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Logistic Regression Analysis of Exclusive Breastfeeding Practice among Mothers in Amanuel Town, Northwest, Ethiopia

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Abstract: Background: Breast milk is the optimal food for infants. A mother's breast milk has the perfect combination of nutrients needed for her infant's growth and development. That is breast milk is perfect, natural and protective food for infants. In Ethiopia suboptimal breastfeeding practices are the major contributor to an estimated 70,000 infant deaths per year which is 24% of the total infant death annually which can be significantly prevented by nutrition interventions such as exclusive breastfeeding. Thus it was a basic need to conduct research survey to identify significant factors on exclusive breastfeeding. The objective of the study was to assess the exclusive breastfeeding practice and associated factors among Mothers in Amanuel Town, Northwest, Ethiopia, 2017. Methods: community based cross sectional study was conducted on 254 mothers who have child up to one year in Amanuel Town, Ethiopia, 2017. The whole mothers who had child up to one year in the town were including in the study and data was collected by structured administered questionnaire. The collected and edited data was coded and entered to SPSS software for further analysis. Descriptive statistics was used to describe the socio-demographic characteristics' of the study participants and the prevalence of exclusive breast feeding. Both bivariate and multivariate binary logistic regression analysis were used to identify the relationship between dependent variable and the independent variable. Results: From total participants, majority (72.4%) of mothers were give breast milk for the infant immediately within one hour of birth. Most mothers (79.9%) feed colostrum (first milk) to the newborn and the prevalence exclusive breast feeding within six months was 46.5%. From bivariate logistic regression analysis, variables which were associated with exclusive breast feeding (P<0.25) were; religion, level of education of mother, occupation of mother, marital status, health status of mother and infant, antenatal care, breast feeding counseling during ANC, place of delivery, postnatal care, Colostrum feeding and number of children alive. From multivariable analysis, mother occupation, mother health status, colostrum feeding, infant health status, breastfeeding counseling and place of delivery were significant variables for EBF (P≤ 0.05). Conclusion: Having antenatal care counseling about breastfeeding, health status of mother, infant health status, mother occupation, place of delivery and colostrum feeding were the determinant factors for EBF practice. Mothers with healthy infant, got breastfeeding counseling during pregnancy and fed colostrum were more likely to practice EBF than the other.

Keywords: Exclusive Breastfeeding, Colostrum Feeding, Logistic Regression

1. Introduction

Breast milk is the optimal food for infants. A mother's breast milk has the perfect combination of nutrients needed for her infant's growth and development [1]. Breast milk is

perfect, natural and protective food for infants. It contains all essential nutrients including carbohydrates, essential fats, proteins, minerals, and immunological factors [2]. Newborns when exclusively breastfed for the optimal duration of six months are significantly protected against the major

childhood diseases [1]. Breastfed holds all essential nutrients provided in a bioavailable and easily digestible and protect children as well as mother from diseases with immunological properties [3]. Nutrients such as vitamins A and C, iron, zinc and vitamin D are more easily absorbed from breast milk than from other milk. And it contains essential fatty acids needed for the infant's growing brain, eyes, and blood vessels and these are not available in other milks [4] and [5]. Breast milk contains antibodies that can protect infants from bacterial and viral infections and it helps the child to fight germs and reduces the risk of developing infections [4]. Breastfed babies have fewer infections in their early life, less diarrhea and vomiting, chest and ear infections because breast milk help a baby's own immune system work best [6]. Exclusive breastfeeding means babies are given only breast milk and nothing else-no other milk, food, drink, even no water for the first six months of life since it provides best and complete nourishment for the baby during the first six months of life [5], [7] and [8]. Exclusive breastfeeding is recommended because breast milk is uncontaminated and contains all the nutrients necessary in the first six months of life. In addition, the mother's antibodies in breast milk provide the infant with immunity to disease [9]. Exclusively breastfed children are at a much lower risk of infection from diarrhea, acute respiratory infections, pneumonia, meningitis, ear infections, lower rates of childhood cancers including leukemia and lymphoma than infants who receive other foods [5], [7] and [8]. Worldwide, two-thirds of deaths of children are due to poor exclusive breastfeeding practices [10]. Exclusive breastfeeding from birth to six months has the potential to prevent 13 % of child mortality, and it is estimated that the lives of at least 1.2 million children worldwide would be saved every year [6]. However, no more than 35% of infants worldwide are exclusively breastfed during the first four months of life [10]. Only 38% of children less than 6 months of age are exclusively breastfed in the developing countries [11] and 21% in WCA [12]. In Ethiopia suboptimal breastfeeding practices are the major contributor to an estimated 70,000 infant deaths per year which is 24% of the total infant death annually which can be significantly prevented by nutrition interventions such as exclusive breastfeeding [13]. In Ethiopia 52 % of children less than six months old are exclusively breastfed [9]. The Ethiopian HSDP IV planned to increase in the proportion of exclusively breastfed infants under age 6 months to 70 % by the end of 2015 [14]. Different literatures showed that having a young infant, being a housewife, having prenatal EBF plan, delivering at a health facility, giving birth vaginally, receiving infant feeding counseling /advice, unemployed mothers , low income, mothers fed colostrum, didn't give prenatal food, mothers supported by husband, living in urban, having good knowledge on exclusive breastfeeding , lower parity and having primary education were factors associated with exclusive breastfeeding practice (Bahir Dar, Motta, Afar). Therefore, to know significant factors of exclusive breastfeeding practice and associated factors among mothers in Amanuel town, it was basic concern to conduct this research. The collected data from the survey was used to generate baseline information. Then, the objective of this study was to assess the existing exclusive breast feeding practice and associated factors among mothers of children less than 12 months old in Amanuel town, Northwest, Ethiopia. Specifically: To determine prevalence of exclusive breastfeeding practice and to identify factors associated with exclusive breastfeeding practice in Amanuel town.

