Research article

Magnitude and Determinants of Childhood Vaccination among Pastoral Community in Amibara District, Afar Regional State, Ethiopia

Samuel Mebrahtom*, Yemane Birhane**

* Department of Public Health, Haramaya University
** President, Addis Continental Institute of Public Health

E-mail: saron1988@yahoo.com

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ABSTRACT

Background: Vaccination is one of the most cost-effective public health interventions available, saving millions of people from illness, disability and death each year (1). It averts an estimated 2 to 3 million deaths every year; however an estimated 22 million infants worldwide are still missing out on basic vaccines. In developing countries the coverage are low, thus vaccine preventable diseases are still pose significant threats. In Ethiopia, the vaccination coverage has increased markedly over the past ten years (70% increment over ten years) with remarkable wide variation among the regions which indicates the least coverage in the Afar region which encompasses majority of pastoralist (3,4).

Objectives: To determine the vaccination coverage and associated factors among children aged 12 - 23 months in the pastoral community

Methods: A community based cross- sectional/prevalence study design with internal comparison using a 2-stage cluster sampling technique based on the WHO-EPI model was employed. A total of 1534 children of aged between 12-23 months were selected from 30 randomly selected clusters/villages. Data collection was employed using a standard & structured questionnaire from mother's verbal response & observation from vaccination cards. Data were entered using EPI-Info version 3.2.2 & transferred to SPSS version 20 statistical software for analysis.

Results: The finding of the study revealed that only 8.3 percent of children were fully vaccinated while 54.3 percent were partially and 37.4 percent were not vaccinated at all. Vaccination coverage was highest for BCG (40%) and lowest for DPT3 (10%). The association result indicated that children are more likely to be fully vaccinated in those mothers spouse being an occupant other than Livestock (AOR: 2.6, 95% CI: 1.42, 4.74), households having a monthly average income of 500-1000 birr (AOR: 4.3, 95% CI: 1.62, 11.3), mothers attending ANC more than two times (AOR: 5.5, 95% CI: 2.80, 10.9), mothers visit PNC for second times (AOR: 9, 95% CI: 1.56, 51.8) and for third times (AOR: 18.1, 95% CI: 4.96, 66.1), having a knowledge of childhood vaccination (AOR: 11.3, 95% CI: 5.53, 22.9) were significant and prominent determinant factors.

Conclusions: There is very low vaccination coverage among children aged 12-23 months with poor quality of the immunization program. Spouse occupation, Income, Number of ANC visit and PNC, knowledge of the

mothers on childhood vaccination were significant predictor of children's to be fully vaccinated. Therefore, special attention should be given on significant factors along with mobilization and awareness of the pastoral community so as to improve the vaccination coverage.

Keyword: Pastoral community fully vaccinated Card retention Invalid dose Drop-out rate

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1. INTRODUCTION

Vaccination is one of the most cost-effective public health interventions available, saving millions of people from illness, disability and death each year (1). Each year, more than 100 million children are vaccinated against measles, polio, and other diseases. Millions of children's lives have been saved—at least 20 million over the past two decades (2). However, vaccine preventable diseases still pose significant threats in the developing countries. Vaccines, which protect against disease by inducing immunity, are widely and routinely administered through immunization programs in every country of the world. The prevention of childhood diseases through increased access to immunizations is one of the greatest success stories in global public health. Immunization coverage is one of the indicators used to monitor progress towards the achievement of MDG4 and the reduction of child morbidity and mortality.

In Ethiopia, EPI program services started in 1980 that have been provided to children under one year of age for the six vaccine preventable childhood diseases (tuberculosis, poliomyelitis, tetanus, diphtheria, pertussis and measles). But, the pentavalent vaccine DPT-HepB-Hib, introduced in 2007, has replaced the previous DPT vaccine. The national HSDP IV has initiated several activities. One of the major focus areas is strengthening routine immunization. The Vaccination coverage has increased markedly over the past ten years (70% increment over ten years). Despite this, there is a wide variation among regions in full vaccination coverage, ranging from 79 percent in Addis Ababa to 9 percent in Afar (3). Similarly, the third Performance Review Report of the Health Sector Development Programme (HSDP III), shows that One year before the termination of HSDP III, five regions (Addis Ababa, Harari, Amhara, Tigray, and SNNP) have persistently showed better achievements than the national average for the last three consecutive years while, Gambella (35.9%), Afar(41.3%) and Somali (30.3%) regions where majority of their population are pastoralist seem to be far less than the average performing half below the targets. Thus, vaccine preventable diseases remain the most common cause of childhood mortality. Afar Region has had the status of being the least – covered regions in Ethiopia. This region consists 90% of Pastoral communities which is the most marginalized, remote and isolated people. For many years, health sectors attempt to improve the situation of childhood vaccination in the pastoral community through the provision of EPI activities, training, expanding health education and community mobilization activities. However, these efforts are not based on systematic evidence into possible determinants of the prevailing practice. Thus, Vaccination rates are still stagnant or falling throughout the region. Therefore, this study is decided to determine childhood vaccination coverage of children aged 12–23 months and those associated factors in the Amibara pastoral community.

