Magnitudes of Immunization Dropout Rate and Predictors for 12-23 Months Aged Children in Abobo District Southwest Ethiopia

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Abstract: Vaccination is the epicenter of preventive care for good children's health outcomes in each nation. Nevertheless, a number of factors have been hindering the attainment of targets from providing complete vaccination in different nations. This study aims to assess predictors of immunizations in 12-23 months aged children in Abobo District, Gambela regions southwest Ethiopia.

Method: A community-based cross-sectional study was employed in 436 pairs of mothers to children aged 12–23 months from 12 marches---27 April 2019. The study participant was recruited by multistage-sampling were used for each kebele. Data were entered into Epi-Data version 3.1 after cleaning and coded, exported to STATA/SE-14/R logistic regression analysis. Variables with P-value <0.25 in bivariate logistic regression were transported into multivariable logistic regression. A variable with 95%CI in AOR was used as claim predictors for the dropout rate.

Results: The overall dropout rate of immunization from completion was found 25.8% (95%CI: 21.5--30.2). Factors like mothers did not attend ANC (AOR= 4.59, 95% CI: 2.58, 7.84), being home delivery (AOR=6.46, 95% CI: (3.5--- 11.4), postponed last immunization scheduled (AOR=3.44, 95% CI: 1.98---5.97), children ill during measles vaccine (AOR=1.83, 95% CI: (1.02---3.28), Mothers refused ≥30 minutes for vaccine service waiting (AOR=3.58, 95% CI: (1.99, 6.44) were significantly associated with immunization dropout out.

Conclusion: The immunization dropout rate was unacceptable and higher compared to WHO reference (<10%). Home delivery postponed measles vaccine, child illness, ANC status Service refusal ≥30 minutes waiting for the vaccine were independently associated with dropout.

Keywords: Immunization dropout, under-five children, southwest Ethiopia.

INTRODUCTION

Immunization is the incitement of changes within the immune system through which protection happens. It is considered one of the foremost cost-effective and capable well-being mediations, reducing childhood dreariness, mortality, and disability [1,2]. Globally, 19.9 million newborn children were under-vaccinated. Of which 12.4 million lived in 10 nations, 5.6 million still dying every year by vaccine-preventable diseases. The sub-Saharan African countries took the lion's share of 80% of the death [3,4]. Even Africa has made remarkable progress in immunization services. Around 14.8 million (68%) children who did not receive the DTP3 vaccine during the first year lived in 10 countries. According to Africa's 2013 immunization data report, Ethiopia has the second-largest number of incompletely vaccinated children from the region, next to Nigeria [5]. In Ethiopia, 70% -80% of children received BCG initially; however, 50%-54% received the end measles-containing vaccine on schedule [5,6]. Much peer-reviewed research on immunization dropout rates indicated that socioeconomic and demographic factors, difficulty on topography, armed conflict, and maternal knowledge affect childhood immunization completion [7-11].

METHODS

Study Setting and Populations

A community-based cross-sectional study was employed among randomly selected 436 pairs of mothers to children aged 12–23 months from 12 March-27 April 2019 in the Anguawa district, one of the five districts with 24 kebeles Gamble Regional state southwest, Ethiopia.

Source Population and Study Population

All children aged 12 -23 months with a history of vaccination were source populations for this study.

Whereas children aged 12 -23 months with a history of vaccination from 12 marches up to 27 April 2019 were study populations.

Inclusion Criteria

Study participants who resident at least six months in Abobo districts of Gambela regions

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E-ISSN: 1929-4247/22

Sample Size Determination and Procedures

The sample size was calculated by using single population formula considering the following assumption. The confidence interval of 95%, Zα/2=1.96 at 95% CI, d≤1/5 overall dropout rate of p=22.2% and d=5% design effect 1.5 and non-response rate 10%, therefore the final sample size for the study to be 436 using this formula $n = (Z\alpha/2) * P\frac{(1-P)}{(D)2}$ [9,12]. There are a total of 24 kebele in Abobo districts, and a multi-stage sampling procedure was used to obtain the representative study populations. In the first stage, simple random sampling of lottery methods selected 8 (out of 24) Kebele. At the end sampling frame was prepared for 12-23 month child-mother paired on excels after proportional sample allocations for each kebele were allocated based on their source of population.

Outcome Ascertainments

The outcome variables for this research are 12-23 month children **"**completed vaccinated/ not completed" vaccination—Whereas**:** -ages of mothers, family occupation, PNC service, and comorbidity, etc.