2. Methods and Materials

2.1. Study Area and Period

The study was conducted in Amanuel Town which is located in East Gojjam Zone, Amhara Regional State, Ethiopia. Amanuel is located 328 kilometers from Addis Abeba the capital city of Ethiopia and 237 kilometers from Bahir Dar which is the capital of the Amhara National Regional State. Community based quantitative cross-sectional study was employed to collect data. The source of population for this study was all mothers who had newborn up to 12 months old in Amanuel Town, during the study period.

2.2. Sampling Procedure and Data Collection

All mothers who had child up to one year old in Amanuel Town were included in the study. When the respondent (mother) had more than one infant up to one year old in the same house, the youngest child was selected. A structured administered questionnaire was employed to collect data from participants or mothers of a child. It was constructed from previous research done on similar topic [16]. The questionnaires were pre–tested and the necessary correction was made before the actual data collection and one day training was given to the data collectors. The principal investigators closely supervised the entire data collection processes. The filled out questionnaires and examination results were collected after checking for consistency and completeness on daily base.

2.3. Study Variables

Dependent variable: The dependent variable is exclusive breastfeeding (Yes, No)
Independent variables
Maternal related variables: age, religion, marital status, educational status, occupation, maternal illness, husband educational status.
Obstetric and health service related: parity, antenatal care, breast feeding counseling during pregnancy, place of delivery, postnatal care.
Infant related variables: age, sex, birth order, colostrum feeding status, infant health.

2.4. Operational Definitions

Exclusive breastfeeding: Fed only breast milk (including milk expressed or from a wet nurse) allows ORS, drops,

syrups (vitamins, medicine and minerals), do not allow anything else.

Complementary feeding: Breast milk (including milk expressed or from a wet nurse), any food or a liquid including non-human and solid or semi-solid foods milk and formula.

Partly breastfed: Fed on breast milk and complementary foods (milk, porridge, semi-solids or solids).

Knowledge score on EBF: An average of responses on knowledge variables was done by computing variables and mothers who scored less than the average are labeled to have poor knowledge and those scored above as having good knowledge.

Parity: Number of live births a mother has.

Multi Para: A woman who has given to 2 or more live children.

2.5. Data Processing and Analysis

The collected and edited data was coded and entered to SPSS software for further analysis. Descriptive statistics including frequency, percentages, were used to summarize the socio-demographic characteristics' of the study participants and the prevalence of exclusive breast feeding. To identify factors associated with exclusive breastfeeding practice; both bivariate and multivariable binary logistic regression analyses were used. Bivariate logistic regression is used to identify the relationship between each independent variable with the dependent (outcome) variable and those variables with a p value < 0.25 were included in the final model. Multivariable binary logistic regression model was employed by selecting only variables that are significant at (P<0.25) in the bivariate analysis. The strength of relationship between independent and dependent variables was measured using P-value (P -value ≤0.05) from final binary logistic regression model.

