Effect of counselling and text message reminder on the uptake and adherence of iron and folic acid supplements among pregnant women attending antenatal clinic in Gwagwalada, Abuja

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ABSTRACT

Background and Objectives: Innovative strategies are required to mitigate poor compliance to iron-folic acid supplementation and associated high burden of anaemia in Nigeria.

Objectives: This study was designed to assess how counselling and text message reminders could improve the uptake and adherence to iron-folic acid supplements among Nigerian pregnant women.

Methods: The study used a quasi-experimental design with a simple random sampling of 153 respondents equally allocated into three groups; counselling (A), counselling and text message reminders (B), and control (C). Adherence to the supplements was assessed using pill count and the 8-item Morisky adherence questionnaire. Parametric and nonparametric analyses were utilized to evaluate survey results across the two interventions.

Results: Age of respondents (years) was 31.23±5.05, 31.97±5.63 and 26.63±6.25 for Groups A, B and C, respectively. Self-report adherence was 71.96±13.62, 68.02±11.56, and 65.19±11.84 in group B, A and C, respectively. Folic acid adherence was 91.62±7.98, 89.61±8.62, and 88.57±14.10; while iron adherence was 91.29±8.03, 89.36±8.86 and 88.55±14.00 in group B, C and A, respectively. Group A was 2.6 times more likely to have poor folic acid adherence, 4.0 times more likely to have poor iron adherence and 1.6 times more likely to have poor self-report adherence compared to group B.

Conclusion: Counselling and text message reminders are more effective than antenatal counselling alone in improving uptake and adherence to iron-folic acid supplements among Nigerian pregnant women. Efforts to prevent iron deficiency anaemia among Nigeria women should incorporate counselling and text message reminders to enhance adherence to uptake and adherence to iron-folic acid supplements.

INTRODUCTION

Anaemia constitutes a global public health problem, especially for women of reproductive age in developing nations and affects approximately 42.6% of the general population [1]. Iron deficiency is a common nutritional

deficiency that causes anaemia, although anaemia can be caused by a variety of dietary deficiencies, including deficits in vitamins A, B_{12}, B_6, C, D, and E, as well as folate, riboflavin, copper, and zinc [2]. In Nigeria, anaemia is a major public health problem among women of reproductive age with 58% of women aged 15-49 years reporting some degree of anaemia, while 28% had mild and moderate anaemia [3].

The World Health Organization recommends that all pregnant women take a regular dose of 30–60 mg of iron and 400 g of folic acid during gestation as part of antenatal care services [4]. However, adherence remains poor and has not improved significantly in recent decades among low- and middle-income countries, including Nigeria [5]. Earlier studies have attributed low Iron-Folic Acid (IFA) supplement uptake and poor compliance to many factors including poor knowledge and understanding of its benefits, real or perceived side effects, a lack of comprehensive counselling from healthcare practitioners, and forgetfulness, among others [6, 7].

Iron and folate requirements are high during pregnancy, and the quantity of iron absorbed from the diet is insufficient to meet these needs [8]. As a result, if maternal supplementation is not provided throughout pregnancy, pregnant women are at significant risk of developing anaemia owing to iron and folate deficiencies [9]. Evidence has shown that women who failed to meet this increased requirement had a low iron store and the probability of presenting with iron and folate deficiency was high [10]. Consequences associated with iron and folic acid deficiency anaemia in pregnancy include fatigue, pallor, dyspnea, palpitations, migraines, leg cramps, cold sensitivity, disorientation, reduced immunological function, higher risk of heart disorders owing to inadequate haemoglobin, mortality in bleeding during birth, miscarriages, stillbirths, preterm, and low birth weight, and decreased maternal breast milk production [11–15].

Counselling is an effective tool used in Social Behaviour Change and Communication (SBCC) strategies. The health of individuals and communities can be improved through social behaviour change and communication, an evidence-based communication approach targeted at influencing observable, measurable action [16, 17]. It is impossible to overstate the importance of using social behaviour change and communication strategies, such as counselling, to enhance health outcomes over time [18]. When SBCC strategies are planned and executed locally, they are especially effective: they are suited to the local context realities, and they are locally accepted, owned, and driven [19].

