An Investigation of Patterns and Factors Associated with Exclusive Breast Feeding in Northern Ghana

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Abstract: *Introduction*: The main aim of this study was to assess the practice of exclusive breastfeeding (EBF) and explore its determinants in Tamale Metropolis, Northern Ghana.

Methods: In this analytical cross-sectional study, systematic random sampling was used to select 355 mother- infant pairs between 0-6 months from among consenting mothers attending post natal care at the Tamale Teaching and West Hospitals in the Tamale Metropolis.

Results: The prevalence of EBF among infants < 6 months in the Tamale Metropolis for the past 24 hours was 92.1 % but it was 75.5 % in the one month prior to the study.

In logistic regression analyses, factors that had significant positive association with EBR were institutional delivery, current mother's employment, maternal motivation and household wealth index. Compared to home delivery, women who delivered at a health institution were five times more likely to practice EBF (Adjusted odds ratio [AOR] = 5.17, CI: 2.45 – 10.90). Petty traders were four times more likely to exclusively breastfeed, compared to women who were unemployed (A OR = 4.05, CI: 1.93 – 8.51).

EBF provided 80 % (Adjusted OR = 0.2, CI: 0.08-0.37) protection against chronic malnutrition whilst high household index reflecting socio-economic status provided only 10 % protection against chronic malnutrition in the study sample (Adjusted OR = 0.9, CI: 0.81- 0.98).

Conclusion and Recommendation: Strategies that target improving knowledge and skills on lactation management among women, as well as strategies to improve health facility delivery especially among non-working mothers, may help to improve EBF in Northern Ghana.

Keywords: Exclusive breastfeeding, breastfeeding patterns, determinants, Northern Ghana, household wealth index, institutional delivery.

INTRODUCTION

Though breastfeeding is nearly universal in Ghana, the prevalence of exclusive breastfeeding (EBF) is lower than the international recommended levels. The World Health Organization (WHO) recommends EBF for the first six months of life with early initiation and continuation of breastfeeding for two years or more together with nutritionally-adequate, safe, age-appropriate complementary feeding starting at six months [1]. The Ghana Demographic and Health Survey (GDHS) conducted in 2008 showed that 63 % of Ghanaian children less than six months were exclusively breastfed and the average length of exclusive breastfeeding was four months [2]. The situation appears to be deteriorating as available information shows that EBF rate has declined from 54 % in 2006 to 46 % in 2011 [3]. There is however, little information on the factors contributing to this situation.

Early initiation of breastfeeding, EBF for six months, and timely introduction of age-appropriate complementary feeding are the key nutrition behaviours necessary for improved child health and nutritional status [4, 5]. Though these interventions need little economic investment to succeed, progress in attaining these goals has been slow and child malnutrition continues to be a major public health problem in developing countries. For example, in the Northern Region of Ghana, the prevalence of chronic malnutrition has increased from 32 % in 2008 to 37 % in 2011 [3]. The persistent prevalence of chronic malnutrition in many parts of the Developing World including Northern Ghana is of particular concern to all human development advocates.

The low proportion of women practicing EBF in most developing countries has been attributed to various maternal and child factors including place of residence, gender and age of the child, mother working outside home, maternal age and educational level, access to mass media and economical status [6-8]. Since these factors are not the same in every environment, it is important that the specific factors influencing EBF are fully understood for effective intervention options. It is against this background that this study sought to assess exclusive breastfeeding patterns and the factors contributing to it in the Northern Region of Ghana.

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As a way of measuring EBF rate, the World Health Organization (WHO) defined exclusive breastfeeding as the situation where an infant has received only breast milk from the mother (either directly from the breast or expressed) and no other liquids or solids with the exception of drops or syrups consisting of vitamins, mineral supplements, or medicines in the past 24 hours [9]. In this study, we defined EBF in two ways based on a recall of liquids or foods given to the child in the past 24 hours and also over one month period prior to the interview. A recall over a one month period was included in this study because this duration is relatively long enough to test whether the infant was actually on EBF.

Problem Statement

The prevalence of EBF in Ghana remains low though the Ghana Health Service (GHS) has been promoting optimal infant feeding practices including EBF for some time now. Some mothers continue not to exclusive breastfeed their children. The reasons for this are unclear and therefore needed further investigation. This study therefore sought to assess the practice of EBF and explore its determinants in the Northern Region of Ghana.

