Predictors of Immunization Defaulting among Children Age 12-23 Months in Hawassa Zuria District of Southern Ethiopia

Fikru Tesfaye[1], Alemu Tamiso[2], Yemane Birhan[2], Tariku Tadele [3]
[1]Department of Public Health/Unit of Epidemiology and Biostatistics, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[2]Addis Continental Institute of Public Health, Addis Ababa, Ethiopia
[3]Department of Internal Medicine, College of Medicine and Health Science, Hawassa University, Ethiopia

Article Info

ABSTRACT

As part of the overall package of maternal and child health services in Ethiopia, all children are provided with free immunization services and it is available in all government health facilities, both in rural and urban areas. But significant number of children was defaulted from Immunization schedule, even after the health extension program was launched. Therefore, the study was assessed predictors of immunization defaulting among children age range of 12-23 months, in Hawassa Zuria district of southern Ethiopia. Unmatched case control study was conducted in six Kebeles which were selected from 26 kebeles by simple random sampling techniques. Cases were children in the age ranges of 12 - 23 months who did not complete the recommended immunization. All cases (105) and controls (209) in the kebeles were identified by using health posts Vaccine registration book. Bivariable and multiple logistic regression model were used to identify important predictor of immunization defaulting. P-value of less than 0.05 was considered as the level of significances. The study identified educational status, place of delivery, immunization related knowledge, ANC follow up and household wealth status as significant predictors of defaulting from immunization schedules. Sustained health education on vaccination related knowledge and institutional delivery services utilization will be needed. The household literacy and economic status should also get emphasis so as to decreases defaulting of children from immunization schedule.

Corresponding Author:

Alemu Tamiso
Addis Continental Institute of Public Health
Addis Ababa, Ethiopia
Email: tamisodebiso@gmail.com

1. INTRODUCTION

Immunization is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent infection or disease [1]. There were between 2 and 3 million deaths occurred during each year by vaccine preventable diseases alone. To reduce this figures of mortality and morbidity, the World Health Organization (WHO) launched Expanded Program on immunization (EPI) in 1974, less than 5% of the world's children were immunized during their first year of life against six killer diseases; polio, diphtheria, tuberculosis, peruses, measles and tetanus. Today, 83% of the world's children less than one year of age have received these life-saving vaccinations. As a result, in the World more than 2.5 million deaths of children prevented each year from vaccine preventable diseases [2]. Increasing numbers of countries, including developing   countries, are adding new and under-used vaccines, like Hepatitis B,

Haemophilia's influenza type b (Hib) and yellow fever vaccine to their routine infant immunization schedules [3].

Ethiopia as one of the member states, adopted EPI in 1980 with the aim of reducing morbidity and mortality of children from vaccine preventable diseases. Here EPI had its objective to control high deaths of infant and increase immunization coverage by 10% annually and reach 100% in 1990. Unfortunately, the program had not succeeded as the plan; however, current EPI coverage increases significantly [4],[5]. The country has adapted and used the Reaching Every District (RED) and the Sustainable Outreach Services (SOS) approach to enhance immunization coverage since 2003. Currently, Ethiopia is showing progress towards more country wise coverage by building and staffing more than 15,000 peripheral health facilities in order to realized its objective of reducing child and infant mortality as well as millennium development goals (MDG) of 2015[2].

Despite, EPI services exists in all kebeles and delivered by health extension workers to community, still there is high number of defaulters, due to the major determinants to achieving universal immunization including low access to services, inadequate awareness of caregivers, missed opportunities, and high dropout rates that have been recognized since the early years of EPI effort [4],[6]. But after health extension program was launched exact factors for immunization defaulting was not assessed in southern Ethiopia, so the study assessed predictors of immunization defaulting among children age 12-23 months in Hawasa Zuriya district of southern Ethiopia.