2. OBJECTIVES

General Objective:

- To determine the vaccination coverage and associated factors among children in pastoral community

Specific Objectives:

- To determine the prevalence of full child immunization coverage
- To identify factors associated with childhood vaccination practice among pastoral community

3. RESEARCH METHOD

Study area and period: The study was carried out in Amibara Woreda, Zone 3, Afar Region, from Oct 26, 2012 - Apr 19, 2013.

Study design: A community based cross-sectional study with internal comparison was employed in the rural villages of Amibara district of Afar Region. This study was involved interviewing the pastoral mothers/guardian of eligible children aged 12-23months.

Source population: The Source Population was all households with children of 12-23 months in the district

Study population: study population was children 12-23 months, prior to the survey and their mothers/guardians lived within eligible household in 30 randomly selected villages of the woreda/district.

Sampling and Sample Size: A 2-stage cluster sampling technique based on the WHO-EPI model was used for sample selection. In the first stage, selection of villages was done using SMART software with the chance of each village being selected with proportional to its population size. In the second stage, selections of households were undertaken randomly with a view to providing all the households in the village a fair chance of being selected. The Sample size is calculated based on the specific objectives. For objective one- to determine the prevalence of full immunization coverage; Using OpenEpi Version 2.3 single population proportion, the Sample size is calculated with the following assumptions: The coverage of fully Immunized children of the Afar Region 8.6% (3), Confidence Level of 95%, Precision of $\pm$ 2% and design effect of 2. Thus, the sample size is 1495. Non-respond rate of 4% is added and the total sample size is 1555 (Approx. 1560 Households). The minimum number of children to be sampled is given by the formula n_{min}= n/cluster size. N_{min}= 1560/30 N_{min} = 52 per cluster. For objective two- Identify factors associated with childhood vaccination practice among pastoral community. Using OpenEpi Version 2.3 unmatched case-control, the sample size is calculated considering EDHS 2011 vaccination coverage by background characteristics of the Afar Region with the assumptions of α = 95, power 80%, Ratio of controls to cases 1:4, least extreme odds ratio to be detected 2. As a result, the largest sample size 719 is taken. To this end, the prevalence sample (1560 households), the higher of the two, is chosen for the sample and planned for the study.

Data Collection Methods and Instrument: A standardized and structured questionnaire was developed for the purpose of data collection after reviewing WHO, UNICEF and EDHS relevant literatures' including making reference to other similar surveys, a draft questionnaire was developed. Data collection was employed into two important approaches: Individual interview from mother's verbal response and Observation from vaccination cards shown to the interviewer. The interview was the first tool for the study that was going to be presented by the interviewer with questioning. The second data collection instrument was observation which had an intention of what would actually exist on vaccination card of a child. For those respondents whose vaccination cards were available, the interviewer copied the vaccination dates directly onto the questionnaire. When there was no vaccination card for the child or if a vaccine had not been recorded on the card as being given, the respondent was asked to recall the vaccines given to her child. Vaccinations reported on the vaccination card represent vaccines given by routine immunization services, while vaccines based on mother's recall usually include routine and other immunization services such as campaigns.

Study Variables

Dependent Variable: childhood vaccination status (unvaccination, partially vaccinated and fully vaccinated) in children 12-23 months of age.

Independent Variables:
- **Maternal and Child Characteristics**
  Demographic factors (Age, Marital status, parity, Family size), Socio-economic status (Education, occupation, Income), Socio-cultural factors (Life style pattern, Mothers authonomy), KAP (Knowledge, attitude & practice), Maternal health care utilization (ANC, TT Vaccination, Place of delivery, post- natal Care), Child characteristics (Sex)
- **Access to & Utilization of health Care Service**
  Availability of health facility, distance of health facility from the residence, time Spent to travel to health facility
- **Quality of health care**

Vaccination Program quality (Card retention, drop-outs, Invalid doses)

