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Factors Contributing to Anaemia in Children under Five Years in the Ga East Municipality, Ghana

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Authors' contributions

Author LO was involved in the study design, data collection and Statistical analysis. Author SM participated in statistical analysis manuscript editing and protocol writing. Author OV wrote the first manuscript and was involved in correcting all errors after editor's feedback. Author CN was involved in managing the references. Author HOU carried out the assembling of tables and figures. All authors read and approved the final manuscript.

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ABSTRACT

Anaemia is a significant public health issue globally with extreme health consequences. More than two (2) billion individuals have been infected worldwide. A cross-sectional study design was used in this study. The study population included all mothers with children under- five years of age and are residents in the selected communities. A sample size of 282 mothers with children under five years was selected. Multistage sampling technique was used in selecting the sample. The multiple logistic regression models were used to assess the influence of demographic factors on knowledge and prevalence of anaemia. All significant associations and influence were determined at a 0.05 level of significance. The prevalence of anaemia in children was found as 47.9% (95%CI: 42%-54%). Also, family history of anaemia was 49.7% of the respondents. Bivariate analysis showed a significant association among almost all the variables and the anaemia condition in children except for the mother's age (p=0.486), the number of children (p=0.60) and delivery status (p=0.271).

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Factors that were statistically significant were mother's education, mother's occupation, family type and family income (p<0.001). Again, other factors such as father's occupation and religious affiliation also had a p-value of <0.01. Child's birth weight was also significant with p-value=0. 037. It was noted that the high awareness of childhood anaemia among caregivers does not necessarily translate to high knowledge levels. More than half of the participants had poor knowledge on the signs and symptoms, complications and management of childhood anaemia.

Keywords: Anemia; prevalence; knowledge; under-five; association; occupation.

1. INTRODUCTION

All over the world, children who are not up to five years old are much exposed to health problems like malaria. Anaemia is a condition in which the number of red blood cells or their ability to carry oxygen is not enough to meet the physiological needs of a person. It impacts low, middle and high income countries and has negative health consequences as well as negative effects on economic and social development [1]. It is a major global health problem with serious effects on human health and has affected over two (2) billion people worldwide. Among these affected populations, children under-fives are one of the most vulnerable groups [2,3].

Anaemia in children is of great significance because it alters children's mental, physical and social makeup, as well as behavioural and cognitive states, resulting in poor academic performance and capacity for work later [4] Iron deficiency is seen as the most common cause of anaemia in children less than five years old, with a smaller part caused by other micronutrient deficiencies like Vitamin A, B12 and folate.

Approximately 60 per cent of African children under the age of five have anaemia. The prevalence of anaemia among preschool children in sub-Saharan Africa ranges from 42 per cent in Swaziland to 91 per cent in Burkina Faso. Studies in Cape Verde, however, showed that the prevalence of anaemia in children under the age of 5 is approximately 50%. A children's anaemia research along the Tanzanian coast reported a prevalence of 74 percent. Another Democratic Republic of Congo research reports a prevalence of 43 per cent [4,5].

Degree of anaemia. Anaemia has a huge impact on the economy of the affected child's family. It threatens national development as it claims the lives of the young ones who are the future leaders for the entire country. It is easily preventable but has high morbidity and mortality rates in Ghana. The incidence of anaemia was 84% and 68% respectively in rural and urban areas. The Upper West and Upper East regions had the highest incidence of anaemic in children of 88% to 89%. The Greater Accra Region had a prevalence rate of 62% [6]. In general, several studies on anaemia have been performed in Ghana, but household characteristics have not been fully studied. Anaemia cases recorded in 2018 in the Ga East Municipality in the Greater Accra Region of Ghana was 4,291 [7]. The Municipality did not record any death related to Anaemia in 2018 despite the increase in cases. However, the Municipality however recorded one death related to anaemia in 2019. It is based on the above-mentioned problems that this study sought to assess the factors contributing to anaemia in children less than five years.

The findings of this research will help identify the factors that contribute to the cause of anaemia among children under-five years and suggest to responsible and appropriate authorities the possible ways of helping mothers and caregivers to prevent it. It will also help the management of health institutions within the study area to identify some of the factors that contribute to anaemia so that they can equip their institutions in order to manage anaemia cases well. Again, it will also help the Ministry of Health (MOH) and Ghana Health Service to enhance the maternal and child Health programmes. Other stakeholders in the health industry will also be able to rely on the findings to plan, organize and distribute resources equitably. Students and lecturers will also gain because it will serve as a source of information for teaching and learning respectively. Researchers in this study area can also rely on this study for future research.

2. MATERIALS AND METHODS

2.1 Method and Design

A comprehensive cross-sectional analysis method was used for this study. The explanation for the strategy was to learn of the causes contributing to anaemia in children below the age

of five in the Ga East municipality and to save time and expenses.

2.1.1 Profile of study area

Located in the northern part of the Greater Accra region, the Ga East Municipality occupies a total area of around 166 km2. Abokobi is the administrative seat of the municipality of Ga East. It is boarded by the municipality of Ga West to the west, by the municipality of Adentan to the east, by the metropolis of Accra to the south, and by the district of Akuapim South to the north. The area is lowland with temperature ranging from 32℃ to 27℃ with the area experiencing major rainfall patterns. The northern part has a semi rainforest with deciduous trees but is gradually transforming into grassland because of the activities of humans and animals.

