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Prevalence and determinants of folic acid uptake among women of childbearing age in the Ho municipality of the volta region of Ghana

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ABSTRACT

Folic acid is an essential vitamin that is found in certain green lush vegetables, such as kale, spinach, and cabbage. An estimated 300,000 children are born with NTDs globally each year resulting in the death of approximately 88,000. Studies shows, preconceptional folic acid supplementation reduces the incidence of NTDs by more than 70%, however, adherence to supplementation remains low. This research explores the prevalence and determinants of Folic acid uptake among women of childbearing age in the Ho Municipality of the Volta Region, Ghana. This is a cross-sectional study where a multi-stage probability sampling technique was used in selecting 317 study participants. Chi-square test and multivariate logistic regression models were used to evaluate the effect of selected indicators on the uptake level of respondents on FA. A prevalence of 27.18% was determined. Ethnicity, occupation and availability of NHIS were associated with FA supplementation. Public health education strategies should be used to encourage FA use, increase awareness and knowledge on FA supplementation and pregnancy counseling to reduce the incidence of NTDs.

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Introduction

Folic acid is an essential vitamin that is found in certain green lush vegetables such as kale, spinach, and cabbage^[1] with some citrus fruits, such as oranges, and leguminous sources, such as beans, lentils, and peas.^[2,3] It is vital for humans and other animals as it is one of the basic building blocks and a catalyst for several important biochemical reactions of the body.^[4]

The United States Public Health Service Task Force, in 1992 advised that women who can become pregnant should take at least 0.4 milligrams (400 micrograms) of folic acid daily before conceiving and should continue this augmentation throughout the first trimester of pregnancy.^[5] Many congenital malformations which include neural tube defects (NTDs) are prevented when folic acid is taken right before and just after a woman conceives.^[6] Congenital structural anomalies of the embryonic structure that develops into the spinal cord, brain and surrounding structures lead to NTDs.^[3,7] These birth defects are largely preventable by adequate uptake of folic acid by women of the reproductive age^[8] and several studies reported that peri-conceptional and preconceptional augmentation of folic acid can prevent up to 50% of the cases of NTDs as well as cardiac and craniofacial abnormalities.^[9,10]

With the knowledge on the protection given by folic acid supplementation during the pre-conception and peri-conception against the risk of neural tube defects.^[11,12] It is expected that women in their reproductive age will take up this supplement while preparing for pregnancy. Unfortunately, this is not the case. The aim of this study is to determine the prevalence and

determinants of folic acid uptake among women of childbearing age in the Ho Municipality of the Volta Region of Ghana.

Methodology

Profile of study area

A cross-sectional study was carried out in the Ho Municipality which shares boundaries with Adaklu and Agotime–Ziope Districts to the South, to the North by Ho West District and the East by the Republic of Togo. It lies between latitudes 6° 20' N and 6° 55' N and longitude 0° 12' E and 0° 53' E with Ho serving as its administrative capital. The Regional capital, Ho, is found within the municipality. Recently, the Ho West District was carved out of Ho Municipality for ease of administration and faster development. The total land area is 2,361 square kilometers thus representing 11.5% of the region's total land area. Ho municipality is estimated to have a population of 224,422 as of 2020 with a growth rate of 2.5%. The municipality has one Regional Hospital, one Polyclinic, 23 Health Centers and 38 CHPS Zones and Family Health Clinics.

Study method and design

A descriptive cross-sectional design was employed in the study where data was collected in the study area from January 2021 through to March 2021. A structured questionnaire was used as the primary tool for data collection.

Inclusion criteria

Women who are aged 18 to 49 years, are of sound mind, not undergone hysterectomy and are not pregnant.

Exclusion criteria

Women who are aged below 18 and above 49 and have undergone hysterectomy and are pregnant.

Sample size and sampling technique

A sample size of 317 was estimated. A prevalence of 25% was used in estimating the sample size based on a study carried out in the Northern part of Ghana by.^[13] Cochran's formula was used to obtain the sample size.

$$n = \frac{z^2 \times pq}{e^2}$$

where **n** is desired sample size, (Cochran, 1977), **z** is reliability coefficient for 95% CI set at Z-Score of 1.96, **p** is Prevalence of uptake of folic acid among women of childbearing age ($p = 25\%$ or 0.25,^[13] **q** is $(1-0.25) = 0.75$, **e** is sampling error set at 5%. Therefore:

$$n = \frac{(1.96)^2 \times 0.25 \times 0.75}{(0.05)^2} = 288.12 \approx 288.$$

Calculating a 10% non-response rate of the sample size (288), the operational sample size was finally computed to be $288 + 28.8 = 316.8 \approx 317$ participants. A multi-stage random sampling technique was used to select both the communities where the study was conducted and the respondents for the study. First, communities in the five sub-districts were selected through simple random

selection. A systematic sampling method was then used in selecting the respondents for the study within the communities.