Data Quality Control and Management: To control the measurement/observational error/during the survey, the following strategies was employed: Questionnaire was prepared in a simple and tactful manner, Interviewer that had been involved was at least 10th or preparatory complete, had good understanding of the local language (Affari), Amharic and English. Two days training was provided to the interviewer and the Job description for interviewer, Supervisors was carried out some interview for quality control and each questionnaire was checked by the supervisor for data validity and reliability in terms of completeness and consistency and had been corrected before leaving each village. Interviewing time was selected in such a way that there was a high chance of the interview at her home at the time of the survey.
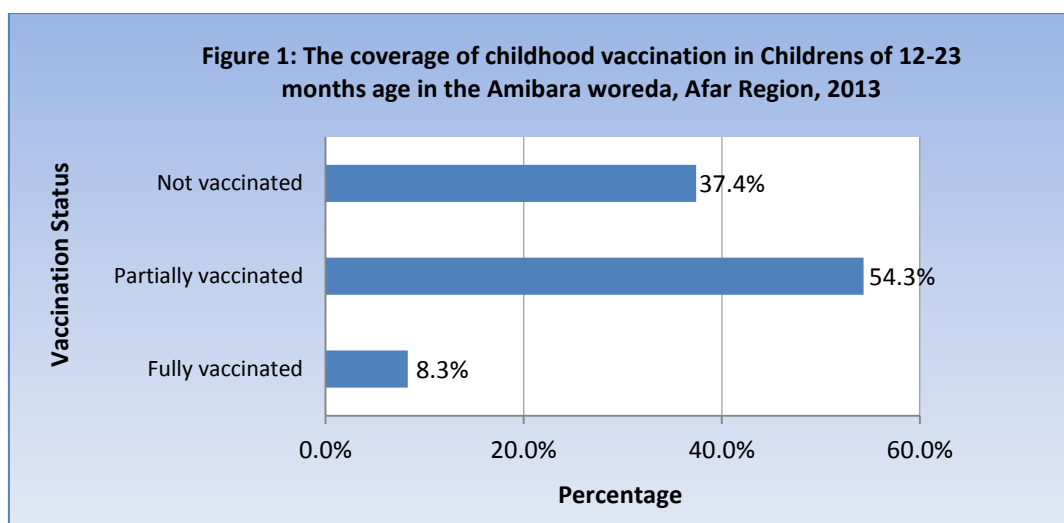
Data processing and Analysis: The responses from the completed questionnaires was coded, entered and cleaned using Epi Info 3.2.2 and exported to SPSS version 20 statistical package in which data analysis had been done. Univariate analysis was done to describe the frequency of data using percentage. Binary logistic regression was employed to determine crude odds ratio for bivariate and adjusted odds ratio for multivariate analysis with 95% confidence interval. Variables that showed statistical significant in the bivariate were further analyzed in multivariate logistic regression to adjust for potential confounders and to identify real factors that affects for fully vaccination.

Ethical Considerations: The ethical approval and clearance was obtained from Research stream committee of ACIPH and Haramaya University. Permission was also obtained from the woreda administrative and health office of Amibara district of Afar region. The necessary ethical consideration was made before the actual data collection takes place. Interview was carried out only with full consent of the person being interviewed. Privacy and strict confidentiality was maintained during the interview process and careful measures were taken for the safety to all collected data.

4. RESULTS AND ANALYSIS

Socio-Demographic, economic and cultural characteristics: A total of 1534 children aged 12 - 23 months were surveyed from 30 clusters distributed in the districts which yields the respondent rate of 98.3%. Of the children surveyed, 819 (53.4%) were male and 715 (46.6%) were female. The majority of the respondent age distribution was under the range of 26-39 years old 646 (42.1%) and the least age group 4 (0.3%) were greater than 60 years old. The majority 1393 (90.8%) were married and the rest unmarried 33 (2.2%), divorced/separated 51(3.3%) and widow 57(3.7%). The majority of households had a family members of greater than three 1101 (71.8%) where as those households having less than or equal to three family members were 433 (28.2%). From the total of the respondent, 1439 (93.8%) were not educated and 95(6.2%) of them were educated. The spouse educational status were shows that 1237 (80.6%) were not educated while 160(10.5%) were educated. The highest number of spouse occupation were livestock herding 875(57%) and 522 (34%) were other than livestock herding. The highest number of respondent 684 (44.6%) were lied in the monthly income of 150-499birr and the least 21(1.4%) were under the monthly income of 1500birr and more. The majority of autonomy of the household relay on the autonomy of both husband and wife 1232 (80%) while 183 (12%) only mothers and 119 (8%) were only husband. About 43.5% of mothers had attended ANC follow up and the majority of the respondent visited ANC for two times. About 44.5% of respondent took TT, and among these, majority of them took three doses of TT. Most of the pastoral mother's deliver at home (96%) and the mother's visited PNC (7.6%) and about 40% took three times visits of PNC. The KAP of mothers/caretakers on the vaccination and vaccine preventable disease is another factor assessed in this study in which from the total sampling subject, 579(37.7%) had a knowledge while 955(62.3%) did not have knowledge on childhood vaccination. The willingness to vaccinate their child were 1389 (90.5%) and the practice of vaccinated their children were 960 (62.6%). About 1242 (81%) of the respondents were reported the availability of health facility near their vicinity. The distance of the health facility from their vicinity, 936 (75%) were less than 5km while 306 (25%) of the respondent were greater than 5km. For majority respondent 619(49.8%) the average walking time to the nearest health facilities were less than 15 minutes and only 8 (0.64%) were more than 1 hour.

Magnitude and Prevalence of Childhood vaccination coverage: From the total of 1534 children aged 12-23 months selected and included in this study, 960 (62.6%) of them were received one or more of the six recommended vaccine and 574 (37.4%) are not vaccinated. Out of vaccinated, 127(8.3%) children finished all recommended vaccination and 833(54.3%) of them had taken one or more vaccine but did not complete the recommended doses.