Behaviour change interventions and reminders have been the primary focus of SMS (Short Message/Messaging Service) research in healthcare settings [20, 21]. According to the transtheoretical change model, reminders can pass educational information or cues that can help initiate possible behavioural changes [22]. Reminders can help with prospective memory, which is remembering to do something in the future [23, 24]. Automated SMS reminders or notifications can be sent to a user's phone, reminding them to do (or not do) something [25]. This study was designed to assess how IFA counselling and text message reminders could improve the adherence and uptake of IFA supplements among pregnant women attending antenatal care in Gwagwalada, FCT-Abuja. The specific objectives were to: (i) determine adherence and uptake of IFA supplements and (ii) determine the impact of implementation strategies on the uptake and adherence of IFA supplements.

METHODS
Study design
This study adopted a quasi-experimental design.

Study setting
The study was conducted in a primary health care facility (Gwagwalada Township Clinic) and tertiary health facility (University of Abuja Teaching Hospital), both located in Gwagwalada Area Council, Federal Capital Territory, Abuja.

Study Population
Pregnant women registered in the sampled health facilities within the study period constituted the study population. A pregnant woman was considered eligible for the study if she was aged 15-49 years, capable of verbal communication, consented to participate in the study, in her first, second and beginning of third trimester (had up to 90 days

before the expected date of delivery). A total of 153 pregnant women were enrolled in the study and they were allocated into three groups of 51 participants each; Counselling group, Text message reminder and counselling group, and Control group using a simple random sampling procedure.

Sampling Technique
University of Abuja Teaching Hospital and Gwagwalada Township Clinic were purposively selected for the study following ease of access and earlier training of the health care providers in these health facilities on nutrition assessment, counselling and maternal nutrition by the Federal Ministry of Health. Pregnant women were and allocated into three groups using simple random sampling procedure, after giving written consent. The researcher and research assistants recruited respondents from both health facilities during routine ANC visits till the required study sample size was reached.

Intervention
The intervention strategies were delivered in three modes. All groups (A, B and C) received IFA supplements for 90 days, Group (A and B) received IFA counselling and calendars containing information on IFA as well as frequently asked questions on IFA supplementation, while group C did not receive any intervention except the IFA supplements distributed to all groups. In addition to IFA counselling and calendars, group B received daily text message reminders which were sent every morning for the period of 90 days from the time of recruitment into the study. Group A and B were located at the University of Abuja Teaching Hospital, while group C was situated at the Gwagwalada township clinic Federal Capital Territory, Abuja. Counselling sessions were delivered during antenatal visits of respondents. IFA supplements were distributed at the end of each ANC session corresponding with the number of days for their next ANC appointment for three consecutive months after being recruited into the study. Calendars containing critical Social Behavioral Communication Change (SBCC) information about IFA regime, importance, and frequently asked questions on IFA were developed and pretested [26]. These IFA calendars were distributed to every respondent in the intervention groups A & B at the instance of recruitment into the study group. The SBCC calendars were to be read and taken home as reminders to take the supplements and as an additional source of information on IFA.

Daily Text Messaging
Daily customised text message reminders were sent to pregnant women in group B in the morning for a period of 90 days upon recruitment into the study. An already validated format of text message reminders from literature [27] was adapted to fit the purpose of the research. This reminder was sent daily to women in group B "Please take one tablet each of Fersolate (red tablet) and Folic acid (yellow tablet) today!"

Data Collection
Implementation strategies on the uptake and adherence of IFA supplements: The impact of implementation strategies on the uptake and adherence of IFA supplements was assessed as a consequence of stringent adherence to IFA supplementation.