Study objectives

The specific objectives were as follows:

i. To measure the prevalence of exclusive breastfeeding.

ii. To compare the nutritional status of children of exclusive breast feeding children with non-exclusive breast feeding children.

iii. To assess the determinants of exclusive breast feeding.

iv. To measure socioeconomic household wealth index and investigate its relationship with breast feeding patterns.

METHODOLOGY

Study Area

The study was conducted in the Tamale Metropolis of Northern Ghana. Tamale Metropolis is one of the twenty administrative districts and capital town of the Northern Region. The Metropolis has 32 health facilities including two government hospitals namely the West and Central Hospitals and one Teaching Hospital. The Metropolis has been divided into six sub districts including Bilpela, Choggu, Sagnerigu, Taha/Kamina, Tamale central and Vitin sub districts. Data for this study were collected from the Tamale West and Teaching Hospitals.

The Northern Region is the largest of ten regions in Ghana. Agriculture is the major economic activity, and rice and maize are the major staple foods. This region was selected because it has one of the highest malnutrition rates in the country.

Study Design and Sampling

In this analytical cross-sectional study which was conducted in June 2012, systematic random sampling was used to select 355 mother- infant pairs between 0-6 months from among consenting mothers attending post natal care at the Tamale Teaching and West Hospitals in the Tamale Metropolis.

The outcome variable of interest used for calculating the sample size was the coverage of exclusive breastfeeding rate (that is, 70 %) for the Northern Region [2]. Considering 95% confidence level, 5 % relative precision and an extra 10 % to take care of non-responses and spoiled questionnaires the estimated sample size was 355 mother- child pairs.

Data Collection

After consent was obtained from eligible mothers, a face-to-face interview using a pre-tested structured questionnaire was conducted by the investigator in postnatal clinics of the selected hospitals. The questionnaire was pre-tested among 35 mother-infant pairs from another health clinic in the same metropolis.

Data collected included maternal socio-demographic characteristics (ethnicity, age, religion, marital status, education level, and occupation), pregnancy related variables (parity, number of antenatal visits, and place of delivery), infant feeding practices and household wealth index variables. Furthermore, the reasons for being able to practice EBF or not were assessed.

Determination of Household Wealth Index

A household wealth index based on household assets and housing quality was used as a proxy indicator for socio-economic status (SES) of households. An absolute measure of household wealth

(wealth index) used in this study is based on an earlier concept developed by Garenne & Hohmann [10], whereby the sum of dummy variables created from information collected on housing quality (floor, walls, and roof material), availability of water and type of toilet facility, and ownership of household durable goods and livestock (e.g. bicycle, television, radio, motorcycle, sewing machine, telephone, cars, refrigerator, mattress, bed). These facilities or durable goods are often regarded as modern goods that have been shown to reflect household wealth. A household of zero index score for example, means that household had not a single modern good. The scores were thus added up to give the proxy household wealth index. The index varied from 0-18. Households that had a wealth index score of 13 and below were classified as having a low wealth index score and those that had a wealth index score of 14 and above were classified as having a high wealth index score. The main aim of creating the index was to categorize households into SES groupings in order that we could factor in socio-economic status in multiple regression analysis and to compare the difference in exclusive breast feeding patterns between the groups of lowest and highest SES.

Data Analysis

The data collected were cleaned, coded and entered into Statistical Package for the Social Sciences (SPSS) version 18.0. The dependent variable was exclusive breastfeeding (EBF). Bi-variate analysis was performed to determine the variables associated with EBF. Pearson's chi-square test of independence was performed to test the existence of significant association between potential risk factors and EBF. A stepwise backward binary logistic regression model was used to assess the independent association between independent variables and exclusive breastfeeding adjusting for infant age. The level of significance was set at $p < 0.05$. Odds ratio (OR) and 95% Confidence Interval (CI) were calculated as a measurement of association between an independent variable and the main outcome variable.

