth order of second to third birth order. About 237 (62.7) children had age in between 12 to 18 months and the rest 141 (37.3) were in 19 to 23 month with mean of 17.1 month (SD=3.54). With regard to family size 242 (64%) of the participants had 5 or more and whereas about 136 (36%) had 4 or less families. The mean family size was 4.42 (SD=1.48). Forty six (33.8%) children who had incomplete immunization status were from house hold having four or less family size.

In the bivariate analysis, mother/care taker of the child (p-value <0.001), young mothers (p-value <0.001), having three or more children in the household (p-value <0.001), family size (p-value 0.032), maternal occupation (p-value =0.006), monthly family income less or equal to 500 Ethiopian Birr (P-value = 0.016), residence (p-value = 0.03) and experience of child death (P-value <0.001) were significantly associated with completion of vaccination at $p < 0.05$ from different socio-demographic variables (**Table 2**).

Table 2:- Bivariate analysis of socio-demographic factors related to incomplete childhood immunization among children aged 12-23month in Konta special district, southern Ethiopia, Feb- Apr. 2016 (n = 378).

Variables	Category	Immunization status		COR at 95% CI	P-value
		Incomplete N (%)	Complete N (%)		
Care takers of child	Mother	8(25.1)	256 (74.9)	1	
	Father	14(63.6)	8 (36.4)	0.192(0.079,0.473)	<0.001
	Others	3(21.4)	11(78.6)	1.23(0.336,4.552)	0.753
Maternal age (year)	≤19	80(64.5)	44 (35.5)	18.26(0.031,0.096)	<0.001
	>19	23(9.1)	231 (90.9)	1	
Number of children	<3	37(14.2)	223 (85.8)	1	
	≥3	66(55.9)	52 (44.1)	0.130(0.079,0.216)	<0.001
Family size	≤4	46(33.8)	90 (66.2)	0.603(0.379,0.958)	0.032
	≥5	57(23.6)	185 (76.4)	1	
Maternal educational status	Illiterate	59(15.6)	166 (43.9)	1	
	Readandwrite	26(6.9)	89 (23.5)	0.822 (0.485,1.344)	0.467
	Primary(1-8)	1(0.3)	13 (3.4)	0.216 (0.028,1.691)	0.414
	Secondary(9-12)	7(1.9)	9 (2.4)	3.62 (0.290,1.014)	0.105
	Higher educ		8 (2.1)	4.545 (0.012, 1.321)	0.999
Marital status	Married	78(20.6)	221 (58.5)	1	
	Single	22(5.8)	20 (5.3)	3.117 (0.61,6.02)	0.353
	Divorced	3(0.8)	20 (5.3)	0.425 (0.123,1.470)	0.41
	Widowed		14 (3.7)	0.012 (0.03,0.142)	0.276
Religion	Orthodox	55(14.6)	161(42.6)	1	
	Muslim	2(0.5)	4 (1.1)	1.464 (0.261,8.213)	0.665
	Protestant	46(12.2)	110 (29.1)	1.224 (0.772,1.940)	0.389
Maternal occupation	Housewife	74(19.6)	193 (51.1)	1	
	Farmer	16(4.2)	21 (5.6)	1.987 (0.983,4.015)	0.056
	Gov't employs	7(1.9)	11(2.9)	0.062 (0.008,0.459)	0.006
	Merchant	1(0.3)	42 (11.1)	1.660 (0.620, 4.443)	0.313
	Others	5(1.3)	8 (2.1)	1.663(0.517, 5.143)	0.405
Monthly income(in Birr)	≤500	85(30.9)	190 (69.1)	1	
	500-1000	9(15.0)	51 (85.0)	2.53(1.19,5.38)	0.016
	>1000	9(20.9)	34 (79.1)	1.69(0.776,3.67)	0.186
Residence	Urban	2(4.5)	42(95.5)	9.10(2.16,38.32)	0.03
	Rural	101(30.2)	233 (69.8)	1	
Experience of child death	Yes	33(56.9)	25 (43.1)	0.212(0.118, 0.380)	<0.001
	No	70(20.9)	250 (78.1)	1	

Note: - *statistically significant at P<0.05

Care taker: other= Grandparents/older siblings

Occupation: other=NGO, daily laborer

5.2 Maternal characteristics of the respondents

Fifty four (54.5%), 79(32.2%) and 50(36.8%) children's who had incomplete immunization were from mothers who had no ANC attendance, no PNC follow up and not taking TT vaccination during their child pregnancy respectively. The mean time taken of 56.61(SD=43.13). For mothers who responded that the time taken to reach the nearest health facility was 31 to 60minutes and above 60minute had 49(31.8%) and 33(29.2%) defaulted children in their vaccination status compared to those who reported below 15 and 15 to 30 minutes respectively.

In bivariate analysis, not attending ANC (p-value = 0.022), no PNC follow up (p-value =0.003), not taking TT vaccination (p-value =0.002), giving birth at home (p-value <0.001), time taken (p-value=0.002), sex of child (p-value <0.001), age of child (p-value <0.001) were significantly associated with immunization completion at p<0.05(**Table 3**).