Adherence to IFAS: Adherence to the IFA supplement was measured in two ways. First, pill counts were based on the quantity of pills left in the returned prescription bottles. The number of unused pills in the returned pill bottles was documented at each ANC return visit.
Pill count Adherence was calculated by the formula:
Adherence

$$= \frac{Initial\ number\ of\ pills\ in\ the\ bottle\ given - Number\ of\ pills\ remaining\ in\ the\ bottle}{Number\ of\ days\ between\ dispensing\ date\ and\ return\ date\ of\ the\ pill\ bottle} \times 100$$

Pill count adherence was presented based on a percentile (<50%, 50-74.9%, 75-79.9%, ≥80%). Respondents with 80% or more were categorized as having good adherence, while those with less than 80% were categorized as having poor adherence. Secondly, self-report adherence was assessed using an existing validated and standardized self-reported questionnaire, the 8-item Morisky Adherence Questionnaire (MAQ) [28]. Each question assessed a unique medication-taking behavior rather than a predictor of adherence behavior. For each question, the response categories were yes/no, with a dichotomous response and a 5-point Likert response for the last item. The maximum obtainable point for each question was one point, and the maximum obtainable point for each respondent was 8 points per visit. The total number of points scored by each respondent based on the number of visits was calculated and converted to percentage to categorize the self-report adherence, and respondents with 80% or more of their total obtainable points were categorized to have good adherence, while those with less than 80% were categorized to have poor adherence.

Statistical analysis

Questionnaires were screened for completeness, coded, and analysed using the IBM Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive statistics were used including employed means and standard deviation for numerical variables, and while frequency count and percentage were used for categorical variables. Inferential statistics such as analysis of variance, paired sample t-test, and Pearson Chi-square test were used to compare means and examine the significance level and relationship between categorical variables at $p<0.05$..

Ethical Approval

This study followed the ethical principles of respect of persons, beneficence and justice guiding the use of human respondents in research. Written informed consent was obtained before the commencement of the research. Ethical approval was obtained from the University of Ibadan/ University College Hospital Ethics Committee with approval number UI/EC/21/0386, and the University of Abuja Teaching Hospital Health Research Ethics Committee with approval number UATH/HREC/PR/2021/012/008.

RESULTS
Socio-demographic characteristics of the Pregnant Women

The socio-demographic characteristics of the respondents is presented in Table 1. The overall mean age was 30.17±6.03 years, higher in group A -Counseling (31.23±5.05 years) and group B-Text message reminder and counselling intervention group (31.97±5.63 years) compared to group C-Control (26.63±6.25 years). More respondents in Group B (82.9%) and A (67.7%) compared to C (40.7%) had tertiary education and more respondents in Group C (11.1%) than A (6.5%) and B (2.9%) had no formal education. Occupational distribution showed there were more housewives in Group C (33.3%) than B (22.9%) and A (9.7%). Overall household size was 3.52±1.69, and similar in Group A (3.39±1.31), B (3.66±1.61) and C (3.48±2.19). There were more respondents in the intervention groups (90.3% in Group A and 82.9% in Group B) compared to Group C (55.6%) with personal income. The study reveals that the distribution of age (p=0.012), education (p=0.016), occupation (p=0.001), husband's education (p=0.017), personal income (p=0.004) and monthly income (p=0.001) varies significantly across the groups. This implies that most of the socio-demographic characteristic of respondents was not evenly distributed.

Table 1: Socio-demographic characteristics of the Pregnant Women

Variable	All Respondents n(%)	Intervention Group Group A n(%)	Intervention Group Group B n(%)	Control Group Group C n(%)	P-value
Age (Years)					
≤20	3(3.2)	0(0.0)	0(0.0)	3(11.1)	
21-30	49(52.7)	13(41.9)	17(48.6)	19(70.4)	0.012
31-40	37(39.8)	17(54.8)	16(45.7)	4(14.8)	
>40	4(4.3)	1(3.2)	2(5.7)	1(3.7)	
Mean Age (±SD)	30.17±6.03	31.23±5.05	31.97±5.63	26.63±6.25	0.103
Religion					
Christian	57(61.3)	21(67.7)	24(68.6)	12(44.4)	0.016
Muslim	36(38.7)	10(32.3)	11(31.4)	15(55.6)	
Highest Education					
No formal Education	6(6.4)	2(6.50)	1(2.90)	3(11.1)	
Basic Education	6(6.4)	1(3.2)	1(2.9)	4(14.8)	
Senior Secondary	20(21.5)	7(22.6)	4(11.4)	9(33.3)	
Tertiary Education	61(65.6)	21(67.7)	29(82.9)	11(40.7)	
Present Occupation					0.001
House wife	20(21.5)	3(9.7)	8(22.9)	9(33.3)	
Civil servant	21(22.6)	9(29.0)	9(25.7)	3(11.1)	
Petty trader	15(16.1)	11(35.5)	0(0.0)	4(14.8)	
Artisan	6(6.5)	1(3.2)	1(2.9)	4(14.8)	

