

Sub-Optimal Complementary Feeding Practices and Anaemia of Children 6-24 Months in Tolon District of Northern Ghana

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ABSTRACT

Background: Suboptimal complementary feeding practices have been identified as one of the leading contributors to malnutrition in children within the first 1000 days of life. The most vulnerable period within this time is the complementary feeding period. This stage is usually characterized by increased energy and nutrient demands by the child. The inability of caregivers to respond to these increases eventually leads to underweight, wasting, stunting and micronutrient deficiencies. The main objective of the study was to identify sub-standard complementary feeding practices and their impact on anaemia status of children 6-24 months. Three hundred and eighty-four respondents made up of children and their caregivers were sampled across 10 health facilities in the Tolon district of Northern Ghana.

Methods: An analytical cross-sectional study design was adopted for 384 children and their caregivers in health facilities in the district. Multistage sampling technique involving Quota sampling and simple random sampling using coin toss was used to select respondents. Data collected included maternal demographic characteristics, IYCF feeding practices, 24 hrs dietary recall, anthropometric measurements of children and anaemia status of children.

Results: Anaemia in the study setting was very high (93%) and particularly higher among children within the age bracket of 10-17 months. There was no statistically significant relationship between anaemia and amount of food consumed, preference of the child and frequency of feeding. Multivariate analyses of predictors using binary logistic regression revealed a significant relationship between anaemia and minimum dietary diversity ($p=0.001$), child's age ($p=0.02$), continuous breastfeeding at 6 months ($p=0.001$) and previous history of malaria infection in children ($p=0.01$).

Conclusion: The study has exposed the impact of dietary diversity and continuous breastfeeding after 6 months as the two most significant complementary feeding practices contributing to anaemia among children 6-24 months in the Tolon district of Northern Ghana. It was therefore recommended that caregivers should be educated on the benefits of continuous breastfeeding as well as dietary diversification using locally available foods during IYCF counselling.

Keywords: Complementary feeding; Anaemia; Minimum dietary diversity; Minimum acceptable diet

INTRODUCTION

In Africa, micronutrient deficiency is very severe. Poor sanitary conditions, poor infant and young child feeding practices, existing societal norms and superstitions as well as poor advocacy of malnutrition as a medical condition among others are contributing factors to the widespread of micronutrient

deficiency. Governments over the years have identified the problem of micronutrient deficiency and its associated repercussions. Some have made strives to increase the number of health staff at health facilities, providing health facilities in remote parts of countries, improving child growth monitoring and promotion, food fortification and supplementation in some cases, health promotion, social and behavior change and

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nutrition advocacy. These solutions have been developed to address one or more of the following factors as identified by UNICEF to contribute to the high micronutrient deficiency rates; inadequate food and hygiene practices are related to a number of factors: lack of education of caregivers, beliefs and cultural taboos, the workload of the caregiver, poor access to resources, poverty, and food insecurity. The aim is to redirect focus of curbing micronutrient deficiency among children to cost effective infant and young child centered programmes.

The situation in Ghana is not different from other countries on the continent. The Ghana Demographic and Health Survey (GDHS) of 2014 found out that micronutrient malnutrition is highly prevalent and persistent among children in the country and recorded 66 percent of children age 6-59 months are anaemic comprising of 27 percent being mildly anaemic, 37 percent being moderately anaemic and on the brink of assuming severely anaemic status unless conditions improved, and about 2 percent are severely anaemic and need urgent medical interventions. This high prevalence of anaemia in the country could be buttressed by the fact that 52 percent of children younger than 6 months were exclusively breastfed and only 13 percent of children age 6-23 months met the minimum standards set by three core Infant and Young Child Feeding (IYCF) practices.