Table 3:- Bivariate analysis of maternal health service characteristics related to incomplete childhood immunization among children aged 12-23month in Konta special district, southern Ethiopia, Feb- Apr. 2016

Variables	Category	Immunization status		COR at 95% CI	P-value
		Incomplete N (%)	Complete N (%)		
ANC attendance	Yes	49(17.6)	230(82.4)	1	0.022
	No	54(54.5)	45(45.5)	0.178(0.108,0.293)	
Number of ANC	0	86(59.7)	58(40.3)	18.92(0.029,0.96)	<0.001
	1-4	17(7.3)	217(92.7)	1	
PNC follow up	Yes	24(18.0)	109(82.0)	0.462(1.289,3.624)	0.003
	No	79(32.2)	166(67.8)	1	
Number of PNC	0	66(31.1)	146(68.9)	1	0.056
	1-4	37(23.3)	129(77.7)	1.576(0.988,2.514)	
TT vaccination	Yes	53(21.9)	189(78.1)	1	0.002
	No	50(36.8)	86(63.2)	0.482(0.304, 0.766)	

Number of TT	≤3	75(26.5)	208(73.5)	1	
	>3	28(29.8)	66(70.2)	0.85(0.508,1.422)	0.536
Place of delivery	Home	97(34.5)	184(65.5)	7.99(0.053,0.296)	<0.001
	Health facility	6(6.2)	91(93.8)	1	
Time taken	<15	3(6.5)	43(93.5)	1	
	15-30	18(27.7)	47(72.3)	5.489(1.511,19.94)	0.010
	31-60	49(31.8)	105(68.2)	6.689(1.97,22.62)	0.002
	>60	33(29.2)	80(70.8)	5.912(1.71,20.40)	0.005
Decision making	Yes	8(4.2)	182(95.8)	1	
	No	94(50.3)	93(49.7)	0.043(0.020,0.093)	<0.001
Sex of child	Male	51(20.6)	197(79.4)	1	
	Female	52(40.0)	78(60.0)	0.39(0.24, 0.62)	<0.001
Age of child	12-18	43(18.1)	194(81.9)	1	
	19-23	60(42.6)	81(57.4)	0.29(0.187,0.479)	<0.001
Birth order of child	1	3(7.3)	38(92.7)	0.148(0.039,1.556)	0.305
	2-3	84(28.9)	207(71.1)	1	
	>4	16(34.8)	30(65.2)	0.761(0.394,1.465)	0.415

*Statistically significant at P < 0.05 1=Reference

5.3 Maternal knowledge about vaccination and Vaccine preventable disease (VPD)

About 270(71.4%) of the respondents have heard about immunization and 259(68.5%) were from health workers. About 56(46.7%) children who were incomplete in their vaccination status were from mothers who didn't know the benefit of vaccination. Around 271(71.7%) responded that the importance of vaccine were to prevent disease. Seventy one (56.1%) children who were incomplete in their vaccinations were from participants who responded that the age to begin childhood vaccination was after one month.

Of participants, 301 (79.6%) had reported that the age of completion for vaccination was 9month.

In bivariate analysis, heard about VPD, knew benefit of vaccination, knew age at which vaccination begins and completes and session taken to complete vaccination were significantly associated with immunization completion at $p < 0.05$ (**Table-4**)

Table 4:- Bivariate analysis of maternal knowledge about vaccination and VPD in Konta special district, southern Ethiopia, Feb-Apr. 2016

Variables	Category	Immunization status		COR at 95%CI	P-value
		Incomplete N (%)	Complete N (%)		
Heard about vaccination	Yes	101(27.2)	271(72.8)	1	0.737
	No	2(33.3)	4(66.7)	0.745(0.134,4.132)	
Source of information	Health worker	51(13.5)	208(55)	1	<0.001
	Radio	38(10.1)	48(12.7)	3.22(1.91, 5.45)	
	Friend	9(2.4)	12(3.2)	3.05(1.22,7.65)	
	others	5(1.3)	7(1.9)	2.91(0.88,9.55)	
Heard about VPD	Yes	60(22.2)	210(77.8)	1	0.001
	No	43(39.8)	65(60.2)	0.432(0.269,0.698)	
If yes to above source	Radio	9(2.7)	70(20.8)	0.086(0.568,1.102)	0.255
	TV	13(3.9)	23(6.8)	0.508(0.234,1.102)	0.586
	Friends	2(0.6)	15(4.5)	2.233(0.043,4.783)	0.279
	School		1(0.3)	0.527(0.116,2.396)	0.407
	Health workers	41(12.2)	162(48.2)	1	
Knew the benefit of vaccination	Yes	47(18.2)	211(81.8)	1	<0.001
	No	56(46.7)	64(53.3)	0.255(0.158,0.411)	
If yes what are they	To prevent disease	63(16.7)	208(55)	1	1.00
	For child health	38(10.1)	41(10.8)	3.06(0.0813,5.166)	
	Others	2(0.5)	26(6.9)	0.25(0.059,1.100)	
Knew age of vaccine begins	At birth	30(22.4)	104(77.6)	1	0.713
	After 4 weeks	29(20.6)	112(79.4)	1.11(0.626,1.98)	
	After one month	71(56.2)	32(43.8)	2.59(0.736,9.153)	
Knew session taken vaccination	Yes	10(5.8)	163(94.2)	0.074(0.037,0.148)	<0.001
	No	93(45.4)	112(54.6)	1	
Number of session taken	5x	2(0.6)	11(3.3)	1	0.576
	4x	83(24.9)	28(8.4)	1.818(0.22,14.75)	
	once	12(3.6)	176(52.7)	2.96(0.65,1.34)	
	Others	2(0.6)	20(6)	0.682(0.14,3.26)	

Knew age at which child completes vaccination	9month	58(15.3)	212(56.1)	1	
	12month	33(8.7)	43(11.4)	2.80(1.637,4.80)	<0.001
	24month	4(1.1)	5(1.3)	2.92(0.761, 11.24)	0.118
	36month	3(0.8)	9(2.4)	1.28(0.319,4.64)	0.772
	Others	5(1.3)	6(1.6)	3.04(0.898, 10.33)	0.074

*Statistically significant at P<0.05

5.4 Factors independently associated with incomplete childhood immunization

Variables that were significant in bivariate analysis (at p<0.05) and with p-value less than 0.25 were candidate for multivariable logistic regression and entered into it with backward stepwise regression analysis to identify factors that were independently associated with incomplete childhood immunization. Consequently, number of children in the household, no ANC attendance, not taking TT vaccination, giving birth at home, not knowing the benefit of vaccination and knew age at which child vaccine begins were remained to be independently associated with childhood immunization (**Table: 6**).

