

Research

Anaemia prevention among pregnant women: Views and experiences of pregnant women and antenatal care providers in Accra, Ghana

Sawudatu Zakariah-Akoto^{1,*}, Harmony Omeife², Victoria Hall Moran², Godfred Egbi¹, Seth Adu Afurwuah³, Nicola M Lowe², Richmond Aryeetey⁴

¹Noguchi Memorial Institute for Medical Research, University of Ghana, Legon. ²Centre for Global Development (C4Globe), University of Central Lancashire, Preston UK. ³Department of Nutrition, University of Ghana, Legon. ⁴School of Public Health, University of Ghana, Legon

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Background and Objective

Anaemia among pregnant women is a public health challenge in Ghana. Although there is a national programme of routine iron-folic acid (IFA) supplementation, coverage is suboptimal. The current study explored experiences and perceptions of anaemia prevention, and IFA use among pregnant women and antenatal care providers at two hospitals in Accra, Ghana, for enhancing the supplementation programme.

Methods

Utilizing a qualitative approach, 6 focus group discussions with 48 purposively selected pregnant women, and 10 in-depth interviews with care providers in two hospitals were conducted. Interviews were transcribed verbatim. Using both deductive and inductive approaches, *priori* themes that informed the design of the interview guides, and emerging codes from transcripts were used in data analysis.

Results

In both hospitals, pregnant women reported awareness of anaemia and identified poor quality diets and failure to take IFA as the predominant causes. Regular IFA supplementation, and consumption of fruits, vegetables, and animal-source foods were indicated as the main anaemia remedies by the pregnant women. Turkey berry, beetroot, and hibiscus flower were also reported as therapeutic remedies for anaemia. IFA use was linked with improved appetite, haemoglobin, and health status of mothers and their fetus. Both providers and pregnant women indicated that IFA is freely accessible through government facilities but may also be purchased. IFA supplements are recommended to be taken daily but three times for treatment; however, non-adherence to the recommended frequency was reported. This was attributed to adverse reactions including nausea and vomiting, unanticipated cost of increased appetite, forgetfulness to take IFA, misperceptions about adverse effects of IFA, transportation cost to access IFA, and long waiting time at hospitals. Community-level focused antenatal care, follow-up visits, and phone calls were reported by providers as strategies to improve IFA uptake. Community sensitization, enhanced access to IFA, and participatory approach to ANC services were suggested by pregnant women as strategies for improving IFA uptake.

Conclusions

Food insecurity and misperceptions about IFA should be addressed as part of efforts to address low IFA adherence and high maternal and child anaemia rates in Ghana.

^a Corresponding author: szakaraiah-akoto@noguchi.edu.gh

INTRODUCTION

Anaemia affects 32 million women worldwide; women in Central and West Africa and South Asia carry the greatest burden (Stevens et al. 2013; GBD-2021-Anaemia-Collaborators 2023) and in these regions, every 1 in 2 women is anaemic. There are several causes of anaemia but an important cause is low intake of dietary iron, also described as nutritional iron deficiency (iron-deficiency anaemia, IDA), accounting for over 50% of all anaemia cases (McLean et al. 2009). Other common causes of anaemia include co-existing infections such as HIV, helminths, and malaria (Petry et al. 2016; Wirth et al. 2017). In Ghana, iron deficiency, malaria, and helminthic infections are the main risk factors for anaemia (SPRING, 2016).

IDA, is particularly common during pregnancy, due to an increased iron requirement (WHO 2017). The adverse consequences of IDA in pregnancy include higher rates of preterm births, postpartum haemorrhage, infants with low-birth weight, increased susceptibility to infections and perinatal mortality. These consequences contribute to high infant and maternal mortality as well as disability-adjusted life years within LMICs (Stevens et al. 2022). An estimated 571 million women experience health challenges that are attributable to IDA (WHO 2023). Thus, anaemia prevention is a critical public health priority.

As in many other countries in Sub-Saharan Africa, Ghana has a high burden of maternal anaemia. Anaemia is estimated to affect about 51% of the country's population of pregnant women (GSS et al. 2023). Although there are simple low-cost strategies to address maternal anaemia (Peña-Rosas et al. 2015), implementing these interventions successfully on a large scale remains to be achieved. Micronutrient supplementation is recognized as an effective strategy for addressing anaemia in pregnancy (WHO 2016). Per WHO recommendation, a combined tablet of 60mg of ferrous sulphate and 0.4mg of folic acid daily is the recommended dose for pregnant women in Ghana (Ferka et al. 2024). This recommended dose is taken as prophylaxis for all pregnant women; however, owing to the very low haemoglobin levels among some pregnant women, Ghana's Standard Treatment Guidelines (2017) recommends a higher dose of ferrous sulphate (iron) 8 hourly or 200mg elemental iron per day in three divided doses for treatment of severe anaemia (MOH 2017). Despite these recommendations, adherence to micronutrient supplements remains sub-optimal in Ghana. Even with the free distribution of supplements through antenatal care programmes, the evidence indicates that only 25% of pregnant women consumed the recommended amount of supplements (for up to 180 days or more) (SPRING 2016).

The reasons for poor implementation of micronutrient supplement programmes are well documented, including poor adherence to micronutrient supplementation, inconsistent supplement supply, inadequate counselling, and sub-optimal support from healthcare workers (Siekman et al. 2017). Other barriers to poor usage or low acceptance of iron supplements found in Sub-Saharan Africa include low education, inadequate antenatal care visits among pregnant women, and absence of intensive counselling for women of childbearing age (Ba et al. 2019). Seidu et al. (2024) also identified self-efficacy on IFA use as an internal

barrier in Northern Ghana.

In view of these barriers, novel interventions have been reported for the prevention and management of anaemia including cash transfers, low-cost ante-natal check-ups and free ante-natal care, free transport and drugs (including IFA supplements), and food fortification using micronutrient powders as sprinkles for pregnant women (Totade et al. 2023). USAID has also supported with interventions to reducing the disease among women of reproductive age including pregnant women, especially in resource constrained settings (USAID 2011). These interventions include daily supplementation with IFA for all pregnant women, weekly supplementation for non-pregnant women, and malaria and hookworm control in endemic settings. These interventions have also been adopted in Ghana through Ghana Health Services' national anaemia control programme (USAID 2023). Other interventions include equipping healthcare providers with the requisite skills for diagnosing anaemia using simple and reliable diagnostic tools such as Hemocue for accurate measurement of haemoglobin levels and engaging communities to adopt positive nutrition/dietary behaviour to improve their health and reduce the risk of getting anaemic (USAID 2023).

Despite these interventions, anaemia among pregnant women is remains high in the country and, therefore, there is a need for innovative approaches to address these identified barriers (WHO 2023). There is also insufficient evidence about antenatal care processes with respect to anaemia prevention; such evidence will be useful to improve adherence to iron-folic acid supplementation (IFA). Therefore, the current study explored perceptions, experiences and expectations about anaemia prevention and IFA supplement use among pregnant women and antenatal care providers in Ghana.

METHODS

STUDY DESIGN AND SETTING

This qualitative study was conducted in Accra, Ghana, from January 2021 to December 2021. The Accra metropolis has an estimated population of five million. A purposive sampling method was used to select two healthcare facilities –one public (Facility A) and one private (Facility B). These facilities serve women with varied backgrounds, that is, low to middle income population groups living in the Accra Metropolis and surrounding peri-urban communities.

Facility A is located in Ayawaso West Municipality and managed by University of Ghana. It has a bed capacity of 130 and provides a wide range of emergency medical services as well as public health services including maternal and child health. Facility B is located in Madina in La-Nkwantanang Municipality. It has a bed capacity of 65 and provides maternity services in addition to emergency and specialist services. The socio-economic status of patient population in these two facilities is comparable to that of many urban Ghanaians in general, that is, between low and middle socio-economic groups.

SELECTION OF PARTICIPANTS

With the assistance of two health workers who were trained on the study protocol and the heads of the maternity units at each facility, the study aimed to recruit both pregnant

women and health workers. Pregnant women aged 18 years or older and attending antenatal care (ANC) at each of the selected facilities, were contacted by their respective health workers and nominated by their heads of units to join and assist in the study. The health workers explained the purpose of the study to each participant during their antenatal visits and invited interested pregnant women to participate in the study. Interested pregnant women who provided informed consents were then considered eligible to participate in the study. The contact numbers of these consented pregnant women were made available to the research team through the health providers. Each of these pregnant women was then contacted via phone by one of the research team members and formally invited to participate in a focus group discussion (FGD) with at least 8 other pregnant women on an appointed day. On the day of the FGDs, each pregnant woman provided consent to the research team, which was audio-recorded (to minimize spread of COVID-19).

Health workers were included if they were involved in providing antenatal care services at either facility and willing to participate in the study. The health workers were contacted through the heads of the maternity units of both facilities and the two health workers who assisted in the recruitment of the pregnant women for the FGDs. Again, their contact numbers were shared with the research team who called at a later date, explained the purpose of the study to them and sought their consent for participation. Appointments were booked with health workers who verbally agreed to participate, and a convenient day and time was agreed for their consent to be audio recorded and to commence the in-depth interviews.