Also, the prevalence of malaria in children age 6-59 months was 36 percent as measured by Rapid Diagnostic Test kit (RDT) and 27 percent as measured by analysis of blood smears via microscopy coupled with poor sanitation conditions recording only 14 percent of households having an improved toilet facility that is not shared with other households and six in ten households having access to an improved source of drinking water, including a piped source within the dwelling, yard, or plot; a public tap, standpipe, tube well, or borehole; a hand pump, protected well, or protected spring; and rainwater. All of the above factors coupled with low level of maternal knowledge on recommended infant and young child feeding practices contributed to the high anaemia prevalence as reported by GDHS 2014 [1].

The survey also explained that children in the Northern Region of Ghana were more likely to be anaemic and establishes reciprocal relationship between likelihood of anaemia and mother's educational level and household wealth (both of which are very low in the Northern Region). 82 percent of children surveyed suffered from any form of anaemia. This comprised of 23.2 percent, 55.4 percent and 3.4 percent suffering from mild, moderate and severe anaemia respectively. The factors contributing to the high anaemia prevalence are not different from those mentioned above. In many of these contributing factors, the region holds the highest record and it is one of the regions that contribute immensely to the prevalence of micronutrient deficiencies especially anaemia in the country. The inadequacy of information on the effect of negative complementary feeding practices on anaemia of children at various geographic levels has motivated the conduction of this research to investigate the effect of suboptimal complementary feeding peculiar to the Tolon district of Northern Ghana [2].

MATERIALS AND METHODS

The study adopted an observational analytical cross-sectional design planned to measure the exposure (suboptimal complementary feeding practice) and the outcome (anaemia) simultaneously. The study setting was the Tolon district of the Northern region of Ghana. It has 6 sub districts, 2,588 communities and 10 health facilities. The population under study were children 6-24 months and their mothers/care takers. These have been selected because they are most affected and are at a higher risk of being anaemic [3].

A sample size of 384 participants was used. This was calculated with the Snedecor and Cochran (1989) sampling formula using 95 percent confidence interval, prevalence of 50% and 5% level of precision. The Tolon district has 5 sub districts namely Tolon, Nyankpala, Kpendua/Gbrumani, Lingbunga and Wantugu. Each of these sub districts has health facilities that provide health services to communities under them. Quota sampling method was used to determine the number of respondents to interview in the health facility and simple random sampling using coin toss was used to select respondents at each facility. Each of the sub district health centres were visited on child welfare clinic days where attendance for the study population is available in significant numbers.

Data collection was conducted using a structured questionnaire. Anthropometric data was collected using the MUAC tape, anaemia status was determined using URIT 12 hemoglobinometer and dietary quality was determined using a 24 hrs dietary recall form. The independent variable was anaemia and dependent variables were maternal socio-demographic characteristics, amount and frequency of feed, child's feeding preference, Mid Upper Arm Circumference (MUAC) and hygiene. Minimum dietary diversity was assessed and categorised into 'less than 6 food groups and at least 6 food groups' in a 24 hrs dietary recall. Minimum Dietary Diversity (MDD) and Minimum Meal Frequency (MMF) were used to assess Minimum Acceptable Diet (MAD). With relation to hygiene, the practices used for the study were; wash hands of mother/caregiver and child before feeding, ensure clean eating place, ensure food is hot, ensure bowl is clean and ensure water is treated before drinking. Participants were categorised based on their composite hygiene scores into poor hygienic practices and adequate hygienic practices [4].

Data analyses was done using SPSS version 17 software. Univariate analyses was used to analyse frequencies and percentages of variables. Bivariate analyses in the form of cross tabulation was used to present dynamics of variables using proportions. *Chi-square* tests was also used to test the significance of variables used in bivariate analyses using 95 % confidence interval. Lastly, binary logistic regression analyses using backward likelihood ratio was used for multivariate analyses. This analyses was selected due to its ability to compare the effect of several dependent variables with each other and their effect on the dependent variable. Hence revealing strong predictors of the dependent variable. All covariates were included in generating the regression model and the results were represented using odds ratio and confidence intervals [5].