Ethical Consideration

Ethics approval for the study was obtained from School of Medicine and Health Sciences Ethics Research Committee. Permission to conduct the study was also obtained from the Medical Directors of the hospitals selected for the study. Before obtaining consent from mothers, detailed explanations of the aim of the study was orally communicated to them and they were made to understand that a decision to participate or not will be at their own discretion. Each participant was assured that whatever information they gave to us will remain confidential and would be used strictly for academic purposes. Written consent was sought from every participant. For illiterate women, a right thumb print was taken as a signature.

RESULTS

Sample Characteristics

A total of 391 eligible mother-infant pairs were approached for the study but 36 (10 %) declined participation. The mean (SD) of maternal age was 27.0±3.3 years. The majority of the women, (99.4 %), were married. Table **1** shows the rest of the socio-demographic characteristics of the respondents.

Infant Feeding Practices

Out of the 355 children aged 0-6 months, all of them were still breast feeding as of the time of the study. Feeding babies with the first yellowish milk that was produced immediately after delivery (that is, colostrum) was reported by 85.4 % (303) of mothers whilst the rest discarded it. The practice of giving pre-lacteals was on the low side as 99.4 % (353) of mothers reported giving nothing to the baby before putting the baby to the breast. The proportion of infants < 6 months who received only breast milk the past 24 hours was 92.1 % (327). The EBR for the past one month was however, 75.5 % (268). The main reason given by mothers for not practicing EBF was that child was thirsty and therefore needed to be given water. The major reasons of mothers (motivation) for exclusively breast feeding their babies were mother's perception that breast milk ensures proper child growth, advice given by health workers and breast milk being regarded as food for the child. The breast feeding motivation that was most associated with EBF was health promotion messages received from health workers (Chi-squared = 36.4, $p < 0.001$). Timely initiation of breastfeeding (TIBF) rate (that is, proportion of children born in the last 24 months who were put to the breast within one hour of birth) was 93.2 % (331).

Nutritional Status Assessment

The magnitude of under nutrition among children 0-6 months was quantified using three anthropometric indicators: Weight-for-height z-score (WHZ), Height-for-age z-score (HAZ) and weight-for-age z-score (WAZ). The WHO 2006 reference curves were used as the

Table 1: Socio-Demographic Characteristics of Study Sample (N = 355)

CHARACTERISTICS	N	%
Maternal Age (years)		
19-24	84	23.7
25-29	193	54.4
30-34	74	20.8
35+	4	1.1
Religion		
Islam	254	71.5
Christian	96	27.0
African Traditional Religion	5	1.4
Education		
Primary	57	16.1
Junior High School	76	21.4
Senior High School	63	17.7
Tertiary	85	23.9
Arabic school	7	2.0
None	67	18.9
Occupation Type		
Unemployed	92	25.9
Farming	18	5.1
Salaried worker	110	31.0
Trader in finished Products	73	20.6
Pito Brewing	15	4.2
Others	47	13.2
Ethnicity		
Dagomba	181	51.0
Gonja	70	19.7
Mamprusi	11	3.1
Ewe	25	7.0
Akan	35	9.9
Others	33	9.3

standard to classify low anthropometric levels (that is, two standard deviation (SD) units below the reference median) for the three indices [11]. Table **2a** shows the prevalence of under nutrition in the whole sample.

Comparison of the Nutritional status of EBF Children and Non-EBF Children

Bivariate analysis showed that the prevalence of underweight was significantly higher in non-EBF children compared to EBF children (39.3% versus 10.1%) Chi-squared = 20.2, $p < 0.001$. The prevalence of stunting was also higher in non-EBF compared to EBF children (32.1% versus 13.5 %) (Chi-squared =7.1, p-value = 0.008). However, though the prevalence of wasting (acute malnutrition) was also higher in non-EBF children compared to EBF children (14.3% versus 5.5%), the association was weak one (Chi-square = 3.4, p-value = 0.06). Table **2b** also shows that the mean z-scores were higher among exclusively breastfed children compared to non-exclusive breast feeding children.

In multiple logistic regression analysis, EBF still provided 80 % (Adjusted OR = 0.2, CI: 0.08-0.37) protection against chronic malnutrition (Table **2c**).