2. RESEARCH METHOD

Study design

Population based unmatched case-control study design was done among children

Study area

This study was conducted at Hawassa Zuriya District in Sidama Zone, Southern Ethiopia. It is located 22 Km's from south of Hawassa town (capital of southern nation, nationality and people region) and 292 Km's south from Ethiopian capital, Addis Ababa. The District has 26 kebeles; 3 urban and 23 rural kebeles. In the District majority of population lives in rural areas and it have 5 health centres and 22 health posts. The total coverage of health in the district was 84%. The estimated total population of the districts were 151,310(76,260 (50.4%) and 75,050 (49.6%) are females and males respectively). The total number of children eligible for immunization of 2013 was 5750.

Study population

All children living in the age range of 12-23 months, those who lived the past 2 years in these study areas and the children at least had single exposure to be vaccinated was included in the study and. Children who started immunization and default later and those children who found in age range of 12-23months and who completed all recommended vaccines were included as case and control respectively. Children whose guardian/mother confused to describe concisely about information of child related to immunization was excluded from the study.

Sample size determination

The sample size calculation for determinant of immunization defaulters were done by using unmatched case control formula, using STATCALC program of EPI info version 3.5.1 with considering the following assumptions; confidence level of 95%, power of 80%, case to control ratio of 1:2. Odds ratio of 3.7 and its proportion obtained from previous Literature [6].

$$n = (Z_{\alpha/2} \sqrt{(1+1/r)} P(1-P) + Z_\beta \sqrt{(P1(1-P1)+ P2((1-P2)/r))^2} (P1-P2)^2$$

As it can be seen from the table, the sample size calculation for the determinants are based on significant factors at different studies, the result includes non-respondent 10%. Among a lot of exposure variables, Mothers Education concerned with Illiteracy was the highest sample size when compared with other assumed factors. For more information look (Table 1).

Table1. The Sample size calculation for the Predictors, by using significant factors from different study, 2014

No	Significant Predictors	Citation	CI	Power	Case: Control	Exposure of		OR	Samples size		
						case	Control		case	Controls	Total
1	Mothers Education (Illiterate mother)	(4, 7)	95%	80%	½	94.4	82	**3.7**	**105**	**209**	**314**
2	ANC follow UP (No visit)	(7)	"	"	"	65.6	41.6	2.6	63	124	187
3	Area of Resides (Rural)	(8)	"	"	"	51.9	12.5	7.6	21	41	62
4	Immunization related knowledge (Poor)	(7)	"	"	"	48.4	26.7	2.5	70	140	210
5	Delivery site (At home)	(8)	"	"	"	49	15.3	5.3	28	55	83

Sampling procedures

The study was conducted in six kebeles (similar with small villages) which were selected from 26 kebeles by simple random sampling techniques. All cases and controls of those selected kebeles identified by using kebeles health posts Vaccine registration book. Sampling frame was prepared from this registration book. The total sample size 314 (105 cases and 209 controls) was distributed to each selected Kebeles' based on proportional to size allocation. Finally, the study individuals were chosen by systematic sampling with using interval of every 6th households. Only mother was interviewed after we were reached the households.

Operational definition

Fully Immunized: A child between age ranges of 12-23 months who received all recommended vaccine based on EPI program schedule up to Measles vaccine.

Immunization defaulters: Occurs when the child missed at least one of the recommended vaccine.

Unvaccinated: A child who does not receive any dose of the recommended vaccines

Vaccinated: A child who take at least one dose of the recommended vaccines

Coverage by card only: Coverage calculated with numerator based only on documented dose excluding from the numerator those vaccinated by history.

Knowledge of immunization: Assessed using eight immunization related knowledge assessing factors provided to respondents. Those who had answered four or more assigned as having satisfactory knowledge and those below as having poor knowledge.