RESULTS

The results showed that majority of women assessed for the study were between 26 to 35 years illiterate, married and engaged in informal work like farming, charcoal burning and shea butter processing as shown in Table 1. Analyses of anaemia revealed that 92.7% of all children assessed were suffering from one form of anaemia. Out of this, 47.7% were moderately anaemic (7.0 g/dl-9.9 g/dl), 15.4% were mildly anaemic (10.0 g/dl-10.9 g/dl) and 29.7% were severely anaemic (<7.0 g/dl). Among all children 6-24 months assessed, only 32.3% met their minimum meal frequency and 25% consumed amounts of food

recommended for them according to UNICEF requirements. However, the question did not apply to 15.1% of the children because they had not commenced complementary feeding as at the time of the study. In addition, 91.7% of mothers were practicing continuous breastfeeding for children older than 6 months. Texture of food given to the children was generally appropriate with an observed feeding based on demand proportions decreasing from the 6-9 months to 18-24 months old bracket [6].

Table 1: Socio demographic characteristics of caregivers.

Socio demographic variables	Frequency	Percent
Age distribution (years)		
15-25	82	21.4
26-35	217	56.5
36-45	82	21.4
46-55	3	0.8
Total	384	100
Religion		
Christian	3	0.8
Islam	381	99.2
Total	384	100
Marital status		
Single	9	2.3
Married/Cohabiting	375	97.7
Total	384	100
Ethnicity		
Dagomba	383	99.7
Mamprusi	1	0.3
Total	384	100
Occupation		
Formal	17	4.4
Informal	329	85.7
Unemployed	38	9.9
Total	384	100

Educational level		
None	325	84.6
Lower and upper primary	23	6
Middle/JHS	24	6.2
SHS, vocational, tertiary, training college	12	3.2
Total	384	100

Analyses from 24 hrs dietary recall revealed that the most consumed food group (95.4%) was from the category of cereals. This was followed by spices and condiments that are included in family foods. For purposes of the study, consumption of iron sources of food was presented as follows; organ meat (0.1%), fleshy meat (0.3%), eggs (0.1%), fish (16.4%), dark green leafy

vegetables (9.6%), legumes (6.9%), milk and milk products (1.5%). Even though, the proportion of children who consumed non heme sources of iron is high, their consumption of vitamin C sources of food is low as presented in Table 2.

Table 2: Food groups consumed.

Food groups	Responses		Percent of cases (%)
	N (384)	Percent of response (%)	
Cereals group	331	22.1	95.4
White tubers and roots Group	32	2.1	9.2
Dark green leafy vegetable group	144	9.6	41.5
Vitamin A rich vegetables, tubers and fruits	100	6.6	28.8
Vit C. fruits and vegetables	126	8.4	36.3
Organ meat (iron rich)	2	0.1	0.6
Fleshy meat group	4	0.3	1.2
Eggs group	2	0.1	0.6
Fish group	246	16.4	70.9
Legumes nuts and seeds group	103	6.9	29.7
Milk and milk products group	23	1.5	6.6
Oils and fats group	113	7.5	32.6
Spices, condiments and beverages group	275	18.3	79.3

Even though continuous breast feeding after 6 months was high among the children assessed, a significant proportion of the children (15.1%) were not breastfeeding at the time of the study. Table 3 revealed that non breastfed infants recorded the lowest consumption of iron rich foods. On the contrary, the group recorded the highest consumption of non heme dark green leafy vegetables and relatively higher amounts of Vitamin C. Approximately 35% of children consumed at least 6 food groups

[7]. Out of which non-breastfed children formed only 11.3 percent and an overall mean dietary diversity score of 4 was observed. Test of significance of relationship between age of children and MDD also revealed that children who were 18-24 months old were more likely to meet their MDD ($p < 0.01$). Only 8.4% of children were able to meet their minimum acceptable diet (MAD). Table 4 showed that only the age of the child presented a relationship with MAD. It also revealed that

children 6-9 months were more likely to meet their MAD ($p < 0.01$). In terms of hygiene, 57% of caregivers practiced adequate hygiene by obtaining at least 3 hygiene composite scores. Breastfeeding status and minimum dietary diversity were the only complementary feeding practices that presented a

significant relationship with anaemia in using *Chi-square* test as shown in Table 5.