DATA COLLECTION

Data collection was done from August through September 2021. Six FGDs with pregnant women and ten in-depth interviews (IDIs) with healthcare providers (HCPs) were used to collect data from study participants. The decision to conduct IDIs was informed by the difficulty in getting them together as a group due to their different work schedules and low numbers per facility. The FGD and IDI question guides were developed based on the study objectives and tested for relevance through a pre-test in a different facility. The topics explored included pregnant women's experiences of ANC services and use of IFA, knowledge of anaemia prevention and management, perceptions about importance of IFA, and barriers to IFA use. Pregnant women's perceptions on participating in designing optimal pregnancy interventions and suggestions for improving ANC services and adherence to IFA were also explored. Data gathered from health workers included their perspectives on ANC attendance, protocol for delivering care, information shared during ANC and their perceptions on women's attitude to the use of IFA. Participants' socio-demographic and employment data including age, marital status, highest educational attainment, number of children ever born, and employment status and years of service were collected.

All the FGDs and IDIs were conducted at the premises of the selected health facilities. The IDI and FGD settings were selected to be suitable to participants and with strict adherence to all COVID-19 protocols that were in place during 2021. Two research fellows, a male and a female, moderated the discussions. They were supported by two research assistants who took notes and managed the audio-

recorders. IDIs Interviews and FGDs were conducted in English and Twi languages, as appropriate. IDIs and FGDs were audio-recorded with participants' consent. The durations of the interviews and discussions ranged from half an hour to an hour and a half, depending on the number of languages used-

DATA CODING, MANAGEMENT, AND ANALYSES

All audio-recorded interviews were transcribed into English by trained transcribers from University of Ghana. Transcribed data were reviewed by listening to the audios to ensure consistency by one of the researchers (SZA). Notes taken during interviews and focus group discussions were coded to identify emerging themes and issues in need of follow-up, and to ensure that response saturation was reached for each of the questions asked. Transcripts were deductively analysed using a thematic analysis approach (Braun and Clarke 2012) and guided by a-priori themes/topics on the IDIs and focus group discussion guides.

Additionally, inductive analysis was used to identify emerging themes (Byrne 2022). The analyses involved thoroughly reading a few of the transcripts for familiarization with issues while coding all responses, systematically. This initial coding informed the development of two codebooks - one for pregnant women and the other for providers.

The codebooks comprised the main themes, their sub-themes, and operational definitions. Each sub-theme or code was defined to standardize the coding process between coders. Two members of the research team coded the data set and collated the themes and sub-themes. These themes and sub-themes were, again, reviewed by three senior members of the research team before the writing out of the results. The draft codebooks were reviewed by the rest of the research team, and then used to inform the coding of the rest of the transcripts. Quotations were identified to illustrate themes/sub-themes/codes.

ETHICAL CONSIDERATION

The study was approved by the Ghana Health Service Ethic Review Committee (GHS-ERC: 005/O3/21) and the University of Central Lancashire ethics committee (HEALTH 0147). Permission was also obtained from the management of the two selected facilities. Informed consent was obtained from all participants prior to data collection. All participants were told they had the right to withdraw from the study at any time. Participants were given identity numbers to conceal their identities and names of facilities withheld for ethical reasons. Transcribed data were transferred to University of Central Lancashire (UCLan) through OneDrive and securely stored in accordance with UCLan and University of Ghana data protection and ethics protocols.

At the time of data collection (2021), COVID-19 was at its peak, and this posed ethical challenges in respect of potentially enhancing spread of the infection among participants and the study team. The research team therefore took measures to avert any adverse outcomes by enforcing all the Ghana Health Service's COVID-19 protocols including wearing of facial masks, enforcing social distancing during the discussions, holding discussions and interviews in open spaces at the health facilities and ensuring the use of sanitizers among participants as often as possible. Additionally, following recommendations from the

ethical committee of University of Central Lancashire and with patient safety in mind, the process of obtaining consent was changed from the use of hard paper consent forms to a verbal process which was much simpler and reduced the risk of COVID-19 infection. Although a consent form was still required, it functioned as a script read to participants, who, in turn, agreed verbally with each statement read to them. The process was audio recorded as a separate file from the interview/FGD.

RESULTS

BACKGROUND CHARACTERISTICS OF STUDY PARTICIPANTS
 Forty-eight pregnant women took part in the study. The socio-demographic information on pregnant women is shown in Table 1.

Table 1. Socio-demographic characteristics of participating pregnant women

Variables	Frequency (N=48)	Percentage (%)
Age (years)		
18-26	9	19
27-34	22	46
35-42	17	35
Marital status		
Single	7	15
Married	41	85
Gestational age		
1 - 12	1	2
13 - 26	13	27
27 - 40	34	71
Use of IFA		
No	0	0
Yes	48	100
Education		
Primary	4	8
JHS/Middle	7	15
SHS	13	27
Tertiary	24	50
Occupations		
None	3	6
Informal sector	28	58
Formal sector	17	36
Number of children		
None	15	31
1 - 3	28	58
4 - 6	5	11

SHS= Senior High School JHS= Junior High School
 IFA=Iron folic acid

Ten HCPs with varied expertise providing services for pregnant women participated in the study. Their background information is shown in Table 2.

THEMES

The three thematic areas linked with the objectives of the study that were identified are anaemia prevention and management; factors affecting adherence to IFA supplements among pregnant women and healthcare providers' current and suggested strategies to improve ANC attendance and adherence to IFA supplements.

THEME1: ANAEMIA PREVENTION AND MANAGEMENT

Three sub-themes were identified under this theme:

women's awareness of anaemia, symptoms, and causes; solutions to prevent and treat anaemia; and women's desire to know their anaemia status.

Table 2. Background information on health care providers

Variables	Frequency (N=10)	Percentage (%)
Sex		
Male	3	30
Female	7	70
Age		
31-40	6	60
41-50	3	30
50+	1	10
Job description		
Gynaecologist	1	10
Senior medical officer	2	20
Midwife officer	4	40
Public health nursing officer	2	20
Dietician	1	10
Years of professional practice		
2-10	4	40
11-20	5	50
More than 20	1	10
Years in facility		
2-5	4	40
6-9	4	40
10-25	2	20

WOMEN'S AWARENESS OF ANAEMIA, SYMPTOMS, AND CAUSES

Overall, pregnant women were knowledgeable about the causes of anaemia and how it may affect them. The predominant cause mentioned was sub-optimal diet. Other causes identified included failure to take medications and supplements, or not sleeping under a treated mosquito net (leading to malaria infection). Women also provided examples of anaemia symptoms:

"There is no strength in the body. Get tired easily, you would not be able to rest well. Sometimes your eyes would show you that your blood level is low. It will become white [pale]" (FGD 01- Facility B).

Other perceptions some women had about the indirect causes of IDA were having insufficient rest, overthinking, and stress, leading to poor eating habits

"Thinking a lot also stresses you and that can make you anaemic because you're not eating well" (FGD 6, Facility A)

SOLUTIONS TO PREVENT AND TREAT ANAEMIA

Participants confirmed that screening for anaemia was one of the solutions to preventing and treating anaemia. This activity comprised a physical examination followed by verification through laboratory tests such as full blood count. HCPs believed that a detailed physical examination was an indispensable preliminary activity in screening for anaemia:

"...I do general examination before I do labs. I can pick up an anaemia case because pale lips, conjunctiva is pale and sometimes the palms. Also, sometimes they even have puffy, pedal oedema. Yes, that's classical if the person has severe anaemia you could tell. Apart from

that, I've to do full blood count and look at the HB level. We've the values there, so I can tell, if I'm expecting 11g, which is the WHO standard" (IDI 10- Midwife).

There appeared to be adequate resources for laboratory testing for anaemia. Both facilities had the capacity to perform the tests whenever needed, although some women arrived at the clinic having taken their own tests from other laboratory service providers:

"There hasn't been any time when the lab was unable to check for full blood count. The only time patients will come with their own results from outside is when they're coming for their first visits, the booking visits. Some of them, you know, do the labs before they come here" (IDI 01- Midwife).

The consumption of a nutrient-rich diet (including vegetables, fruits, and meat) and drinking enough water were among the actions that pregnant women regarded as effective for the prevention and treatment of anaemia. The use of IFA supplements (sometimes referred to as drugs or medicines) was also acknowledged as important:

"Drink a lot of water, have enough rest, eat a nutritious diet, for example, beans, fish, egg, and foods you get strength from." (FGD 01- Facility B)

"We'll have to take the medicines (IFA) that they give us and eat well too" (FGD 01-Facility B).