Apart from this, variables that include: family size, pace of residence, PNC follow up, time taken to reach the nearest health facility, heard about immunization and knew session needed were not significantly associated with incompleteness of childhood immunization.

Table 5:- Multi-variable logistic regression showing factors associated with incomplete childhood vaccination, Konta special woreda, Southern Ethiopia, Feb- Apr. 2016:

Variables	Category	Immunization status		COR at 95% CI	AOR(at 95%CI)
		Incomplete N (%)	Complete N (%)		
Number of children	<3	37(14.2)	223(85.6)	1	1
	>=3	66(55.9)	52(44.1)	0.130(0.079,0.216)	0.123(0.060, 0.252)*
Family size	≤4	46(33.8)	90(66.2)	0.603(0.379,0.958)	0.616(0.211,1.796)
	>=5	57(23.6)	185(76.4)	1	1
Residence	Urban	2(4.5)	42(95.5)	9.10(2.16,38.2)	0.144(0.192, 20.12)
	Rural	101(30.2)	233(69.8)	1	1
ANC attendance	Yes	49(17.6)	230(82.4)	1	1
	No	54(54.5)	45(45.5)	0.178(0.108,0.293)	2.11(0.108- 0.293)
PNC follow up	Yes	24(18.0)	109(82.0)	1	1
	No	79(32.2)	166(67.8)	0.462(1.289,3.624)	0.860(0.445,1.662)
TTvaccination	Yes	53(21.9)	189(78.1)	1	1
	No	50(36.8)	86(63.2)	0.482(0.304,0.766)	2.31(1.33- 6.025)*
Place of delivery	Home	97(34.5)	184(65.5)	1	1
	Healthfaci	6(6.2)	91(93.8)	7.99(0.053,.0296)	3.42(1.064-2.042)*
Time taken	<15	3(6.5)	43(93.5)	1	1
	15-30	18(27.7)	47(72.3)	5.489(1.511,19.94)	3.92(0.286, 53.71)
	31-60	49(31.8)	105(68.2)	6.689(1.978,22.623)	1.96(0.147, 26.25)
	>60	33(29.2)	80(70.8)	5.912(1.713,20.404)	2.80(0.198, 39.57)
Heard about VPD	Yes	60(22.2)	210(77.8)	1	1
	No	43(39.8)	65(60.2)	0.432(0.267,0.698)	NI
Knew the benefit of vaccination	Yes	47(18.2)	211(81.8)	1	1
	No	56(46.7)	64(53.3)	0.255(0.158,0.411)	1.25(0.158, 0.411)*
Knew age of vaccine begins	At birth	30(22.4)	104(77.6)	1	1
	After4week	29(20.6)	112(79.4)	1.11(0.626,1.98)	0.940(0.44, 1.99)
	In one month	57(56.2)	32(43.8)	2.59(0.736,9.153)	1.40(1.328, 5.82)*

Note: - *statistically significant at $p < 0.05$, NI= Not included in the model because of $p > 0.05$

6. Discussion

Immunization is one of the most successful and cost-effective health interventions. It prevents debilitating illness and disability, and saves millions of lives every year.

This study was conducted in Konta special woreda, southern Ethiopia to assess the prevalence of vaccination incompleteness and associated factors among children aged between 12-23 months old. Regarding the immunization status of children, about 103(27.2%, 95%CI: 22.6-31.7) of children didn't complete their vaccination status. Polio, Penta, PCV, and measles were the most defaulted vaccines with vaccination rate of (77.8%, 78%, 76.2% and 73.3%) respectively. This result was higher than those found in Kenya, Cameroon, Lay Armacho and Arbaminch Zuria district, which was 22%, 14.1%, 21.6% and 20.3% respectively (**22, 23, 34, 62**). This may be due to the fact that there were lower maternal health services utilizations in the area when compared to the above ones, high turnover number of health extension workers, topographic challenges since majority of the kebeles were found in hard to reach areas for supportive supervision and monitoring and evaluation. Implying that vaccine preventable disease is expected to occur on those children who are incomplete in their vaccination status. For instance, there was an occurrence of 1109 measles case outbreak and death of 87 under five children in the woreda from 2015 to March 2016.

However, it was lower than the previous studies in Ambo and Wonago district (**28, 29**). This may be due to the difference in time of study and progress in health service programs.

This study assessed different factors and found that number of under five children in the household, no ANC attendance, not taking TT vaccination, giving birth at home, not knowing the benefit of vaccination, knowledge on age at which child vaccination begins and maternal knowledge on immunization and VPD were independently associated with incompleteness of childhood immunization. We found that children from families with three or more children in the household were 88% less likely to complete their child's vaccination status compared to those who had below 3 children (AOR=0.123, 95%CI: 0.060- 0.25). This may be due social engagement, and face a higher burden of care and may not be able to take their younger child for vaccination services. Other studies in Gilgelgibe and Kenya have also found an association between number of children and vaccination status (**22, 36, 41**).

Our data showed that mothers who had no antenatal visits had two times the probability of being incomplete immunization for their children compared to their counterparts (AOR=2.11, 95%CI :0.108- 0.293). This is in line with previous studies done in Mechakel of East Gojam, Hosanna of southern Ethiopia, Giligeldibe, Pakistan and Cameroon (**39, 40, 41, 61, 23**).