2.1.2 Data Collection techniques and tools

Due to its capability to gather a lot of information, questionnaires were used to collect data. Its use saved a lot of time and money, and it is easy to analyse the data generated. In this case, the research participants used both open and closed-ended structured questionnaires to gather information. Qualified field assistants administered the questionnaire after completing training on the essence of the research, confidentiality, voluntary participation, and how to collect the quantitative data. The instrument consisted of 32 items, which were split into four parts. Section 'A' aimed to obtain participant demographic information, such as age, gender, educational status, marital status, occupation, monthly expenses, etc. Section 'B' aimed to learn about mothers' awareness of factors that cause anaemia in children under-five. Team 'C' also aimed to explore how mothers in children under five handled anaemia.

2.1.3 Sampling method

A multi-stage sampling approach was employed to pick the respondents. This method includes probability sampling techniques where the sampling takes place in many stages, such that the sample size at each step is reduced. This approach has been selected as it is versatile and cost-effective, helping to reduce the population into smaller groups. The study population was assigned numbers. This was to help choose the communities that will be representative. Simple random technique was used to select the respondents from each subgroup.

2.1.4 Study population

Frankel (2000) identified the community of the sample as the focus group of the researchers. Bordens (2002) claims that all people are classified in a definable demographic category. The Ga East Municipality of the Greater Accra Area Ghana was the study community for this particular project.

2.1.5 Sample size determination

A total of two hundred and eighty-two (282) mothers with children under- five years were selected for the study. The sample size was obtained using Cochran's formula for sample size calculation.

$$n = \frac{Z^2pq}{e^2}$$

Where,

Z= 95% Confidence Interval = 1.96
e= Margin of Error = 0.06
p= Prévalence = 60% = 0.6 (Parbey *et al.,* 2019)
q= 1-0.6 =0.4s

The.0

? There fore,

$$n = \frac{(1.96)(1.96)x(0.6)x(0.4)}{(0.0\ \theta)(0.0\ \theta}$$

n = 256

A 10% non-response rate was added to the sample size bringing the total up to 282.

2.1.6 Sampling technique

The study employed a multistage sampling where the entire municipality was sub-grouped into five sub-districts (clusters). One community was each randomly selected from the five sub-districts. To select households, convenience sampling was therefore used to determine the families. Depending on the inclusion criteria, qualified mothers and guardians with their children were approached, and the research procedure was explained to them. Those who agreed to be part of the research were selected. The same method was used until the required sample size for each community was achieved.

2.2 Data Handling

A structured questionnaire was used to collect the data. Participants were informed of the study's purpose by so doing, their consent was sought, and the questionnaires were administered to them to answer appropriately. Research assistants were trained in collecting the data. The guidance was provided where necessary. Fifteen (15) days were used in collecting the data. The tool's reliability was ensured by the accurate and careful phrasing of each question to avoid ambiguity. This was done to discover potential challenge which was removed before the tool was deployed. Respondents were educated on the need to respond truthfully.

2.3 Data Analysis

Data analysis is how statistical and logical methods are systematically applied to define, explain, condense, recap, and analyse data. (Tobias, 2001, et al.). The researcher has categorized, compiled, coded, and analysed data collected from the field using the 2016 version of Microsoft Excel and the statistical software package, STATA (StataCorp. 2007).Statistical Software. Release 14. StataCorp LP, College Station, TX, US). The use of numerical methods, such as percentages, ratios, and cross-tabulations, were included in the statistical analysis. The Chi-Square tests were also used to determine the correlations between the outcome variable and the selected explanatory variables. Multivariate analyses have been used to pick out possible associations among independent variables further and predict factors that significantly influence anaemia. It was seen as statistically significant, a p-value of less than 0.005, or a confidence level of 95 percent. For inclusion criteria, mothers or caregivers who lives in the community more than three years was selected to participate in the study. However, any respondent who do not live in the study area was not eligible to participate in the study (exclusion criteria).

The researcher and assistants introduced themselves to potential respondents and sought permission first before asking them to respond to the questionnaire. Respondents were assured of anonymity and confidentiality of their responses due to the sensitivity of some information such as respondents' monthly income. The Ensign College of Public Health Ethics Review Board gave an ethical approval requested by the student/researcher. The submitted information was not shared with anyone who was not part of the study. No reward was given for participating in the study. Finally, the reference list correctly recognized all documentation such as technical and scholarly articles and other published papers, which have been used or compiled by the researcher.

3. RESULT

3.1 Demographic Characteristics of Respondents

The average age of respondents was 31±6.36 years, with the distribution ranging from 19 to 55 years. The majority of them were within the age group of 19-39 years, representing 49.3% of the total sample. The respondents' educational status shows that those who have Secondary/High school education were the majority (39.4%), with Primary school level education being 30.9%. In terms of their religion, most of them were Christians (84.8%). Muslims and traditionalists formed less than 15.0%. Mothers' occupation was Government employees (52.5%) and private employees (38.7%). Nearly 50% of the study participants had a history of anaemia in their family, and over 80% also a normal delivery or delivered at term. (Table 1). Regarding the fathers' working status, it was found from the data that most of them, representing about 72.3%, were Government sector employees. Whiles 13.1% and 14.5% were private-sector employees and unemployed, respectively (Fig. 1). As part of this study's objectives, the knowledge and awareness of anaemia among children were assessed among mothers and caregivers. The assessment was done on the signs and symptoms, causes, and complications. As shown in Table 2 above, 75.2% of the caregivers had heard of anaemia before their children were admitted. Almost all the respondents (85.8%) also agreed that anaemia causes problems in later life.