Figure 1: The coverage of childhood vaccination in Childrens of 12-23 months age in the Amibara woreda, Afar Region, 2013

Out of the respondent, 119(7.8%) mothers showed a vaccination card. As for the coverage by antigen (Card + history) 40% of children had received BCG vaccine, and DPT1/polio1 – 28%/ 54%; DPT2/Polio2- 20%/31%, DPT3 10%; OPV3 16%; & measles 23%

Table 1: Percentage of children age 12-23 months who received specific type of vaccine at any time before the survey, (Vaccination Card or mother's report) Amibara woreda, Afar Region, 2013

Antigen	Coverage			
	Card	Mothers history	Card+ history	Percent
BCG	79 (5.15%)	529(34.5%)	608	40%
Polio1	84 (5.48%)	748(48.8%)	832	54%
Polio2	76 (4.95%)	406 (26.5%)	482	31%
Polio3	61(3.98%)	184 (12%)	245	16%
DPT/Penta1	82 (5.35%)	344(22.4%)	543	28%
DPT/Penta2	74 (4.82%)	227 (14.8%)	437	20%
DPT/Penta3	64 (4.17%)	91 (5.90%)	155	10%
Measles	55 (3.59%)	295 (19.2%)	350	23%

The associated factors of fully vaccination: The associated factors to completion of vaccination were analyzed using logistic regression which includes demography, socio-economic and cultural factors, maternal health care utilization, KAP and health care availability and utilization.

Demographic, socio-economic and cultural factors: The association of these variables was assessed using biviriate and multivariate analyses. The bivariate analysis result indicated that family sizes of greater than three family member in the households were 1.76 (95% CI 1.11, 2.78) times more likely to be fully vaccinated their children than family size less than or equal to three family members but, there is no a significant association in multivariate. The Mothers'/guardian educational status shows a significant association by bivariate analysis which indicated that the educated pastoralist mothers/guardian were 2.6 (95% CI 1.51, 4.61) times more likely to be fully vaccinated than non-educated. But, there is no association in multivariate analysis. The spouse education also significant in bivariate but not in multivariate in which the educated pastoralist were 6.14 (95% CI 4.03, 9.35) times more liked to be fully vaccinated than those who did not. Concerning spouse occupation, in bivariate analysis, being occupation of other than livestock herding were 7.18 (95% CI 4.54, 11.3) times more likely to be fully vaccinated their children than mothers spouse having an occupation of animal herding and also in multivariate analysis, mothers spouse being and occupant of other than animal herding were 2.59 (95% CI 1.42, 4.74) times more likely to complete their children vaccine than having occupation of animal herding.

Regarding income, the result of bivariate analysis shows that a household having an income of more than 1000 birr were 7.8 (95% CI 4.27, 14.1) times more likely to be fully vaccinated their children than household having a monthly income of less than 500birr. The household income of 500-1000birr per month were 2.4 (95% CI 1.52, 3.72) times more likely to be fully vaccinated their children. In multivariate analysis, households having a monthly income of 500-1000birr were 4.27 (95% CI 1.62, 11.3) times more likely to be fully vaccinated, but household who had an income of more than 1000 birr per month had no difference.

The autonomy of only mothers has no difference with those of only husband. But, those households which had an autonomy by both husband and wife were 6.3 (95% CI 1.54, 25.9) times more likely to be fully vaccinated their children than an autonomy of households only by husband. In multivariate analysis, being a decision maker by mothers only were 0.19 (95% CI 0.06, 0.57) times less likely and by husband and wife were 0.12 (95% CI 0.02, 0.87) times less likely to complete their children than households having an autonomy of only husband.

Table 2: The association of demography, socio-economic & cultural factors of the respondent to fully vaccination of Childrens age 12-23months, Amibara woreda, Afar Region, 2013

Variables	Fully Vaccinated		Odd ratio (95% CI)	
	Yes	No	Crude	Adjusted
Family Size:				
>3HH members	103(6.7%)	998(65%)	1.759 (1.11, 2.78)*	0.972 (0.50, 1.89)
$\leq$3HH members	24 (1.6%)	409(26.7%)	1	1
Education:				
Educated	17(1.1%)	78(5.1%)	2.633 (1.51, 4.61)*	0.671 (0.26, 1.72)
No Education	110(7.2%)	1329(86.6%)	1	1
Spouse Education: n= 1397				
Educated	44 (3.1%)	116 (8.3%)	6.137(4.03,9.35)*	1.423 (0.73, 2.78)
No education	72 (5.2%)	1165 (83.4%)	1	1
Spouse Occupation n= 1397				
Livestock herding	25 (1.8%)	850 (60.8%)	1	1
Other than Livestock	91 (6.5%)	431 (30.9%)	7.179(4.54,11.3)*	2.591 (1.42, 4.74)*
Income:				
<500birr	78 (5%)	1179 (76.9%)	1	1
500-1000 birr	30 (2%)	191(12.5%)	2.374 (1.52, 3.72)*	4.270 (1.62, 11.3)*
>1000birr	19 (1.2%)	37(2.4%)	7.762 (4.27, 14.1)*	1.927 (0.69, 5.38)
Autonomy				
Only husband	2(0.13%)	117 (7.63%)	1	1
Both(husband & Wife)	120(7.82%)	1112 (72.5%)	6.313 (1.54, 25.9)*	0.124 (0.02, 0.87)*
Only mother	5(0.33%)	178 (11.6%)	1.643 (0.31, 8.61)	0.191 (0.06, 0.57)*

Significant at 95% CI

Maternal health Care Utilization (ANC, TT, Place of delivery, PNC)