Children's whose mothers who had no TT vaccination during their pregnancy were 2.3 times at risk of vaccination incompleteness compared to children who were from mothers who had TT vaccination (AOR=2.31, 95%CI:1.33- 6.025). This finding is similar with the previous studies in Jigjiga district, LayArmacho of North Gondar and Hosanna (**30, 34, 40**) Children whose place of delivery at home was 3.4 times more likely to have incomplete vaccination than those who were born at health institution(AOR=3.42,95%CI:1.064-2.042). Findings in Jigjiga district, Mecha of North West Ethiopia, Mechakel of East Gojam, Pakistan and Arbaminch Zuria district showed similar result (**30, 31, 39, 61, 62**). The possible reasons could be that weaker maternal utilization of health care services or no contacts with health-care staff during pregnancy could cause poorer exposure to information toward immunization.

Additionally, mothers who didn't know the benefit of vaccination were 1.25 times more likely to have defaulter children compared to their counterparts (AOR=1.25, 95%CI: 0.158, 0.411). This finding is in line with the study done in Arbegona district of Southern Ethiopia where mothers who didn't know the benefits of vaccination were five times more likely to have defaulter children than their counterparts (AOR = 5.51; 95 % CI: 1.52, 19.94) and Wonago district (**29,64**). This might be due to mothers who don't know the benefits of vaccination were not motivated to had vaccine for their child and may be reluctant in accepting health professional's instructions regarding vaccine schedules, whether they know the schedule of each vaccine or not. Besides this, the risk of not completing their children immunization increases for mothers of children who responded the age to start immunization is one month after birth than mothers answered just at birth (AOR= 1.40, 95% CI :1.328, 5.82). This result is comparable with the findings in Ambo woreda of central Ethiopia and Hosanna town (**28, 40**).

This result is consistent with the previous studies (**31, 33, 40, 62**). This might be due to the fact that lack of knowledge makes mothers' to be negligent and hinders so as to develop positive attitude towards the use of vaccination which results in default in their child immunization.

In this study different socio-demographic characteristics of mother like age of mother, occupation, educational status, marital status, residence and income were not significantly associated with the incompleteness of childhood immunization status. This finding is supported by the previous studies in Mecha, EDHS, Mechakel and Arbegona (31, 35, 39, 64).

However, this is inconsistent with Arbegona district of southern Ethiopia of maternal age (64), Giligilgibe and Arbaminch of educational status (41, 62), Mecha and Jigjiga of residence (30, 31), Sinana of monthly family income (33) where they found significant association.

Limitation of the study

The above findings ought to be considered in light of certain limitations: Information on child immunization in the survey was based on either immunization cards or self-reports of mothers and the information received through self-reports were subjected to recall and social desirability biases. Due to this fact, the vaccination status might be under/overestimated, because self-reports by the mother were handled in the same way as information from vaccination cards.

7. Conclusions

This study reveals that immunization incompleteness among children aged 12-23 months was high compared to the regional level and previous studies.

The result of this study showed that majority of factors associated with childhood incomplete vaccinations were factors related to maternal health service related characteristics. The major factors independently associated with vaccination incompleteness were having three or more children in the household, no ANC attendance, not taking TT vaccination, giving birth at home, not knowing the benefit of vaccination and knowledge on age at which vaccine. However, the socio-demographic characteristics of mother were not significantly associated with childhood immunization status in this study.

8. Recommendations

To woreda health office:- Better work to raise the awareness of mothers by provision of health education to increase the utilization of ANC visit, Tetanus Toxoid vaccination, institutional delivery which in turn leads to vaccinate their children.

To Health professionals and HEW's:- should work to aware mothers on utilizations of maternal health services and knowledge related to age at which child immunization start and benefit of immunization and VPD which in turns increase the immunization coverage among children.

For Researchers: - Better if further research done especially considering qualitative method and facility based studies to capture other important contextual factors which is not addressed in this study.

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Annexes

Annex 1:- Study Information Sheet and Informed Consent

Questionnaire on Prevalence and factor associated with incomplete immunization among children aged 12-23 months in konta special woreda southern Ethiopia, 2016.

Confidentiality and consent

I. Information sheet

Greeting: Good morning/afternoon

My name is-----I am from Jimma University Department of Epidemiology and working a research on assessment of prevalence and factors associated with incomplete immunization status of children of age 12-23 months in konta special woreda. This study aimed to identify the prevalence and associated factors of incomplete immunization status of your child. I would like to ask you a few questions which take 20-30 minutes.

I would very much appreciate your participation in this survey. This information could help us to identify the prevalence and associated factors of incomplete immunization which leads to the program planers and government officials to design for health service utilization and coverage. You were selected randomly to be participant of this study if you give me consent after you have understood the following information sheet:

Rights of participants: Participating and not participation is the full right and participants can stop for participating in the study at any time. They could also skip any question which they want to respond. They can ask any question which is not clear for them.

Confidentiality: Any information forwarded was kept private and her name will not specified.

II. Informed consent

I had read this form or it was read to me in the language I comprehend and understand all conditions stated above. Therefore, willingness to participate in this study.

1) Yes -----2) No ----- signature-----

If yes, continue with the questions, If No, stop the interview.

Date of interview in Ethiopian Calendar -----/-----/-----

Time stated----- Time completed -----

Study area: - woreda/ 1.Town----- 2.kebele-----3.house number-----

Name of Interviewer-----

Name of Principal investigator: ALEMU KOCHO;

Address: Tell: 0916301770 Email: alemukocho2@gmail.com

Name of institution: Jimma University College of Health Science

Address: Jimma, Ethiopia

Guiding Principles: - For majority of questions, possible options are listed. Therefore, following the instructions, Listening carefully, fill or Circle answer sheets exactly what the respondents answered accordingly.