"The vegetables and other foods they talked about; I think you should eat them. Also, vitamins help in the absorption of iron. So, while you're taking that one then you eat fruits as well so that they'll aid the absorption of the iron in your body" (FGD04 - Facility A).-

Additionally, some pregnant women mentioned a variety of local remedies and foods they ate to manage anaemia, including *Kwahu Nsusia* (African turkey berry), beetroot, waakye leaf (sorghum leaf), *bokoboko* leaf (water leaf), and *sobolo* (hibiscus flower). Whilst most insisted that IFA should also be taken to complement their diets, a few participants said that they did not need to take IFA supplements because they use local remedies, sometimes citing the influence of peers in their decision making.

"I boil waakye leaves in the traditional clay pot and drink it three times a day" (FGD04-Facility A -).

"I eat kontomire and turkey berries; they make my Hb [haemoglobin] levels okay" (FGD04-Facility A).

The influence of others was also evident in some women's decisions not to take IFA at all, believing them to be linked to fetal macrosomia and difficult births.

"Since my first born, I've not taken it (IFA) because I hear women say that "Oh, when you take the hospital medicine (IFA) your baby will become very fat and at delivery, you'll have difficult labour" (FGD 05-Facility A).

WOMEN'S DESIRE TO KNOW THEIR ANAEMIA STATUS

Women were happy to be tested for anaemia in pregnancy and there was consensus that their anaemia status should be determined by the HCPs since they are experts and know what was best for their clients. A pregnant woman stressed the level of trust bestowed on healthcare providers in respect of clinical examination of their pregnancy or health status:

"Please, they know everything so they should do it" (FGD 01-Facility B).

HCPs confirmed that most pregnant women wanted their

anaemia status to be determined and may sometimes even request a repeated test if they had some doubt about a previous one. One HCP described the situation:

"Some people even come to me that 'Oh, I'm not really okay with the full blood count I did, I still want to see if I'm okay'. Some people will say something like 'I usually have a good Hb level, but since I'm pregnant, things are going low, so can you request for me?'. Some come willingly, maybe when you do it, two weeks after, it's okay but they still want to do it again" (IDI, 08 - Midwife).

There was some concern, however, about the frequency with which their blood samples were drawn for analysis. One woman expressed her concern to her provider:

"The other day I was asking the midwife about my blood level being low. I came last week, and she took a sample. This week too she has taken another sample. Isn't she draining the little that I have? If it's low, then I think we should not be taking it every week" (FGD 04-Facility A).

Although most pregnant women indicated their desire to know their laboratory test results, they complained that, in some cases, HCPs did not discuss the results with them. They would prefer to have the opportunity to ask questions about their test results, particularly with their doctor:

"It's the labs. Sometimes they'll run them and tell you they found nothing. Then you must go. But at least, they should let you see the results as done in other places – they'll print them for you, then you go through, and see other test results. It may not be only the FBC [full blood count] and Hb that they want. But other issues are there, so you can also see them yourself and ask the doctor questions such as "so Doctor what's it?" "This one is short, this one is high, this one is this, so what does that mean?" The doctor will explain them to you but here, they'll just tell you, "Everything is okay" ..." (FGD 05-Facility A).

Some pregnant women indicated that they would like the HCPs to explain the reasons for requesting the laboratory examinations so they can make informed decisions:

"Sometimes, when they ask me to do a particular test, I want to know why I should do it. I insist to know the whys and how it is going to affect me" (FGD 06 - Facility A).

THEME 2: FACTORS AFFECTING ADHERENCE TO IFA AMONG PREGNANT WOMEN

Several factors affected the uptake of IFA among pregnant women. These factors fall under five sub-themes namely: women's knowledge, understanding and access to IFA supplements; women's choices and preferences for IFA; women's interactions with HCPs related to anaemia/IFA; perceived positive and negative effects of using IFA; and motivations and barriers to IFA use.

WOMEN'S KNOWLEDGE, UNDERSTANDING AND ACCESS TO IFA SUPPLEMENTS

All pregnant women who participated in our study appeared to be familiar with the several types of prenatal supplement. Folic acid, iron and vitamin C were the most used. Participants linked IFA with improved haemoglobin levels, and many claimed that IFA boosted their overall health status. Many women also associated IFA with improved appetite, although some women also saw this as a negative aspect to taking IFA when resources were low:

“When I take it (IFA), I eat a lot, So, I’m okay with it” (FGD 01-Facility B).

“Instead of her taking the folic acid, she’ll not. She would say it makes her overeat and that she’ll not get money to buy food. Some people cannot afford food, so they would avoid taking drugs that make them hungry” (FGD 04-Facility A).

This contrasted with some HCPs’ perceptions, however, who reported that some women lacked knowledge about the importance of IFA.

“One thing I’ve also observed is that some ...don’t know the importance of it. It is just like you’re preaching; some would take the lesson, some won’t take it. Some will have their own means - the traditional ways of going for concoctions- trying to boost their haemoglobin and all that” (IDI, 02 - Public Health Nurse).

Pregnant women commonly received IFA during antenatal care services at the health facility. Prescribed supplements were given free of charge, although at one hospital, private patients were billed for all medicines supplied, including IFA:

“I started antenatal in the third month of pregnancy. So, when I came [to ANC]...they started to give me folic acid and iron tablets” (FGD 02 - Facility B).

“When I came [for ANC], they gave me folic acid and Zemcifer [a brand of IFA]” (FGD, 03- Facility B).

HCPs indicated that they offered all pregnant women access to IFA on their first antenatal visit. They stressed the importance of the first visit as a time of “orientation” for all pregnant women, as captured by one HCP:

“During the antenatal, the first visit is when you need to be educated on all the requirements and essential things to know throughout the pregnancy. So, on the first visit, there must be some education,” (IDI, 07 - Doctor).

HCPs explained that pregnant women were offered access to IFA by the midwives at registration or during their group education sessions. One HCP indicated that this form of access was marked by collaboration across HCPs within the health facility, including the dietetics, pharmacy, and gynaecology departments. Access to IFA was not limited to first visits but also extended to subsequent ANC visits. In the words of one HCP:

“And we do it subsequently too. Usually, we even call them on phone and ask them ‘Oh, have you taken your medicine?’ Especially those who have issues with taking the medicines can even come and say, ‘When I take the medicine, I’ve diarrhoea, I’ve issues’, so we’ve to change the medicines for them” (IDI, 08 - Midwife).

WOMEN’S CHOICES AND PREFERENCES FOR IFA

Pregnant women often cited preference for brands of IFA, such as Pregnacare, Modifin, Vitafole and Hymoclubin. Women perceived that these brands provided the best quantities and qualities of nutrients. They also preferred these brands because they require one daily dose rather than several daily doses of other brands:

“That one has more nutrients, and the nutrients too are of better quality than the folic acid. Pregnacare has an additional Omega 3 oil that’s also exceptionally good for the development of the foetus. The doctor was giving me that one- Pregnacare throughout. The doctor said that one tablet contains everything, so I don’t need to take several tablets together. It combines all the nutrients

into one capsule. When you take it, you’re done” (FGD 05-Facility A).

Some pregnant women reported that they had changed the brand of supplements they took, often due to consumer loyalty and flavor preference:

“Oh, all my previous pregnancies, I took Pregnacare but, with this one, they gave me the green ones, but I just feel I should go back and take what I used to take previously - Pregnacare - because when I take it, I am ok. The green ones do not give me any issues though” (FGD 04 -Facility A).

The frequency that women took IFA supplements ranged from one to three times a day. Reasons given for the frequency of consumption included compliance with providers’ instructions:

“It’s compulsory to take it twice so that is what I do. Because I do not have any other option, I take it twice a day” (FGD 02 - Facility B).

Most participants, however, indicated they did not take the supplements as recommended owing to forgetfulness:

“You’ll not intentionally put it down, but you will decide that, in the evening, you’ll take it. In the evening you’ll sleep, and your mind won’t be on it” (FGD 02 - Facility B).

Other factors influencing the frequency and time of taking IFA included adverse reactions such as nausea or being prescribed a higher dose.

“Morning sickness. Some people vomit in the morning a lot. So even if you take it, you’ll vomit it out” (FGD 03 - Facility B).

“When I was coming for the antenatal, I was asked to take it [IFA] twice but, the frequency was increased to 3 times when my blood level dropped.” (FGD, 06 - Facility A).

There was no consensus among pregnant women on the preferred frequency and time of taking IFA, which ranged from once weekly through once daily and twice daily to thrice daily. Some women described placing their supplements at vantage points as a reminder to take them:

“As for me, I place the IFA on my dining table where I normally sit to eat. So, when I finish eating, it’s right there on the table to remind me to take it” (FGD 01-Facility B).

Others appreciated the support given by their spouses to take their IFA. Two women explained the support they got:

I tell my husband that even if I forget to take my IFA and go to sleep, he should wake me up to take it.” (FGD 05 - Facility B).

The other day my husband gave me 100 cedis for taking my medicine.” (FGD 06 - Facility A).