Immunization coverage: Proportion of children took recommended vaccination

Immunization status: Being fully/partially vaccinated or unvaccinated

Data collection procedures

A pretested and structured questionnaire was prepared based on reviewed literatures. The questionnaire were prepared in English and then translated to local language (Sidamu-affo) and back translated to English to maintain consistency. Eight health extension workers supervised by 2 public health professionals were recruited and trained for three days to collect Socio-demographic and socioeconomic characteristics (Sex of child, Average family income, Area of Residence, Maternal education, Mothers occupation, Maternal religion and residences) and health facility related characteristics (Postponing child immunization schedule, Antenatal care (ANC) follows up, Distance to health facility and place of delivery). The data collection tool was pretested on the 3rd day of training in another similar kebeles and respondents were selected by using similar method with the main study which was include 10% (32) of participant from the total, in order to sort out language barriers and contextual differences.

Data Quality Assurances

To assure data quality, data collectors and supervisor was trained for three days by principal Researcher's and 10% of the sample were pretested in outside of the studied area to identify potential problems that was arise during the actual data collection period. The principal investigator and the supervisor were making day to day on site supervision during the whole period of data collection. Completeness, accuracy and consistency of the collected data were checked on daily bases during data collection by supervisor and the principal investigator. Trained collectors were collecting the data after thoroughly explaining the objective of the study to each study subject and informed consent was obtained.

Data processing and analysis:

The data were cleaned to check for its completeness, consistency and the presence of missed values and variables. Any error identified was corrected as necessary. Then, it was entered into a pre-designed format in Epi-info version 3.5.1 and transferred to SPSS version 20 for analysis. Description of the main analysis findings was done using frequencies, percentages and summary statistics. Binary Logistic regression Model was fitted. First bivariate analysis between dependent and independent variables, then all independent variables that showed statistical significance with a p-value <0.05 in the bivariate analysis were included in the multivariate model. Those predictors with p-value <0.05, in the multivariate analysis, were considered as independent and significant factors associated with incomplete immunization among children aged 12-23months.

Ethical Consideration

Ethical clearance was obtained from the Institutional Review Boards of Hawassa University and Addis Continental Institute of Public Health. Formal letter of cooperation was written for sidama zone Health Department. Then Permission letter was in hand from Sidama Zone health department and Woreda health office respectively. During the data collection process, the data collectors were inform the mothers/caretakers about the purpose, anticipated benefits and harms/discomforts of the research project. The data collectors were also inform them that their name were not used and confidentiality of information was kept, participation in the study is absolutely based on their free willingness and as they have full right to refuse, withdraw their participation at any time from their participation. After doing so, study participants were asked if they have well understood the whole thing. Any question rose was more clarified and their voluntariness to participate was asked. Oral consent was obtained for their willingness for participation.

3. RESULTS AND ANALYSIS

From the total of 314 sampled children aged between 12-23 months, 308 children (103 cases and 205 controls) were interviewed with response rate of 98%. The mean age and standard deviation (SD) of children was 17.25 months and 3.12 respectively. Fifty one percent of children were female and the rest are male.

Maternal, child and household socio-demographic characteristics

Regarding to socio-demographic characters; as we compare the different educational status of respondents 74 (71.8%) of cases and 64 (31.2%) of controls were illiterates, 21 (20.4%) of cases and 95 (46.3%) of controls attended primary School & 8 (7.8%) of cases and 46 (22.4%) of controls attended secondary and above level. If we compare, marital status between the two-study groups, about 81 (78.6%) cases and 181 (88.3%) controls were married, Pertaining to knowledge about immunization of respondents, 63 (61.2%) cases and 182 (88.8%) controls were had satisfactory knowledge related to vaccination. When we compare the household wealth status 32 (31.1%) of cases and 40 (19.5%) of the Controls were found in the wealth quintal of poorest category, while 22 (21.4%) cases and 58 (28.3%) controls were found in the highest wealth quintal. Regarding to sex of the child, 67 (65%) cases and 90 (43.9%) controls were females, According to delivery site majority 93 (90.3%) of cases and 125 (61%) of controls children were born at home. 62 (60.2%) cases and 73 (35.6%) controls of the participating children were in the birth order of 4th and above

Knowledge as determinant of immunization defaulting.