Data collection tool and variables

The structured questionnaire was used to gather data on the socio-demographic characteristics of the respondents, the use of folic acid, knowledge and awareness on the use of Folic acid and Obstetric factors that may be associated with the uptake of Folic acid. The variable “Awareness” was measured by asking participants to respond to the question “have you ever heard about FA.” A “yes” response was taken that the participant was aware. Knowledge about FA supplementation was a variable measured by asking 6 knowledge-based questions, the right responses were scored out of a maximum of 6 scores. Questions that were used to assess the level of knowledge were on: uses of folic, common food sources of FA, when to start taking the FA tablet, number of tablets to be taken in a day, Hearing about NTDs, Type of NTDs.

Each right answer attracted a point and up to a total of 6 when all were correct. The overall score for each respondent was then categorized into “adequate knowledge” for scoring 5 and above; and “inadequate knowledge” for scores below 5. Scoring 5 was considered above 50% (55.5%) which was taken to be adequate knowledge.^[14]

Statistical analysis

STATA statistical software package (*StataCorp.2007. Stata Statistical Software. Release 16. StataCorp LP, College Station, TX, USA*) was used for data analysis. Frequencies were computed for the qualitative data. Pearson’s Chi-square test was used to assess the level of association between selected women’s socio-demographic characteristics, obstetric characteristics, knowledge and awareness on the uptake of FA in the preconceptional period. Variables that were significant in the bivariate analyses were entered in a logistic regression model and using the backward elimination method, the independent determinants of FA uptake and the dependent variable, were identified. Statistical significance was assumed at a 95% confidence level.

Ethical considerations

Ethical clearance was sought from the Ethical Review Committee of Ensign Global College. Additionally, administrative approval was obtained from the Regional and Municipal Health Directorates of the Ghana Health Service to carry out the study in the area. Individual consents were obtained from the study participants after explaining the purpose of the study. Confidentiality and anonymity of the study was also assured.

Limitation of study

This study has a characteristic setback from surveys due to the nature of the questions used. Closed-ended questions with predefined responses tends to limit the full responses of the participants. There is a likelihood of bias which may be due to over or under reporting of responses to questions that required recall as participants might try to impress the interviewer.

Results

A total of 308 questionnaires were fully completed and used in the analysis, which yielded a 97.16% participation response rate. Results are presented in [Tables 1–5](#).

Table 1. Sociodemographic characteristics of respondents.

VARIABLE	FREQUENCY	PERCENTAGE (%)
AGE GROUP		
Younger women	167	54.22
Older women	141	45.78
MARITAL STATUS		
Single	171	55.52
Married	125	40.58
Cohabiting	6	1.95
Divorced	6	1.95
RELIGION		
Christianity	297	96.43
Islamic	8	2.60
Traditional	3	0.97
ETHNICITY		
Ewe	280	90.91
Akan	21	6.82
Ga-Dangme	7	2.27
EDUCATIONAL LEVEL		
No formal education	12	3.90
Primary	10	3.25
JHS	130	42.21
SHS	121	39.29
Tertiary	35	11.36
OCCUPATION		
Formal	19	6.17
Informal	144	46.75
Student	114	37.01
Unemployed	31	10.06
INCOME LEVEL		
No income	197	63.96
Less than 300 Ghc	39	12.66
Above 300 Ghc	72	23.38
Folic Acid Intake		
Yes	83	27.18
No	225	72.82

Discussion

The prevalence of preconceptional FA supplementation within the Ho Municipality of the Volta region from the study was 27% which is considered to be low compared to 33.6% that was reported among Lebanese women.^[2] The low prevalence level can be attributed to the fact that a precondition for supplementing which is knowledge (36.04%) has shown to be low by the study. Awareness from the study can be considered to be high. Again, 60 out of 83 respondents who were taking FA mentioned having gotten them from the hospital which is usually only gotten for free during ANC visits. Hence, women need to have the financial capacity to be able to buy from over the counter in order to be able to practice preconceptional folic acid supplementation. Also given that a large number of the respondents have identified to not having any form of income, they are financially incapacitated to be able to augment their folic acid needs by buying over the counter.