The result of bivariate analysis shows that all of the maternal health care components had significant association with fully vaccination status of children in the pastoral community. Those mothers of children who attended ANC follow up were 20.5 (95% CI 10.3, 40.7) times more likely to be fully vaccinated their children than who didn't attend, where as in multivariate analysis, 0.14 (95% CI 0.05, 0.37) times less likely to complete their children than those who didn't visit ANC. The number of visits of ANC had significant association in both bivariate and multivariate analysis where the bivariate analysis shows that the mothers who attended ANC more than two times of visit were 6.9 (95% CI 4.09, 11.8) times more likely to complete the children vaccination than

ANC with not as much of two ANC visit. In multivariate analysis, mothers who had more than two visit of ANC were 5.53 (95% CI 2.80, 10.9) times more likely to be fully vaccinated their children than those who attended ANC not as much of two visits. The mothers TT status showed a significant association with completion of vaccination among children aged between 12-23 months in both analyses. Children of mothers who ever took tetanus toxoid vaccine were 36.8 (95% CI 14.95, 90.6) times more likely to be vaccinated than those mothers who did not received TT vaccine in bivariate analysis where as in multivariate analysis there were 0.25 (95% CI 0.08, 0.80) times less likely to complete children's vaccine. The number of tetanus toxoid doses that mother took had also a significant association with completion of child vaccination of their children in both analyses. Children of mothers who took three and more doses of tetanus toxoid were 1.9 (95% CI 1.27, 2.80) times more likely to be fully vaccinated their children than those who received less than three doses. In multivariate analysis, there were 0.610 (95% CI 0.33, 1.12) times less likely to complete their children vaccine. Regarding the place of delivery, there were significant association in bivariate analysis in which those mothers who delver in the health facility were 2.6 (95% CI 1.30, 5.08) times more likely to be fully vaccinated than home delivery but, there is no significant association in multivariate. The post natal visit had a significant association in both analysis that those mothers who attended PNC were 4.1 (95% CI 2.67, 6.22) times more likely and 0.19 (95% CI 0.09, 0.41) times less likely to be fully vaccinated their children than those who didn't attended in bivariate and multivariate analysis respectively.

Moreover, there were significant association in number of PNC follow up in which those mother who attended PNC for third time were 17 (95% CI 3.86, 77.1) times more likely to vaccinate children's completely than those who attended only one times of PNC visit in bivariate analysis where as there were no difference in PNC visit for the second times and only one visit. In multivariate analysis, having three PNC visit were 18 (95% CI 4.96, 66.1) and having two visit were 8.99 (95% CI 1.56, 51.8) times more likely to finished their children vaccine than those who had only one PNC visit.

Table 3: The association of Maternal health Care Utilization of the respondent to fully vaccination of Childrens age 12-23months, Amibara woreda, Afar Region, 2013

Variables	Fully Vaccinated		Odd ratio (95% CI)	
	Yes	No	Crude	Adjusted
ANC:				
yes	118 (7.7%)	549 (35.8%)	20.49 (10.3, 40.7)*	0.137 (0.05, 0.37)*
No	9 (0.6%)	858(55.9%)	1	1
Number of ANC visit: n=667				
>2 visit	100 (15%)	244 (36.6%)	6.944 (4.09, 11.8)*	5.534 (2.80, 10.9)*
≤ 2 visit	18 (2.7%)	305 (45.7%)	1	1
TT:				
yes	122 (8%)	561 (36.6%)	36.796 (14.95, 90.6)*	0.246 (0.08, 0.80)*
No	5 (0.3%)	846 (55.1%)	1	1
Number of TT dose n= 683				
< 3 times doses	50 (2.7%)	318 (45.7%)	1	1
≥3 times doses	72 (15%)	243 (36.6%)	1.884 (1.27, 2.80)*	0.610 (0.33, 1.12)*
Place of Delivery:				
Home	116(7.56%)	1357 (88.5%)	1	1
Health facility	11(0.72%)	50 (3.26%)	2.574 (1.30, 5.08)*	0.784 (0.30, 2.05)
PNC:				
yes	37(2.4%)	129 (8.4%)	4.073 (2.67, 6.22)*	0.188 (0.09, 0.41)*
No	90(5.9%)	1278(83.3%)	1	1

Number of PNC visit: n=166				
1st visit	2(1.2%)	44 (26.5%)	1	1
2nd visit	6(3.6%)	48 (28.9%)	2.75 (0.53, 14.3)	8.999 (1.56, 51.8)*
3rd visit	29(17.5%)	37 (22.3%)	17.24(3.86, 77.1)*	18.111 (4.96, 66.1)*

KAP / Knowledge, Attitude and Practice/

The association of mothers'/guardians knowledge, attitude and practice was also assessed in this study. The result from bivariate analysis indicated that heard status on vaccine preventable diseases, source of information and willingness/attitude did not have significant association to be fully vaccinated. The results from bivariate analysis shows that the children mothers/guardian who had knowledge on childhood vaccination were 21.5 (95% CI 11.5, 40.3) times more likely to be fully vaccinated than those whose didn't had knowledge. The multivariate analysis also shows that having a knowledge on childhood vaccination were 11.3 (95% CI 5.53, 22.9) times more likely to complete their children vaccine than whose hadn't knowledge.