Annex 2.QUESTIONNAIRE: IN ENGLISH VERSSION

PART ONE: - QUESTIONS ON SOCIO – DEMOGRAPHIC RELATED FACTORS

<i>S/no</i>	<i>Questions</i>	<i>Coding categories</i>	<i>Skip</i>
101	Who is the primary caretaker of the child?	1.mother 2.father 3.other	
102	Age of primary care taker	_____year	
103	Maternal/care taker educational status	1) illiterate 2) read and write 3)primary(1-8) 4) secondary(9-12) 5) higher education	
104	Spouse educational status	1) illiterate 2) read and write 3) primary(1-8) 4) secondary(9-12) 5) higher education	
105	Number of alive children	_____in number	
106	Marital status	1)single 2) married 3)divorced 4) widowed	
107	Ethnicity of parents	1)konta 2) Dawuro 3.others	
108	Religion of care giver	1) Orthodox 2) Muslim 3)protestant 4) Others	
109	Occupation of mother /care giver	1)farmer 2) house wife 3) merchant 4) gov't employee 5)private/NGO 6) Daily laborer 7)other	
110	Occupation of father	1)farmer 2)merchant 3)gov't employee 4)private/NGO 5) Daily laborer 6.other	
111	Family size	_____in number	
112	Family income	_____ETB	

113	Parity	-----in number	
114	Residence	1)Rural 2)urban	
115	Child death	1)Yes 2) No	
116	Time taken to reach the nearest health facility	-----minute.	

PART: - TWO - QUESTIONS ON HEALTH SERVICE RELATED CHARACTERISTICS OF MOTHER

S/no	Questions	Coding categories	Skip
201	ANC attendance	1)Yes 2)No	If 2 skip to Q203
202	Number of ANC attendance	-----	
203	PNC follow up within the last 2 month	1)Yes 2)No	If 2 skip to Q205
204	Number of PNC follow up	-----	
205	TT Vaccination received	1)Yes 2) No	If 2 skip to Q207
206	Number of TT vaccination received	-----	
207	Place of birth	1)Home 2) Health facility	
208	Maternal participation in HH decision making	1) Yes 2) No	
209	Heard about vaccination	1)Yes 2) No	
210	Source of information	1) health worker 2) radio 3) TV 4) friends 5) other	

PART: - THREE- QUESTIONS ON CHILD CHARACTERISTICS RELATED FACTORS

<i>S/no</i>	<i>QUESTIONS</i>	<i>Coding categories</i>				<i>Skip</i>
301	<i>Age of child in month</i>	_____month				
302	<i>Sex of child</i>	1. Male 2. Female				
303	<i>Birth order of child</i>	-----				
304	<i>Does your child received vaccination</i>	1) yes 2) no				<i>If2skip toQ319</i>
305	<i>IF yes to above question Do you have a card where vaccinations are written down, if no go to question number -----?</i>	1) Present 2) absent				<i>If2skipto Q309</i>
306	<i>Copy the vaccination data from the card if card present</i>	<i>Vaccine taken</i>	<i>Day</i>	<i>Month</i>	<i>Year</i>	
		<i>BCG</i>				
		<i>OPV0</i>				
		<i>OPV1</i>				
		<i>OPV2</i>				
		<i>OPV3</i>				
		<i>Penta1</i>				
		<i>Penta2</i>				
		<i>Penta3</i>				
		<i>Measles</i>				
		<i>PCV1</i>				
		<i>PCV2</i>				
		<i>PCV3</i>				
307	<i>Does a child have any vaccinations that are not recorded on this card? Including vaccinations given in a national vaccination day campaign?</i>	1) yes 2)no 88don'tknow 99noresponse				

308	<i>If answer to above question is yes, what is the type of vaccines?</i>	1) vaccine given to prevent the child from measles in mass campaign 2) Vaccine given to prevent the child from polio in mass campaign 3) routine vaccine 4) others specify _____ 88=I don't know 99=No response	
	<i>Please tell me if the child had any of the following vaccinations when no card available</i>		
309	<i>a. A BCG vaccination against tuberculosis, that is, an injection in the arm or shoulder that usually causes a scar</i>	1)Yes 88=I don't know 2)No 99=No response	
310	<i>b. Polio vaccine, that is, drops in the mouth?</i>	1) Yes 88=I don't know 2) No 99=No response	
311	<i>How many times was the polio vaccine given</i>	----- 88=I don't know 99=No response	
312	<i>A penavalent vaccination, that is, an injection given in the right thigh?</i>	1)Yes 88=I don't know 2) No 99=No response	
313	<i>How many times Penavalent vaccination is given?</i>	----- 88=I don't know 99=No response	
314	<i>A PCV vaccination, that is, an injection given in the right thigh?</i>	1)Yes 88=I don't know 2)No 99=No response	
315	<i>How many times PCV vaccination is given?</i>	----- 88=I don't know 99=No response	
316	<i>Was the Rota vaccine given?</i>	1)Yes 88=I don't know 2) No 99=No response	

317	How many times was the Rota vaccine given	----- 88=I don't know 99=No response	
318	A measles injection that is, a shot in the arm at the age of 9 months or older?	1)Yes 2) No	88=I don't know 99=No response
319	Reasons for missed vaccination	1.child was sick 2.mother was sick	3.fear of side effect 4.others
320	Vaccination status of child	1.complete 2. incomplete	

