



Immunization Coverage and Associated Factors Among Children in Bila Town, West Wellega Zone, Oromia Regional State, Western Ethiopia

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Received: September 27, 2019; **Published:** October 16, 2019

DOI: 10.31080/ASMS.2019.03.0440

Abstract

Background: Immunization averts an estimated 2 to 3 million deaths every year globally. In Ethiopia only quarter of children are fully immunized; the rest are remained at risk for vaccine-preventable mortality. To increase the immunization, its coverage and predictors has to be identified. This study has measured immunization coverage and identified the predictors.

Objective: To assess the immunization coverage and associated factors among less than five years children Bila town west Wellega zone, Oromia Regional State, Ethiopia

Method: Community based cross sectional study, systematic random sampling technique was used to 331 participants select the study subjects. The data was collected by using face to face interview. Data was analyzed manually.

Result: It was found that 64.8% of the under-five children in this study were fully immunized while the proportion of children who were partially immunized and not immunized was 31.46% and 3.74% respectively. Mother's education, age and occupational status were associated factors for immunization of children.

Keywords: Immunization Coverage; Less Than Five Years Children; Western Ethiopia

Abbreviations

FIC: Fully Immunized Child; HSDP: Health Sector Development Plan; IMR: Infant Mortality Rate; EPI: Expanded Program on Immunization; MDGs: Millennium Development Goals; NPP: National Population Policy; U5MR: Under-5 Mortality Rate; WHO: World Health Organization;

Background

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 birthday; many during the first year of life [1]. Immunization is a proven tool for controlling and eliminating life-threatening infectious diseases and it is estimated to avert between 2 and 3 million child deaths each year [2]. Routine immunization is considered as the most cost effective Public Health interventions and was first introduced in Ethiopia in the year 1978. Ethiopia placed sixth among the countries of the world in terms of child death as 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 [3].

Globally, 130 million children are born annually and 91 million of these are in developing countries. However, 10 million of these children under five years of age die every year. Over 27 million infants do not get full routine immunizations. Every year more than 10 million children in low and middle income countries die before they reach their fifth birthday. Most of them die because they do not have access to effective interventions that combat common and preventable childhood illnesses [8]. Infant and under-five mortality rates in Ethiopia are some of the highest in the world. One of the major causes of this mortality is vaccine preventable diseases [9]. EPI was started in Ethiopia in 1980 with the aim of reducing morbidity and mortality of children and mothers from vaccine preventable diseases. During the inception of EPI the objective was to increase immunization coverage by 10% annually but this target has not been realized even after two decades because of factors such as poor health infrastructure, low number of trained manpower, high turnover of staff and lack of donor funding. The same factors still affect the program today. The target group when the program started were children under two years of age until it changed to one year in 1986 to be in line with the global immunization target [10].