WOMEN’S INTERACTIONS WITH HEALTHCARE PROVIDERS RELATED TO ANAEMIA/IFA

Pregnant women recalled having varied experiences of IFA-related interactions with HCPs. Negative experiences included being reluctant to disclose symptoms for fear of being referred to a doctor; and limited, hurried provider-dominated interaction:

“But some won’t even tell the midwife their stomachs are painning them because she’ll refer them to the doctor.” (FGD 01 - Facility B).

“We only go for the drugs but don’t usually get the opportunity to ask much about them...At the dispensary they indicate on the drug how many times you should

take it" (FGD 01-Facility B t).

Interestingly, women at the private hospital (Facility B) perceived their contact time with their HCPs as inadequate whilst most women at the public hospital (Facility A) felt that the time given to them by their HCP was adequate:

"My midwife only asks me how my body is doing and gives me medicine. We don't talk for long. She'll usually ask, "do you've medicine today?" and "are we done?" We don't exceed 3 minutes when talking." (FGD 01-Facility B).

"Twenty or 15 minutes but I think it's okay because I don't have any problems except my blood levels." (FGD 04 - Facility A).

Most pregnant women attributed the inadequacy of contact time given to discuss anaemia and strategies to prevent it to the large numbers of clients relative to HCPs. This imbalance created low provider-client ratios, which pregnant women understood. The following responses from two participants in the same facility confirmed this finding:

"Sometimes you're the only one inside and people outside are waiting to enter. The midwife only asks you about your health and then prescribes the drugs for you; she doesn't have time to talk a lot when there're others to attend to" (FGD 02 - Facility B).

"She'll answer in such a way that she'll be fast to attend to others. Even though it isn't rude, it may seem so" (FGD 01-Facility B).

In contrast, a few pregnant women attributed the inadequate contact time to their inability to wait owing to competing pressures on their time. A pregnant woman reiterated that:

"When we come, we're always in haste to go back because sometimes we've other things to do. These questions aren't usually necessary because we've the drugs already. Also, if you ask a question here, nobody will tell you about any kind of drug or even bother to ask you how you felt when you took the drug" (FGD 01-Facility B).

HCPs confirmed the perception of low provider-client ratio as a challenge. They explained that ANC attendance could exceed 150 women at any one time, and clinics are organized four times weekly. The inadequate provider-client contact time was, therefore, the product of the low provider-client ratio. According to a HCP:

"The numbers overwhelm the staff. We've a lot of clients but the nurses are few; so, the entire day, one can even come to work without eating and by the time one realizes it, one must send one's food back home to eat it" (IDI- 06 -Public Health Nurse).

POSITIVE AND NEGATIVE EFFECTS OF USING IFA

Pregnant women reported positive consequences associated with using IFA, including apparent (or reported) improvements in Hb levels, assumed improvements in their immune systems, sleep, and appetite. Women also reported that there were improvements in the health status of their unborn babies after taking IFA, evidenced by feeling their babies move more.

"My blood level was very low - 7.5 after taking Zencifer, it's now 10."

"Also, when you take the drugs, you can feel the baby kicking inside your womb." (FGD 01-Facility B).

"Before I started taking Bioferon, I was feeling dizzy. I felt easily fatigued, but since I started taking Bioferon, I'm okay. I haven't been experiencing the negative effects"

(FGD 04 - Facility A)

In contrast, some pregnant women reported that they experienced negative side effects after taking IFA, such as fatigue, loss of appetite, dizziness, nausea and vomiting, heart burn, frequent bleeding, stomach upset or diarrhoea and sleeplessness.

"Madam, when I take Pregnacare, my heart keeps burning but my Aunt says I should continue taking it. My heart too is burning so what do I do now?" (FGD 06 - Facility A).

"The drug, the blood tonic [IFA] when I take it, it makes me sleep a lot. At least, I must be a bit active. I sleep a lot." (FGD 04 - Facility A,)

"When I take it, it makes me feel like I'm sick. When I don't take the medicine, I'm okay, but when I take it, I feel very inactive." (FGD 02- Facility B).

HCPs also confirmed that some women reported nausea and vomiting when taking IFA:

"...even with the medications we give, like folic acid, someone will say, "it makes me feel nauseous" (IDI 01-Midwife).

"Okay, some of them will say 'oh errm, after taking this I do vomit. I don't like taking this drug at all'" (IDI 03-Dietician).

Sometimes it was the sensory aspect of the IFA that made women feel nauseous:

"The smell of the combined folic acid and the vitamin C puts me off (nauseating) and so I won't take it at all. Rather, since we gain the same nutrients from orange and pineapple, which have Vitamin C, I'll choose them over the supplements because they're natural" (FGD 06 - Facility A).

HCPs linked nausea and other negative reactions to IFA with the tendency on the part of some pregnant women to stop taking IFA without notifying their providers. Reporting such negative side-effects encouraged providers to change dosage or usual routine intake of supplements to minimize the effects. Unfortunately, some pregnant women refused to disclose the information to their providers.

MOTIVATIONS AND BARRIERS TO IFA USE

HCPs and pregnant women reported diverse motivations for using IFA. Public educational and sensitization programs offered in health facilities were recognized as one of the main motivations. These programmes emphasize the importance of prevention through use of supplements prescribed by providers:

"[in the programs] We talk to them about anaemia prevention and intake of folic acid and other supplements we give them. We encourage them to take the IFA because they need it more, because when they weren't pregnant, they supplied blood to only themselves, but now, they're going to feed others in-utero so, they need a lot of blood to supply to the developing foetuses to prevent all the negative effects of anaemia -low birth weight, preterm delivery and postpartum depression in mothers" (IDI 01- Midwife).

Additionally, experiences gained from previous births were considered likely to motivate pregnant women to take their supplements. This motivation emerges even before the first ANC visit of the subsequent pregnancy:

"Some of them, especially those who have given birth before, might have started taking their folic acid and

other supplements at home” (IDI 09 - Midwife).

HCPs and pregnant women both reported that there were barriers to using IFA. Even though all pregnant women, in principle, had free access to IFA through ANC attendance, providers indicated that, in practice, access may be hindered by financial constraints related to traveling from distant locations to the health facility:

“But then, the reason for not coming, some of them cite financial constraints. Even though they’ve National Health Insurance, they’ll tell you they don’t have money to take buses to the hospital” (IDI, 09 - Doctor).

Single parenting was highlighted as a factor that could exacerbate the financial challenges to access:

“A friend of mine has never gotten any support/money from her partner and only gets help from her sister. Some of these problems are always from the men” (FGD 01 - Facility B).

IFA shortages at health facilities, due to factors such as widening access, may also hinder women’s access:

“Sometimes, we experience shortage. At first, we had but now we don’t, so we should’ve more iron folic supplementation for pregnant mothers. Initially, when it came, it was for adolescents then, later, I heard that they’d added the pregnant women and now we’ve run out of stock. Now, they’re dealing more with the adolescent girls and not the pregnant women. So, there should be improved availability of the folic acid and iron supplements so that every pregnant woman can also get it” (IDI 06 - Public Health Nurse).

Other barriers to access included women’s misconceptions about IFA. According to some HCPs, there was a perception among some women that the use of IFA was a mark of poverty or low socio-economic status. A provider confirmed this assertion:

“Iron supplementation has a lot of a local contempt as to whether it’s needed or not. In the white man’s country, deprived communities or minority groups are given iron supplements but the more developed or...sophisticated people aren’t given iron supplements. So, the thinking is that the lower one’s socio-economic status, the higher the chance that one will be iron deficient. That tends to play some role here.” (IDI 01- Midwife).

Low provider-client ratios were seen as a challenge when it came to screening for anaemia. Providers indicated that the high number of pregnant women attending a single ANC clinic can be overwhelming, not only for themselves but also for the pregnant women. Hence, the patience to wait and go through all the ANC processes including screening for anaemia may be unbearable for some pregnant women. HCPs indicated that the disproportionate provider-client ratio exerted heavy workloads on those who were inadequately motivated for their work. There were occasions when HCPs were forced by the overload to work without eating until they returned home.

Pregnant women sympathized with providers regarding the latter’s heavy workload and the barrier it posed to screening. Pregnant women saw the unpleasant circumstance of waiting for a long time as a challenge. Financial difficulties, low involvement of men in ANC, and some aspects of physical examination deterred some pregnant women from going for screening. Some of these barriers may, however, derive from socio-demographic characteristics such as low incomes and single-parenting.

THEME 3: HEALTHCARE PROVIDER’S CURRENT AND SUGGESTED STRATEGIES TO IMPROVE ANC ATTENDANCE AND UPTAKE OF IFA

HCPs described several approaches utilized to improve ANC attendance, and the prevention of and screening for anaemia. These approaches included organizing focused ANC at the community level through the assistance of community health nurses:

“We do small focus antenatal care. So, focus antenatal care here is more like we aren’t waiting for them to even come to us (at the clinic), We’re going out for them so, in communities, we’ve community health nurses who go out” (IDI 07- Doctor).