Table 3: Food groups consumed and breastfeeding status.

Is the child breastfeeding?			
Food groups	Yes (n=384)	No (n=384)	Total
Cereals	300 (95.2%)	31 (96.9)	331 (86.2%)
White tubers and roots	29 (9.2%)	3 (9.4%)	32 (8.3%)
Dark green leafy vegetables	122 (38.7%)	22 (68.8%)	144 (37.5%)
Vitamin A rich vegetables, tubers and fruits	91 (28.9%)	9 (28.1%)	100 (26.0%)
Vitamin C. fruits and vegetables	112 (35.6%)	14 (43.8%)	126 (32.8%)
Organ meat	2 (0.6%)	0 (0.0%)	2 (0.5%)
Flesh meats	4 (1.3%)	0 (0.0%)	4 (1.0%)
Eggs	2 (0.6%)	0 (0.0%)	2 (0.5%)
Fish	216 (68.6%)	30 (93.8%)	246 (64.0%)
Legumes, nuts, and seeds	93 (29.5%)	10 (31.3%)	103 (26.8%)
Milk and milk products	23 (7.3%)	0 (0.0%)	23 (6.0%)
Oils and fats	100 (31.7%)	13 (40.6%)	113 (29.4%)
Spices condiments, beverages	245 (77.8%)	31 (96.9%)	276 (71.9%)

Table 4: Selected IYCF variables and MAD.

Variables		Minimum acceptable diet		Total	P-value
		No (n=384)	Yes (n=384)		
Age of child (months)	6-9 months	86 (24.4%)	20 (62.5%)	106	<0.001
	10-17 months	156 (44.3%)	0 (0%)	156	
	18-24 months	110 (31.3%)	12 (37.5%)	122	
Child's preference	Breastfeeding	263 (74.7%)	23 (71.9%)	286	0.72
	Complementary feeding	89 (25.3%)	9 (28.1%)	98	
Breastfeeding status	Yes	323 (91.7%)	29 (8.3%)	352	0.82
	No	29 (90.6%)	3 (9.4%)	32	

Table 5: Selected complementary feeding practices and anaemia.

Anaemia (n=384)			
Variables	Yes	No	P-value
Age of child			
6-9 months	96 (90.6%)	10 (9.4%)	0.61
10-17 months	146 (93.6%)	10 (6.4%)	
18-23 months	114 (93.4%)	8 (6.6%)	
IYCF practices			
Breastfeeding status			
Yes (Breastfeeding)	33 (93.8%)	22 (6.3%)	0.01
No (Not breastfeeding)	26 (81.3%)	6 (8.7%)	
Amount of feed			
Met	84 (87.5%)	12 (12.5%)	0.09
Unmet	272 (94.4%)	16 (5.6%)	
Frequency of feed			
Met	111 (91%)	11 (9%)	0.41
Unmet	245 (93.5%)	17 (6.5%)	
Minimum dietary diversity			
Less than 6 food groups	240 (95.6%)	11 (4.6%)	0.02
At least 6 food groups	116 (87.2%)	17 (12.8%)	
Hygiene			
Less than 3 hygiene score (low hygiene)	152 (92.1%)	13 (7.9%)	0.7
At least 3 hygiene score (adequate hygiene)	204 (93.2%)	15 (6.8%)	

The results of the binary logistic regression analysis (Table 6) using the backward likelihood ratio revealed that only child's age, minimum dietary diversity and child's breast feeding status out of the other predictors made significant contributions to predicting childhood anaemia. Adjusted odds ratios, Exp(B) values indicated children 6-9 months were 0.15 times less likely to become anaemic than children 18-24 months. Secondly, children who were not breastfeeding were 15.38 times more

likely to become anaemic than those who breastfed. Lastly, children who consumed foods from less than 6 food groups in a 24 hrs dietary recall were 4.4 times more likely to become anaemic than children who ate from at least 6 food groups [8].

Table 6: Predictors of anaemia in children 6-24 months in Tolon district of Northern Ghana.