Table 2a: Prevalence of Under Nutrition Indicators Among Children Aged 0-6 Months (N = 355)

Indicator	N	Prevalence % (n)	95 % Confidence Interval (CI)
Underweight (WAZ < -2 SD)	355	12.4 (44)	9.4 – 16.2
Acute malnutrition (WHZ < -2 SD)	355	6.2 (22)	4.1 – 9.2
Chronic malnutrition (HAZ < -2 SD)	355	14.9 (53)	11.6 – 19.0

Table 2b: Comparison of Mean z-Scores Between EBF and Non-EBF Babies

		N	Mean		95% Confidence Interval for Mean		Test statistic
					Lower Bound	Upper Bound	
WAZ	Non-EBF	28	-1.57	0.99	-1.95	-1.18	F (1, 354) = 28.8, p < 0.001
	EBF	327	-0.44	1.08	-0.55	-0.32	
	Total	355	-0.53	1.11	-0.64	-0.41	
HAZ	Non-EBF	28	-1.33	1.33	-1.85	-0.82	F (1, 354) = 9.6, p = 0.002
	EBF	327	-0.54	1.30	-0.68	-0.40	
	Total	355	-0.61	1.32	-0.74	-0.47	
WHZ	Non-EBF	28	-0.85	0.99	-1.23	-0.46	F (1, 354) = 10.8, p = 0.001
	EBF	327	-0.09	1.19	-0.22	0.04	
	Total	355	-0.15	1.19	-0.27	-0.03	

Table 2c: Determinants of Chronic Malnutrition

Factor	B	S.E.	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
						Lower	Upper
Exclusive breast feeding	-1.74	.382	20.74	<0.001	0.2	0.08	0.37
Household Wealth index	-0.11	.049	4.93	0.03	0.9	0.81	0.98
Age of mother	0.13	.055	6.07	0.014	1.1	1.03	1.27
Male child	0.72	.356	4.10	0.043	2.1	1.02	4.13
Age of child	0.50	.109	20.88	<0.001	1.6	1.33	2.04
Constant	-5.09	1.516	11.27	0.001	0.006		

Compared with female children, male children were two times more likely of becoming stunted and older children were more likely of becoming chronically malnourished (OR = 1.6, CI: 1.33- 2.04). Household Wealth index weakly protected against chronic malnutrition (Adjusted OR = 0.9, CI: 0.81- 0.98). Surprisingly, older maternal age was a risk factor for chronic malnutrition in this group of children (Adjusted OR = 1.1, CI: 1.03- 1.27). Age of the child and exclusive breast feeding were the greatest determinants of chronic malnutrition among children aged 0-6 months.

Factors Associated with EBF

In bivariate analysis, the factors associated with EBF are shown in Table **3**. EBF was associated positively with maternal educational level, current employment of women, health facility delivery, household wealth index, uptake for antenatal care services and mother's motivation to breastfeed exclusively. However, no association was observed between EBF and maternal age, sex of the child, child's age, marital status and maternal ethnicity.

Relationship between Household wealth index and Exclusive Breast Feeding Rate

Bivariate analysis showed that women who practiced EBF in the past one month prior to the study had mean wealth index which was significantly higher than women who did not practice exclusive breast feeding (15.5±3.4 versus 11.6 ±3.7) F (1, 354) = 80.1, P < 0.001.

Table 3: Factors Associated with Exclusive Breastfeeding (EBF)

Factor	N	EBR n (%)	Non-EBR n (%)	Test statistic
ANC Attendance				
None	15	3 (20.0)	12 (80.0)	Chi-square (χ^2) =26.1, p < 0.001
3-4 times	9	7 (77.8)	2 (22.2)	
4+	331	258 (77.9)	73 (22.1)	
Employment				
Unemployed	92	42 (45.7)	50 (54.3)	χ^2 =63.4, p < 0.001
Farmer	18	13 (72.2)	5 (27.8)	
Salary worker	110	100 (90.9)	10 (9.1)	
Petty trader	135	113 (83.7)	22 (16.3)	
Place of delivery				
Institutional delivery	293	249 (85.0)	44 (15.0)	χ^2 =81.7, p < 0.001
Home delivery	62	19 (30.6)	43 (69.4)	
Education				
None	67	39 (58.2)	28 (41.8)	χ^2 =33.34, p < 0.001
Low	140	95 (67.8)	45 (32.2)	
High	148	134 (90.5)	14 (9.5)	
Mother's motivation				
Health promotion	159	140 (88.1)	19 (11.9	χ^2 =36.4, p < 0.001
Proper growth	99	75 (75.8)	24 (24.2)	
Food for infant	97	53 (54.6)	44 (45.4)	

The association between EBF in the past 24 hours prior to the interview and household wealth index was however reduced in which case EBF households scored a mean of 14.7±3.8 as against 12.5±4.6 in non EBF households F (1, 354) = 7.8, P = 0.005.