PART: - FOUR- QUESTIONS ON MATERNAL KNOWLEDGE OF VACCINATION

S/no	Questions	Coding categories	Skip
401	Do you heard about vaccination and vaccine preventable disease?	1) Yes 2) No	If 2 skip to Q403
402	If yes to the above question, from where do you heard about the vaccination and vaccine preventable disease?(Multiple response possible)	1)radio 2)TV 5)health workers	3) Friends 4) school 88 don't know 99 no response
403	Do you know the benefit of vaccinating a child?	1)yes 2)no	If 2 skip to Q405
404	Do you mention the benefit of vaccinating a child? (Multiple response possible)	----- 88. I don't know 99 No response	
405	What vaccine preventable diseases do you know?	----- 88=I don't know 99=No response	
406	Do you tell me the correct age at which the child begins vaccination?	----- 88 =I don't k 99= no response	
407	Know vaccination sessions needed for child to fully immunized	1)Yes 2)No	If 2 skip to Q409

408	<i>Vaccination session needed for child to be fully immunized</i>	----- 88 I don't know 99 no response	
409	<i>At what age the child should complete vaccination?</i>	-----	
410	<i>Knowledge</i>	0.Poor 1.Good	

THANK YOU VERY MUCH!!!!

To be filled by the interviewer

Code of the questionnaire-----

Name of the interviewer-----

Signature of the interviewer-----

Date of the interview-----

To be filled by the supervisor

Name of the supervisor-----

Incorrect parts -----

Corrections to be made-----

Questionnaire- Complete----- Incomplete ----

Annex 3. QUESTIONNAIRE .IN AMHARIC VERSION

በጅማ ዩኒቨርሲቲ የጤና ሳይንስ ኮሌጅ የኢፒድሚዮሎጂ ትምህርት ክፍል

በኮንታ ልዩ ወረዳ ዕድሜያቸው ከ12-23 ወር ወሰን ባሉ ህጻናት የክትባት መጠነ ማቋረጥና ተያያዥነት ያላቸው ጉዳዮች ዙሪያ ጥናት ለማካሄድ የተዘጋጀ መጠይቅ ነው። የካቲት2008 ዓ.ም

የስምምነት ቅጽ

ስሜ-----ይባላል።የጅማ ዩኒቨርሲቲ እያካሄደ ባለው ሳይንሳዊ ጥናት ውስጥ የድህረ ምረቃ ፕሪግራም አስመልክቶ የምረቃ ጽህፍ ለማዘጋጀት መረጃ በመስጠት ላይ እንኛለሁ። የጥናቱ ርዕስና ዓላማ ክትባት ጀምረው የማቋረጥ መጠንና ተያያዥነት ያላቸው ምክንያቶች ላይ በኮንታ ልዩ ወረዳ ጥናት እያካሄድን ነው።በዚህ ጥናት ላይ የሚሳተፉት የተመረጡ እድሜያቸው ከ 12-23 ወራት የሆኑ የህጻናት እናቶች ወይም አሳዲሪዎች ላይ ሲሆኑ ለዚህ ዓላማ ሲባል የተዘጋጁትን የተወሰኑ ጥያቄዎችን በመመለስ እንዲተባበሩን እንጠይቃለን።የሚሰጡትም መልስ በሚሰጥራቸው የሚያዝ ሲሆን ስምም ሆነ አድራሻ ተመዝግቦ አይያዝም።በጥናቱ ያለመሳተፍ መብትም የተጠበቀ ሲሆን እንደዚሁም በማንኛውም ሰዓት ከቃለ-መጠይቅ የማቋረጥና መልስ ሊሰጡባቸው የማይፈልጉ ጥያቄዎችም ካሉ ያለመመለስ ይችላሉ።ሆኖም የሚሰጡት እውነተኛ መልስ በክትባት መጠነ ማቋረጥ ዙሪያ ያሉ ዋና ዋና እንቅፋቶችን ለማወቅና የክትባት አገልግሎትን የበለጠ ለማሻሻል ትልቅ ጠቀሜታ እንዳለው ላረጋግጥሎዎት እወዳለሁ።በመጨረሻም ለሚሰጡት መልስ በቅዳሚያ እየመሰገንኩ በአጠቃላይ መጠይቁ ከ20-30 ደቂቃ በላይ እንዳማይወስድ እገልጽሎታለሁ።ለተጨማሪ ማንኛውም አስተያየትና ጥያቄ ካለዎት በስልክ ቁጥር