According to the Ethiopian Demographic and Health Survey (EDHS) 2005, only 20% of children 12 - 23 months of age were fully vaccinated and 24% of children did not receive any vaccination. Accordingly, children are more likely to be vaccinated the first doses of vaccination than the third and the fourth doses in which 60% of children received Bacillus Calmette- Guirin (BCG) and from these only 35% of them receive measles vaccine which is the last vaccine dose in EPI program of Ethiopian. This shows that there is a high rate of drop out from vaccination [11]. In Ethiopia, low access to services, inadequate awareness of caregivers, missed opportunities, and high dropout rate are major factors contributing to low EPI coverage. Therefore, the aim of this study is to assess the immunization coverage and associated factors among less than five year children in Bila town According to guidelines developed by the World Health Organization (WHO), children are considered fully vaccinated when they have received a vaccination against tuberculosis Bacillus Calmette Guerin (BCG), three doses each of diphtheria, pertussis and tetanus toxoids (DPT), three doses of polio vaccines, and a measles vaccination by the age of 12 months. Since Ethiopia included Hemophilus influenza type B (HiB) and hepatitis B (Hep B) as of 2007; pentavalent vaccine (DPT plus Hep B and Hib) has replaced the previous DPT vaccine [12]. World Health organization reports indicated by the year 2011 worldwide coverage of three doses of DTP, one dose of measles and three doses of polio vaccine were 83%, 84% and 84% respectively. However, more than one-fifth of the world's children, especially those in low-income countries, were still not fully vaccinated at 12 months of age and remained at risk for vaccine-preventable morbidity and mortality [13]. Complete immunization coverage in Kenya by the year 2011 was 76.6% with 99.5% BCG and 77.4% measles coverage. Identified predictors were number of children within the family, place of birth of the child, and opinion on the health immunization services offered [14]. In 2005 Indian complete status immunization was 44% almost similar with Pakistan and factors identified were mother education, mother religion and child birth order [15]. In Ethiopia, the vaccination policy calls for BCG vaccine given at birth or at first clinical contact, three doses of pentavalent (DPT-Hep B-Hib) vaccine and the newly added pneumococcal conjugate vaccine (PCV) vaccine given at approximately 4, 8, and 12 weeks of age, four doses of oral polio vaccine given approximately at 0-2, 4, 8, and 12 weeks of age, and measles vaccine given at or soon after reaching 9 months of age [16]. All these vaccines are recommended to be given within one year of a child age. Ethiopian central statistics agency in its 2011 demographic and health survey found that 24% of Ethiopian children 12 - 23 months age have received all recommended vaccines; one dose each of BCG and measles, and three doses each of DPT and polio (excluding polio zero vaccine given at birth). The finding of this survey showed improved immunization coverage as compared with similar survey in 2005 which revealed that only 20% of children 12 - 23 at the time. The 2011 survey also reported fifteen percent of children did not receive any of the recommended vaccines. Vaccination coverage is

more than double in urban areas than in rural areas of the country (48% versus 20%) [17]. In contrast with this national survey other studies; a 2006 survey reported 49.9% in nationwide, a 2008 survey in Wonago district 41.7% and in 2011 at Ambo district 36% of the children were fully vaccinated [18]. Ethiopian demographic and health survey (EDHS) 2011 also calculated coverage for specific vaccines, 66 percent of children received the BCG vaccine, and 56 percent had received the measles vaccine. A relatively high percentage of children received the first DPT dose (64%). However, only 37% went on to receive the third dose of DPT. More than eight children of every ten (82%) received the first dose of polio, but only 44% received the third dose [Central Statistical Agency [19]. According to guidelines developed by the WHO and shared by Ethiopia, a child is considered fully immunized when he/she has received one dose of BCG, three doses of DPT (since Ethiopia included HiB and HepB since 2007; pentavalent vaccine (DPT + Hep B_Hib) has replaced the previous DPT vaccine), three doses polio vaccines excluding polio zero given at birth and a measles vaccination by the age of 12 months. A child is considered as partially immunized if received any vaccines but missed at least one dose of one BCG, three doses of pentavalent, three doses of oral polio vaccine (OPV) and a measles vaccine. A child is considered as not immunized if he/she does not receive any dose of vaccines [20].

A study conducted in Arba Minch Town and Arba Minch Zuria district showed that children had taken measles (77.6%) as compared with 91.0% of children were vaccinated for BCG. As shown in the figure below corresponding vaccination reduction has been recorded from first to second and third doses of Polio, Pentavalent and PCV vaccines. Even though 93.0%, 92.9% and 91.9% of children had started Pentavalent, PCV and Polio vaccines only 89.8%, 86.3% and 86.3% had completed the recommended third doses of each vaccine respectively. Sharing the definitions given by WHO nearly three fourth (73.2%) of children, the rest 20.3% and 6.5% are partially immunized and not immunized/vaccinated respectively [21].