Others	31(33.3)	7(22.6)	17(48.6)	7(25.9)	0.017
Husband's Education					
No formal Education	2(2.2)	0(0.0)	0(0.0)	2(7.4)	
Basic Education	3(3.3)	1(3.2)	2(5.7)	0(0.0)	
Senior Secondary	15(16.1)	3(9.7)	2(5.7)	10(37.0)	
Tertiary Education	65(69.9)	25(80.6)	28(80.0)	12(44.4)	
Others	8(8.6)	2(6.5)	3(8.6)	3(11.1)	
Household size					0.157
<3	33(35.5)	11(35.5)	9(25.7)	13(48.1)	
3-5	52(55.9)	18(58.0)	24(68.6)	10(37.0)	
>5	8(8.6)	2(6.5)	2(5.7)	4(14.8)	
Mean	3.52±1.69	3.39±1.31	3.66±1.61	3.48±2.19	
Personal Income					0.004
Yes	72(77.4)	28(90.3)	29(82.9)	15(55.6)	
No	21(22.6)	3(9.7)	6(17.1)	12(44.4)	
Monthly income (Naira)					0.001
<30,000	6(6.5)	3(9.7)	0(0.0)	3(11.1)	
≥30,000	7(7.5)	5(16.1)	0(0.0)	2(7.4)	
Don't know/ not sure	59(63.4)	20(64.5)	29(82.9)	10(37.0)	
No Personal Income	21(22.6)	3(9.7)	6(17.1)	12(44.4)	
Total	93(100.0)	31(100.0)	35(100.0)	27(100.0)	

Obstetrics characteristics of the Pregnant Women

The reproductive parameters of the respondents are presented in Table 2. About one-third (32.3%) of the pregnant women in group A, 22.9% in B, and 29.6% in C were primigravida. More than one-third (38.7%) in group A, one-third (34.3%) in group B, and 33.3% in group C were nulliparous, and 22.6% in group A, 20% in B, and 29.6% in C were primiparous. About 23% of participants in group A, 28.6 in group B, and 33.3% in group C were in the first trimester of pregnancy while 71% in group A, 65.7% in group B, and 70.4% in group C were in the second trimester. Almost all (100% in group A, 97.1.2% in group B, and 100% in group C) had started attending antenatal clinics before the interview, while the remaining percentage were on their first antenatal visit. More than half (64.5%) of pregnant women in group A, 54.3% in group B, and 48.1% in group C had attended the antenatal clinic once before the interview, while 35.5%, 42.9%, and 51.9% had attended the antenatal clinic two or more times. There was no significant difference in obstetrics and health service factors distribution across the groups (p>0.05).

Self-report adherence and Pill count adherence among the Pregnant Women

The self-report and pill count adherences among the pregnant women are presented in Table 3. The self-report adherence to folic acid and iron supplement uptake was highest among the respondents in the counselling and text message reminder group (71.96±13.62), 68.02±11.56 in the counselling group and least in the control group (65.19±11.84). Pill count adherence mean score was highest in Counselling and Text message reminder Group (B) and least in the Counselling Group (A). Folic acid adherence was 91.62±7.98, 89.61±8.62 and 88.57±14.10 in groups B, C and A, respectively; however, there was no significant difference in the mean scores across the groups (p>0.05). Similarly, iron supplement intake adherence was highest in group B (91.29±8.03), followed by group C (89.36±8.86), while those in group A had the least (88.55±14.00), and there was no statistically significant difference in pill count adherence across the groups (p>0.05). These findings imply that counselling intervention given to participants in group A did not influence IFA supplement adherence, however, complementing the counselling with text reminders improved adherence among the pregnant women. The percentile distribution of pill count adherence across the groups is also presented in Table 3. Good adherence to folic acid supplementation was highest among the respondents in counselling and text message reminder group (B) with 91.4%, 81.5% among the respondents in the control group and 80.6% among the respondents in the counselling group. Likewise, good adherence to iron supplementation was highest among the respondents in the counselling and text message reminder group (94.3%) compared to 81.5% in the control group and 80.6% in the counselling group. There was no significant difference in the percentile distribution across the three groups.