3.2 Knowledge on Causes, Signs and Symptoms and Complications of Anaemia in Children

The level of knowledge of caregivers on causes, signs, symptoms, and complications of anaemia in children are presented in Table 3 and shows the results of caregivers' knowledge of the signs, symptoms, and complications of anaemia among

children. Respondents answered whether "yes" or "no" on the various statements to indicate their understanding. On the signs and symptoms, nearly half of the respondents (46.1%) indicated that palmer pallor is a symptom, and only 19.2% indicated reduced physical activity is also a symptom. Loss of appetite and weight loss were also characterized by only 25.9% and 35.1%, respectively. On complications, the majority indicated low growth (68.8%) whiles only 17.4% and 29.1% stated shortness of breath and inadequate learning capacity, respectively, as shown in Fig. 2, most of the respondents were of the knowledge that frequent illness on the part of children causes anemia (64.5%) whiles 42.6 also agreed that refusal to eat even causes anaemia. It was also observed that almost all the respondents disagreed that factors such as lack of food at home, witchcraft, and sickle cell are some of the causes of anaemia in children. It was observed that, generally, almost 70% of the respondents had poor knowledge of anaemia. This knowledge is concerning the causes, signs, and symptoms, and complications of anaemia in children (Table 4).

Table 1. Socio-demographic characteristics of respondents

Variable	Frequency	Percentage
Age of mother		
19-29	139	49.3
30-39	111	39.4
40-55	32	11.4
Education of mother		
No formal education	33	11.7
Primary	87	30.9
Secondary/High School	111	39.4
Tertiary	51	18.1
Occupation of mother		
Homemaker	25	8.9
Private Employee	109	38.7
Government employer	148	52.5
Religion Affiliation		
Christian	239	84.8
Muslim	36	12.8
Traditionalist	7	2.5
Family type		
Nuclear family	44	15.6
Extended Family	238	84.4
Monthly family income		
<500 GH₵	26	9.2
500-1000 GH₵	131	46.5
Above 1000	125	44.3
No. of children		
1-2	204	72.3
3-6	78	27.7
No. of under-five children		
One	206	73.0
Two	76	27.0
Delivery status		
Preterm	46	16.3
Term	236	83.7
Birth weight (kg)		
< 2.5	200	70.9
≥ 2.5	82	29.1

Table 2. Awareness among caregivers on childhood anaemia

Variable	Frequency	Percentage
Heard about Anaemia before child's admission		
No	70	24.8
Yes	212	75.2
Maternal Anaemia has relationship to child's Anaemia		
True	209	74.1
False	73	25.9
Anaemia causes problems later in life		
True	242	85.8
False	40	14.2

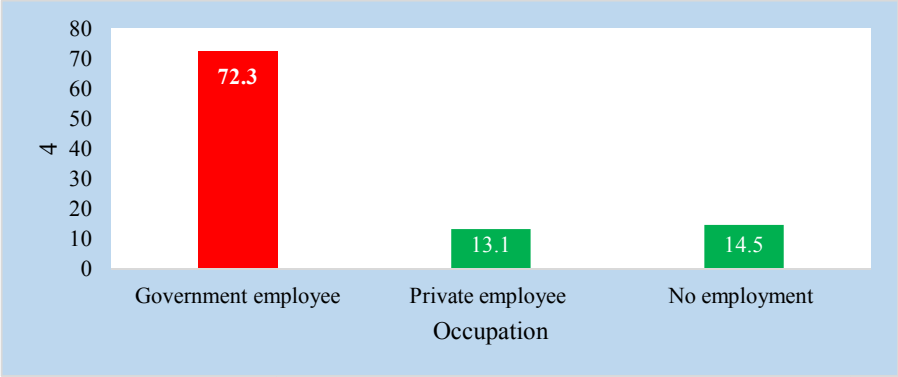

Fig. 1. Employment of fathers

Table 3. Knowledge on signs and symptoms among caregivers

Signs & symptoms of anaemia	Yes	No
Palmer pallor	130 (46.1)	152 (53.9)
Reduced physical activity	54 (19.2)	228 (80.9)
Loss of appetite	73 (25.9)	209 (74.1)
Loss of weight	99 (35.1)	183 (64.9)
Complications of anaemia	**Yes**	**No**
Poor growth	194 (68.8)	88 (31.2)
Shortness of breath	49 (17.4)	233 (82.6)
Poor learning capacity	82 (29.1)	200 (70.9)