Table 4: The association of knowledge, attitude and practice of the respondent to fully vaccination of Childrens age 12-23months, Amibara woreda, Afar Region, 2013

Variables	Fully Vaccinated		Odd ratio (95% CI)	
	Yes	**No**	**Crude**	**Adjusted**
Knowledge on Childhood Vaccine				
Knows	116(7.6%)	463(30.2%)	21.501 (11.5, 40.3)*	11.251 (5.53, 22.9)*
Don't know	11(0.7%)	944(61.5%)	1	1

Significant at 95% CI

Health Facility availability and accessibility

The associations of health care availability and accessibility with the completion of vaccination was assessed and the bivariate result shows that Children of households with the availability of health facility were 32.9 (95% CI 4.57, 236.1) times more likely to be fully vaccinated than those of household with unavailable of health facility. In multivariate analysis, there were 0.24 (95% CI 0.03, 2.06) times less likely to finalize the vaccine of children than those with no health facility. The distance travel from the household to the health facility were 1.83 (95% CI 1.11, 3.0) times more likely to be fully vaccinated where as in multivariate analysis this factor had no a significance association.

Table 5: The association of Health facility availablity and accessability of the respondent to fully vaccination of Childrens age 12-23months, Amibara woreda, Afar Region, 2013

Variables	Fully Vaccinated		Odd ratio (95% CI)	
	Yes	**No**	**Crude**	**Adjusted**
Availability of Health facility:				
yes	126(8.2%)	1116 (72.8%)	32.86 (4.57, 236.1)*	0.237 (0.03, 2.06)*
No	1(0.07%)	291(19%)	1	1
Distance: n= 1242				
<5km	106 (8.53%)	830 (66.8%)	1.826 (1.11, 3.0)*	0.745 (0.41, 1.36)
>5km	20 (1.61%)	286(23%)	1	1

Quality of EPI (Card retention rate, Vaccination drop-outs and Invalid doses)

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From the total vaccinated children, Only 119 out of 960 (20.7%) of children had vaccination cards, indicating a very low card retention rate. Dropout rates between the first and third doses of DPT are the best indicator of program continuity and follow-up of children in EPI. The drop-out rate from DTP1-DTP3 (card + history) has found to be 18%.

Table 6: The vaccination drop-out of Childrens age 12-23months, Amibara woreda, Afar Region, 2013

Vaccine		Dropped out of	Percentage
BCG- Measles		40%-23%*	17%
DPT/OPV	I to II dose	28%-20%	8%
	II to III dose	20%-10%	10%
	I to III dose	28%-10%**	18%
Overall dropout rate***		5/28	18%

*** % of BCG Coverage (card or history) Minus % of Measles Coverage (card/ history)*
*** ** % of DPT1/penta1 Coverage Minus % of DPT3/Penta3 Coverage*
*** ***(DPT1 coverage - Measles coverage) / DPT1 coverage x 100*

The major administrations of invalid doses were found in DPT1 and measles who received too early that accounted for up to 8.4% and 7.6% of vaccinations respectively. The DPT3 dose received too short interval has found to be 4.20%. From the reasons given for not vaccinated their children, the three major cause of the respondents said the health workers did not come (34%), and 25% of the respondent gave a response of vaccination hurts children and 19% of them said absence of health facility. The commonest reason for the partially vaccination of the children according to the respondent were found to be obstacles (67%), lack of information (19%) and lack of motivation (14%).

Reasons of Respondent for Unvaccinated and partially vaccinated of children

The respondents who were not vaccinated and partially vaccinated their children asked for their reasons. From the reasons given for not vaccinated their children, the three major cause of the respondents said the health workers did not come (34%), and 25% of the respondent gave a response of vaccination hurts children and 19% of them said absence of health facility.

Table 7: Reasons of Respondent for unvaccinated children's of age 12-23months Amibara woreda, Afar Region, 2013

Reason for not Vaccinated	Frequency	Percentage
Absence of Health facility	109	19%
Health worker did not come	196	34%
Vaccination is of no use	48	8%
Vaccination hurts children	144	25%
culture refute vaccination	19	3%
Religion not allowed	5	0.9%
Fear of side effect	28	5%
Others	25	4%
Total	574	100%

The commonest reason for the partially vaccination of the children according to the respondent were found to be obstacles (67%) followed by vaccination site is too far (16.4%), mothers too busy (14.3%) and vaccine not

available (13.1%). The Second reasons were lack of information (19%) followed by unaware of vaccination need (10.9%) and fear of side reaction (4.7%). The least reasons were lack of motivation (14%) in which postponed until another time (12.3%) were the main reason in lack of motivation.

Discussion

The vaccination coverage was identified using the availability of vaccination card and mothers/guardian recall. The proportion of children fully vaccinated is those children who received all basic vaccinations which includes BCG, three doses each of DPT-HepB-Hib and OPV excluding polio vaccine given at birth and a dose of measles. The findings of this study revealed that only 8.3% of the children were fully vaccinated in which the proportions showed almost near to those reported of the Afar region (8.6%) in the EDHS 2011(5) and slightly different from the Ethiopian national Immunization survey 2012 that showed fully vaccinated for Afar region were 12.6% (6). In emerging regions the highest proportion of coverage were documented by mothers recall and largest variation between card and history which leads for high card retention and dropout rate (6). Among those mother interviewed, only 119 (7.8%) had a vaccination card followed by 27(1.8%) were not seen. Based on the vaccination card and recall, the highest coverage were BCG (40%) as it is the first vaccine to be given, but the subsequent vaccines show less coverage which can give an illustration of the high coverage of partial vaccination and may be due to obstacles reasons that was given by the respondent. The pentavalent3 coverage is lower (10%) than measles (23%) and the OPV vaccine coverage was slightly higher than the coverage of the pentavalent vaccine which is given simultaneously according to the EPI schedule. The coverage of Measles and OPV is higher may be due to the occasionally given through campaign which could account for measles and OPV having the highest vaccination coverage.