At the community level, mothers and mothers-in-law were given some education on the benefits of ANC attendance, screening for anaemia and IFA. Pregnant women were shown images of babies born with spinal abnormalities to motivate them to take the supplements and eat nutritious diets. An HCP gave an example of how she managed to convince a pregnant woman about the importance of taking supplements during one of such outreach activities:

“We show some of them pictures of children with spinal bifida. For instance, I personally showed a picture to somebody in a community and the person responded ‘yeah, I used to see it several times but now I don’t see it again.’ I told the person that it’s all because of the supplements they take. So, we encourage them to also encourage others to take supplements and eat nutritious diet in addition so that we can fight anaemia.” (IDI 02 - Public Health Nurse).

Scheduling ANC according to gestational age to discuss issues such as premature labour, helped in reducing the number of persons coming for ANC at the same time, thus, reducing congestion and its associated challenges and creating a more enabling environment for educating them on how to minimize risks:

“What we’re doing now is booking them according to their gestational age to try and manage the space, and to reduce the pressure on the providers even though emergency cases can be reported any time. Grouping them has cut down the number of clients we attend to in a day so that we can have time to address all their issues and give them the education and the information they need to prevent all the risks.” (IDI 02 - Public Health Nurse).

HCPs also stated that frequent personalized visits to expectant mothers was a strategy that they used to improve ANC:

“We give each pregnant woman a specific nurse who becomes more like her companion during the pregnancy period. So, they [the nurses] come, they know their clients’ homes and they go to see them there, not monthly, but frequently. They’ve basic equipment to check blood pressure - to do the same as we do at the clinic. Of course, they can’t do the labs but, as I said, there’re ways to check Hb, they’re simple...” (IDI 07- Doctor).

In situations where pregnant women were not assigned to specific nurses/midwives, phone calls were made to them to check on their health. The calls were also used to remind clients of their next ANC visit:

“I take their [phone] numbers, especially, those with the high-risk cases we screen, I’ve the data of those high-risk

women and we call them. We call them because some of them can frequently miss visits. They might say 'I'm tired, I won't come', but if I call again, then they say 'Eeei this woman, her work...eii...she has called me'. So, it encourages them" (IDI 10 - Midwife).

To improve IFA uptake, both HCPs and pregnant women emphasized the importance of awareness raising, including partners, facilitating self-direction among pregnant women, and client-centered maternal care in their suggestions. Specific strategies relating to raising awareness included educating women and their partners about eating a nutritious and varied diet.

"Involving males gives them a better understanding of what the pregnant woman goes through and, therefore, encourages them to support their pregnant women as much as possible." (IDI 03, Dietician).

"We've to educate the public, both men and women. In Ghana, husbands play a vital role so we can convince them that the anaemia status and of diet of the pregnant woman play a vital role in the development of the baby. Fortunately, we've a lot of green-leafy vegetables in Ghana which are inexpensive and if we could all eat more of these greens, they'll be cheaper ways of boosting everyone's Hb. Then they should come for antenatal visits and listen to what we've to say. If they've questions, they should always ask them." (IDI, 09 - Doctor).

Some pregnant women from Facility A suggested that their midwives should be the ones to provide the necessary information:

"The midwives need to educate us on the supplements that they're giving us so that we can appreciate them as we've said." (FGD 04 - Facility A).

A care provider suggested that hands-on food demonstrations conducted during ANC visits could be an approach to achieve effective awareness creation:

"During clinical visits, they should check their haemoglobin levels and, again, we should do the food demonstration with all the locally available food nutrients." (IDI 06 - Public Health Nurse)

A third provider suggested using a participatory approach and self-direction among pregnant women:

"I think we should allow clients to decide on what hematinic (IFA supplement) to take. We should!" (IDI 10 - Midwife).

Pregnant women were emphatic that they should be given the autonomy to be involved in the decision-making about their own care. In the words of one pregnant woman:

"It's about me. So, I want to be involved in everything. Everything concerning when to come for antenatal, the day to come for antenatal, when to come uhm, as I said if we're given certain supplements, we should be given options to choose from..." (FGD 04 - Facility A).

"You've to be involved. You must be involved. There should be an interaction as and when. I feel the tests we conduct all the time when we come here aren't important. That's my opinion on it because it's like this is a routine something so when you come, you must do it even if it's not applicable, you must do it no matter what." FGD 04 - Facility A).

As another pregnant woman states, having autonomy in all aspects of her pregnancy and birth would protect them from any mistakes that the HCPs may make:

"Because sometimes they make mistakes, I remember a week before I gave birth, my Hb was 10 and when I came back for the first visit with my baby, the nurse made a mistake and said my Hb had dropped to 9. She asked me to see the doctor. When they gave me the drug, I refused to take it because I knew it was up before I gave birth. The midwife then told me that it was a mistake. We're humans and we all make mistakes so we should be involved." (FGD 06 - Facility A).

Pregnant women called for a participatory approach that facilitates their self-direction as well as a client-centered, client-friendly maternal care system partly for purposes of boosting their self-esteem or respectability. They stressed the need for providers to make them understand the rationale for requesting for some laboratory tests at each ANC Visit:-

"Every time you come, they'll ask you to go to the lab... All I would say is that we should know the reasons for doing the labs. You can even go to the lab and be queried on the reason for coming and you'll not know because you've not been told." (FGD 04 - Facility A).

Communication in a common language was suggested not only to improve the quality of maternal care but also to spare some pregnant women the embarrassment they experience when they meet English-speaking providers. Two pregnant women expressed their sentiments:

"It really bothers me. We don't understand the English also." (FGD 04, Facility A)

"I also don't understand English. It's worrisome so they should investigate it." (FGD 04 - Facility A).

DISCUSSION

The present study set out to explore knowledge, causes, prevention, and management of anaemia among study participants who were pregnant women. It also explored factors affecting the use of IFA among participants as well as HCPs' strategies and sought suggestions for improving IFA uptake among pregnant women.

ANAEMIA SYMPTOMS, CAUSES, PREVENTION, AND MANAGEMENT

Pregnant women and HCPs were knowledgeable about anaemia and its causes, similar to findings reported elsewhere (Siekman et al. 2017; Balcha et al. 2023). Poor diets and failure to consume IFA were perceived as predominant causes. Regular intake of IFA, fruits, vegetables, and animal-source foods was the main strategy known for preventing and managing anaemia among pregnant women. This finding resonates with evidence where the commonest driver of anaemia is nutritional inadequacy derived from inadequate consumption of iron-rich foods, and iron and folic acid supplements (WHO 2023; Diana et al. 2019).

The elevated level of knowledge of anaemia and its causes found in this study may be attributed to the high proportion of participants who were literate, with some having had tertiary education and living in urban communities with high access to health information. Studies have shown that maternal education and urban residence are positively associated with knowledge of anaemia (Balcha, Eteffa, Tesfu, and Alemayehu 2023). Living in an urban location, where social amenities including healthcare services are easily accessible may also place urban dwellers

at an advantage in receiving relevant health information compared to residents in rural locations.

Various home remedies were used by some study participants to prevent and manage anaemia. Turkey berry (fruit of *Solanum torvum*), bokoboko (water-leaf plant), hibiscus flower juice (*Hibiscus sabdarffa -roselle*), locally known as sobolo, beetroot and waakye leaf (sorghum leaf) were some of the remedies used. The benefits of these remedies have been identified in other studies (Agbemafle et al. 2019; Asiedu-Darko 2010; Clifford et al. 2015; Glover-Amengor et al. 2017; Abugri et al. 2013). Turkey berry, for example, has been shown to be a reliable source of iron (Asiedu-Darko 2010). Pregnant women are, therefore, encouraged in many cultures to include these plants in their diets. Hibiscus flower, for example, is used to prepare a popular beverage (Teye et al. 2017). Waakye leaf is noted for its bioactive compounds including carotenoids, which enhances the production of vitamins A, E and B-complex, dietary fibre and other minerals (Abugri et al. 2013). But there is no scientific evidence indicating linkage between anaemia control and these remedies. Research is needed to validate the efficacies of these plants in improving haemoglobin status and their potential safety, especially in pregnancy (Asiedu-Darko 2010).

The study further revealed pregnant women's desire to know their anaemia status, partly because of the perception that it directly benefits them and their unborn babies. Knowing their anaemia status may therefore positively drive their willingness to assess their anaemia status in subsequent pregnancies. Women expressed confidence in their HCPs to test and manage anaemia. Previous studies have shown that patients with high confidence/trust in their health providers are more likely to seek care and adhere to taking their medications (Thom et al. 2021). Pregnant women mentioned three primary concerns about the determination of their anaemia status: not being told of the need for a laboratory test, frequency of drawing blood, and limited discussion of their tests results. These concerns, however, did not appear to deter them from taking the tests, presumably because of their perceived importance. It is recommended, however, that healthcare professionals should spend more time with women to discuss testing and explain the results to help facilitate compliance, minimize misconceptions, with the additional potential to motivate lifestyle modification.