0916301770 ወይም በኢ-ሜይል **alemukocho2@gmail.com** ላይ ማግኘት ይችላሉ።

- 1) የመጠይቅ ቁጥር----- 2) በዚህ ጥናት ላይ ለመሳተፍ ፍቃደኛ ናዎት 1=አዎ----- 2=አይደለሁም

መልሱ አዎ ከሆነ ጥያቄዎን ይቀጥሉ----- ካልሆነ ያቁሙ-----

- 2) መኖሪያ ቦታ ዞን-----ወረዳ/ከተማ-----ቀበሌ----- የቤት ቁጥር ----

- 3) መጠይቁ የተሞላበት ቀን-----

መመሪያ፡ ከዚህ በታች ለተዘረዘሩ ጥያቄዎች እንደየአቀራረባቸው መልስ በመክበብ ወይም ዳሽ በመሙላት

ይመልሱ።

ክፍል አንድ :- የማህበራዊና የሥነ- ህዝብ መጠይቅ

ተ/ቁጥር	ጥያቄ	የመልስ ኮድ	
101	የህጻኑ ዋና አሳዳጊ/ተንከባካቢ ማነዉ	1) እናት 2) አባት 3) ሌላ	
102	ያሳዳጊ/ተንከባካቢ ዕድሜ	-----	
103	በእናትየው የተወለዱ ህጻናት ብዛት	-----	
104	በህይወት ያሉ ህጻናት ብዛት	-----	
105	የቤተሰብ ብዛት	-----	
106	የእናቱ/ያሳዳጊ የት/ት ደረጃ	1) ያልተማረ 2) ማንበብና መጻፍ የሚችል 3) አንደኛ ደረጃ (1-8) 4) ሁለተኛ ደረጃ(9-12) 5) ከፍተኛ ት/ት ደረጃ	
107	ያባቱ የት/ት ደረጃ	1) ያልተማረ 2) ማንበብና መጻፍ የሚችል 3) አንደኛ ደረጃ (1-8) 4) ሁለተኛ ደረጃ(9-12) 5) ከፍተኛ ት/ት ደረጃ	
108	የጋብቻ ህኔታ	1)ያላገባች 2)ያገባች 3) የፈታች 4) የሞተባት	
109	የትኛው ብሄረሰባ አባል ነዎት	1)ኮንታ 2)አሮሞ 3)አማራ 4) ሌላ	
110	የእናቱ/ያሳዳጊ ሃይማኖት ምንድነዉ	1) ኦርቶዶክስ 2) ሙስሊም 3)ፕሮቴስታንት 4) ሌላ	
111	የእናት/ያሳዳጊ ሥራ ምንድነዉ	1)አ/አደር 2)የቤትአመቤት 3) ነጋዴ 4)የመ/ሠራተኛ 5)የግል ድርጅት 6)የቀን ሠራተኛ 7)ሌላ	

112	ያባት ሥራ ምድካሚ	1)አ/አደር 2)የቤትአመቤት 3) ነጋዴ	4)የመ/ሠራተኛ 5)የግል ድርጅት 6)የቀን ሠራተኛ 7)ሌላ	
113	አማካይ የወር ገብ ሰንት ነዉ	-----በር		
114	የሚኖሩበት ቦታ	1) ከተማ	2) ገጠር	
115	ከዚህ በፊት ህጻን ልጅ ሞቶቦት ያዉቃል	1) አዎ	2) አያዉቅም	
116	በአቅራቢያ ያለዉን ጤና ድርጅት ለመድረስ ምን ያህል ጊዜ ይወስዳል	-----ደቂቃ ይወስዳል		

ክፍል ሁለት፤ የእናቶች የጤና አገልግሎትን አጠቃቀምን የሚመለከት መጠይቅ

ተ.ቁ	ጥያቄ	የመልስ ኮድ	
201	በመጨረሻ እርግዝና ወቅት የቅድመ-ወሊድ ምርመራ አድርገዋሉን	1) አዎ 2) አላደረሱም	ካላደረጉ ወደ203 አለፍ
202	አደርገዉ ከሆነ ሰንት ጊዜ ተከታትለኛል	-----	
203	የመጨረሻ ልጅዎን ከወለዱ በኋላ የደህረ-ወሊድ ምርመራ አድርገዉ ያዉቃሉን	1)አዎ 2)አላደረሱም	ካላደረጉ ወደ205 ይሂዱ
204	አድርገዉ ከሆነ ሰንት ጊዜ ተከታትሏል	-----	
205	የመንጋጋ ቆልፍ ክትባት ወሰደዋልን	1) አዎ 2) አላወሰድኩም	ካላደረጉ ወደ207 ይሂዱ
206	ወሰደዉ እንደሆነ ሰንት ጊዜ ወሰዱ	-----	
207	የመጨረሻ ልጅዎን የትካሚ የተገላገሉት	1) ቤት	2)ጤና ድርጅት
208	በቤት ዉስጥ በሚደረጉ ዉሳኔዎች ላይ ተሳትሽ ታዉቅያለሽ (የልጁ እናት)	1) አዎ 2) አላዉቅም	
209	ሰለክትባት ሰምተኛል	1)አዎ 2)አልሰማዉም	
210	ሰምተዉ እንደሆነ ምንጩ ከየት ነዉ	1)ከጤና ባለሙያ 2)ከሬድዮ 3)ከቲቪ 4) ከጓደኛ	5)ከሌላ

ክፍል ሦስት፡- ህጻኑንና የህጻኑን ጤና አገለግሎትን የሚመለከት መጠይቅ

ተ.ቁ	ጥያቄ	የመልስ ኮድ			
301	የህጻኑ ዕድሜ(በወር)	-----ወር			
302	የህጻኑ ጾታ	1) ወንድ	2)ሴት		
303	የመጨረሻው ልጅ ስንተኛ ልጅ ነው	-----			
304	ልጅዎ ከትባት ወሰዶ ያዉቃልን	1)አዎ	2)አልወሰደም		ካልወሰደ ወደ 319 ይሂዱ
305	ለላይኛው ጥያቄ መልሱ አዎንከሆነ የከትባት ካርድ አለዎት	1)አዎ	2) የለም		ካልወሰደ ወደ 309 ይሂዱ
306	ከካረዱ ላይ በሰንጠረዥ ውስጥ ያሉ መረጃዎችን ይገለጹብጡት	Vaccine given	Day	Month	Year
		BCG			
		OPVO			
		OPV 1			
		OPV2			
		OPV3			
		Penta 1			
		Penta 2			
		Penta 3			
		Measles			
		PCV1			
		PCV2			
		PCV3			
		Rota 1			
		Rota 2			
307	ካርዱ ላይ ከተመዘገቡ ከትባቶች ውጪ ለህፃኑ የተሰጠ ከትባት አለ/በዘመቻ የተሰጡ ከትባቶችን ጨምሮ	1)አዎ	2)አይደለም		88 አላዉቅም 99 መልስ የለም