Concerning to Knowledge of respondent about immunization related issues, from the total respondent almost all 101 (98.1%) case and 205 (100%) controls were heard about vaccination and vaccine preventable diseases. Up to 86 (83.5%) cases and 87 (42.4%) controls from total interviewers were mentioned less than four types of vaccine preventable diseases, According to respondent's Knowledge about the age at which the child begins and complete vaccination. Majority of cases 55 (53.4%) and 149 (72.7%) controls, while 20 (19.4%) cases and 125 (61%) controls were knew the age at which the child begins and finish immunization respectively. Pertaining to vaccination session only 28 (27.2%) cases and most 117 (57.1%) controls of the respondents were knew the session needed to be fully protected.

Predictors of immunization defaulter
Bivariable logistic regression analysis results

Bivariable logistic regression analysis showed that Mothers living without a partner [(OR: 2.1, 95% CI: (1.1-3.9)], rural resident[(OR: 2.9, 95% CI:(1.5-5.9)], Illiterate mother[(OR:6.6, 95% CI: (2.9-15.3)],

Time take ≥30 Minutes' walk away to health facility[(OR: 1.75, 95% CI: (1.03-2.97)], ≥5 family size[(OR: 2.6, 95% CI: [(1.6-4.3)], children living in poorest quintile[(OR: 2.1, 95% CI: (1.1-4.1)], Home delivery [(OR: 5.9, 95% CI: (2.9-12.1)), Sex of child being female[(OR: 2.4, 95% CI: (1.5-3.9)], Order of child being 3rd and less in the family[(OR: 2.7, 95% CI: (1.7-4.5)], Children of mothers who had no ANC follow up attendance during their last pregnancy [(OR: 4.3, 95% CI: (2.6-7.1)], and Mothers who did not receive at least two dose of TT vaccination[(OR: 3.5, 95 % CI: (2.1- 5.7)] were significantly associated with immunization defaulting. See Table 2.

Table 2. Bivariable logistic regression analysis of Maternal, child and facility related characteristics on immunization defaulting, in southern Ethiopia 2014

Variables	Immunization Defaulting		COR, 95% CI
	Case, n (%)	Control, n (%)	
Maternal Age (yrs.)			
<20	13(12.6)	23(11.2)	1
20–24	10(9.7)	87(42.4)	0.09(.033-.263)
25–29	17(16.5)	45(22.0)	0.51(.221-1.183)
30–34	31(30.1)	24(11.7)	1.29(.555-3.029)
35–39	24(23.3)	22(10.7)	1.97(.859-4.510)
≥40	8(7.8)	4(2.0)	2.71(.699-10.480)
Marital status			
Married	81(78.6)	181(88.3)	2.05(1.085-3.866)*
Unmarried	22(21.4)	24(11.7)	1
Educational status			
Illiterate	74(71.8)	64(31.2)	6.65(2.92-15.13) ***
Primary	21(20.4)	95(46.3)	1.27(0.52-3.09)
Secondary and above	8(7.8)	46(22.4)	1
Residential area of family			
Rural	92(89.3)	152(74.1)	2.92(1.449-5.867) **
Urban	11(10.7)	53(25.9)	1
Distance far from Health Institution			
<31 Minutes	69(67)	160(78)	1
≥31 Minutes	34(33)	45(22)	4.60(2.478-8.537)*
Family size			
<5	43(24.3)	134(75.7)	1
≥5	60(45.8)	71(54.2)	2.63(1.620-4.281)
Wealth Index			
Poorest	32(31.1)	40(19.5)	2.11(1.073-4.146) *
Poorer	11(10.7)	21(10.2)	1.38(.573-3.327)
Middle	16(15.5)	34(16.6)	1.24(.574-2.681)
Richer	22(21.4)	52(25.4)	1.12(.554-2.245)
Richest	22(21.4)	58(28.3)	1
ANC follow-up of last pregnancy			
Yes	34(33)	148(72.2)	1
No	69(67)	57(27.8)	4.28(2.587-7.082) ***
Toking two or more dose of TT			
Yes	32(31.1)	125(61)	1
No	71(68.9)	80(39)	3.47(2.097-5.732) ***
Postponing schedule of child immunization			
Yes	42(37.5)	70(62.5)	0.75(.462-1.226)
No	61()31.1	135(68.9)	1
Sex of child			
Female	67(65)	90(43.9)	2.38 (1.457- 3.882) **
Male	36(35)	115(56.1)	1
Place of birth			
Home	93(90.3)	125(61)	1
Health Institution	10(9.7)	80(39)	5.95(2.926-12.107) ***
Order(rank) of the Child in the family			
1st,2nd and 3[ed]	41(39.8)	132(61)	2.73(1.680 - 4.451) ***
4th and above	62(60.2)	73(39)	1
Immunization related knowledge			
Poor knowledge	40(38.8)	23(11.2)	5.03(2.792-9.041) ***
Satisfactory knowledge	63(61.2)	182(88.8)	1