2.6. Logistic Regression Model

The logistic model is a statistical tool to predict the probability of an event, given a set of independent variables.

Logistic regression is used to predict the probability of the occurrence of event on the basis of predictor variables and to determine the effect of the independent variables on the odds of response variable, and to identify the impact of covariate control variables.

Binary logistic regression model is a type of logistic regression model when the response variable is categorical variable with two categories. Binary logistic regression model has another application of combining the dependent variables to estimate the probability that particular event will occur, that is a subject will be a member of one of the groups defined by the dichotomous dependent variable. This model applies maximum likelihood estimation method after transforming the dependent variable into a logit of variable.

Model Description

Dependent variable in binary logistic regression is dichotomous, that is, dependent variable can take the value of one for success and zero for failure. Binary logistic regression model is give as follows.

Let X 's are independent variables and Y is dependent variable, with probability of success (Pi) and probability of failure (1-Pi). Hence, the logit transformation of P_i given as follows:

$$logit(P_i) = log\left(\frac{P_i}{1-P_i}\right) = \beta_o + \beta_1 X_1 + \cdots + \beta_k X_k$$

3. Results

3.1. Socio-Demographic Characteristics

Out of total 254 mothers interviewed, 87(34.3%) were aged between 25-29 years. All most (98%) of mothers were Orthodox Christian followers and there is no mothers who follow Catholic. Majority mothers 181(71.3%) of study participants were married. With regard to educational status, 25(9.8%) mothers and 24 (9.4) husband were not educated at all (can't read and write). From total mothers, 105 (41.3%) were housewife and 67 (26.4%) were government employed (T*able 1*).

Table 1. Maternal related socio demographic characteristics.

Variables	Category (N=254)	Frequency	Percentage
Age of mother	15-19 years	13	5.1
	20-24 years	45	17.1
	25-29 years	87	34.3
	30-34 years	51	20.1
	>= 35 years	58	22.8
Religion	Orthodox	249	98
	Muslim	3	1.2
	Protestant	2	0.8
Marital status	Single	33	13
	Married	181	71.3
	Divorced	16	6.3
	Widowed	24	9.4
Husband educational status	Can't read and write	24	9.4
	Can read and write	72	28.3
	Grade 9-12	64	25.2
	Diploma	61	24
	Degree and above	33	13

Variables	Category (N=254)	Frequency	Percentage
Mother's educational status	Can't read and write	25	9.8
	Can read and write	76	29.9
	Grade 9-12	77	30.3
	Diploma	55	21.7
	Degree and above	21	8.3
Occupation	Housewife	105	41.3
	Government employed	67	26.4
	Merchant	69	27
	Daily labor	13	5.1

3.2. Infant and Maternal Health Service Utilization Characteristics

Almost all mothers 233 (91.7%) were healthy and 181 (71.3%) infant were females. Majority (90.6%) of the infant was healthy and 146 (57.5%) of mothers have 1-2 children. Majority (74.5%) of mothers received antenatal care (ANC) during period of pregnancy out of them only 106 (55.8%) were counseled about breast feeding. With regarding to place of delivery, most 156 (61.4%) mothers delivered in health center. From total respondents, majority 170 (66.9%) of mothers received postnatal care, and out of them 137 (80.6%) were counseled about exclusive breastfeeding up to six months *(Table 2)*.

***Table 2.** Infant and maternal health service utilization characteristics.*

Variables	Category (N=254)	Frequency	Percentage
Health status of mother	Healthy	233	91.7
	Sick	21	8.3
Infant sex	Male	33	13
	Female	181	71.3
Parity	First	25	9.8
	Second	76	29.9
	Third	77	30.3
	Fourth and above	55	21.7
Infant health status	Healthy	230	90.6
	Sick	24	9.4
Number of children	1-2	146	57.5
	3-4	79	31.1
	5 and above	29	11.4
ANC follow up	Yes	190	74.5
	No	64	25.2
Number of ANC follow up	Once	40	21
	Twice	43	22.7
	Three times	29	15.3
	Four and above	78	41
Breast feeding Counseling during ANC	Yes	106	55.8
	No	84	44.2
Place of delivery	Hospital	70	27.6
	Health center	156	61.4
	Private clinic	7	2.8
	Inside home	21	8.3
PNC follow up	Yes	170	66.9
	No	84	33.1
Place of PNC follow up	Hospital	26	15.3
	Health center	136	80.0
	Private clinic	6	3.5
	Inside home	2	1.2
Breast feeding Counseling during PNC	Yes	137	80.6
	No	33	19.4