308	ለላይኛው ጥያቄ መልሱ አዎ ከሆነ ምን አይነት ክትባት ነው።	1)በዘመቻ መልክ ለኩፍኝ የተሰጠ ክትባት 2)በዘመቻ መልክ ለፖሊዮ ክትባት 3)በመደበኛ ክትባት ፕሮግራም ተሰጠ 4)ሌላካለ----- 88አላዉቅም 99መልሰ የለም				
	ከዚህ በታች የተዘረዘሩትን ህፃኑ ከወሰደ ይንገሩን (ለህጻኑ የክትባት ካርድ ከሌለ)					
309	የቢሰፊ ክትባት በአፍ ጠብታ የሚሰጥ	1)አዎ 2)አልተሰጠም 88 አላዉቅም 99 መልሰ የለም				
310	ፖሊዮ ክትባት በአፍ ጠብታ የሚሰጥ ተሰጥቷል	1)አዎ 2)አልተሰጠም 88 አላዉቅም 99 መልሰ የለም				
311	የ□ ሊ□ ክትባት ስንት ጊዜ ነው የተሰጠው	----- 88 አላዉቅም 99 መልሰ የለም.				
312	የጸረ አምሰት ክትባት በ ግራ እግር በመረፈ ተሰጥቷል	1)አዎ 2)አልተሰጠም 88.አላዉቅም 99 መልሰ የለም				
313	የጸረ አምሰት ክትባት ስንት ጊዜ ነው የተሰጠው።	----- 88 አላዉቅም 99 መልሰ የለም				
314	የ □ ሰሺ ክትባት በ ቀኝ እግር በመረፈ ተሰጥቷል	1)አዎ 2)አልተሰጠም 88.አላዉቅም				

		99 መልስ የለም				
315	የ ፒሰሪ ክትባት ስንት ጊዜ ነው የተሰጠው?	----- 88 አላወቅም 99መልስ የለም				
316	የሮታ ክትባት በአፍ የሚሰጥ ተሰጥቷል	1)አዎ 2)አልተሰጠም				
317	የ ሮታ ክትባት ስንት ጊዜ ነው የተሰጠው?	----- 88 አላወቅም 99 መልስ የለም				
318	የኩፍኝ ክትባት በግራ እጅ ትከሻ ላይ በመርፌ ተሰጥቷል	1)አዎ 2)አልተሰጠም 88አላወቅም 99መልስ የለም				
319	ህጻኑ ክትባት ያልወሰደበት ወይም ያቋረጠበት ምክንያት ምንድነው.	1. ህጻኑ ስለታመመ 2. እናትቱ ስለታመመች 3. የጎንዮሽ ጉዳት በመፍርሃት 4. ሌላ ካሌ ይጠቀስ--				
320	የህጻኑ የክትባት ሁኔታ	1. ያላጠናቀቀ/ች 2. ያጠናቀቀ/ች				

ክፍል አራት፡- የህጻኑ እናት/ተንከባካብ በክትባት ላይ ያላቸውን ዕውቀት የሚዳሰስ መጠይቅ

ተ/ቁ	ጥያቄ	መልስ	ወደሚቀጥለው እለፍ
401	ሰለ ክትባትና በክትባት ልንከላከላቸው ስለሚንችላቸው በሽታዎች ስምተው ወይም አይተው ያውቃሉ።	1) አዎ 2) አላውቅም	ከላወቁ ወደ 403 <input type="checkbox"/> ሂ <input type="checkbox"/>
402	ለ401 ጥያቄ መልስ አዎ ከሆነ ከየት ነው የሰሙት (ከአንድ በላይ መልስ መስጠት ይቻላል)	1) ከፊደሉ 2) ከቲሺ 3) ከጓደኛ 4) ከት/ቤት 5) ከጤና ባለሙያዎች 88 አላውቅም 99 መልስ የለም	
403	ህጻናትን የማስከተብ ጥቅም ያወቃሉ	1) አዎ 2) አላውቅም	መልስ 2 ከሆነ ወደ 405 <input type="checkbox"/> ሂ <input type="checkbox"/>
404	ካወቁ ይዘርዘሩ	1) በሽታ ለመከላከል 2) ለህጻናት ጤንነት 3) ሌላ ካለ----- 88 አላውቅም 99 መልስ የለም	
405	ክትባት ከምን ምን በሽታዎች ይከላከላል	1) ከፍኝ 2) <input type="checkbox"/> ሮ <input type="checkbox"/> አ 3) ፖሊዮ 4) መንጋጋ ቆልፍ 5) ትክትክ 6) ሌላ ካለ----- 88 አላውቅም 99 መልስ <input type="checkbox"/> ለም	
406	አንድ ህጻን ክትባት በትክክል የሚጀምረው መቼ ነው	1) ወዲያው እንደተወለደ 2) ከተወለደ 4 ሳምንት በኋላ 3) ከተወለደ 6 ሳምንት በኋላ 4) ከአንድ ወር በኋላ 5) ሌላ ካለ ይጠቀሱ----- 88 አላውቅም 99 መልስ የለም	
407	አንድ ህጻን ክትባት ወስዶ ለመጨረስ ሰንት ዙር እንደሚወስድ ያውቃሉ?	1) አዎ 2) አላውቅም	መልስ 2 ከሆነ ወደ 409 <input type="checkbox"/> ሂ <input type="checkbox"/>
408	ካወቁ ህጻኑ ክትባት ወስዶ ለማጠናቀቅ ሰንት ጊዜ ይወስድባታል?	1) አንድ ጊዜ 2) 4 ጊዜ 3) 5 ጊዜ 4) ሌላ ካለ ይጠቀሱ---- 88 አላውቅም 99 መልስ የለም	
409	አንድ ህጻን ክትባት ወስዶ የሚጨረሰው መቼ ነው?	1) 9ወር 2) 12ወር 3) 24ወር 4) 36ወር 5) ሌላ ካለ ይጠቀሱ-	

ሰላደረጉልን ትብብር እጅግ አድርገን አናመሰግናለን !!!