Operational Definition

Dropout Rate (DOR): is the rate difference between the initial vaccines (BCG or Pentavalent I) and the final vaccines (Pentavalent III or Measles). BCG to Measles dropout rate: the percentage of children vaccinated for BCG who do not receive the measles vaccine. BCG=Measles dropout rate overall dropout rate:

$$\frac{BCG - Measles}{BCG} * 100\% \quad (23)$$

Data Collection Instruments

Pre-tested structured questionnaires were used to collect data from respondents. The questionnaire was prepared first in English and translated to the local language. The four diploma nurses and one supervisor were recruited for data collection with one-day training before collections.

Data Analysis Procedure

Epi Data version 3.1 and STATA/R14 (SE) version software were used for data entry and analysis. All bivariate at p-value ≤ 0.25 was exported to multivariable logistic regression. Variables with a p-value less than 0.05 and respective adjusted odds ratio (AOR) with 95% CI were declared as independent predictors for vaccine dropout.

RESULT

Socio-Demographic Characteristics

From a total of 436 study participants, 422 were interviewed with (response rate 96.8%). The mean age of the respondents was 30 years with (SD ±6). Nearly two-thirds 273 (64.6 %) mothers had unable to read and write, but 296(70.1%) caregiver mothers decide immunization service utilization of their children by themselves (Table **1**).

Baseline Clinical Factors of Children

The mean age of children was 16 months with (SD±2.8), while more than half 221 (52.4%) of children were males in sex and nearly 257(60.9%) of them were found within second and fourth birth order. One-fourth of 106 (25.1%) children defaulted from scheduled immunization due to medical comorbidity. Whereas 163 mothers–child paired did not start any ANC before delivery.

Immunization Dropout Status Reasons

The overall immunizations dropout rate was found to be 25.8% (95%CI: 21.5--30.2). Of the totals, 109(25.8%)children dropout from immunization schedules were due to the absence of staff in clinics.

Independent Factors Associated with Immunization Dropout

During binary analysis, eleven independent variables were found nominated as candidates for multivariable logistic regressions with a p-value of <0.25. However, after controlling confounding in multivariable logistic regression, five independent predictors were found for immunization dropout rate at p-value <0.05 were identified. A child whose mothers did not attend at least one ANC visit during pregnancy was 4.59 times (AOR= 4.59, 95% CI: 2.58, 7.84) more likely to dropout out as compared with counterpart. Health institution delivery was indispensable for having a well-baby and mother after labor in addition to PNC service unitization and BCG vaccine initiations. However, mothers who delivered at home were 6.46 times (AOR=6.46, 95% CI: (3.5--- 11.4)) more likely dropout from immunization than mothers who deliver at a health facility. Mothers who encountered postponed last immunization schedule by service provider were 3.44 times AOR=3.44, 95% CI: 1.98---5.97) more likely dropout than those mothers who got service with exact scheduled. Mothers having ill children during measles

Table 1: Baseline Socio-Demographic Characteristics of the Study Participants in Abobo District, Gambella, 2019

Variable	Category	Frequency (N)	Percentage (%)
Age of mothers years	15-19 years	12	2.8
	20-30 years	77	18.2
	31-39 years	118	28
	≥40 years	215	51
Residence area of family	Rural	369	87.4
	Urban	53	12.6
Educational status of mother	Illiterate	273	64.7
	Read and write	44	10.4
	Elementary and junior	49	11.6
	High school and above	56	13.5
Educational status of father	Illiterate	243	57.6
	Read and write	37	8.8
	Elementary junior	45	10.7
	High school and above	97	13.01
Wealth index	Lowest	84	19.9
	Second	85	20.1
	Middle	84	19.9
	Fourth	85	20.1
	Highest	84	19.9
Maternal decision EPI	Yes	296	70.1
	No	126	29.8
Sex of child	Male	221	52.4
	Female	201	47.6
Childbirth order	1^{st}	110	26.1
	$2\text{-}4^{th}$	257	60.9
	$\geq 5^{th}$	55	13
Child Illness	yes	106	25.1
	no	316	74.9
ANC visit	Yes	259	61.4
	No	163	38.6
TT vaccination	Yes	255	60.4
	No	167	39.6
Place of delivery	Heath facility	248	58.8
	Home	174	41.2
PNC visit	Yes	300	71.1
	No	122	28.9

Others[1]= likes Students, Others[2] = Farmer, Housemaid.

immunization were 1.83 times (AOR=1.83, 95% CI: (1.02---3.28) more like dropouts than counterpart children. Mothers who did wait ≥30 minutes for service of immunization at health institution were 3.58 times (AOR=3.58, 95% CI: (1.99, 6.44) more likely to drop out as compared to mothers who did not wait a long time at the scheduled date of immunizations (Table **2**).

