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Research Article
Factors Influencing and Hindering Prenatal Supplement Intake among Women in Northern Ghana

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Abstract

Background and Objective: There is widespread awareness of the benefits of prenatal supplements in developing countries. Despite the fact that the government of Ghana provides free prenatal supplements (iron-folic acid) to all pregnant women, the rate of compliance with these supplements is low in the northern regions of Ghana. Little is however known about the reasons for the noncompliance. This study aimed to investigate through mixed methods the barriers and motivators for taking the supplement among mothers who attend health facilities located in northern region of Ghana. **Materials and Methods:** As we expected breastfeeding mothers to show a comprehensive experience of pregnancy cycle, we investigated through mixed methods the barriers and motivators for prenatal supplements uptake among mother with children aged 0-23 months. **Results:** Five common themes were identified: (a) Family support, (b) Knowledge of supplement benefits, (c) Social network support, (d) Health care providers' communication/reinforcement and (e) Different views on benefits of prenatal supplements. Key motivators were family support, social network support, knowledge of supplement benefits and reinforcement by health care providers. Common barriers were adverse effects, inadequate knowledge of supplements and disrespectful communication from medical staff. The factors that motivate and hinder the intake of IFA supplements are complex. Health care professionals can increase adherence by improving communication with patients about the benefits of taking IFA supplements as well as the risk of not taking them. **Conclusion:** In the northern region of Ghana, pregnant women don't take iron-folic acid supplements on a regular basis as prescribed by doctors.

Key words: Ghana, iron-folic acid, lactating women, micronutrient deficiencies, pregnant women

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

During pregnancy, folate and iron deficiencies lead to puerperal sepsis, low birth weight, preterm birth[1], growth retardation, stunting and impaired cognitive development[2-4]. Globally, in pregnant and lactating women, folate and iron deficiencies are among the most common micronutrient deficiencies. The poor quality of diets makes the population more susceptible to deficiencies of these nutrients[2,3,5]. Worldwide, 38% of pregnant women and 43% of children suffer from anemia, 50 and 43% of the reported anemic cases in pregnant women and children respectively were attributed to iron deficiency[6].

Globally, 70% of women of childbearing age do not take folate, a nutrient that is most critical during pregnancy[7]. Globally, folate deficiency is not well estimated in those at greatest risk of being deficient, such as pregnant women, women of reproductive age and young children[8]. (In developing countries, folate deficiency during pregnancy is further compounded by the lack of a good folate estimator. Based on the crucial roles that iron and folate play in maternal and child health, WHO recommends daily oral iron and folic acid supplementation. Pregnant women should consume 30-60 mg of elemental iron and 400 g (0.4 mg) of folic acid per day to prevent maternal anemia, puerperal sepsis, low birth weight and preterm birth[1].

A number of studies have confirmed the beneficial role of Iron-folic Acid (IFA) supplements during pregnancy in reducing neural tube defects, low birth weights, small for gestational age newborns and maternal anemia[9-12]. Though the benefits of using prenatal supplements on birth outcomes have been well established, particularly in developing countries. In the northern region of Ghana, 52.8% of women use prenatal supplement (iron-folic acid) even though the supplements are provided free to all pregnant women by the government. Little is known about the reasons for the non-compliance. Using mixed methods, this study was conducted to investigate the barriers and motivators for taking the supplement among subjects who attended health facilities in the northern region of Ghana.

MATERIALS AND METHODS

This research was conducted using a health facility-based analytical cross-sectional study design in the Tamale Metropolitan area. Four health facilities: Seventh Day Adventist Hospital, Tamale Central Hospital, Tamale Central Reproductive and Child Health Center and Bilpiela Health Center were included in the study. A total of 382 mothers were selected from the four health facilities and agreed to participate in the study.

To estimate the proportion of non-compliance with iron-folic acid intake and identify the motivators and barriers to compliance, sample size was calculated using the following equation:

$$n = \frac{Z^2_{1-\alpha/2}\ p(1-p)}{d^2}$$

Level of significance was 5%. The expected proportion of non-compliance with iron-folic acid intake was 52.8%. Absolute error was 7%. Non-response rate was 4%. Quantitative data was collected using a semi-structured questionnaire. Qualitative data on barriers and motivators of prenatal supplements intake were collected using six focus group discussions. Each focus group was consisted of eight participants. Using convenient sampling, women 15-49 years of age who had children aged 6-24 months were recruited to ensure that they reflected a complete pregnancy experience. A written consent form was signed or thumb printed by participants who voluntarily agreed to participate in the study. Ethical approval was obtained from Kintampo Health Research Centre (KHRC) Ethics Committee of Ghana. It is worth mentioning that some preliminary findings of this study were showcased at a conference and Abstract is published in Current Developments in Nutrition[13].