Family size which was not as much of three members were more likely to be fully vaccinated their children than those who had greater than three a family member in the households in bivariate analysis evenif it had not a significant association in multivariate. The Mothers educational status had significant association in both bivariate and multivariate logistic regression in which mothers/guardian that had education were 3 times more likely to be fully vaccinated their children than mothers who didn't had education. This result is consistence with the study done in Cameroon (all P <0.013) (6), South Africa (7) and rural India OR=3.24, p<0.001) (8). The result identified in Somaliland was shows that vaccination status was difficult to relate with mother's education due to most mothers education level were illiterate (9). The spouse education had significant in bivariate analysis in which the spouse who had educational background was 6 times more likely to be fully vaccinated their children than who didn't educate. The respondent spouse who have an occupation of other than animal herding were 7.2 and 2.6 times more likely to be complete the children vaccine in bivariate and multivariate respectively. The household having higher monthly income had more likely to complete the vaccination of their child than those who had less income. The autonomy of both husband and wife in bivariate analysis had 6 times more likely to be fully vaccinated than autonomy of husband only even if it is a less likely in multivariate analysis. Antenatal care (ANC) visit, number of ANC visit, TT and number TT dose taken by the mother showed significant association with the complete of child vaccination. Mother who had ANC visits were 21 times more likely to complete vaccination than those didn't visited. Those mothers who had more than two visit of ANC were seven times more likely in bivariate and 5.5 times more likely in multivariate to complete their children vaccine than those who had only one ANC visit. In another studies, it was showed that ANC Visit is an important factor for the fully vaccinated status of children (5,7,10). Regarding TT, the mother's who had taken TT vaccine were 37 times more likely and 0.25 times less likely to finished children vaccination than who didn't took TT vaccine in bivariate and multivariate respectively. Mother who had taken three and more dose of TT were 1.9 times more likely and 0.6 times less likely to finalize their children vaccine than less than three doses in bivaraite and multivariate. The association of place of delivery with fully vaccination shows that those mothers who delivered in health facility 2.6 (95% CI 1.30, 5.08) times more likely to be fully vaccinated their children than home delivery. This result has similarity with study conducted in a rural community of Nigeria in which Children delivered at health facilities were 2.3 times more likely (95% CI=1.431-3.759; p<0.001) to complete child vaccine compared with those delivered outside health facilities (19). In addition, the study in Kenya, 1.3 times higher odds of full vaccination (10) and in India home delivery (OR=3.6) increased the risk of

non-immunization significantly (7). The study in Ambo also indicated that being born in the health facility (AOR=2.1, 95% CI: 1.3-3.4) has significantly associated with full vaccination. These revealed that, mothers who delivered at health facility have more exposed to get the information and have an opportunity to encourage by the health professionals concerning the benefit and receiving of vaccination than mother who delivered at home. Mothers who follow PNC are more likely to be fully vaccinating their children. The result indicated that having a PNC follow up were 4 times more likely and 0.19 times less likely to vaccinated than those didn't had PNC visit in bivariate and multivariate respectively. This was followed in the study done in Ethiopia; in which mothers who used post-natal health services were more likely to complete vaccination (11). Similarly, the study conducted in Kenya, the bivariate analysis shows that postnatal care was associated with full vaccination of their children (10). The number of PNC visit had also significant association in both analysis in which multivariate analysis shows that having 3rd PNC visit were 18 times more likely and having a visit for 2nd times were 9 times more likely to be fully vaccinated their children than those who had only one visit of PNC.