Method

Institutional based descriptive cross-sectional study was conducted from January 1, 2017 to January 20, 2019 G.C at Ambo, university which were west shoa zone central Ethiopia. The sample size was calculated using single population proportion formula by assuming population proportion. To calculate the proportion formula, an estimate of 73.2% is taken from Arba Minch town and Zuria District, Southern Ethiopia, 2013. To get the possible sample at 95% confidence interval, which is Z-value of 1.96 and marginal error of 5%, it is calculated as follows:

$$n = \frac{(z\alpha/2)^2 * p (1-p)}{d^2}$$

Where

p = Estimated proportion of the under five years old children take fully immunization

Z = Level of confidence interval 95%=1.96

d =Degree of precession (the margin of sampling error to be used = 0.05

q = 1-p

$$n = \frac{(1.96)^2 * 0.732(1-0.732)}{(0.05)^2} = 301$$

In addition, by considering the non-response rate 10% final sample size was calculated as; n= nf +10%nf = 331 In addition the amount of data collected qualitatively was determined by the saturation of the data collected.

Ethical clearance was obtained from Ambo University research committee written informed consent for participation in the study was obtained from participants just after start of the interview.

Results

Socio-demographic characteristics of mothers or caregivers

A total of 331mothers or care givers of children less than five years were interviewed with a response rate of 100%. Of the total 331 respondents, 315 (95.2%) were mothers of the children and 16 (4.8%) were caregivers. The majority 321 (97%) of respondents belong to Oromo ethnic group, 268 (81.9%) of them protestant Christian and 43 (13%) Muslim in religion.

The median age of the mothers or caregivers was 28 (± 6.1 SD) years, which ranges from 17 to 58 years. From the total respondents, 190 (57.4%) attended primary school, while 33 (9.4%) completed secondary school and above level and 108 (32.2%) of them can't read and write. More than half, 186 (56.2%) of mothers or caregivers and 175 (52.9%) of fathers were farmers. Socio-demographic characteristics of children from a total of 331 children included in the study, 133 (40.2%) were females, 198 (59.8%) were males From the total children who have participated in this study, 323 (97.6%) were vaccinated at least once and 8 (2.4%) were never vaccinated (Table 1).

Variables	Frequency	Percentage
Respondent's relation with child		
Mothers	315	95.2
Fathers	7	2.1
Caregivers	9	2.7
Age of the Mother (years)		
<20	47	14.2
21__25	78	23.6
26__30	178	53.8
>30	28	8.5
Family Type		
Nuclear	279	84.3
Joint	52	15.7

Monthly family income (Rs.)		
<300	7	2.1
301_600	103	31.1
601_1000	88	26.6
>1000	133	40.2
Education status of Mother		
No formal education	56	16.9
Elementary school	186	56.2
High school	60	18.1
Diploma and above	29	8.8
Occupation of mother		
House wife	211	63.7
Merchant	53	16.0
Government employed	31	9.4
Others	26	7.9
Sex of child		
Male	154	46.5
Female	177	53.5
Age(in months) of the child		
<12	47	14.2
12-23	72	21.8
24-35	80	24.2
36-47	64	19.3
48-60	68	20.5

Table 1: Socio-demographic characteristics of children less than five years in Bila town, west walega zone, Oromia region, western Ethiopia, 2017.

Availability and accessibility of vaccination services

Availability and accessibility of vaccination services Almost all, 331 (100%) of respondents reported that they have access to health facilities that provide immunization services. Majority of them, 305 (92.1%) reported that they have more access to health center, 305 (92.1%) have access to services provided at health center and 26 (7.9%) to services provided during outreach. As far as average distance to health facility in travel hours or minutes was concerned, 325 (98.2%) of respondents have travelled ≤ 15 minutes and 6 (1.7%) travelled greater than an hour (Table 2).

Immunization coverage with different vaccines

It was found that 64.8% of the under-five children in this study were fully immunized while the proportion of children who were partially immunized and not immunized was 31.46% and 3.74% respectively. This study found that coverage with BCG vaccine was 94.4%. The coverage of three doses of DPT, Oral Polio and Hepatitis B vaccine was found to be 76% whereas coverage for measles vaccine was 77.2%.