Statistical analysis: The data were analyzed using Statistical Analysis System (SAS 9.4) (SAS Institute Inc., Cary, NC, USA). Sociodemographic characteristics and health indicators of respondents were described using frequency distributions, mean (standard deviation), 95% confidence intervals, Adjusted Odd ratio (AOR) and p-values. Chi-square analysis was used to find the association between self-reported IFA intake compliance and maternal sociodemographic characteristics. Additionally, a step-wise multivariable logistic regression model was used to examine the relationship between the risk of non-compliance with IFA prescription, IFA side effects and sociodemographic factors of mothers. If a mother reported that she took all IFA tablets while visiting a hospital or health facility, she was considered compliant. Individuals with incomplete data were not included in the analysis.

Qualitative data was transcribed and analyzed with the help of excel spread sheets using color coding. Grounded Theory was used to examine the qualitative data transcribed from the focus group discussion[14,15]. The analysis allowed

authors to generate a theory by which people build their own conceptualizations of motivators and barriers of prenatal supplements intake[16]. Participant responses were compiled and reviewed as a means to condense the data into analyzable codes (open codes)[17,18]. These initial codes were collaboratively determined at the level of audio recording transcription. We related specific codes from the first phase into broader "subcategories"[14,15]. Selective Coding was used to integrate all relationships between categories and subcategories into one overarching phenomena.

RESULTS

Table 1 indicates the characteristics of research participants. The majority of the mothers were married (92%), government employees (55%), urban dwellers (77%), Muslims (84%), Dagombas (74%) and lactating women (99%). Most mothers reported no side effects from IFA tablets intake (73%), non-compliance with IFA prescription (74%) and having normal range of BMI (55%), male household heads (94%) and government employees as their spouses (72%). The study subjects did not attend school or had only primary education (41%), did not smoke during pregnancy (99%), lived in households with average wealth index (34%) and were in monogamous union (63%).

In terms of the association between demographic characteristics and self-reported compliance with iron-folic acid supplement intake (Table 2), we found that mothers who reported no side effects from IFA tablets were more likely to report compliance with iron-folic acid supplement intake compared to mothers who reported side effects from IFA tablets intake. Additionally, mothers in urban areas were more likely to report compliance with iron-folic acid supplement intake compared to mothers in rural areas. Similarly, mothers in monogamous union were more likely to report compliance with iron-folic acid supplement intake compared to mothers in polygamous unions. After adjusting for residency and polygamy status, only side effects remained as the key determinant for self-reported compliance with iron-folic acid supplement intake (Table 3).

Figure 1 presents the result of the six focus groups discussion among mothers. Five common themes were identified: (a) Knowledge of supplement benefits, b) family support, (c) Social network support, (d) Health care providers' communication/reinforcement and (e) Different views on benefits of prenatal supplements. Table 4 presents the key motivators and barrier to iron-folic acid supplement intake. Key motivators include knowledge of supplement benefits, family support, social network support and reinforcement by

Table 1: Demographic characteristics of mothers (24-32 years) at health facilities in northern Ghana

	No.	Mean±SD
	352	28±4
	n	Percentage
Side effects		
Yes	93	27
No	255	73
Compliant to iron-folic acid supplement intake		
Yes	92	26
No	256	74
Household head sex		
Male	331	94
Female	21	6
Residence		
Urban	272	77
Rural	79	23
Wealth index		
Lower	115	33
Middle	116	33
Upper	116	33
Ethnicity		
Dagomba	260	74
Gonja	29	8
Others	63	18
Religion		
Christianity	56	16
Islam	295	84
Traditional	1	0
Marital status		
Single	26	7
Married	321	92
Separated	4	1
Education		
None/primary	145	41
Secondary	135	38
Post-secondary	26	7
Tertiary	46	13
Polygamy		
Yes	130	37
No	221	63
Smoked during pregnancy		
Yes	2	1
No	350	99
Parity (no. of pregnancies)		
1	101	29
2	95	27
3	77	22
≥4	79	22
Job type-self		
Government	193	55
Self	159	45
Spouse job type		
Government	152	72
Self	100	28
Physiological status		
Pregnant	4	1
Lactating	346	99
BMI		
Underweight	15	4
Normal	192	55
Overweight	103	29
Obese	42	12