Determinants of EBF in the Past One Month Prior to the Study

All the variables associated with exclusive breastfeeding in bivariate analyses were included in a multivariate model. In the hierarchical models of multivariable analysis, place of delivery, maternal motivation, type of mother's occupation and household wealth index were retained as significant determinant factors for EBF. This set of determinants accounted for 45.0 % of the variance in EBF in the past one month (Nagelkerke R Square = 0.45). The strongest determinants of EBF rate were place of delivery, and mother's occupation being a trader (Table **4**).

In the logistic regression analysis, EBF remained independently associated with health facility delivery. Compared to home delivery, women who delivered at a

Table 4: Determinants of EBF in the Past One Month Prior to the Study

	B	Wald	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
Motivation derived from breast feeding promotion messages	1.21	10.04	0.002	3.36	1.59	7.12
Petty trader	1.40	13.70	<0.001	4.05	1.93	8.51
Household wealth index	0.17	8.88	0.003	1.18	1.06	1.32
Institutional delivery	1.64	18.65	<0.001	5.17	2.45	10.90
Constant	-4.38	30.98	0.000	0.01		

health institution were five times more likely to practice EBF (adjusted odds ratio [AOR] = 5.17, CI: 2.45 – 10.90).

A unit increase in household wealth index was associated with 1.2 times more likelihood of a woman practicing EBF (AOR = 1.18, CI: 1.06 – 1.32). Exclusive breastfeeding was found to be dependent on a woman's occupation. Petty traders were four times more likely to exclusively breastfeed, compared to women who were unemployed (A OR = 4.05, CI: 1.93 – 8.51).

Mother's motivation to practice EBF was an important determinant. When mothers were asked of their motivation to do EBF the responses were breast milk is food, breast feeding promotes proper child growth and messages received during health promotion sessions. Compared to mothers regarding breast milk being food for babies, mothers who cited breast feeding promotion messages received from health staff were three times more likely of practicing exclusive breast feeding (AOR = 3.36, CI: 1.59 – 7.12).

When household wealth index was introduced into the regression model, the Nagelkerke R Square increased from 0.36 to 0.45 but then the educational level of the woman was no longer a determinant of EBF. The prevalence of EBF among women who had no formal education was significantly lower than women who attained at least senior secondary school level education (58.2% versus 90.5 %) (Chi-squared = 33.4, $p < 0.001$). As shown in Table **5**, the household wealth index was also significantly higher among women of higher educational level $F (2, 354) = 139$, $P < 0.001$.

The mean ANC attendance was significantly higher among women of higher educational level, compared to women who did not receive formal education (6.6 versus 5.1) $F (2, 352) = 38.4$, $p < 0.001$.

Our data also showed that women who attended ANC 1-3 times were more likely of delivering in a health institution, compared with women who did not attend ANC (86.4 % versus 29.2 %) (Chi-squared = 50.9, $p < 0.001$).

DISCUSSION

Breastfeeding Patterns

The present study aimed to investigate the patterns and determinants of exclusive breastfeeding at 6 months among mothers in Tamale Municipality of Northern Ghana. Using a 24 hour recall period, the overall prevalence of exclusive breastfeeding (EBF) among mothers with infants up to six months of age was 92.1%, which is higher than the national breastfeeding average of 63 % estimated in the Ghana Demographic and Health survey conducted in 2008 [2]. However, the proportion of infants < 6 months who received only breast milk the past one month was 75.5 %. The difference in these figures is significant and has implication for policy and programme design. In assessing breastfeeding practices in household, most studies have used the 24 hour recall methodology as described by the WHO [9]. In this study, we defined EBF in two ways based on a recall of liquids or foods given to the child in the past 24 hours and also over one month period prior to the interview. A recall over a one month period was included in this study because this duration is relatively long enough to test whether the infant was actually on EBF.