Relationship between Obstetrics characteristics and Adherence to IFA supplementation

The relationship between obstetrics characteristics and adherence of the pregnant women to iron folic acid supplementation is presented in Tables 4 and 5. Self-report adherence is significantly associated with the number of children the pregnant women prior to current pregnancy. All other factors including the parity, gestational age, and prior attendance of antenatal clinic during the current were not significantly associated with self-report adherence. All the variables including gravida, parity, gestational age, and prior attendance of antenatal clinic during the current were not significantly associated with both folic acid and iron pill count adherence. Table 5 shows the odd ratio of respondents in group A (counselling) compared to group B (counselling and text message reminder). With counselling only, pregnant women were 2.6 times more likely to have poor folic acid pill count adherence when compared to pregnant women who had both counselling and text message reminder. Also, respondents who had only counselling were four times more likely to have poor iron pill count adherence when compared to respondents with both counselling and text message reminder; and 1.6 more likely to have poor self-

Table 2: Obstetrics characteristics of the participants

Variable	All Respondents	Intervention Group		Control Group	
	n(%)	Group A n(%)	Group B n(%)	Group C n(%)	p-value
Gravida					0.595
1(Primigravida)	26(28.0)	10(32.3)	8(22.9)	8(29.6)	
2 -4	58(62.4)	20(64.5)	22(62.9)	16(59.3)	
>4	9(9.7)	1(3.2)	5(14.3)	3(11.1)	
Parity					0.862
None (Nullipara)	33(35.5)	12(38.7)	12(34.3)	9(33.3)	
1(Primipara)	22(23.7)	7(22.6)	7(20.0)	8(29.6)	
≥2	38(40.9)	12(38.7)	16(45.8)	10(37.0)	
Gestational Age (Weeks)					0.684
≤12 weeks	25(26.9)	7(22.6)	10(28.6)	8(29.6)	
13-26 weeks	64(68.8)	22(71.0)	23(65.7)	19(70.4)	
≥27	3(3.2)	2(6.5)	1(2.9)	0(0.0)	
Don't remember	1(1.1)	0(0.0)	1(2.9)	0(0.0)	
Ever attended an Antenatal clinic					0.433
Yes	92(98.9)	31(100.0)	34(97.1)	27(100.0)	
No	1(1.1)	0(0.0)	1(2.9)	0(0.0)	
Number of antenatal visits before now					0.543
Once	52(55.9)	20(64.5)	19(54.3)	13(48.1)	
≥2	40(43.0)	11(35.5)	15(42.9)	14(51.9)	
Never	1(1.1)	0(0.0)	1(2.9)	0(0.0)	

Table 3: Self-report and Pill Count Adherence among the Pregnant Women

Pill Count / Self-report Adherence	Self-report Groups					Folic acid Groups					Iron Groups				
	A	B	C	F	P	A	B	C	F	P	A	B	C	F	P
Mean	68.02±11.56	71.96±13.62a	65.19±11.84a	2.32	0.10	88.57±14.10	91.62±7.98	89.61±8.62	0.71	0.49	88.55±14.00	91.29±8.03	89.36±8.86	0.59	0.59
Percentile distribution						A	B	C	X^2	P	A	B	C	X^2	P
<50%						1(3.2)	0(0.0)	0(0.0)	5.617	0.467	1(3.2)	0(0.0)	0(0.0)	8.477	0.205
50-74.9%						3(9.7)	1(2.9)	1(3.7)			3(9.7)	2(5.7)	1(3.7)		
75-79.9%						2(6.5)	2(5.7)	4(14.8)			2(6.5)	0(0.0)	4(14.8)		
≥80%						25(80.6)	32(91.4)	22(81.5)			25(80.6)	33(94.3)	22(81.5)		