3.3. Breastfeeding and Related Practices of Mothers

From total participants, majority 184 (72.4%) of mothers were give breast milk for the infant immediately within one hour of birth. Most mothers 203 (79.9%) feed colostrum (first milk) to the newborn and the prevalence exclusive breast feeding within six months was 46.5%. Among mothers who didn't exclusively breastfeed their infant, the main reasons mentioned were; perception of breast milk only not sufficient for infant 85 (62.5%) and decreased breast milk secretion 27 (19.8%). Most 222 (87.4) of mothers had information about the importance of breast milk for the infant *(Table 3)*.

Table 3. Breastfeeding related practices of mothers.

Variables	Category (N=254)	Frequency	Percentage
Breast feeding for the first time	Within one hour	184	72.4
	After one hour	57	22.4
	From 1-3 days	10	3.9
	After three days	3	1.2
Colostrum feeding	Yes	203	79.9
	No	51	20.1
Reason of not feeding colostrum	Infant can't feed	33	64.7
	Not good for the infant	12	23.6
	Yellow color and jelly	4	7.8
	Culture	2	3.9
Within six month exclusive breast feeding	Yes	118	46.5
	No	136	53.5
Reason of not only mothers milk	Dry breast	27	19.8
	Breast feeding is not sufficient	85	62.5
	The infant is thirsty of water	10	7.4
	No parallel with work	13	9.6
	Makes me tired	1	0.7
Feed for the infant until breast percolate within three days	Only mothers milk	155	61
	Water	70	27.6
	Butter	13	5.1
	Sugar solution	16	6.3
Reason of not breast feeding	Make pain on my breast	27	27.3
	Sick the infant	22	22.2
	Due to sickness	17	17.2
	Breast accumulate milk immediately	19	19.2
	Culture	14	14.1
Importance of breast feeding for the infant	Yes	222	87.4
	No	32	12.6

3.4. Factors Associated with Exclusive Breastfeeding

From participants of this study, 46.5% of mothers were practiced exclusive breastfeeding. To identify factors that associated with exclusive breastfeeding practice, each variable were assessed independently whether they are predictor of EBF practice or not. From bivariate logistic regression analysis, variables which were associated with exclusive breast feeding (P<0.25) were; religion, level of education of mother, occupation of mother, marital status, health status of mother and infant, antenatal care, breast feeding counseling during ANC, place of delivery, postnatal care, Colostrum feeding and number of children alive. Variables which were associated in the bivariate analysis were tested in the final multivariate analysis to see their significant association with exclusive breastfeeding practice. Hence, from multivariate analysis, mother occupation, mother health status, colostrum feeding, infant health status, breastfeeding counseling and place of delivery were significant variables (P≤ 0.05) (Table 4).

Table 4. Factors that affect EBF practice among mothers of infant age up to one year using multivariate logistic regression analysis model.

Variables	Category	B	S.E.	Wald	Df	Sig.	Exp (B)	95% C.I. for EXP (B)	
								Lower	Upper
Religion	Muslim			.459	2	.795			
	Protestant	-21.859	21197.228	.000	1	.999	.000	.000	.
	Orthodox	-1.122	1.656	.459	1	.498	.326	.013	8.359
Marital status	Single			6.167	3	.104			
	Married	.884	.638	1.921	1	.166	2.421	.694	8.450
	Divorced	-.205	.513	.160	1	.689	.815	.298	2.224
	Widowed	.608	.762	.638	1	.425	1.837	.413	8.180
Educational level of mothers	can't read & write			4.277	4	.370			
	Can read & write.	.946	.727	1.696	1	.193	2.576	.620	10.701
	Grade 9-12	.562	.586	.921	1	.337	1.754	.557	5.529
	Diploma	.378	.585	.418	1	.518	1.460	.464	4.598
	Degree & above	.986	.565	3.043	1	.081	2.680	.885	8.110
Mother occupation	Housewife			4.274	3	.233			
	Employed	.897	.646	1.928	1	.165	2.452	.691	8.695
	Merchant	1.251	.637	3.849	1	.050	3.492	1.001	12.181
	Daily labor	1.102	.651	2.861	1	.091	3.009	.840	10.785
Mother health status	Healthy								