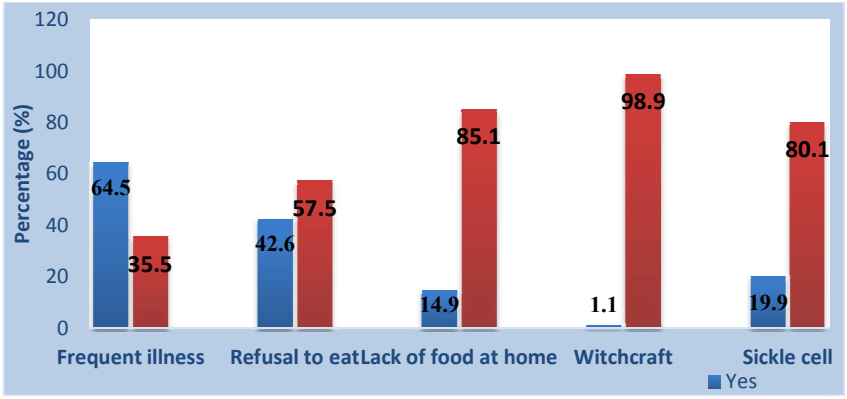

Fig. 2. Knowledge on causes of anaemia in children

Table 4. Knowledge level among caregivers on anaemia in children

Knowledge Level	Frequency	Percentage (%)
Good	85	30.1
Poor	197	69.9

3.2.1 Factors associated with knowledge level among respondents

Bivariate analyses were performed using Chi-square tests to determine the socio-demographic factors associated with caregivers' knowledge level. A p-value <0.05 was considered as a significant level. The detailed result is presented in Table 5. Table 5 provides the bivariate analysis of factors associated with anaemia on the knowledge level of respondents. The results indicate that some of the variables were significant at p-value<0.05 whiles others were not. The statistically significant factors include the educational level of the mother (p<0.001), occupational status of both mother and the father (p<0.001), and the professed religious belief of the mother (p = 0.012).

Table 5. Bivariate analysis of socio-demographic factors with the knowledge level

Variable	Poor	Good	X^2 (*df*)	P-value
Age of mother				
19-29	46 (33.1)	93 (66.9)	1.44 (2)	0.486
30-39	29 (26.1)	82 (73.9)		
40-45	10 (31.3)	22 (68.8)		
Education of mother				
No formal education	17 (51.5)	16 (48.5)	34.71 (3)	<0.001*
Primary	41 (47.1)	46 (52.9)		
Secondary/High School	22 (19.8)	89 (80.2)		
Tertiary	5 (9.8)	46 (90.0)		
Occupation of mother				
Government employer	3 (12.0)	22 (88.0)	13.815 (2)	<0.001*
Homemaker/House wife	46 (42.2)	63(57.8)		
Private Employee	36 (24.3)	112 (75.7)		
Father's occupation				
Government employee	10 (24.4)	31 (75.6)	9.250 (2)	0.01*
No employment	19 (51.4)	18 (48.7)		
Private employee	56 (27.5)	148 (72.6)		
Religion Affiliation				
Christian	65 (27.2)	174 (72.8)	8.922 (2)	0.012*
Muslim	15 (41.7)	21 (58.3)		
Traditionalist	5 (71.4)	2 (28.6)		
Family type				
Nuclear family	61(25.6)	177 (74.4)	14.740 (1)	<0.001*
Extended Family	24 (54.6)	20 (45.5)		
Monthly family income				
<500 GH₵	17 (65.4)	26 (34.6)	29.837 (2)	<0.001*
500-1000 GH₵	48 (36.6)	83 (63.4)		
Above 1000	20 (16.00	105 (84.0)		
No. of children				
1-2	55 (27.0)	149 (73.0)	3.544 (1)	0.060
3-6	30 (38.5)	48 (61.5)		
The family history of anaemia				
Yes	17 (12.1)	123 (87.9)	42.776 (1)	<0.001*
No	68 (47.9)	74 (52.1)		
Delivery status				
Preterm	17 (37.0)	29 (63.0)	1.212 (1)	0.271
Term	68 (28.8)	168 (71.2)		
Birth weight (kg)				
< 2.5	53 (26.5)	147 (73.5)	4.332 (1)	0.037*
≥ 2.5	32 (39.0)	50 (61.0)		

Table 6. Logistic regression output of factors significantly associated with knowledge

Variable	COR	P>z	95% C.I.	AOR	P>z	95% C.I.
Education of mothers						
No formal education	Ref		1	Ref		1
Primary	1.19	0.669	0.53-2.67	1.25	0.64	0.49-3.14
Secondary/High School	4.30	0.003*	1.80-10.26	3.64	0.01*	1.37-9.70
Tertiary	9.78	0.001*	2.66-35.98	5.27	0.04*	1.08-25.67
Occupation of mother						
Government employee	Ref		1	Ref		1
Homemaker	0.19	0.048*	0.05-0.69	1.87	0.479	0.33-10.61
Private Employee	0.42	0.174	0.12-1.52	1.58	0.583	0.31- 8.01
Father occupation						
Government employee	Ref		1	Ref		1
Unemployed	0.31	0.015*	0.11-0.84	0.84	0.777	0.24-2.88
Private employee	0.85	0.688	0.39-1.86	0.97	0.956	0.37 -2.59
Religion						
Christianity	Ref		1	Ref		1
Muslim	0.52	0.075*	0.25-1.08	0.58	0.227	0.25-1.39
No Religion	0.15	0.010*	0.28-0.81	0.08	0.015*	0.01 - 0.61
Family type						
Extended family	Ref		1	Ref		1
Nuclear family	3.48	0.0001*	1.76-6.87	2.35	0.041*	1.04- 5.36
Monthly family income						
500-1,000 Gh	Ref		1	Ref		1
<500 GH₵	0.30	0.007*	0.12-0.76	0.42	0.102	0.15-1.19
Above 1000	3.04	0.002	1.64-5.61	1.77	0.187	0.76-4.11
Family history of anemia						
No	Ref		1	Ref		1
Yes	6.65	0.001*	3.44-12.83	4.86	0.000*	2.47-9.54
Birth weight (kg)						
< 2.5	Ref		1	Ref		1
≥ 2.5	0.56	0.037*	0.32-0.98	0.83	0.575	.42-1.61
_constant				0.20	0.175	.02-2.06