P-value: * 0.01<p<0.05   **0.001<p<0.01   ***p<0.001
Multiple logistic regression analysis

From the Multiple logistics regression analysis; children who borne from Illiterate mother [(**AOR: 3.62; 95% CI: (1.33-9.86)**] was **4** times more likely to defaulting vaccination schedules than children who

borne from mothers who had completed secondary and above educational level, regarding to wealth; children living within households with poorest quintile [(**AOR: 2.90, 95% CI: (1.17-7.17)**], was 3 times at risk for immunization defaulting than highest wealth quintile. From health facility factors; Home delivery [(**AOR: 4.10, 95% CI: (1.71-9.83)**], was **4** times at higher risk for immunization defaulting than children who borne in the health facility. Another health facility related characteristics which had association was ANC follow up. Thus mothers who had not followed ANC during their last pregnancy [(**AOR: 2.39, 95% CI: (1.28-4.49)**)] was **2** times highly default from immunization schedules than mothers who tried to utilize ANC care for last pregnancy. Children who borne from mothers who had poor immunization related knowledge was (**AOR**: **4.054, 95% CI: (1.96-8.39)**)] **4** times more likely to defaulting from full vaccination than the counterpart **(see** Table 3**).**

Table 3. Multiple logistic regression analysis of effect of maternal, child, household and health institutional related characteristics on immunization defaulting, in southern Ethiopia, 2014

Variable		Immunization defaulting		Odds Ratio (95%Cl)	
		Case	Control	Crude	Adjusted
Marital status	Married	81(78.6)	181(88.3)	2.048(1.085-3.866)	1.640(0.73-3.69)
	Unmarried	22(21.4)	24(11.7)	1	1
Educational status	Illiterate	74(53.6)	64(46.4)	6.648(2.92-15.13)	**3.618(1.33-9.86)***
	Primary	21(18.1)	95(81.9)	1.271(0.52-3.09)	1.078(0.38-3.03)
	Secondary and above	8(14.8)	46(85.2)	1	1
Sex of child	Female	67(65)	90(43.9)	2.378 (1.457- 3.882)	1.44(0.78-2.66)
	Male	36(35)	115(56.1)	1	1
Place of delivery	Home	93(90.3)	125(61)	5.952(2.926-12.107)	**4.102(1.71-9.83)****
	Health facility	10(9.7)	80(39)	1	1
Birth order	1st-3ed	41(39.8)	132(64.4)	2.734(1.680 - 4.451)	1
	4th and above	62(60.2)	73(35.6)	1	1.318(0.66-2.64)
Residential area	Rural	92(89.3)	152(74.1)	2.916(1.449-5.867)	1.076(0.43-2.73)
	Urban	11(10.7)	53(25.9)	1	1
Average time walk to facility	<31 Minutes	69(67)	160(78)	1	1
	≥31 Minutes	34(33)	45(22)	4.600(2.478-8.537)	1.251(0.62-2.51)
Family size	<5	43(41.7)	134(65.4)	1	1
	≥5	60(58.3)	71(34.6)	2.633(1.620-4.281)	1.463(0.73-2.92)
Wealth Index	Poorest	32(44.4)	40(55.6)	2.109(1.073-4.146)	**2.897(1.17-7.17)***
	Poorer	11(34.4)	21(65.6)	1.381(.573-3.327)	0.941(0.29-3.00)
	Middle	16(32.0)	34(68.0)	1.241(.574-2.681)	0.959(0.34-2.64)
	Richer	22(29.7)	52(70.3)	1.115(.554-2.245)	1.247(0.53-2.95)
	Richest	22(27.5)	58(72.5)	1	1
ANC follow-up	Yes	34(33)	148(72.2)	1	1
	No	69(67)	57(27.8)	4.280(2.587-7.082)	**2.39(1.28-4.49)****
Receiving two or more TT dose	Yes	32(31.1)	125(61)	1	1
	No	71(68.9)	80(39)	3.467(2.097-5.732)	1364(0.70-2.64)
knowledge of Mother's	Poor	40(38.8)	23(11.2)	5.025(2.792-9.041)	**4.054(1.96-8.39)*****
	Enough	63(61.2)	182(88.8)	1	1