Though a recall period of one month may lead to recall bias from respondents, it is also true that dietary intake over 24 hour period may not truly reflect the usual dietary habit. In our analysis, the association between potential determinants and EBF based on one month was most cases stronger than EBF based on 24-hour recall.

Some investigators including Piwos *et al.* [12] have questioned the validity of data on exclusive breastfeeding based on 24 hour periods. Aarts *et al.* [13] reported a wide discrepancy on the prevalence of exclusive breastfeeding based on a 24-hour recall

Table 5: Comparison of Household Wealth According to Maternal Educational Level

Educational level	N	Mean	Std. Deviation	95% Confidence Interval for Mean		Minimum	Maximum
				Lower Bound	Upper Bound		
None	67	11.7	3.1	10.9	12.4	7.00	20.00
Low	140	12.6	3.3	12.1	13.2	7.00	21.00
High	148	17.6	2.5	17.2	17.9	10.00	23.00
Total	355	14.5	3.9	14.1	14.9	7.00	23.00

period and exclusive breastfeeding since birth. Though prevalence of EBF was reported to be generally high, it was different for different population sub-groups. For example, the EBR for the past one month was only 45.7 % among non-working women.

A recent study conducted in Ghana estimated the 24-hour EBF rate to be 46% nationally, and 63.6 % for the Northern where this present study was conducted [3]. Our estimates far exceeded this. The marked difference may be due to the fact that a small number of children (only 79) aged 0- 5 months were sampled for Northern Region in the Multiple Indicator Cluster Survey (MICS) that was sponsored by UNICEF and so it is not possible to have meaningful comparisons for the results.

From our findings, 93.2 % of babies were given breast milk within the first hour of birth as recommended by WHO and UNICEF [14]. Most mothers, (85 %) fed colostrum to their babies, which is a good practice because colostrum is rich in vitamins, minerals, protein and immunoglobulins that protect the child from infections [15]. Giving prelacteals was on the low side as 99.4 % of mothers reported giving nothing before initiation of breast feeding.

Nutritional Status of EBF and Non-EBF Children

Nutritional status is primarily measured by a child's growth in height and weight and is directly influenced by food intake and occurrence of infection. The prevalence of underweight, wasting and stunting was higher in non-EBF infants than the in EBF infants. This finding is consistent with several national level surveys including the Benin Demographic and Health Survey of 2006, the Liberia Demographic and Health Survey of 2004 as well as the Ghana Demographic and Health Survey of 2008 [2, 16, 17]. Similar findings were reported from Brazil in which EBF children aged six months achieved a better rapid growth in weight and length compared to Non-EBF [18].

Determinants of Exclusive Breastfeeding

The independent variables that associated positively with EBF were high maternal education, mother's motivation, type of maternal occupation, a high socioeconomic status, uptake of prenatal services and institutional delivery, details of which are described below:

Maternal Occupation and EBF

Evidence from the findings of this study showed a marked positive relationship between the work mothers do and their ability to exclusively breastfeed their infant. Mother's occupation was classified as unemployed, farmer, salary worker and petty trader. Exclusive breastfeeding was more common among mothers who were engaged in petty trading and those on regular salary. Petty traders were four times more likely to exclusively breastfeed, compared to women who were unemployed. Both the salary worker and the farmer were more likely to do exclusive breastfeeding, compared to non-working women, though the association was weak. The finding is consistent with the findings of another study which reported that women whose partners had professional executive occupations were more likely than their counterparts to practice EBF [19]. It is surprising that non-working mothers were less likely to do exclusive breastfeeding compared to working mothers since the expectation is that they may have time for breastfeeding. Further analysis of our data showed that non-working mothers in our sample least patronized institutional deliveries and prenatal services; factors which were important determinants of EBF in our sample and this may explain why non- working mothers were negatively associated with EBF. A study conducted in Nigeria reported of similar findings where exclusive breastfeeding was dependent on a mother's occupation. In that study the prevalence of EBF was highest among traders [20]. A study in Tanzania also reported of positive association between EBF and maternal occupation, uptake of institutional delivery services [21].