Another reason could be the low number of women who do not (280, 90.91%) attend pregnancy counseling compared to those who do (28, 9.09%). The Prevalence of supplementing with folic acid as observed in the current study compares in many ways as findings stated in literature such as,^[15] ^[16,17]^[13,18] and ^[2]. Women who were on any family planning method were 2 times more likely to supplement with FA compared to those who weren't. This finding is parallel with a study by^[19] among Ethiopian women where those on family planning were 3 times more likely to supplement compared to their counterparts who weren't. The statistical significance can be attributed to the fact that pregnancy counseling, including preconception care, is given in the family planning unit, women

Table 2. Association between sociodemographic characteristics and uptake of folic acid.

INDICATORS	UPTAKE OF FOLIC ACID (N = 308)		P- VALUE
	YES 83 (26.95%)	NO 225 (73.05%)	
Age group			0.918
Younger women	50 (60.24%)	117 (52%)	
Older women	33 (39.76%)	108 (48%)	
Marital status			0.456
Single	52 (62.65%)	119 (52.89%)	
Married	28 (33.73%)	97 (43.11%)	
Cohabiting	2 (2.41%)	4 (1.78%)	
Divorced	1 (1.20%)	5 (2.22%)	
Educational level			0.105
No formal	2 (2.41%)	10 (4.44%)	
Primary	2 (2.41%)	2 (2.41%)	
JHS	27 (32.53%)	103 (45.78%)	
SHS	38 (45.78%)	83 (36.89%)	
Tertiary	14 (16.87%)	21 (9.33%)	
Occupation			0.004 *
Informal	36 (43.37%)	108 (48.00%)	
Formal	7 (8.43%)	12 (5.33%)	
Student	39 (46.99%)	75 (33.33%)	
Unemployed	1 (1.20%)	30 (13.33%)	
Ethnicity			0.024 *
Ewe	70 (84.34%)	210 (93.33%)	
Akan	11 (13.25%)	10 (4.44%)	
Ga-Dangme	2 (2.41%)	5 (2.22%)	
Income Level			0.626
No Income	53 (63.86%)	144 (64.00%)	
Less than 300 Ghc	8 (9.64%)	31 (13.78%)	
Above 300 Ghc	22 (26.51%)	50 (22.22%)	
Religion			0.766
Christianity	79 (95.18%)	218 (96.89%)	
Islamic	3 (3.61%)	5 (2.22%)	
Traditional	1 (1.20%)	2 (0.89%)	
NHIS			0.023 *
Yes	68 (81.93%)	155 (68.89%)	
No	15 (18.07%)	70 (31.11%)	

* Statistically significant at a 95% CI

Table 3. Association between folic acid uptake and awareness and knowledge about folic acid.

INDICATORS	UPTAKE OF FOLIC ACID		P-VALUE
	YES 83 (26.95%)	NO 225 (73.05%)	
Awareness level			
Aware	78 (93.98%)	190 (84.44%)	
Not aware	5 (6.02%)	35 (15.56%)	0.027 *
Overall knowledge			
Adequate	44 (53.01%)	67 (29.78%)	
Inadequate	39 (46.99%)	158 (70.22%)	< 0.001 *

* Statistically significant at a 95% CI

who have used family planning methods might have some sort of information regarding preconception folic acid supplementation.

Having a chronic health condition also showed a significant association with FA uptake in the bivariate analysis. This association can also be attributed to the fact that individuals with these conditions could seek information about preconception health and pregnancy. However, during the multivariate analysis, FA supplementation and having a chronic health condition did not show any association.

Table 4. Association between folic acid uptake and obstetric factors.

INDICATORS	UPTAKE OF FOLIC ACID		P-VALUE
	YES 83 (26.95%)	NO 225 (73.05%)	
Ever been pregnant			
Yes	40 (48.19%)	134 (59.56%)	0.074
No	43(51.81%)	91 (40.44%)	
Pregnancy counseling			
Yes	10(12.05%)	8.00 (18%)	0.273
No	73 (87.95%)	207 (92.00%)	
A child with a birth defect			
Yes	3 (3.61 %)	4 (1.78%)	0.337
No	80 (96.39%)	221 (98.22%)	
Family planning			
Yes	23 (27.71%)	32 (14.22%)	0.006 *
No	60 (72.29%)	193(85.78%)	
Chronic health condition			
Yes	0 (0.00%)	212 (94.22%)	0.025 *
No	83 (100.00%)	13 (5.78%)	

* Statistically significant at a 95% CI

Table 5. Multivariate analysis of significant variables from bivariate analysis to the uptake of folic acid.