P-value: * 0.01<p<0.05   **0.001<p<0.01   ***p<0.001

Childhood mortality can be significantly lowered if routine vaccination is completed, but significant number of eligible children in Ethiopia was defaulted from immunization schedule which increase them to die from vaccine preventable disease [9]. This study was assessed predictors for immunization defaulting and revealed educational status, place of delivery, ANC follow up and household wealth status as the significant predictors of defaulting from completion of immunization schedules in children aged between 12-23 months after adjusting all confounding variables.

Accordingly Maternal education status was significantly associated with immunization defaulting. Children who borne from illiterate mothers were 3.6 times more likely to default from immunization schedule than children who borne from mothers who had attended secondary or higher education: This is consistent with the study done by Edward Bbaale, which showed that maternal education contribute to bring important changes on attitudes, traditions and beliefs, which increase autonomy and control over household resources, which enhance healthcare seeking, whereas illiteracy had high risk of defaulting [10]. Another finding from Nepal and Philippines were in line with this study that maternal education was important predictors for immunization defaulting [11],[12]. This might be due to the low level of understanding about the benefits of vaccination, low chance of exposure and difficult to listen a message in Amharic from radio

and TV, among illiterates. But, inconsistent with another studies done in Nigeria and in southern part of Ethiopia, which showed educational status were not significant predictors to immunization defaulting [13].

Other socio-economic characteristic of the respondents which was significantly associated with defaulting from completion of child immunization was household wealth status. In thus children living in the family within poorest quartile were 3 times more likely to defaulting from immunization schedule than children who live in the highest wealth quintal. These finding is consistence with the study done by Renstein, which showed family wealth status as significant predictors of immunization defaulting [14]. Another report done in West-Cape had indicated that the household with higher wealth status were more likely to complete the immunization schedule. Similarly literature obtained from Ethiopia also assures that wealth level had significant association for immunization defaulting [7].

This might be attributable to household with good economic status were able to cover the cost involved during repeated visits like transportation and other related cost [15]. This may be also due to the absence of transportation, access to media like radio and TV and other related cost.

Among health facility related factors; ANC follow up of mothers was significant predictor of immunization defaulting after adjustment of all other variables, Children of mother who had no ANC follow up during their last pregnancy were 2.4 times more likely to default from immunization schedule than those attend ANC follow up. Study done in Philippines and sub-Saharan African agreed with this finding [12],[16]. Another study done in Ethiopia also indicate ANC utilization as significant predictors of immunization defaulting [8]. Reason behind this might be when mothers had no ANC follow up; they miss information about immunization related knowledge which was obtained from repeated education during ANC follow up.