The findings of this study are however, at variance with other studies which showed that mothers who are employed, or anticipate returning to full-time employment, are less likely to exclusively breastfeed and that when they do, they tend to breastfeed their babies for a shorter duration [22, 23]. Obviously, time availability does not seem to be an important issue here because the non-working mothers are expected to have enough time at their disposal to practice EBF but that was not the case in our sample. It appears the decision to do EBF is being influenced by a myriad of complex factors. Some other studies conducted elsewhere showed that non-working mothers were positively associated with exclusive breastfeeding [24-26].

Uptake of Prenatal Care Services and Pattern of Breastfeeding

The findings of this present study show a significant positive association between antenatal care (ANC)

attendance and EBF. This is in support of the findings of previous studies which show that women who patronized prenatal services and were informed of the benefits of EBF, exclusively breastfed their babies. For example, a study conducted in rural and an urban areas of Tanzania concluded that mothers having knowledge and being informed about breastfeeding issues by healthcare workers were most likely to practice EBF [27]. Adequate and appropriate maternal knowledge about breastfeeding issues through contacts with health services and health personnel trained in breastfeeding have been shown to increase rates and longer duration of exclusive breastfeeding [27-32]. Our finding that uptake of prenatal services was strongly associated with EBF is in support of this.

Place of Delivery and EBF

The association between EBF and place of delivery was highly significant in this study population. Information given before discharge after hospital delivery may explain the association between place of delivery and EBF. It is also most likely that women who attend ANC would deliver more in health institutions and could have obtained information on breast feeding during the prenatal services. Indeed, our data showed that women who attended ANC were more likely of delivering in a health institution (86.4 % versus 29.2 %) (Chi-squared = 50.9, $p < 0.001$). Our finding is therefore in consonance with other studies which also claimed that the place of delivery is positively associated with the type of breastfeeding mothers practiced. For example, Mudambi in a study in Nigeria showed a significant association between EBF and delivery in a private or public hospital [33]. Perez – Escamilla [34], in a study reported that women who deliver in the maternity center with more breastfeeding friendly policies practice EBF. In Tanzania, women who delivered at the health facilities had three times the odds of reporting practicing EBF compared to those who delivered at home [35]. In Switzerland, Italy and Brazil, similar findings have been reported where hospital delivery and health facility factors like rooming-in and nursing guidance at maternity hospitals were strong determinants for EBF [36-38].

In contrast, a study conducted in Canada revealed that mothers choosing to deliver at home were five times more likely to exclusively breastfeed than mothers giving birth at hospitals [39]. This relationship has been attributed to the negative influence of formula supplementation in the hospital [40].

Relationship between Household Wealth Index and EBF

In this study, an indirect measure of household economic status was assessed based on possession of 26 consumer items and living conditions that reflect a decent living and considered necessary for modern day life. They included motor cycle, telephone, running water, electricity, type of house, toilet facilities, color television, computer, video, private car and refrigerator.

Exclusive breast feeding was strongly more related to household wealth index than educational attainment of the mother. Results of bivariate analyses showed a very strong positive association between maternal educational level and EBF but the relationship was not sustained in a multiple logistic regression which controlled for household wealth index.

There existed significant association between EBF and household wealth index. Women who practice EBF were better of economically than those who did not. This finding is consistent with one other study which reported that EBF is positively related to socioeconomic status in most countries [41]. From our findings, when household wealth index was introduced into the regression model, the Nagelkerke R Square increased from 0.36 to 0.41 but that made maternal educational level an insignificant determinant of EBF, though it was initially significant. This shows how strong household wealth index was related to EBF. But why should EBF be so strongly related to economic status? It is possible for example, uptake of prenatal care services may be influenced by the economic status of the woman and so the well to do are more likely to benefit from such services which in turn can determine the likelihood of practicing EBF. However, it is not simply the case that when a woman's economic standing is good, she may practice EBF. One other possible explanation for this association is that in our sample, the wealthier households were also having women of highest educational level and the prevalence of EBF among women who had no formal education was significantly lower than women who attained at least senior secondary school level education. Essentially, household economic status is correlated with maternal education. So in the absence of household wealth index, educational level serves as a proxy measure of economic status. Studies that do measure maternal educational level but not economic status of the mother are likely to find attainment in education being a significant determinant of EBF. For example, several studies conducted in different settings

have reported of positive association between EBF and maternal education [41, 42], though others have found no association [32].