Table 2: Association between demographic characteristics and self-reported compliance with iron-folic acid supplement intake

Variables	Non-compliant	Compliant	p-value
Mother's age			
<25	8.1	23.6	0.778
>25	18.4	50.0	
BMI			
Underweight	0.6	3.7	0.202
Normal	15.8	38.8	
Overweight	6.0	23.0	
Obese	4.0	8.1	
Side effects			
Yes	12.2	14.2	<0.0001
No	14.5	59.0	
ANC attendance			
<8	1.4	4.0	0.992
≥8	24.8	69.7	
Household head sex			
Male	24.4	69.5	0.46
Female	2.0	4.0	
Residence			
Urban	18.4	59.4	0.026
Rural	8.1	14.1	
Wealth index			
Lower	6.4	26.5	0.073
Middle	9.0	24.2	
Upper	11.1	22.7	
Ethnicity			
Dagomba	18.4	55.8	0.405
Gonja	2.9	5.2	
Others	5.2	12.6	
Religion			
Christianity	5.5	10.4	0.141
Islam	21.0	63.1	
Marital status			
Single	3.1	4.7	0.104
Married/cohabitation	21.8	70.4	
Education			
None/primary	11.8	28.7	0.271
Secondary	8.1	30.8	
Post-secondary	2.3	5.2	
Tertiary	4.3	8.9	
Polygamy			
Yes	12.4	24.4	0.021
No	14.1	49.1	
Parity (no. of pregnancies)			
1	7.8	23.3	0.294
2	8.3	18.4	
3	4.0	17.8	
≥4	6.3	16.1	
Job type-self			
Government	17.0	38.5	0.051
Self	9.5	35.1	
Spouse job type			
Government	20.4	51.7	0.208
Self	6.0	21.8	

health care providers. Barriers cited most were adverse effects, inadequate knowledge of supplements and disrespectful communication from health care providers.

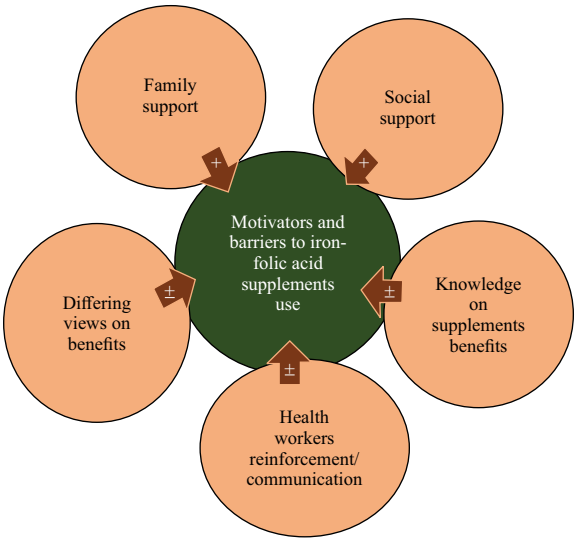

Fig. 1: Emerging theory: Overarching themes for motivators and barriers of iron-folic acid supplement intake/compliance
±: Facilitator and barrier, +: Facilitator

Table 3: Determinants of self-reported compliance with iron-folic acid supplement intake among mothers (24-32 years) in northern Ghana (n = 352)

Variables	OR	95% CI	p-value
Side effects			
yes	0.32	0.18,0.53	<0.0001
no		Ref	
Residence			
Urban	0.74	0.42,1.33	0.3130
Rural		Ref	
Polygamy			
Yes	1.65	0.99,2.76	0.0560
No		Ref	

Table 4: Motivators and barriers for iron-folic acid supplement intake among mothers (24-32 years) in northern Ghana

Motivators	Barriers
Knowledge of supplement benefits	Adverse effects
Family support	Inadequate knowledge of supplements
Social network support	Disrespectful communication from health care providers
Reinforcement by health care providers	

DISCUSSION

It is well established that prenatal supplements are beneficial for birth outcomes in developing countries[9-11]. The rate of compliance with the use of prenatal supplements (iron-folic acid) in Ghana, however, is low. The rates are particularly low in northern region of Ghana even though the supplements are provided free to all pregnant women by the government[19,20].