Place of delivery was another facility related characteristic which showed a significant association with the immunization defaulting. Children of mother delivered at home were 4 times more likely to defaulting vaccination than those children delivered in a health facility. This is similar with study done at Mozambique which indicate that home delivered mothers children had high risk of defaulting immunization [17]. Another studies done in Kenya and in East Africa showed place of delivery as significant predictors. [18],[19]. Ethiopian study also revealed that children born in Health facility were 2.6 times more likely to complete immunization [8]. This might due to the fact that mothers delivering at home would not have contact with health professionals and exposure to know about immunization which is provided in prenatal and postnatal period.

Another reason that contribute for immunization defaulting was maternal immunization related kknowledge. Children of mother who had poor knowledge related to immunization were 4 times more likely to incomplete vaccination than those who had satisfactory knowledge. This is consistence with a cross-sectional study in West Bengal of India, that identified low knowledge about immunization was the significant predictors immunization defaulting [20]. The finding obtained from Nigeria reported that Parental immunization related knowledge had strong influence on immunization defaulting [13]. Another study done in Eastern Ethiopia approved that Unaware of mothers let them not to return for 2nd and 3rd dose because of information on place and/or time of immunization and wrong perception contraindication were statistical significant factors for the immunization default of children [21]. Similarly the report done in south Ethiopia revealed that knowledge of the mothers/caretakers about the benefit of immunization had significant effect on vaccine defaulters [7]. This might be due to information depth; with low analysis of benefit and harm about vaccination of the child and low understanding of morbidities and mortalities due to vaccine preventable diseases and likes.

Limitation

Attitude of the mothers/caretakers was not studied, which may have an impact on immunization and not complimented by qualitative method which can answer why question. Recall bias was introduced due to mother might forget the vaccination and related issue of their children. Despite these limitations, to the best of our knowledge, this study presented primary results of the study and had used adequate cases and controls and Regular and intensive continuous supervision made by the supervisors and the principal investigator that ensured the issue of data quality management.

4. CONCLUSION

This study identified the predictors for immunization defaulter through Bivariable and multiple logistics logistic regression. In the Bivariable analysis many predictors were identified as predictors. Mothers live without a partner, Rural resident, Illiterate mother, Regarding to distance mothers walk ≥30 Minutes to health facility, Un-proportional family size (≥5), Family living within poorest quartile, Chilled of mothers who delivery at home, Sex of child being female, Rank of child being 4th and above, Children of mothers

who had no ANC follow up last pregnancy, and mothers who not receive TT vaccination were predictors of immunization defaulting. But in multivariate analysis only factors such as educational status, place of delivery, ANC follow up, Household wealth status and Immunization related knowledge of mothers were showed the significant association with the defaulting from completion of immunization schedules in children aged between 12-23 months after adjustment for other variables. Health professionals should motivate and continuously teach mothers to promote attendance of ANC follow up and institutional delivery as well as to reduce long waiting time in health facility and postponements. Proper information on the doses and timing of the vaccination should be given for the mother coming for immunizing their child by health profession. Besides the governments and stack holders should give much emphasis on improving educational status mothers and economic status of households.

Authors' contributions: FT was the primary researcher, conceived the study, designed, participated in data collection, conducted data analysis, drafted and finalized the manuscript for publication; **AT** was assisted in data collection and reviewed the initial and final drafts of the manuscript; **YB** was assisted in data collection and reviewed the initial and final drafts of the manuscript; **TT** interpreted the results, and reviewed the initial and final drafts of the manuscript**.** All authors read and approved the final manuscript.

List of abbreviation: HEP: health extension program, **MDG**: millennium developments Goal, **OPV** (oral polio vaccine), **RED**: reaching every district; **SNNPR**: Southern nation nationality and people region, **TT**: Tetanus Toxic, **WHO**: World Health organization.

Competing interests: The authors declare that there is no competing interest.

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