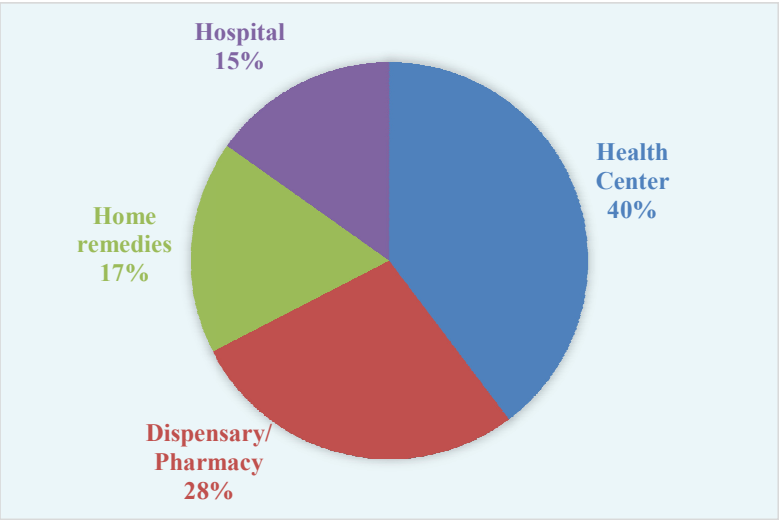

Fig. 2. First place of treatment of children with anaemia

Also, factors such as monthly family income, family history of anaemia's birth weight were significant at p<0.05. On the other hand, factors such as the mother's age, delivery status, and the number of children were all not significantly associated with the knowledge level at p<0.05.

3.2.2 Multivariate analysis of factors associated knowledge level of respondents

A multivariate logistic regression analysis was performed using factors that were significantly associated with the knowledge level at the bivariate stage. This was done to determine the measure of the predictor variable's effect on the likelihood of having an anaemic child. Table 6 presents the details. In Table 6, the multivariate logistic regression gives the factors associated with the right knowledge level among respondents. It is observed that knowledge level increases with education, which was significant with secondary and tertiary education. Adequate knowledge was 3.6 times higher among those with secondary education than those with no formal education (p-value=0.01 and 95% CI: 1.37-9.70) when all other covariates have been adjusted. There are 5.3 times higher odds in tertiary education (p=0.04 and 95% CI: 1.08-25.67). Nuclear family status was also associated with increased knowledge level (2.4 times more likely) with a p-value=0.041. Concerning those who had no family records of anemia, those who had been almost five times more likely to have higher knowledge (P<0.001, 95%CI:2.47-9.54) when all other covariates have been adjusted for. This study also examined the prevalence of anaemia among children and how caregivers manage the condition. The prevalence of anaemia in children was found as 47.9% (95%CI: 42%-54%). This was assessed using multiple one-way table in Stata. Also, a family history of anaemia was 49.7% of the respondents (Table 7).

Association between anaemia in children and the socio-demographic characteristics of caregivers was performed using a Chi-square test. With a p-value<0.05, a variable is labeled as statistically significant. The detailed result is presented in Table 8. From the results presented in Table 8, the bivariate analysis shows a significant statistical association among almost all the variables and anaemia in children except for the mother's age (p=0.486), the number of children (p=0.60), and the delivery status (p=0.271). Statistically significant factors were the mother's education and occupation, family type, and family income (p<0.001). Again, other factors, such as the father's occupation and religious affiliation, also had a p-value of <0.01. The child's birth weight was also found to be significant with a p-value=0.037.

3.2.3 Multivariate logistics regression analysis of significant factors

A multivariable logistic regression model was fitted with variables that were found to be significant in Table 8. This was done to adjust for confounding effects of the present on other variables and determine the significant variables' odds ratio. This is shown in Table 9 with details. As shown in Table 9, after adjusting for variables in the multivariate logistic regression model, family income and family history of anaemia were the only significant factors. Compared to those with a monthly family income of less than 500 GH₵, those with income above GH₵ 1,000 had five (5) times higher odds of anaemia in children (p-value=0.021, 95%CI:1.28-28.81). Also, a family history of anaemia is positively associated with anaemia in children. Thus, those with a history of anaemia were 9.6 times more likely to have children with anaemia with p-value<0.001 (95%CI:5.23-17.79) controlling for the other covariates in the model. Children born at full term were 0.43 times less likely to experience the anaemic condition.

Respondents were also examined to determine how they manage anaemia conditions in children. This is presented here in tables and charts. From Table 10, most children are fed at most three times a day (71.6%) whiles 5.0% and 20.6% are provided 2 and 4 times, respectively. In most cases, mothers are responsible for feeding children (59.9%). The first drug given to children included Panadol™ syrup (26.2%), Panadol™ syrup*, and Anti-malaria (25.9%). As shown in Fig. 3 above, Health Centres were the significant places of seeking care (40%), followed by pharmacy shops (28%) and home remedies (17%). The assigned reasons for the respondents' choice of place for seeking healthcare are presented in Fig. 4. Affordability (39.7%) was the primary reason for choosing a place to treat children with anaemia. This was followed by the proximity of the home to the residence (31.6%) and the severity of the illness (28.7%) The final objective of this study looked at caregiver's preventive practices towards anaemia in children. This was determined by asking caregivers a set of questions about

preventive practices. The results are presented here in Table 11 and Fig. 5. Table 11 shows that major of the caregivers fed the children with citrus fruits (72.0%) whiles just half (51.1%) fed with cheese in diet. Almost all give children fruit drinks (81.9%) and exclusive breastfeeding was also practiced by 84.4% of the respondents. Soya bean products in diet and regular medical checks were done by 75.9% and 57.8% respondents respectively.