Variable	Frequency	Percentage
Presence health facility		
Yes	331	100
No	0	0
Number of health facilities		
Health center	1	
Private clinic	3	
Travel time to Nearest Vaccine site		
< 15 minutes	325	98.2
>One hour	6	1.7
Know local Vaccine site schedule		
Yes	241	72.8
No	90	27.2
Ever return without getting vaccine		
Yes	293	88.5
No	38	11.5

Table 2: Availability and accessibility of vaccination services.

Vaccine	Yes N (%)	No N (%)
BCG	252 (76.1)	79 (13.9)
Pent3	306 (92.4)	25 (7.6)
OPV3	306 (92.4)	25 (7.6)
Measles	268 (81)	63 (19)
Polio	306 (92.4)	25 (7.6)

Table 3: Immunization coverage with different vaccines.

Factors association Immunization Status of the Child

Age, educational status and occupational status of the mothers were associated with the immunization status of the child.

Discussion

This study assessed the complete immunization coverage and factors associated with it among children less than five years old in Bila town of Oromia Regional State, western Ethiopia. The pentavalent3 coverage was 92.4% and 81% took measles. The OPV vaccine

Variable	Immunization status		P -value
	Fully immunized N (%)	Partially or not immunized N (%)	
Mothers age in years			
<20	27(57.4)	20(42.6)	0.03
21-25	47(60.3)	31(39.7)	
26-30	131(73.6)	47(26.4)	
>30	22(78.6)	6(21.4)	
Educational status of mothers			
no formal education	26(46.4)	30(53.6)	0.02
Elementary school	134(72.0)	52(28.0)	
High school	43(71.7)	17(28.3)	
Diploma and above	27 (93.1)	2(6.9)	
Occupational status			
House wife	193(91.5)	18(8.5)	
Merchant	31 (58.5)	22 (41.5)	0.01
Government employed	28(90.3)	3(9.7)	
Others	17(65.4)	9(34.6)	

Table 4: Factors association Immunization Status of the Child.

coverage was higher than the coverage of the pentavalent vaccine. The penta3 coverage was higher than the measles coverage. It is logical acceptable and the long time gap between the two vaccines, in which the mother may not return back the measles vaccine. The higher coverage of measles and OPV vaccination was assumed to be due to the frequent national campaign that focused on the two vaccines.

Compared the immunization coverage of Bila town with the EDHS 2016, the proportion of children fully vaccinated in the present study was higher by 39%, but it was similar by proportions

of unvaccinated children [10]. Beside this, the current findings is higher than the 2006 immunization coverage survey in the country which estimated fully vaccinated by card is only at 20% [18]. But it is lower than the immunization coverage reported in the 2008 health and health related indicators [19] and 2010 woreda health office report. This difference is may be due to the over reporting of health and health related indicators data from some areas.

From the total interviewed households, 291 (87.9%) mothers showed the vaccination card of their children. The coverage by card only was also less than that of health and health related indicators.

The proportion of fully vaccinated children in this study was about 8% higher than the EDHS 2016 and 2015 EPI survey coverage [10,18,19]. This difference is because of the result from such country level study includes area of low immunization coverage.

Declarations

Ethics approval and consent to participate

The study proposal was initially approved by the ethical review board of Ambo University. A formal letter of permission was obtained from the college and submitted to department. The information about the study was given to the participants. Verbal and then written informed consent was sought from each participant who agreed to participate in the study and full filled the inclusions criteria. Only anonymous data collected in private rooms.

Availability of data and materials

This study is a part of institutional based a descriptive cross sectional study on Immunization coverage and associated factors among under-five year old children in. The dataset pertaining to this study will be shared upon reasonable request.

Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contributions

TakeleT has involved in advice all part of activities. All of us read and approved the final manuscript. Teferra L. has involved edited the all part of manuscript Dawit E. has involved in the conception, design, analysis, data interpretation and report writing.

Acknowledgements

We would like to acknowledge Ambo University College of Medicine and Health Science for funding this study, In addition, we would like to thank data collectors and study participants.

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Volume 3 Issue 11 November 2019

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