Variables	AOR	P-value	95% CI for Exp(B)	
			Lower	Upper

Child age				
6-9 months	0.15	0.01	0.04	0.61
10-17 months	0.42	0.22	0.11	1.67
Not Breastfeeding	15.38	0.01	3.26	72.66
Low MDD	4.44	0.01	1.83	10.77

DISCUSSION

The analyses of anaemia assessment of children revealed that majority of children were suffering from one form of anaemia or the other at the time of the study. In addition, the risk of a child becoming anaemic increased as the child aged. A large proportion of these anaemic children were moderately malnourished and were most likely to be severely anaemic given the current state of feeding practices. Data collected suggested that anaemia was most rampant among children 10-17 months. The increase in proportion of anaemic children in 6-9 months bracket to children in the 10-17 months bracket raises questions and emphasis on the later age bracket as a vulnerable time in child's development [9]. This finding is collaborated by Schellenberg et al., who aimed at documenting the prevalence, age-distribution, and risk factors for anaemia in Tanzanian children less than 5 years old. A contributing factor to the high prevalence of anaemia among children 10-17 months could be the continuous depletion of iron reserves due to aging coupled with the inadequacy of breastmilk alone to provide adequate amounts of iron and facilitated by poor dietary intake and diversity.

The amount, frequency and quality of food eaten by children should increase and improve as the child grows through the various age brackets. The aim is to continuously complement depleting essential vitamins and minerals such as iron from breastmilk. However, findings of the study revealed that there was no statistically significant relationship between anaemia and amount of food, preference of the child and frequency of feeding in a simple *chi-square* test. This may be due to the fact that amount and frequency of food does not assure availability of iron in the food. This is buttressed by Silvia et al., 2007 who revealed that the insufficient intake and low bioavailability of nutrients, including iron may be the consequence of low purchasing ability of families that affects food availability in the household [10].

The study revealed a significant relationship between anaemia and minimum dietary diversity and implied that children with lower dietary diversity scores were more likely to be anaemic. This is explained by the fact that poorly diversified diets lack essential micronutrients such as iron needed for development. Hence a highly diversified diet will contain more micronutrients to promote growth and prevent micronutrient deficiencies. Continuous breastfeeding showed a significant relationship with anaemia status of the children as children who were breastfeeding at the time of the study. Breastmilk though inadequate for children 6-24 months contains micronutrients

such as iron. Hence children who are continuously breastfed will have to will require relatively less amounts of micronutrients from complementary foods to meet daily requirements.

CONCLUSION

The quality of the complementary feeding period depends on the quality of complementary feeds and adherence to complementary feeding recommendations. These two parameters must be applied simultaneously after 6 months to increase the child's chances of strong neural and cognitive development, robust immunity against diseases and prevention of micronutrient deficiencies. This study has exposed the impact of dietary diversity and continuous breastfeeding after 6 months as the two most significant complementary feeding practices contributing to anaemia among children 6-24 months in the Tolon district of Northern Ghana. It explains that the high prevalence of anaemia in the study setting is as a result of low dietary inadequacies owing to poor diversity/variety and lack of continuous breastfeeding after 6 months.

It is therefore recommended that caregivers should be educated on the benefits of continuous breastfeeding and dietary diversification using locally available foods during IYCF counselling during child welfare clinic days or during outreach. The Ghana health service should in place measures to motivate mothers to adopt recommended IYCF practices regarding dietary diversity as the child grows and continuous breastfeeding after 6 months.

LIMITATIONS

- Biochemical analyses of blood samples could not be conducted.
- Maternal anaemia status was not assessed.
- The study was conducted at health facility levels.

COMPETING INTEREST

The author(s) declare that they have no competing interest.

AUTHORS CONTRIBUTION

FNA conceived and designed the study, performed data collection, analyses and interpreted the results with AC. The manuscript was written by FNA and AC. PA contributed to planning and overall supervision of the study. PA and AC

contributed to the revision of the manuscript. All authors approved the final version of the manuscript.

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