Table 7. Prevalence and family history of anaemia in children

Variable	Frequency	95% CI
Diagnosed with Anaemia in children (Prevalence)		
Yes	135 (47.9)	0.42-0.54
No	147 (52.1)	.46-.58
The family history of anaemia		
Yes	140 (49.7)	
No	142 (50.4)	

Table 8. Bivariate analysis results of factors associated with anaemia in children

Variable	Diagnosed of Anaemia		X^2 (*df*)	P-value
	No	Yes		
Age of mother				
19-29	79 (56.8)	60 (43.2)	3.68 (2)	0.159
30-39	50 (45.1)	61 (54.9)		
40-45	18 (56.3)	14 (43.8)		
Education of mother				
No formal education	22 (66.7)	11 (33.3)	12.69 (3)	0.005*
Primary	55 (63.2)	32 (36.8)		
Secondary/High School	46 (47.1)	65 (58.6)		
Tertiary	24 (47.1)	27 (52.9)		
Occupation of mother				
Government employer	11 (44.0)	14 (56.0)	10.41 (2)	0.005*
Homemaker/Housewife	70 (64.2)	39 (35.8)		
Private Employee	66 (44.6)	66 (55.4)		
Father occupation				
Government employee	20 (48.8)	21 (51.2)	5.62 (2)	0.06*
Not employed	26 (70.3)	11 (29.7)		
Private employee	101 (49.5)	103 (50.5)		
Family type				
Extended Family	31 (70.5)	13 (29.6)	7.01 (1)	0.008*
Nuclear family	116 (48.7)	122 (47.9)		
Monthly family income				
<500 GH₵	22 (84.6)	4 (15.4)	22.76 (2)	<0.001*
500-1000 GH₵	77 (58.8)	54 (41.2)		
Above 1000	48 (38.4)	77 (61.6)		
Family history of anaemia				
No	112 (78.9)	30 (21.3)	81.99 (1)	<0.001*
Yes	35 (25.0)	35 (75.0)		
Delivery status				
Preterm	22 (47.8)	24 (52.2)	0.41 (1)	0.523
Term	125 (52.1)	111 (47.9)		
Birth weight (kg)				
< 2.5	96 (48.0)	104 (52.0)	4.70 (1)	0.30*
≥ 2.5	51 (62.2)	31 (37.8)		
Iron food item given to child				
No	39 (65.0)	21 (35.0)	5.06 (1)	0.024*
Yes	108 (48.7)	114 (51.4)		

Table 9. Multivariate logistic regression output of factors associated with anaemia in children

Variable	COR	P>Z	95%CI	AOR	P>z	[95% C.I]
Education of mothers						
No formal education	1			1		
Primary	1.16	0.726	0.50-2.72	0.99	0.982	0.32-0.72
Secondary/High School	2.83	0.011*	1.22-6.53	1.87	0.229	0.65-0.17
Tertiary	2.25	0.080*	0.89-5.71	0.58	0.412	0.12-0.13
Occupation of mothers						
Govt. employee	1			1		
Homemaker/Housewife	0.44	0.063	0.18-1.07	0.99	0.995	0.31- 3.25
Private	0.98	0.956	0.41-2.30	0.92	0.82	0.47- 1.83
Family type						
Extended family	1			1		
Nuclear family	2.51	0.008*	1.24-5.08	1.77	0.202	0.74-4.24
Monthly family income						
<500 GH₵	1			1		
500-1000 GH₵	0.26	0.013*	0.08-0.82	2.38	0.199	0.63-8.92
Above 1000	2.29	0.001*	1.37-3.82	5.15	0.021*	1.28-20.81
Family history anaemia						
No	1			1		
Yes	11.2	0.001*	5.78-21.69	9.65	0.000*	5.23-17.79
Birth weight (kg)						
<2.5	1			1		
≥ 2.5	0.56	0.031*	0.33-0.95	0.78	0.474	.40-1.54
Delivery status						
Preterm	1			1		
Term	0.81	0.523	0.43-1.53	0.57	0.186	0.24 - 1.32
Iron-rich food items						
No	1			1		
Yes	1.96	0.027*	1.08-3.57	1.06	0.898	0.46 - 2.42
_cons				0.09	0.006*	0.01 - 0 .48

*NB: *: measured association is statistically significant; p-value: <0.05; ref: reference group; COR: Unadjusted Odds Ratio; AOR: Adjusted Odds Ratio. CI: Confidence Interval*