Variables	Category	B	S.E.	Wald	Df	Sig.	Exp (B)	95% C.I. for EXP (B)	
								Lower	Upper
	Sick	1.229	.567	4.708	1	.030	3.419	1.126	10.381
Colostrum feeding	Yes								
	No	-1.100	.421	6.811	1	.009	.333	.146	.760
Infant health status	Healthy								
	Sick	-1.764	.610	8.366	1	.004	.171	.052	.566
Number of children alive	1-2			.298	2	.862			
	3-4	-.091	.457	.039	1	.843	.913	.373	2.237
	5 and above	-.231	.472	.240	1	.624	.794	.314	2.003
ANC follow up	Yes								
	No	-.157	.381	.169	1	.681	.855	.405	1.804
Breast feeding counseling on ANC	Yes								
	No	-1.419	.347	16.686	1	.000	.242	.123	.478
	Hospital			5.959	3	.114			
Place of delivery	Health center	1.149	.602	3.647	1	.056	3.155	.970	10.259
	Private clinic	1.363	.578	5.571	1	.018	3.909	1.260	12.126
	Inside home	1.722	1.049	2.698	1	.100	5.597	.717	43.700
PNC	Yes								
	No	-.286	.350	.668	1	.414	.751	.378	1.492

4. Discussions

The aim of the study was to assess exclusive breastfeeding practice and associated factors among mothers of children aged less than 12 months in Amanuel town. The prevalence of exclusive breastfeeding was 46.5%. The prevalence of exclusive breastfeeding (46.5 %) at six months of age was lower than study in Congo (49.2%) [2], Motta town (50.1%) [16], Mecha District (47.13%) [17], Debre Tabor Town 70.8% [22]. The prevalence of exclusive breastfeeding was higher than study in Kenya 33% [15], Addis Ababa health center (29.3%) [18], Malaysia (43.1%) [19], Bangladeshi (35.9%) [23], Dhaka Slums (27.2%) [24]. In multivariable analysis, mother being merchant, mother health status, colostrum feeding, infant health status, breastfeeding counseling and delivering at private clinic were found to be independent predictors of exclusive breastfeeding among the infants aged up to six months. The study revealed that those mothers who did not get counseling about exclusive breastfeeding during antenatal follow up were 0.242 times less likely than those mothers who get counseling during antenatal care to practice exclusive breastfeeding. Thus, breast feeding counseling was significant factor for EBF practice and it is similar with the study conducted in Debre Markos [3], Addis Ababa health center [18], Motta Town [16], rural Ghana [21], Debre Tabor [22]. This study revealed that mothers who squeezed colostrum were 0.33 times less likely to practice exclusive breast feeding than mothers who feed the colostrum. That is, colostrum feeding was significant variable for exclusive breast feeding practice and similar findings were observed in Gozamen District [3], Motta Town [16], Debre Tabor [22]. In our study, mother occupation was significance variable on exclusive breast feeding. Merchant mothers were 3.492 times more likely to breast feed exclusively than the housewife mothers and it is similar with the studies conducted in Motta Town [16], Brazil [20]. That is, housewife mothers were less likely to be exclusive breast feeding and this idea reverse study in Debre Tabor Town [22], Bangladeshi [23]. In this study, place of delivery was significant factor for exclusive breast feeding the result is similar with study in Congo [2]. Mother health status was another significant factor of exclusive breast feeding and it is supported by [24].

5. Conclusions

The prevalence of exclusive breastfeeding practice was low (46.5%). From logistic regression analysis, counseling of breastfeeding during antenatal care, health status of mother, infant health status, mother occupation, place of delivery and colostrum feeding were the determinant factors for EBF practice. In general, healthy mothers, mothers who had healthy child, mothers those who get counseling during antenatal care and mothers who feed the colostrum were more likely to breast feeding exclusively than their counter. Training of health professionals regarding to infant feeding practices and counseling should be strengthened and work to strengthen maternal and child health services. Health workers should give community based breastfeeding education and counseling to pregnant women and provide education and counseling to mothers on breast feeding and related traditional practices like milking and throwing colostrum to the newborn. Further study needed to identify other significant factors of exclusive breastfeeding.

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