DISCUSSION

The overall proportions of immunization dropout were found at 25.8% (95%CI: 21.5--30.2). This is incomparable with WHO reference (<10%) [7]. In fact, this might be due to missed appointment dates and a lack of caretakers' awareness of the scheduled date by

Table 2: Multivariable Analysis for Determinant Factors Associated with Immunization Dropout among Children Aged 12-23 in Abobo District, Southwest Ethiopia

Variable	Category	Immunization dropout status Dropout n (%) not dropout n(%)		COR (95%CI)	AOR (95%CI)	p-value
Place of delivery	Home Health facility	78(44.8) 31(12.5)	96(55.2) 217(87.5)	5.68(3.51, 9.19) 1[R]	6.46(3.55, 11.4) 1[R]	.001*
Postponed schedule	yes No	62(45.9) 47(16.4)	73(54.1) 240(83.6)	4.33(2.73, 6.78) 1[R]	3.58(1.99, 6.44) 1[R]	0.001*
Child illness	Yes No	35(33) 74(23.5)	71(67) 241(76.5)	1.65(0.99, 2.59) 1[R]	1.83(1.02, 3.28) 1[R]	0.043*
ANC visit	No yes	69(42.3) 40(15.4)	94(57.7) 219(84.6)	4.01(2.25. 6.35) 1[R]	4.59(2.58, 7.84) 1[R]	0.001*
Waiting time	>30 minutes <30 minutes	80(37.7) 29(13.8)	132(62.2) 181(86.2)	3.78(2.34, 6.11) 1[R]	3.58(1.99, 6.44) 1[R]	0.002*

the health facility. Moreover, this report is higher than finding in n Basra 19.3% [11], Haryana India, 13.88% [12], and Arba Minch 11.7% [13]. This might be due to access to immunization services and EPI implanting plans differ from one area to another. However, it was lower than the previous studies conducted in the Jigjiga Somalia, 40.3% (8) Uganda, 47% [10].

The reason might be due to the health service setup. According to a report of this study absence of health workers at the time of immunization was associated with dropout. This is in line with a study done in Sudan [15]. A child whose mothers failed to attend one of the ANC visits during pregnancy was associated with dropout from immunization compared to mothers who followed ANC. This result is similar to the finding in central Ethiopia [19].

Similarly, mothers who delivered at home in this research were more likely to drop out than those who delivered at health facilities. This is agreed with a study done in Jigjiga [8]. A Possible explanation for this finding might be that mothers who give birth at home would not communicate with health professionals and contact to know about immunization at postnatal periods. However, those health care providers' post phoned immunization schedules were significant association dropout rate. Those mothers who encountered postponed schedules of last immunization date by service provider were more likely to drop out. This finding is supported in finding in south Ethiopia [16].

In the same way, mothers who waited ≥30 minutes at a health facility for the immunize program were more likely to drop out than mothers who did not wait longer than thirty minutes. This finding is in line with Benin [10]. This might be mothers do not motivate to accumulation of last immunization schedule next time.

CONCLUSION

This study revealed child immunization dropout in 12-23 months age was higher and unacceptable range as compared with WHO recommendations.

ACKNOWLEDGEMENT

We would like to thanks all data collectors and supervisors of Abobo districts and administrative staffs

AUTHORS' CONTRIBUTIONS

AK was involved in the conception, design, analysis, and interpretation of the data, report writing, and manuscript drafting. FK, AG, and AK assisted with the conception, designing, analysis of the study and critically reviewed the manuscript, and all authors approved the final manuscript.

ETHICAL CLEARANCE

Ethical clearance was obtained from Jimma University Research Ethics Review Committee (JURERC) with (Ref. No: JHRPGI|723/2019) & issued data21/02/2019)to obtain the formal letter.

Of clearance to conduct this research. A written, official letter of cooperation from Jimma University was given to the Abobo district health office.

DATA SET

All data used in this was obtained upon formal request from the main author.

ABBREVIATIONS

ANC = antenatal care

AOR = adjusted odds ratio

BCG = Bacillus Calmette Guerin

CDC = centers for disease control

CI = confidence interval

COR = crude odds ratio

EPI = Expanded Program on Immunization

FUNDING

Jimma University fully funded the study.

CONSENT FOR PUBLICATION

There is no consent for publication for this research

DISCLOSURE /CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest for this research.

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Received on 24-07-2021 Accepted on 09-09-2021 Published on 11-03-2022

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