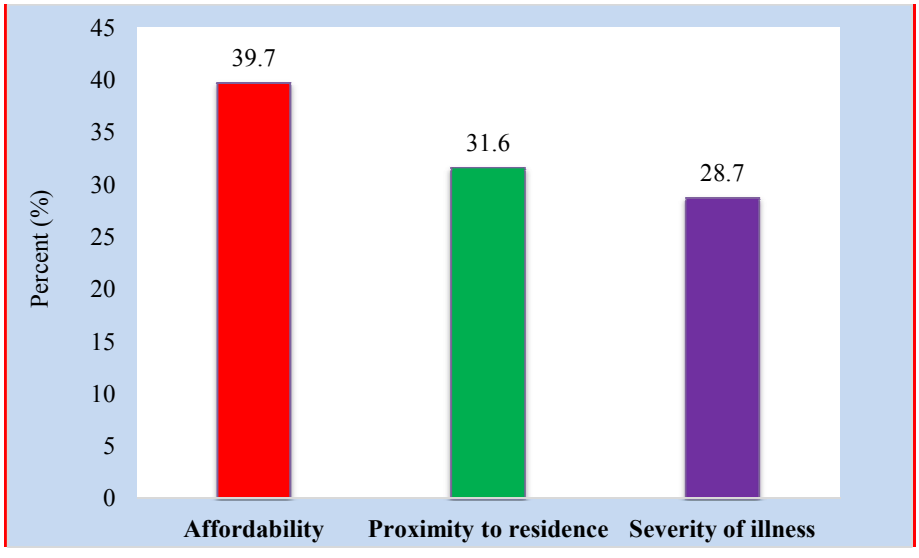

Fig. 3. Factors influencing place of choice for treatment

Table 10. Anaemia management practices by caregivers

Variables	Frequency	Percentage (%)
How many times was the child fed?		
2 times	14	5.0
3 times	202	71.6
4 Times	58	20.6
> 4 Times	8	2.8
Person responsible for feeding the child		
Mother	169	59.9
Self	98	34.8
Siblings	10	3.6
Caregiver	5	1.8
First Drug given to child		
Panadol™ syrup*	74	26.2
Panadol™ syrup* and Anti-malaria	73	25.9
Anti-malaria	51	18.1
None	84	29.8

Table 11. Prevention by caregivers

No	Variable	Yes	No
1	Use of citrus fruits in the child's diet	203 (72.0)	79 (28.0)
2	Use cheese in the child's diet	144 (51.1)	138 (48.9)
3	Mother satisfied regarding child taking sufficient diet	231 (81.9)	51 (18.1)
4	Use of fruit juice	212 (75.2)	70 (24.8)
5	Continuation of exclusive breastfeeding continue for six months	238 (84.4)	44 (15.6)
6	Spinach is used in cooking	132 (46.8)	150 (53.2)
7	Black grams are used in cooking	122 (43.3)	160 (56.7)
8	Whether the child was taken to hospital for weakness	189 (67.0)	93 (33.0)
9	Iron-rich food items are given to a child	222 (78.7)	60 (21.3)
10	Dried fruits are given to a child	139 (49.3)	143 (50.7)
11	Soya products are used in diet	214 (75.9)	68 (24.1)
12	Non-vegetarian food is used in diet	123 (43.6)	159 (56.4)
13	The child is taken for regular medical check-ups	163 (57.8)	119 (42.2)

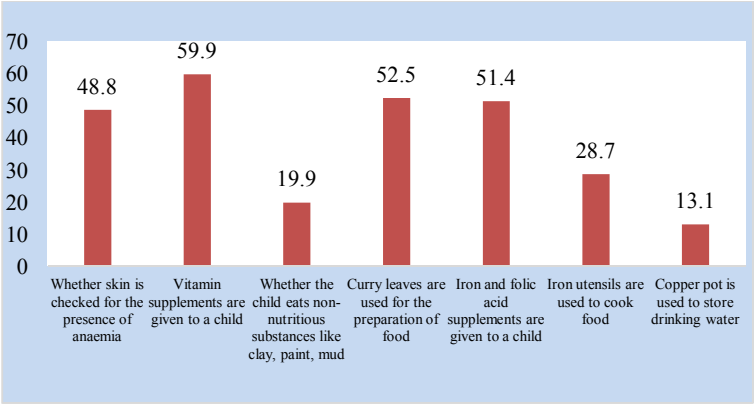

Fig. 4. Caregiver's prevention practices towards anaemia in children

4. DISCUSSIONS

This current study found a more significant difference in proportion between the young respondents and the older ones. Over 80% of the respondents were under the age of 40 years (19-39). This implies the majority of the respondents fell within the reproductive age group of 15-49 years (WHO 2010). Similar to this finding was a study conducted in Ghana where health facility

data on mothers with anaemic children were mainly studied and were showed to be the youthful population (Nikoi and Anthamatten 2013);[4,5]. The difference between the design of these previous studies and the current study is that the previous studies focused only on health data on women and their children [8,9]

Knowledge and awareness are vital in ensuring that people become more cognizant of a situation and understand how and when to take action. In terms of a disease condition, creating awareness through sensitization actions help to reduce the spread, vulnerability and fears [10,11]. Again, having adequate knowledge also helps to seek early care and management. In this current study, it was revealed that despite the higher proportion (75%) of the respondents who have heard of anaemia in children only 30% of the total sample had good knowledge of the condition and also had poor knowledge on its signs, symptoms and complications. It was interesting revelations because earlier studied among similar population conducted in two areas in Ghana, Greater Accra and Volta Regions found good knowledge and awareness among care caregivers (Nikoi and Anthamatten 2013; Parbey *et al.,* 2019). In India and Tanzania [10,12], there was also a reported high knowledge of childhood anaemia among caregivers and household heads. This differences in knowledge levels could be attributed to several factors such as education received on the disease, different geographic area, exposure to mass media etc. (Mosha, 2018).