Indicators	Category	P-value	Unadjusted OR (95%CI)	P-value	Adjusted OR (95%CI)
Ethnicity	Ewe	Reference	1	Reference	1
	Akan	0.009	3.3 (1.34–8.10)	0.051	2.712 (1.04–7.69)
	Ga-Dangme	0.830	1.2 (0.23–6.32)	0.890	1.14 (0.18–7.43)
Occupation	Informal	Reference	1	Reference	1
	Student	0.107	1.56 (0.908–2.678)	0.271	1.33 (0.77–2.48)
	Formal	0.275	1.75 (0.640–4.784)	0.915	0.934 (0.313–2.92)
	Unemployed	0.026	0.1 (0.13–0.759)	0.044	0.110 (0.015–0.94)
Awareness level	No	Reference	1	Reference	1
	Yes	0.034	2.873 (1.086–7.606)	0.102	2.49 (0.843–6.64)
Knowledge on folic acid	Inadequate	Reference	1	Reference	1
	Adequate	< 0.001	2.66 (1.586–4.462)	< 0.001	3.077 (1.726 –5.444)
Family planning method	No	Reference	1	Reference	1
	Yes	0.007	2.312 (1.257–4.25)	0.037	2.00 (1.045–4.136)
NHIS	No	Reference	1	Reference	1
	Yes	0.025	2.04 (1.094–3.829)	0.081	1.90 (0.927–3.72)

This study also revealed that, among those who supplemented, the majority of them belonged to the younger women category which included individuals aged 18 to 27. This is similar to findings in a study done in the upper geographical sector of Ghana where a majority of them fell between the ages of 25–29 years. This same trend was identified in a similar study done by [9]. However, studies done by [20] were in contrast to the current study. These studies identified advanced maternal age to be associated with uptake of FA. Differences in the findings could be due to differences in the socio-economic status of the study participants.

With education, 42% of the respondents had schooled to the JHS level. 38 out of the total number who supplemented were individuals that were educated to the SHS level. This finding is however different from studies like [2,15,18] where knowledge and supplementation were correlated with the degree of education. This difference can be attributed to the large number of respondents (130) being educated to the JHS level. Another possible reason for the difference in findings between the current study and that of the previous studies could be that, even though formal education has been unequivocally shown to be associated with folic acid supplementation, the majority (89%) of the participants in the current study have been found to have low level of education.

This study assessed the relationship between marital status and folic acid supplement use. The results indicated that out of the 83 respondents who were supplementing during the preconceptional

period only 34% of them were married. A test of association between marital status and pre-conceptional use of folic acid could not detect any statistical significant association between groups. This finding is different from that from the study done by^[1] where marriage or cohabiting was found to be two times more likely to result in the use of folic acid in the pre-conception period than not being married. In 2012, a study by^[20] also reported single women are less likely to supplement with FA. One probable reason could be that married women have their partners encouraging and reminding them to take their supplements and also awareness might have been created in relation to childbirth.

Conclusion

In conclusion, this study showed that there was a very low prevalence of pre-conceptional folic acid supplementation among women of childbearing age in the Ho Municipality of the Volta Region in Ghana. Their occupation, ethnicity and availability of valid NHIS card were some demographic characteristics that were positively associated with the uptake of FA. Obstetric factors that were associated with FA uptake included women who were on any family planning method and those who had any chronic health condition. The awareness level of the study participants on FA supplementation was identified to be high however, knowledge was identified to be low and inadequate. Government and NGOs in health should design programmes aimed at increasing the use of FA by providing them for free to women in their reproductive age when they attend the hospital and not just at ANC clinics. There should be a vigorous effort by the GHS and NGOs in health through health education to increase awareness and knowledge on pre-conceptional folic acid supplementation. Finally, it will be recommended that future research work should adopt a qualitative approach to further explore in-depth any missing reason why women of reproductive ages in the study region are not taking the recommended doses of folic acid.

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This work was carried out in collaboration between all authors. LMN and SM participated in conceiving the study and in the development of data collection tools. LMN carried out data collection. LMN and SM participated in the data analysis and drafting of the manuscript. All authors read and approved the final manuscript.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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