It appears well educated mothers may have greater access to information on breast feeding as they attend prenatal care services. From our data the mean ANC attendance was significantly higher among women of higher educational level, compared to women who did not receive formal education. There was indeed a strong positive association between educational level and household wealth index and so wealthier women may as well be informed on breast feeding issues. Adequate and appropriate knowledge about breastfeeding issues has been shown to be associated with high rates and a longer duration of exclusive breastfeeding [32, 43].

However, one study found no association between socioeconomic variables with EBF [27]. The proxy socioeconomic variables used in that study included maternal and paternal educational levels, occupation, marital status and asset ownership. The lack of association in that study may be due to the fact that EBF was reported to be rare in their sample. Furthermore, the way socio-economic status was assessed appears not to be comprehensive enough. For example, ownership of a radio, bicycle or type of dwelling was used to reflect level of socioeconomic status. In our study, a composite index of ownership of these modern goods and other household living conditions were pulled together and used as proxy of socio-economic status of the women.

Mother's Motivation and EBF

Mother's motivation to practice EBF was an important determinant. When mothers were asked of their motivation to do EBF the responses were breast milk is food, breast feeding promotes proper child growth and messages received during health promotion sessions. Compared to mothers regarding breast milk being food for babies, mothers who cited breast feeding promotion messages received from health staff were three times more likely of practicing exclusive breast feeding. Breastfeeding promotion interventions immediately after delivery have shown to have a strong effect on EBF prevalence in many studies [36-38, 44].

Summary of Findings

The prevalence of exclusive breast feeding (EBF) among infants < 6 months in the Tamale Metropolis for the past 24 hours was 92.1 % but it was 75.5 % in the one month prior to the study. The proportion of infants who were put to the breast within one hour of birth was 93.2 %.

In logistic regression analyses, factors that had significant positive association with EBR were institutional delivery, current mother's employment, maternal motivation and household wealth index. The strongest determinants of EBF rate were place of delivery, and socio-economic status as measured by household wealth index. Compared to home delivery, women who delivered at a health institution were five times more likely to practice EBF (adjusted odds ratio [AOR] = 5.17, CI: 2.45 – 10.90). A unit increase in household wealth index was associated with 1.2 times more likelihood of a woman practicing EBF (AOR = 1.18, CI: 1.06 – 1.32). Exclusive breastfeeding was found to be dependent on a woman's occupation. Petty traders were four times more likely to exclusively breastfeed, compared to women who were unemployed (A OR = 4.05, CI: 1.93 – 8.51). Mother's motivation to practice EBF was an important determinant. Compared to mothers regarding breast milk being food for babies, mothers who cited breast feeding promotion messages received from health staff as their source of motivation, were three times more likely to practice exclusive breast feeding (AOR = 3.36, CI: 1.59 – 7.12).

In a multiple logistic regression analysis, EBF provided 80 % (Adjusted OR = 0.2, CI: 0.08-0.37) protection against chronic malnutrition whilst high household index reflecting socio-economic status provided only 10 % protection against chronic malnutrition in the study sample (Adjusted OR = 0.9, CI: 0.81- 0.98).

CONCLUSION/SUGGESTIONS

In this study population, EBF was associated with institutional delivery, having secondary school education, high household wealth index and having a motivation to EBF emanating from health promotion messages received on breast feeding. Evidence from this study shows that EBF is protective of child malnutrition and should be promoted with renewed enthusiasm. In order to improve on EBF rate in the Tamale Metropolis, it is essential that stakeholders take steps to provide knowledge and information on the adequacy of water in breast milk and its ability to satisfy a baby's thirst using all available channels including radio and health contacts. Strategies that

target improving knowledge and skills on lactation management among women, as well as strategies to improve health facility delivery especially among non-working mothers, may help to improve EBF in Northern Ghana though improved household wealth economic conditions may also be required.

LIMITATION OF STUDY

The information collected on breastfeeding and is prone to several potential limitations including recall and information bias from the respondents. In particular a recall period of one month may be difficult for some mothers. These could lead to overestimation of the prevalence of exclusive breastfeeding in this study. The cross-sectional nature of this study also prevents drawing causal inferences from the association between the determinant factors and exclusive breastfeeding.

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