Mean scores with the same superscript ([a]) are significantly different (p=0.036)

Table 4: Relationship between Obstetrics characteristics and Adherence to IFA supplementation

Factors		Self-Report adherence				Pill Count (Folic acid) adherence				Pill Count (Iron) adherence			
		Poor	Good	X^2	p-value	Poor	Good	X^2	p-value	Poor	Good	X^2	p-value
Gravida	1	18(37.5)	8(17.8)	6.603	0.037	5(35.7)	21(26.6)	1.959	0.375	6(46.2)	20(25.0)	3.428	0.180
	2-4	28(58.3)	30(66.7)			9(64.3)	49(62.0)			7(53.8)	51(63.8)		
	>4	2(4.2)	7(15.6)			0(0.0)	9(11.4)			0(0.0)	9(11.2)		
Parity	Never	19(39.6)	14(31.1)	3.067	0.381	6(42.9)	27(34.2)	0.533	0.912	7(53.8)	26(32.5)	2.344	0.504
	1	13(27.1)	9(20.0)			3(21.4)	19(24.1)			2(15.4)	20(25.0)		
	2-4	16(33.3)	21(46.7)			5(35.7)	32(40.5)			4(30.8)	33(41.2)		
	>4	0(0.0)	1(2.2)			0(0.0)	1(1.3)			0(0.0)	1(1.2)		
Gestational age	≤ 12 weeks	15(31.2)	10(22.2)	2.239	0.524	4(28.6)	21(26.6)	0.743	0.863	4(30.8)	21(26.2)	0.735	0.865
	13-26 weeks	32(66.7)	32(71.1)			10(71.4)	54(68.4)			9(69.2)	55(68.8)		
	≥27 weeks	1(2.1)	2(4.4)			0(0.0)	3(3.8)			0(0.0)	3(3.8)		
	Didn't remember	0(0.0)	1(2.2)			0(0.0)	1(1.3)			0(0.0)	1(1.2)		
Ever attended antenatal during the current pregnancy	Yes	47(97.9)	45(100.0)			14(100.0)	78(98.7)	0.179	0.672	12(92.3)	80(100.0)	6.221	0.140
	No	1(2.1)	0(0.0)			0(0.0)	1(1.3)			1(7.7)	0(0.0)		

Table 5: Odds ratio Self-Report and Pill Count Adherence

		Folic Acid Pill Count Adherence		Iron supplement pill count adherence		Self-report adherence	
	Value	95% Confidence Interval		Value	95% Confidence Interval		Value	95% Confidence Interval
		Lower	Upper		Lower	Upper		Lower	Upper
Odds Ratio for Group (Counselling Group / Counselling Group and Text message Group)	2.560	.582	11.261	3.960	.736	21.302	1.619	.611	4.288
For cohort Iron/Folic Acid Adherence = Poor	2.258	.616	8.276	3.387	.737	15.573	1.280	.777	2.106
For cohort Iron/Folic Acid Adherence = Good	.882	.722	1.077	.855	.707	1.035	.790	.488	1.280

report adherence compared to respondents with both counselling and text message reminder.

DISCUSSION

Despite World Health Organization recommendations for iron and folic acid supplementation, poor compliance is mentioned as one of the primary causes of low IFA supplement uptake. Several factors have been found to influence IFA to supplement compliance, including a lack of understanding of the necessity of IFA supplements during pregnancy, side effects, and a lack of comprehensive counselling from healthcare practitioners, forgetfulness, among others [6,7]. Therefore, this study assessed how IFA counselling and Text Message reminders could improve the uptake and adherence of IFA supplements among pregnant women attending antenatal clinics.