In this current study, caregivers' socio-demographic factors were examined to ascertain their association with the knowledge level of caregivers. Factors such as educational level, age, marital status, number of children, income levels, among others, were assessed. The selection of variables was based on literature and pretesting of the survey. This helped for proper analysis and comparison of results with what already exists in literature. The bivariate analysis of these variables (Table 5) revealed that the education of mother, occupation of mother, occupation of father, family type, family income and history of anaemia in the family were significantly associated with caregivers' knowledge at p-values <0.05. When the further analysis was performed with a multivariate logistic regression model, it was found that some factors remained significant determinants of knowledge level. These factors were educational level, family type and history of anaemia in the family.

The type of family structure that is whether nuclear or extended was also found to be significantly associated with caregivers' knowledge level. This current study found that compared to extended family, caregivers from the nuclear family were more knowledgeable and had 2.4 higher odds of good knowledge on childhood anaemia. This could be attributed to the circumstances surrounding the two types of family structures where there is more closeness and information sharing in nuclear families than in extended families (Regine *et al.,* 2016). It could also be related to the situation that most of these women from nuclear families have attained higher educational levels; thus, the higher level of knowledge on anaemia (Table 5). Inconsistent with this finding is a pervious study conducted in Kumasi; the Capital of Ashanti region [13] of Ghana, where it was reported that family type was not a significant factor to good knowledge on childhood anaemia among caregivers (Anokye *et al.,* 2018). This study identified and assessed the prevalence of childhood anaemia among respondents. Compared to the prevalence of anaemia found in the literature and those reported in other studies, this study found (47.9%) which is slightly higher than the global prevalence but less than the national prevalence of Ghana. Thus, 47.9% of the children studied were diagnosed with anaemia as at the time of the study. This, however, was less than the overall reported prevalence of anaemia in children under five in Ghana, 78.4% (N = 2168, 95% CI: 76.7-80.2) [4] and close to the global prevalence of 48% (Shenton, Jones and Wilson, 2020). Furthermore, of the review done from various works of literature, these prevalence were found; in Kenya, it was noted that the prevalence of anaemia among children in this age group was 28.8% [14,15] while in Togo, from a sample of two thousand, eight hundred ninety children aged (6–59months), a prevalence of 70.9% was found (Yaya, 2019). In a bivariate analysis to find the associated factors contributing to the high prevalence of anaemia (Table 8), several socio-demographic factors were found. These factors were the occupation of mother, occupation of father, family type, monthly income, history of anaemia, birth weight and iron food intake by the child. However, in a further analysis using a multivariate logistic regression model, only family income and history of anaemia were found to be significantly associated with anaemia in children.

5. CONCLUSIONS

As found in the results section presented in this study, it was noted that the high awareness of childhood anaemia among caregivers does not necessarily translate to high knowledge levels. More than half of the participants had poor knowledge on the signs and symptoms, complications and management of childhood anaemia. The formal high school attainable levels among the respondents also did not reflect on their knowledge level. Additionally, mothers or caregivers from the nuclear family and those who have a family history of childhood anaemia were the only groups found to have a significant association with high knowledge level.

However, a significant association was found with the family income level, family history of anaemia and prevalence of anaemia in children. Furthermore, the study found that management and preventive practices of childhood anaemia were done mainly by their mothers rather than any other person. Health Centres were the primary facilities where management of the conditions were done. This calls for more attention for education at these points for mothers since that is where they are likely to meet health personnel. It was also a common practice by caregivers to use some practices to prevent the condition in their children. Some of these practices include feeding of the children with fruits, iron-rich food items, soya products, among others.

RECOMMENDATIONS

Various findings have been made from this study and, on this note, some recommendations have been provided for consideration by the appropriate authority.

1. The health authority should intensify education on childhood anaemia to the communities and mothers using the health facilities. Education should be detailed and focused on the signs and symptoms as well as management and prevention. These areas need a critical look for mothers to understand the condition well and its impact on the general well-being of their children.
2. Since most of the caregivers seek care from the Health Centres, it is important to put up measures to increase how these mothers are educated on the conditions at the health centres; this may include the use of peer “instructors” to help them understand the lesson at the level of their peers.
3. The health authority should put in place measures to reduce new cases of the condition and also intensify treatment to reduce the prevalence of childhood anaemia.
4. Caregivers from families with a history of anaemia should be aware of their status and put in measures to prevent future occurrence of the condition in the family.
5. Caregivers must adhere to the prevention and management measures given them by their health professionals in order to reduce the condition.
6. Further research work should focus on examining the underlining causes and reasons for the high prevalence of the condition in the municipality.
7. Future research should include qualitative design to gather in-depth details from the perspective of the caregivers and health workers to get a triangulation of data for detailed analysis.

ETHICAL CONSIDERATION AND CONSENT

Permissions to conduct this study were duly obtained with the aid of the requisite documentation, including the use of both permission and consent forms. Administrative approvals were also obtained from the offices that have jurisdiction over the participatory communities. The Ensign College of Public Health Ethics Review Board gave an ethical approval requested by the student/researcher.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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