The high levels of knowledge associated with the benefits of IFA consumption demonstrated by participants in the study may be derived from the routine educational messages shared with pregnant women during antenatal services and the elevated levels of education attained by most participants. Both providers and pregnant women indicated that the latter received extensive one-on-one counselling prior to being provided with IFA during either their first ante-natal or subsequent visits. Both providers and pregnant women indicated that IFA can be accessed free through government facilities but may also be purchased especially when facilities run short of supply. WHO recommends universal daily consumption of 30-60mg of iron and 0.4mg of folic acid by pregnant women for a minimum of 180 days (about 6 months) during pregnancy and continued consumption for six weeks postpartum in settings where anaemia is severe (prevalence of 40% or more) (WHO 2023; Billah et al. 2022; Wemakor et al. 2020). The

recommendation further states that where a woman is diagnosed with anaemia during pregnancy, her daily elemental iron should be increased to 120mg until her haemoglobin level rises to normal (110g/L or better) (WHO 2016). Ghana adopted this recommendation as part of its strategy to combat anaemia, with the National Health Insurance Scheme absorbing the cost (Wemakor et al. 2020).

Specifically, Ghana's approved dosage for pregnant women is a combined tablet of 60mg of iron (ferrous sulphate) and 0.4mg of folic acid once daily for at least 180 days from preconception to 6 weeks after birth (Ferka et al. 2024). Both pregnant women and providers in the current study confirmed the free access to IFA in their various facilities, but some pregnant women perceived the frequency of consuming IFA daily- up to three times - as a barrier to using the supplement. The practice of consuming IFA more than once daily reported by some pregnant women in the current study may appear to contradict the approved recommended dosage. A provider, however, explained that some doctors/dieticians recommended some pregnant women to consume higher doses (up to 200mg) of ferrous sulphate, owing to their very low haemoglobin levels. An HCP explained that giving a pregnant woman —up to 200mg of elemental iron for the treatment of iron deficiency anaemia was in line with the guidelines indicated in the British National Formulary (2022) and Ghana's Standard Treatment Guidelines (2017). Severely anaemic pregnant women are, therefore, encouraged to take ferrous sulphate tablets with elemental iron equivalent to 65mg three times daily to ensure adherence to the treatment daily dosage of 200mg of elemental iron. Adherence in this context, is the extent to which patients observe the intake/use of IFA the exact way their health professionals direct them to do (Singh 2017). A pregnant woman who does not take the exact dosage of IFA as recommended by her provider based on her need may, thus, be regarded as non-adherent to the latter's recommendations. Available data in Ghana indicate that between 58.7% and 79.9% pregnant women adhere to their daily consumption of IFA for a period of 90 days or more (Seidu, Gaa, and Mogre 2024) --although the recommended period in Ghana is 180 days or more (Ferka et al. 2024).

Other barriers to adherence include adverse reactions to IFA (including nausea, vomiting), financial cost of improved appetite, forgetfulness to take IFA, misconceptions, transportation cost to access IFA, and long waiting time at hospitals. Some of these barriers have been identified by previous studies (Desta et al. 2019; Bahati, Kairu-Wanyoike, and Nzioki 2021; Sedlander et al. 2020; Siekmans et al. 2017). Other misconceptions, including associating IFA intake with development of a big foetus, difficult labour, and mothers-in-law not being in favour of their daughters-in-law consuming it, were identified in India (Sedlander et al. 2020). Our findings further resonate with those in Afghanistan, Nigeria, and Senegal, where long waiting time and interpersonal factors including husbands, mothers-in-law and other family members taking the decision for pregnant women to go for antenatal care were common barriers to accessing and consuming IFA (Siekmans et al. 2017). Similar to findings in the current study, HCPs in Nigeria identified IFA shortage as a major barrier to IFA uptake (Siekmans et al. 2017).

FACTORS AFFECTING UPTAKE OF IFA AMONG PREGNANT

WOMEN

Women's choices and preferences regarding IFA were guided by several factors. The first was the quality and quantity of nutrients contained in a particular supplement as reported in a previous study (Marshall et al. 2022). The second factor was the frequency of daily doses, which were dependent on instructions given by HCPs. A study in Ethiopia, for instance, showed that pregnant women were frustrated about the frequency and recommended doses of pills (Abeje et al. 2023). Lower frequency of IFA intake has been associated with greater scope of convenience and less frequent side-effects including vomiting (Billah et al. 2022). The flavours of IFA and consumer loyalty were other drivers of intake. Pleasant flavour may be less likely than unpleasant flavour to generate vomiting, nausea, and similar negative reactions to IFA (Gonella and Dimonte 2016). Forgetfulness on the part of some pregnant women hindered IFA adherence, as reported in several other studies (Kassa et al. 2019; Bahati, Kairu-Wanyoike, and Nzioki 2021; Tegodan et al. 2021). An enabler for taking IFA mentioned by pregnant women and HCPs was placing supplements at vantage points for purposes of reminding pregnant women to take them. Spousal support was also reported to enhance pregnant women's perception of the usefulness and uptake of IFA. Similar findings have been reported elsewhere (Simuyemba1 et al 2020; Arisukwu et al. 2021).

Pregnant women in the current study reported negative effects of IFA including fatigue, poor appetite for food, dizziness, nausea, vomiting, heart burn, frequent bleeding, stomach upset/diarrhea and sleepiness. Similar findings have been reported elsewhere (Mukhopadhyay et al. 2004; Tegodan et al. 2021; Bahati et al. 2021; Siekmans et al. 2017). Despite the perceived negative effects of taking IFA, most pregnant women were motivated to use IFA for several reasons. The foremost factor may have been the effectiveness of facility-based public education/awareness creation and sensitization programmes. Such programmes can enhance awareness of the potential benefits and cost of alternative medications, treatment, control, and management options (WHO 2012). They also can address misguided fears, prejudices, and misconceptions. Clients and spouses may, thereby, be enabled to make informed decisions regarding IFA choices and preferences and frequency of taking it. Beneficiaries of awareness creation programmes may become more aware of the dangers of anaemia related to non-use of IFA. Pregnant women may be motivated to use IFA by the impact of their IFA-related experiences and their perceptions of its usefulness (Mekonnen et al. 2021). Experience, fondly labelled "the best teacher", focuses on taking preventive rather than curative measures. Positive experiences motivate maximization of awareness of the benefits of IFA. A blend of foresight and hindsight may motivate using IFA.

HCPs and pregnant women assessed the availability of anaemia screening as adequate. Availability may relate to the demands of the official policy on screening as a mandatory component of ANC. It may also relate to reports of the benefits of screening and the attendant increased patronage. The foremost barrier to screening for anaemia was identified as the heavy HCP workload emanating from low provider-client ratios (Darmawati et al. 2020). Pregnant women may be deterred from seeking screening services by the long queues and waiting periods that result from the

considerable number of tests on ANC days. Finance posed a barrier to screening among some women. Some tests fall outside the schedule of expenses that are eligible for national health insurance coverage/subsidies. Transport expenses borne by pregnant women from distant locations may pose barriers to screening. In other studies, low male-involvement in ANC attendance and issues, low incomes, single parenthood, and other socio-demographic characteristics were identified as major barriers to screening (Darmawati, et al. 2017). Pregnant women may feel motivated by the involvement of males in ANC issues by assuring them of the solidarity and practical support needed from husbands/partners and other male relatives. Unpleasant aspects of physical examination reported in the current study posed a barrier to some pregnant women, as reported elsewhere (Chimatiro et al. 2018).

HEALTHCARE PROVIDERS' CURRENT AND SUGGESTED STRATEGIES TO IMPROVE ANC ATTENDANCE AND IFA UPTAKE

Community-level focused ANC, follow-up visits, and phone calls were providers' strategies to improve IFA uptake. These strategies have been adopted elsewhere with positive impact on IFA consumption (Alive and Thrive 2022). Those interventions included counselling husbands on support for pregnant women and counselling on IFA supplementation, weight-gain monitoring and dietary quality (Alive and Thrive 2022). In the current study, both participant groups suggested community sensitization/awareness creation on IFA, a participatory approach to ANC services that facilitates self-direction among women, and client-centred/client-friendly maternal care to improve IFA uptake. Similar strategies have been suggested in earlier studies (KendraSiekmans et al. 2017; Kavle and Landry 2017). Using relevant languages/dialects for sensitization could enhance the effectiveness of IFA programmes in a situation such as the current one, in which English was a limiting factor.

LIMITATIONS

The pregnant women were selected by their healthcare providers with a risk for potential selection bias. Participants may have also felt obliged to provide "presumably acceptable" responses which may not reflect their actual practices. However, to address this issue, all interviews and focus group discussions were conducted in the absence of the healthcare providers in the respective facilities. Participants were also encouraged to be as candid as possible to share their lived experiences and perceptions as they could lead to targeted interventions to address their peculiar situation.

Another potential weakness/limitation of the study was the reliance on self-reported experiences of participants where they might under-report, forget or exaggerate their experiences/responses. To minimize the potential negative effect of bias in self-reported experience on the quality of data gathered, participants' responses were probed further during the discussions and interviews. Also, issues raised by participants in one discussion group/interview were brought up in subsequent discussions and interviews for confirmation and elaboration.