Medication adherence plays a vital role in optimizing the outcomes of many treatments, and preventive regimens and self-report is the most common method for assessing adherence behaviour in research and clinical care [29]. In this current study, self-report adherence ranged from a mean of 68 with counselling to about 72 when counselling was complemented with text message reminder. Pill count adherence ranged from 89 to 92; and 87 to 91 for folic acid and iron, respectively. In addition, good adherence was high across the three groups and consistently highest for counselling and text message reminder for both folic acid and iron pill counts. Self-report adherence in this study across the three groups is higher compared to the report from a study conducted among pregnant Cameroonian women, where 16.4% of pregnant women in their study had good adherence [30] and 20.4% prevalence of good adherence rate reported by Taye and others in Mecha district, Western Amhara [31]. Self-report adherence was significantly low among respondents in the control group, followed by counselling only group while the respondents counselling and text message reminder group had the highest self-report adherence. Furthermore, respondents in group A were 2.56 times more likely to have poor folic acid pill count adherence when compared to group B, respondents in group A were 3.96 times more likely to have poor iron pill count adherence when compared to group

B, and respondents in group A were 1.62 times more likely to have poor self-report adherence when compared to the group. These findings revealed the efficacy of the intervention strategy used in group B. Counselling and text message reminder was more effective in improving the uptake and adherence to iron and folic acid supplements among respondents in the study. This finding revealed that counselling intervention alone was not significantly effective in helping pregnant women improve their uptake and adherence to iron and folic acid supplement. However, adding text message reminders to counselling could significantly affect the uptake and adherence of Iron and Folic Acid Supplements among pregnant women.

When compared to the World Health Organization cut-off point for pill count supplement adherence (<80%), poor adherence was lowest (8.6%) among respondents in counselling and text message reminder group, followed by the control group, while those in the counselling only had the highest (19.4%) percentage for poor adherence. This showed that counselling as a stand-alone intervention did not necessarily translate into the uptake and adherence to the supplement. Also, there is a possibility that the respondents in this group forgot what they heard and learned during the counselling sessions received during ANC. Good pill count adherence in the three groups was found to be higher than what was reported in some previous studies, like the study conducted in Uganda (11.6%),[32] Southwest Ethiopia (38.3%),[33], Addis Ababa (61%) [34]. The difference between previous studies mentioned and the adherence of pregnant women in the control group could probably be attributed to the difference in socioeconomics and socio-cultural structure of study location and time. The lower adherence among the respondents in the counselling only group is contrary to the report from previous studies conducted in Southeastern Nigeria [35], Southwest Ethiopia [33], Misha district of South Ethopia [36], Cambodia [37], and Mecha district of Amhara [31].

Pregnant women in group B had a higher percentage of good adherence (94.3%) compared to those in group A (80.6%) and those in group C (81.5%). The probable reason for this could be attributed to the fact that a significant number of

participants reported that they sometimes forget to take their iron and folic acid supplement, and text messages served as a means of reminding them to take their supplements. This finding agrees with a previous study conducted in Ethiopia among pregnant women, where 85% of pregnant women missed taking their supplements due to forgetfulness [33], and another study in India, where 48.8% missed their iron and folic supplement due to the same reason [38].

CONCLUSION AND RECOMMENDATION

The use of text message reminders to complement customary counselling during antenatal care is more effective in improving the uptake and adherence to iron and folic acid supplementation among pregnant women. The use of text message reminders increases self-report adherence as well as iron and folic acid pills count adherence. Therefore, inculcating text message reminders or other forms of electronic reminders as part of traditional counselling could impact positively the uptake and adherence to IFA supplements and could contribute to reducing the burden of iron deficiency aneamia among Nigerian pregnant women.

Limitation to study

This study used only a quantitative approach. Adding a qualitative context to this study would give crucial insight into possible barriers to adding text message reminders and other forms of electronic reminders to already existing counselling that occurs during antenatal visits. Also, no biochemical test was done to confirm the reported levels of adherence across groups, as the use of pill count and self-report adherence alone is not the gold standard for checking adherence to supplements.

Author Contributions

Conceptualization and Methodology: EU, EO & OA, Data curation & analysis: EU, Investigation & original writing : EU, EO & OA:, Writing, review & editing : EU, EO, JO AJO, BIC & SMA, Supervision: OA, JO & EO

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