The findings of this study indicated that those mothers who did not heard about vaccine preventable disease were less chance to vaccinate their children. About 27.6% were not aware about vaccine preventable disease, but this had no significant difference in completion of children vaccination among pastoral community. Studies indicated that, lacks of awareness about immunization contribute to low immunization coverage in Ethiopia (12). Many studies expressed that, those who have no information were not begun the vaccination for their children. The mother's who had knowledge on childhood vaccination were 11 times more likely to complete their children vaccine than who hadn't knowledge. These finding is coherent with the National EPI coverage survey report 2006 (13). The study in Nigeria, indicated that satisfactory maternal knowledge on immunization (p= 0.006) were the factors that were significantly associated with completion of vaccination (14). In another study, knowing the number of times to visit the immunization (p< 0.01), had significant increase chance of having fully vaccinated (15). Furthermore, Most of the pastoral mother/guardian of children 12-23months of age have positive attitude towards vaccination (90.5%), and the practices to be vaccine their children was 62.6% with the low coverage of 8.3%. This is clearly indicating a discrepancy between the high level of attitude and positive practices, with the observed low immunization coverage just like the KAP study conducted in congo which indicated that those mothers who had positive attitudes towards immunization (98%), found to be low (37%) coverage (16). In this study the availability of health facility was 81% and the distance to the nearest health facility which is less than 5km was 75.3% and shows a significant association with the completion of children vaccine. Even if the availability and distance of health care service was in good percentage, the coverage of child vaccine is very low. This may reveal that availability of health facility with lack of EPI services, which is similar to the study in Allahabad district of India which indicated that a low coverage of immunization was due to lack of availability of services in rural areas (17). This pointed out that availability of health facility did not necessarily lead to wider vaccination coverage. Card retention rate was defined as the proportion of children whose immunization cards were available. Interviewers asked mothers or guardian to show the vaccination cards. All vaccinated children should be issued with such cards. But the card retention of the study subject has found to be very low (20.7%) which indicated poor quality. The other quality of service assessed was dropout rate which is used to measure program continuity. This study revealed high drop-out rates (18%) in the EPI program of pastoral community. In routine EPI programmes, drop-out rates higher than 10% usually indicate a serious quality problem with the programme. In addition, whether the dose is valid or invalid was investigated in the study. A dose is considered invalid when it does not meet the immunization schedule criteria (dose given before a minimum age or after a too short interval). A vaccine dose administered after an invalid dose was considered as invalid, even when the interval had been respected. In this study, there was an administration of invalid dose which indicated that some vaccinators in the service delivery do not adequately screen children before giving vaccines. Different reasons were given by the respondent for not vaccinated and partially vaccinated. The reasons like absence of health professionals; no health facility and no vaccination were the reasons why mothers didn't vaccinated their children. While lack of obstacles particularly vaccination site are far away from them, mothers busy, which are similar with base line done by core polio group in Ethiopia (18).

Conclusion

The study findings have clearly indicated that there is very low vaccination coverage among children age 12-23 months in the pastoral community in which only 8.3% fully vaccinated, and high number of partially and unvaccinated children. There is a very low coverage by the type of antigen (Card + history) in which DPT3 and Polio3 were 10% and 16% respectively. The quality of Immunization program is poor with the card retention rate of 20.7%, dropout rate of 18%, and the presence of invalid dose. The spouse occupation other than livestock herding and income were the major factors which determine fully vaccination status of children 12-23 months of age. Being visited more ANC and PNC had strong significant association than other components of maternal health care utilization as it implied the mothers would have a chance for the children to be fully vaccinated and gives clue that utilizing maternal health care by the mothers had an opportunity to take their children for vaccination. The knowledge of childhood vaccine has significant association for being fully vaccinated of children in which having a knowledge of vaccine by the mothers/guardian were 11 times more likely to be fully vaccinated than from those who hadn't knowledge. Even if the majority of the respondent had access to health facility, the coverage of vaccination is very low which indicated that the health care services were lack strong EPI program as most respondent give a reason for not vaccinated their children due to the health worker did not come to give vaccination.

Recommendations

The coverage of children vaccine should improved through the strong efforts of the regional health bureau by means of improving access and availability of the vaccines. A special attention and frequent follow up for this emerging region should be given by the FMOH and stakeholders as well as sustainable efforts are needed to strengthen routine vaccination program. EPI strategic directions should be given using findings of studies. Both in service and out service training should be strengthen and provided by regional health bureau and FMOH. The regional health bureau should be building the capacity of health professionals and health extension workers on vaccination and expanding the program. In line with this, supportive supervision needs to be strengthened at all levels to help and improve routine programme performance. Strong monitoring and evaluation of the expanded immunization program should be formulated and strengthened. The district/woreda health office should be design EPI plan on the evidence based approach so as to enhance the service and hence, clear and detailed strategic objective and initiatives with clear mapping of seasonal pastoral movements is required to ensure targeted outreach services to this community. The district/woreda should allocate enough budgets for EPI. The EPI program should be design based on the pastoral way of life and convenient vaccination time should be planned for the pastoral mothers. The plan should include sketch maps showing actual locations and seasonal movement of these communities. Both in service and Out reach service including mobile team and house to house EPI service should be strengthen at district/woreda level should be strengthen. The vaccines should be available every time in the health facilities and reviews of EPI performance and monitoring the data quality should be required so that the actual coverage of vaccine could be found at all levels. The EPI service quality has shown a serious quality problem with the programme and need to be addressed the on the spot of the problem. Consquently, high drop-out rates should be improved by investigating and taking measures for the reasons of high drop-out, improving availability of service and service quality. One of the most important aspects is strategies for health extension program practitioner. They have to be trained and strengthen their capacity towards vaccination. Mobilizing the community and resources by means of encouraging community participation is required to increase maternal health care utilization in the pastoral women's as it build a good opportunity to vaccinate their children. The knowledge of vaccine related aspects has shown a huge gap; thus the health extension workers needs to be providing the information to the community and the health education and communication has to be implemented in a sustainable manner. Appropriate information on the doses and schedule of the vaccination should be given for those mothers who came for vaccinating their child. Health education on immunization shall be strengthening with their cultural way of exchanging information system. Finally, further qualitative studies and strategies should be design.

Acknowledgements

Dedication

This research is dedicated to all marginalized pastoral children who lost their lives due to disease that can be preventable by vaccine.

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