The study did not collect data on participants' socio-demographic characteristics, variables which might have enhanced understanding of their responses, given the diversity of socio-economic characteristics related to the metropolitan setting of Accra.

Using only qualitative methods of enquiry was a

limitation to the study; however, the study was limited by the funding available. The small sample size from only two health facilities in only one region is probably not representative of pregnant women in the whole country. Again, only pregnant women attending the selected healthcare facilities were included in the study, thus, limiting the generalizability of the study findings to all pregnant women in Ghana and others in similar contexts. The findings of the study should, therefore, be interpreted with caution.

CONCLUSIONS AND RECOMMENDATIONS

Both participant groups – pregnant women and HCPs - agree that IFA is potentially beneficial to pregnant women, and their unborn babies. Its availability, access and usage are hindered by the interaction of micro-environmental (personal and inter-personal level) and macro-environmental (community-level and health sector/institutional-level) factors. Strategies for improving intake of IFA should be multi-dimensional in scope and orientation. Ghana must make the combined iron folic acid tablet/capsule/syrup accessible to pregnant women to facilitate a single daily intake of IFA, as indicated in the WHO recommendation. Furthermore, pregnant women be encouraged by their healthcare providers to avoid taking vitamin C supplements (or multivitamin) at the same time as their iron tablets to prevent some of the side effects identified in this study.

It is also recommended that future studies should incorporate quantitative methods to complement the qualitative insights and broaden the statistical context of the findings. Additionally, a follow-up study to implement the strategies suggested for improving IFA intake in health facilities as well as measure the outcomes would be useful in providing evidence for their effectiveness. It is further

recommended that a randomized control trial to assess the efficacy of home-remedies identified in the current study for the prevention and management of anaemia in pregnancy.

AUTHOR CONTRIBUTIONS

HO and RA conceptualized the study; HO, VHM, NML, RA, SAA and SZA contributed to the development of the protocol; SZA, GE, and RA conducted the field data collection; SZA, RA, VMH and GE conducted quality checks and analysed the data; SZA, RA, and VHM drafted manuscript with contribution from other authors. All authors reviewed and approved the final manuscript.

CONFLICT OF INTEREST

None

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REFERENCES

- Abeje, Seblework, Yirgalem Yosef, and Yohannes Fikadu. 2023. "Assessment of Iron-Folate Adherence and Associated Factors Among Pregnant Women in Public Health Facilities of Durame Town, Southern Ethiopia." *Perinatal Nursing and Midwifery* 9:1-8. doi: 10.1177/23779608231189964.
- Abugri, D A, B J Tiimob, V A Apalangya, G Pritchett, and W H McElhenney. 2013. "Bioactive and nutritive compounds in Sorghum bicolor (Guinea corn) red leaves and their health implication." *Food Chemistry* 138 (1):718-723.
- Agbemaflle, Isaac, Sarah L Francis, Helen H Jensen, and Manju B Reddy. 2019. "Influence of Food Security Status and Anemia-Related Knowledge on Perceptions About 2 Nutritious Underutilized Foods Among Ghanaian Caregivers." *Food and Nutrition Bulletin* 40 (4):488-503. doi: DOI: 10.1177/0379572119863561.
- Alive, and Thrive. 2022. Strengthening Maternal Nutrition in Antenatal Care Services: results from implementation research in Ethiopia and India. Alive and thrive.
- Arisukwu, O, C O Igbolekwu, I A Oyekola, E J Oyeyipo, F F Asamu, and O N Osueke. 2021. "Spousal support during pregnancy in the Nigerian rural context: a mixed methods study." *BMC Pregnancy and Childbirth* 21 (772). doi: <https://doi.org/10.1186/s12884-021-04135-3>.
- Asiedu-Darko, E. 2010. "A survey of indigenous knowledge about food and medicinal properties of Solanum torvum in East akim District of Eastern Region of Ghana." *Ghana J Agric Sci* 43 (1):61-64.
- Ba, Djibril M, Paddy Ssentongo, Kristen H Kjerulff, Muzi Na, Guodong Liu, Xiang Gao, and Ping Du. 2019. "Adherence to Iron Supplementation in 22 Sub-Saharan African Countries and Associated Factors among Pregnant Women: A Large Population-Based Study." *Curr Dev Nutr* 3 (12):nzz120. doi: 10.1093/cdn/nzz120.
- Bahati, Felix, Salome Kairu-Wanyoike, and Japheth Mativo Nzioki. 2021. "Adherence to iron and folic acid supplementation during pregnancy among postnatal mothers seeking maternal and child healthcare at Kakamega level 5 hospital in Kenya: a cross-sectional study." *Wellcome Open Research* 6 (80). doi: <https://doi.org/10.12688/wellcomeopenres.16699.2>.
- Balcha, Wondu Feyisa, Tola Eteffa, Azimeraw Arega Tesfu, and Bezawit Abeje Alemayehu. 2023. "Maternal Knowledge of Anemia and Adherence to its Prevention Strategies: A Health Facility-Based Cross-Sectional Study Design." *Inquiry: The Journal of Health Care Organization, Provision, and Financing* 60:1-12. doi: <http://dx.doi.org/10.1177/10707406094569850820321311667773>
- 1.
- Billah, Sk Masum, Camille Raynes-Greenow, Nazia Binte Ali, Farhana Karim, Sharif Uddin Lotus, Rashidul Azad, Mayang Sari, Piyali Mustaphi, Maniruzzaman, Shah Mohammad Mustafizur Rahman, Michael John Dibley, Patrick John Kelly, and Shams El Arifeen. 2022. "Iron and Folic Acid Supplementation in Pregnancy: Findings from the Baseline Assessment of a Maternal Nutrition Service Programme in Bangladesh." *Nutrients* 14 (3114). doi: <https://doi.org/10.3390/nu14153114>.
- Braun, V, and V Clarke. 2012. *Thematic analysis*. Edited by P. M. Camic In H. Cooper, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds),. Vol. 2, *APA handbook of research methods in psychology, Vol. 2: Research designs: Quantitative, qualitative, neuropsychological, and biological*. Washington, DC: American Psychological Association.
- Byrne, David. 2022. "A worked example of Braun and Clarke's approach to reflexive thematic analysis." *Quality & Quantity* 56:1391-1412. doi: <https://doi.org/10.1007/s11135-021-01182-y>.
- Chimatiro, Chancy S, Precious Hajison, Effie Chipeta, and Adamson S Muula. 2018. "Understanding barriers preventing pregnant women from starting antenatal clinic in the first trimester of pregnancy in Ntcheu District-Malawi." *Reproductive Health* 15 (158). doi: <https://doi.org/10.1186/s12978-018-0605-5>.
- Clifford, T, G Howatson, D J West, and E J Stevenson. 2015. "The potential benefits of red beetroot supplementation in health and disease." *Nutrients* 7 (4):2801-2822.
- Darmawati, Darmawati, Tongku N Siregar, Hajjul Kamil, and Teuku Tahlil. 2020. "Barriers to Health Workers in Iron Deficiency Anemia Prevention among Indonesian Pregnant Women." *Hindawi Anemia* 2. doi: <https://doi.org/10.1155/2020/8597174>.
- Desta, Melaku, Bekalu Kassie, Habtamu Chanie, Henok Mulugeta, Tadesse Yirga, Habtamu Temesgen, Cheru Tesema Leshargie, and Yoseph Merkeb. 2019. "Adherence of iron and folic acid supplementation and determinants among pregnant women in Ethiopia: a systematic review and meta-analysis." *Reproductive Health* 16 (182). doi: <https://doi.org/10.1186/s12978-019-0848-9>.
- Diana, Rian, Ali Khomsan, Faisal Anwar, Dyan Fajar Christianti, Rendra Kusuma, and Riris Diana Rachmayanti. 2019. "Dietary Quantity and Diversity among Anemic Pregnant Women in Madura Island, Indonesia." *Journal of Nutrition and Metabolism* Article ID 2647230:7pages. doi: <https://doi.org/10.1155/2019/2647230>.
- Fan, Qianqian, Adriel Shao En Ong, Mariko Siyue Koh, and Kinjal Doshi. 2021. "The mediating role of trust in physician and self-efficacy in understanding medication adherence in severe asthma." *Respiratory Medicine* 190 (106673). doi: <https://doi.org/10.1016/j.rmed.2021.106673>.
- Ferka, Listowel, Akwasi Kumi-Kyereme, Naomi Kyeremaa Yeboa, and Isaac Kweku Adu. 2024. "Pregnant women's perceptions of daily iron supplementation in rural Ghana." *British Journal of Midwifery* 32 (2). doi: 10.12968/bjom.2024.32.2.77
- GBD-2021-Anaemia-Collaborators. 2023. "Prevalence, years lived with disability, and trends in anaemia burden by severity and cause, 1990-2021: findings from the Global Burden of Disease Study 2021." *Lancet Haematol*. doi: [https://doi.org/10.1016/S2352-3026\(23\)00160-6](https://doi.org/10.1016/S2352-3026(23)00160-6).
- Glover-Amengor, M, R Aryeetey, E Afari, and A Nyarko. 2017. "Micronutrient composition and acceptability of Moringa oleifera leaf-fortified dishes by children in Ada-East district, Ghana." *Food Science & Nutrition* 5 (2):317-323.
- Gonella, Silvia, and Valerio Dimonte. 2016. "Potential Effects of Pleasant and Cold Stimuli on Nausea and Vomiting