The present study revealed that relatively higher proportion of mothers did not comply with IFA prescriptions and absence of side effects related to IFA intake. The findings of this study contradict those of other studies which reported lower proportions[21-24]. The striking finding of our study is the low prevalence of IFA intake related side effects and the high proportion of non-compliance. Several studies[25,26] have reported poor compliance due to side effects and forgetfulness, contrary to our findings on side effects. According to the multivariable logistic regression, women who reported to have experienced IFA intake related side effects had 0.32 odds of reporting non-compliance with IFA intake or prescription. It was expected that reporting absence of IFA intake related side effects would lead to higher compliance but different situation was observed, this may be due to diverse reasons including social desirability and false reportings.

For an in-depth analysis of motivators and barriers to prenatal supplement intake, grounded-theory analysis was used. We used grounded-theory methodology to develop substantive theory about motivators and barriers of prenatal supplements using Urie Bronfenbrenner's ecological theory framework[27]. The central theme of this research was adjustment, compliance and non-compliance with IFA tablets intake. Five themes emerged: (a) Knowledge of supplement benefits, (b) family support, (c) social network support, (d) reinforcement by health care providers and (e) Different views on benefits of prenatal supplements. The micro and macro-systems influence an individual's compliance/non-compliance with IFA tablets intake was based on individual's exposure.

Knowledge of supplements' benefits: Women who reported being compliant said, they knew the supplements would help them have: "healthy babies", "good health" and "good appetite". On the contrary, women who reported non-compliance said, they have "no knowledge of supplements" and believed that supplements would make their babies "too big". Interestingly, under the differing views theme, what was considered positive by one mother was viewed negatively by another and vice versa. While some women were happy that IFA tablets will make their babies grow "healthy" and "big" some mothers were non-compliant because they believed supplements will make their babies "big" and may result in "caesarean operation during child birth".

Family support: Compliance with IFA tablets intake was largely dependent on family support. Some of the women illustrated this by stating that*: "My sister in-law checks on me and reminds me to take my tablets, this has been very helpful". "My family members remind me to take my tablets". I don't like the tablets because of their taste so occasionally I lie to my spouse and my sister when they check on my uptake".*

Social networks: Similarly, in order to comply with IFA tablet intake, social networks such as friends and church members played crucial roles. Below are some key statements that support the above: *"Some of my friends call to check on me and this reminds me to take my tablets", "my church members constantly check on how I am doing and whether I have taken my medicines".*

Reinforcement by health care providers: IFA intake compliance is undoubtedly influenced by health care providers' reinforcement as some of the women stated that: *"I am constantly reminded and reinforced to take my medications by the nurses*". Interestingly, in this study it is also observed that, IFA intake compliance is falsely reported due to the attitude of health workers as some mothers stated: *"I tell the nurses I take all my tablets even though I hardly take half of my tablets. I lie to them because of the disrespectful way in which they will reprimand me". "I lie to the nurses about my IFA tablets intake because of the constant harassment from them (nurses) about tablets intake, the constant harassment even makes me not to take the tablets sometimes".* The role of health care providers is thus like a double edged knife which must be managed carefully.

The strengths of our study were the use of both quantitative and qualitative methodological approaches. To the best of our knowledge this is the first study to specifically investigate the motivators for compliance with prenatal supplements intake in the research setting.

A number of factors may have influenced our results, including recall bias and social desirability associated with self-report intake of IFA supplements. There is a possibility that the interpretation of these results will be limited to settings or populations similar to Northern Ghana.

CONCLUSION

Study results demonstrate that pregnant women in the northern region of Ghana have a low level of compliance with iron-folic acid supplements prescribed by their doctors. Noncompliance is largely due to adverse effects of IFA tablets, inadequate knowledge of the benefits of supplements and disrespectful communication from health care providers. Compliance on the other hand is largely influenced by knowledge of the benefits of supplement, family support,

social network support and reinforcement by health care providers. The level of adherence can be improved by reducing communication barriers between health care providers and patients, reducing adverse effects of IFA tablets, improving social network support, improving family support and improving interactions with health care providers.

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