- Induced by Disgusting Tastes." *Journal of Neuroscience Research* 94:366–377.
- GSS, GHS, and ICF. 2023. Ghana Demographic and Health Survey 2022: Key Indicators Report. Rockville, Maryland, USA: Ghana Statistical Service.
- Kassa, Zemenu Yohannes, Tegibelu Awwaris, Alemneh Kabeta Daba, and Zelalem Tenaw. 2019. "Compliance with iron folic acid and associated factors among pregnant women through pill count in Hawassa city, South Ethiopia: a community based cross-sectional study." *Reproductive Health* 16 (14). doi: <https://doi.org/10.1186/s12978-019-0679-8>.
- Kavle, J A, and M Landry. 2017. "Addressing barriers to maternal nutrition in low- and middle-income countries: A review of the evidence and programme implications." *Maternal and Child Nutrition* 14.
- Kendra Siekmans, Marion Roche, Jacqueline K Kung'u, Rachele E Desrochers, and Luz Maria De-Regil. 2017. "Barriers and enablers for iron folic acid (IFA) supplementation in pregnant women." *Maternal & Child Nutrition* 14 (S5):e12532. doi: DOI: 10.1111/mcn.12532.
- Marshall, Nicole E, Barbara Abrams, Linda A Barbour, Patrick Catalano, Parul Christian, Jacob E Friedman, William W Hay, Teri L Hernandez, Nancy F Krebs, Emily Oken, Jonathan Q Purnell, James M Roberts, Hora Soltani, Jacqueline Wallace, and Kent L Thornburg. 2022. "The importance of nutrition in pregnancy and lactation: lifelong consequences." *Am J Obstet Gynecol.* 226 (5):607–632. doi: doi:10.1016/j.ajog.2021.12.035.
- McLean, E, M Cogswell, I Egli, D Wojdyla, and B de Benoist. 2009. "Worldwide prevalence of anaemia, WHO vitamin and mineral nutrition information system, 1993–2005." *Public Health Nutrition* 12:444–454.
- Mekonnen, Abebe, Walleign Alemnew, Zegeye Abebe, and Getu Debalkie Demissie. 2021. "Adherence to Iron with Folic Acid Supplementation Among Pregnant Women Attending Antenatal Care in Public Health Centers in Simada District, Northwest Ethiopia: Using Health Belief Model Perspective." *Patient Preference and Adherence* 15 843–851. doi: <http://doi.org/10.2147/PPA.S299294>
- MOH. 2017. *Standard Treatment Guidelines*. 7th ed. Accra, Ghana: Ministry of Health.
- Mukhopadhyay, Asima, Neerja Bhatla, Alka Kriplani, Ravindra M Pandey, and Renu Saxena. 2004. "Daily versus intermittent iron supplementation in pregnant women: Hematological and pregnancy outcome." *J Obstet Gynaecol Res* 30 (6):409–417.
- Peña-Rosas, J P, L M De-Regil, M N Garcia-Casal, and T Dowswell. 2015. "Daily oral iron supplementation during pregnancy." *Cochrane Database of Systematic Reviews* 7.
- Petry, N, I Olofin, R F Hurrell, E Boy, J P Wirth, M Moursi, and F Rohner. 2016. "The proportion of anemia associated with iron deficiency in low, medium, and high human development index countries: A systematic analysis of national surveys." *Nutrients* 8 (11):1–17.
- Sedlander, Erica, Michael W Long, Satyanarayan Mohanty, Ashita Munjral, Jeffrey B Bingenheimer, Hagere Yilma, and Rajiv N Rimal. 2020. "Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India." *BMC Public Health* 20 (457). doi: <https://doi.org/10.1186/s12889-020-08574-z>.
- Seidu, Haruna, Patience Kanyiri Gaa, and Victor Mogre. 2024. "Adherence to Iron and Folic Acid Supplementation Among Pregnant Women from Northern Ghana." *Nutrition and Metabolic Insights* 17 (1–11). doi: 01.1177876/131878263818221381626184664
- Siekmans, K, M Roche M, J K Kung'u, R E Desrochers, and L M De-Regil. 2017. "Barriers and enablers for iron folic acid (IFA) supplementation in pregnant women." *Maternal & Child Nutrition* 14 ((Suppl 5)e12532).
- Simuyemba1, Moses C, Phoebe A Bwembya, Mumbi Chola, and Charles Michelo. 2020. "A root cause analysis of sub-optimal uptake and compliance to iron and folic acid supplementation in pregnancy in 7 districts of Zambia." *BMC Pregnancy and Childbirth* (2020) 20:2020 (20). doi: <https://doi.org/10.1186/s12884-019-2700-1>.
- Singh, Pooja. 2017. "Medication adherence: adjunct to patient outcomes." *J Pract Cardiovasc Sci* 3 (8). doi: 10.4103/jpcs.jpcs_10_17
- SPRING. 2016. Ghana: Landscape Analysis of Anemia and Anemia Programming. In *Arlington, VA: Strengthening Partnerships, Results, and Innovations in Nutrition Globally (SPRING) project*. Ghana: Ghana Health Service.
- Stevens, Gretchen A, Mariel M Finucane, Luz Maria De-Regil, Christopher J Paciorek, Seth R Flaxman, Francesco Branca, Juan Pablo Peña-Rosas, Zulfi qar A Bhutta, and Majid Ezzati. 2013. "Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: a systematic analysis of population-representative data." *Lancet Global Health* 1 (1):e16–e25. doi: DOI: 10.1016/S2214-109X(13)70001-9.
- Stevens, Gretchen A, Christopher J Paciorek, Monica C Flores-Urrutia, Elaine Borghi, Sorrel Namaste, James P Wirth, Parminder S Suchdev, Majid Ezzati, Fabian Rohner, Seth R Flaxman, and Lisa M Rogers. 2022. "National, regional, and global estimates of anaemia by severity in women and children for 2000–19: a pooled analysis of population-representative data." *Lancet Glob Health* 10 (e627–39).
- Tegodan, E, G Tura, and A Kebede. 2021. "Adherence to Iron and Folic Acid Supplements and Associated Factors Among Pregnant Mothers Attending ANC at Gulele Sub-City Government Health Centers in Addis Ababa, Ethiopia." *Patient Preference and Adherence* 15. doi: <https://doi.org/10.2147/PPA.S301630>.
- Teye, Ernest, Philip Fiifi Owusu, Ransford Opoku Darko, and Frank Kwekucher Ackah. 2017. "Evaluation of composite tea made from roselle (*Hibiscus sabdarffa*), ginger (*Zingiber officinale*) and turkey berry (*Solanum torvum*)." *African Journal of Food and Integrated Agriculture* 1:39 - 44. doi: doi:10.25218/ajfia.2017.01.001.06.
- Thom, D H, M A Hall, and L G Pawlson. 2004. "Measuring patients' trust in physicians when assessing quality of care." *Health Aff (Millwood)* 23:124–132.
- Totade, Manisha, Abhay Gaidhane, and Palash Sahu. 2023. "Interventions in Maternal Anaemia to Reduce Maternal Mortality Rate Across India." *Cureus* 15 (10):e46617. doi: DOI: 10.7759/cureus.46617.
- USAID. 2011. Are We Making Progress on Reducing Anemia in Women? Cross-country Comparison of Anemia Prevalence, Reach, and Use of Antenatal Care and Anemia Reduction Interventions.
- USAID. 2023. Tackling anaemia in Ghana's North East Region.
- Wemakor, Anthony, Humphrey Garti, Mark Maccarthy Akai,

- Abdulai Ayishatu Napari, and Jennifer Dankyi-Frimpoomaa. 2020. "Prevalence and factors associated with compliance to iron and folic acid supplementation in pregnancy in Tamale Metropolis, Ghana." *Nutrire* 45 (2).
- WHO. 2012. Health education: theoretical concepts, effective strategies and core competencies.
- WHO. 2016. WHO recommendations on antenatal care for a positive pregnancy experience. WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland: WHO.
- WHO. 2017. Nutritional anaemias: Tools for effective prevention and control. Geneva, Switzerland: WHO.
- WHO. 2023. Accelerating anaemia reduction: a comprehensive framework for action Geneva: World Health Organization.
- Wirth, J, B Woodruff B, R Engle-Stone, S M Namaste, N Petry N, B Macdonald, and G Aaron. 2017. "Predictors of anemia in women of reproductive age: Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) project." *AJCN*, 106(1) 106 (1):416S– 427S.