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Determinants of Iron and Folic Acid Supplementation Adherence among Women of Reproductive Age in Kilifi South Sub-County, Kilifi County, Kenya

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Iron deficiency anemia among expectant women causes health consequences. Iron Folic Acid supplementation is the foremost strategy established to curb pregnancy-related anemia. Poor adherence is still a problem despite implementation. Pregnant women are recommended to take 60mgs of iron and 400 mcg of folic acid daily from conception till birth.
Objective: The main objective of this study was to find out the determinants of iron and folic acid supplementation adherence among women of reproductive age, with children 0-23 months in Kilifi South Sub-County, Kilifi County, Kenya.
Methodology: A cross-sectional survey was used. Cluster and simple random sampling were used to recruit study participants. Obtained sample size was 324 participants. chi-square and logistic

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regression were utilized to determine the degree of association between dependent and independent variables. Statistical significance was attained at P<0.05. Odds Ratio was used to test for the strength of association.

Results: Adherence to iron and folic acid supplementation was low at 31.2%. Values for various variables were; education level of the mother (*P*=0.002), age(*P*=0.03, OR=1.26), monthly income (*P*=0.044, OR=1.622), Number of ANC visits(*P*=0.000), knowledge on IFAS *(P*=0.023), knowledge on anemia (*P*=0.005), knowledge of anemia causes (*P*=0.000), knowledge of effects of anemia in pregnancy (P=0.000), Being anemic during pregnancy (*P*=0.000; OR=3.35) IFAS accessibility (*P*= 0.019) and challenges faced when acquiring the supplements (*P*=0.03). Some of the challenges listed were late ANC attendance 57.1%, side effects 53.4%, forgetfulness 32.4%, long distance to the facility 59.4%, and stockouts 29.9%. Anemia was found to be high at 69.4%.

Conclusions: Iron folic acid supplementation was low**.** Anemia prevalence was high. Individual factors associated with adherence were education level, antenatal visits, knowledge of the supplements, knowledge of anemia, knowledge of the effects of anemia, and being anemic. Health system factors associated with adherence were the availability of IFAS and experience of challenges during antenatal clinic visits.

Keywords: Iron folic acid supplementation; iron deficiency anemia; anemia; hemoglobin.

ABBREVIATIONS

ANC : Antenatal Clinic
FGD : Focus group discussions
Hb : Hemoglobin
IFAS : Iron Folic Acid Supplementation
KII : Key informant interview
MCH : Mother and Child Health
OR : Odds ratio
SPSS : Statistical Package for Social Sciences
WHO : World Health Organization

1. INTRODUCTION

Iron deficiency is the leading nutrient deficiency worldwide, affecting over 1.9 billion people across all ages accounting for 24.3% prevalence [1]. This constitutes over 18% of the global population [2]. Affected groups include women of reproductive age at 29.9%, non-pregnant women at 29.6%, pregnant women at 36.5%, children aged 6 to 59 months at 39.8%, and under-fives at 60.2% which is highest in Africa [3]. Some of the approaches established to curb iron deficiency anemia are iron and folic acid supplementation (IFAS), food fortification, and dietary diversity of foods rich in vitamin B12, Folate, and Iron. Awareness creation through health promotion and nutrition education are some of the ways to help improve IFAS intake among pregnant women [4]. Anemia prevalence in Southeast Asia and Africa is estimated at 48.7% and 46.3% respectively [5]. Prevalence of anemia in Kenya is estimated at 40.3% [6]. Previous research findings show that 6 out of 10 pregnant women are anemic causing 1 of 10 maternal deaths and 2 of 10 neonatal deaths [7]. The coastal region, where Kilifi County is situated, was found to have the highest anemia prevalence at 72.8% [8]. Results from A micronutrient survey carried out in Kenya showed that the number of women who were pregnant with anemia from 2016 to 2019 increased approximately by 90.1% [8]. According to the World Health Organization (WHO), anemia prevalence above 40% is considered a public health problem [3]. The WHO and Kenyan Ministry of Health recommend a dosage of 30 mg to 60 mg of elemental iron and 400 mcg of folic acid. Adherence is taking 65% or more of the supplements, equivalent to taking them for at least 4 days a week for 6 months or for more than 90 days during pregnancy [9]. In Kenya, only 8% of pregnant women were reported to take IFAS for 90 days or more [7]. Research findings from a study carried out in Kilifi found that 22.2% of pregnant women adhered to IFAS intake [10]. Despite the implementation of IFAS programs, adherence rates seem to remain low. Wellbeing of pregnant women and their children is affected with insufficient iron and folate intake [11]. Maternal iron deficiency causes hemorrhage, birth defects, membrane rapture, fatigue, decreased work capacity, low productivity, and death. Maternal folate deficiency causes neural tube defects, preterm deliveries, low birth weights, birth anomalies, decreased cognition, motor and physical development of children, and other pregnancy complications [12]. These issues cannot be assumed since they have a negative impact on the cognitive ability of children and decreased work capacity in women which results in affecting

national development either directly or indirectly [13]. A Study on Knowledge, Attitude, Beliefs, and Practices (KABP) done in Kilifi County did not clearly identify major factors associated with low IFAS adherence in the county and therefore, need to carry out this research. However, findings from research in other areas pointed out issues like; age, hospital inaccessibility, late antenatal clinic commencement, economic status, education status, rural residence, side effects, and forgetfulness to be some of the factors affecting appropriate intake [14].

2. MATERIAL AND METHODS

2.1 Research Design

The research used a cross-sectional study design. The study design was considered since it allowed for comparison of many variables at a go and the fact that it allowed data collection from a large sample, which contributed to bias elimination.

2.2 Study Area

The study was done in Kilifi South subcounty, located in Kilifi County, Kenya. The research was done at the community level and in two selected governmental health facilities.

2.3 Study Population

Primary data was collected among women of reproductive age in the community, those attending Mother and Child Health clinics (MCH) in two selected governmental health facilities (Mtwapa Health Centre and Junju Dispensary) who had children below 24 months and among six health care providers who were Key informants (KIIs) from the selected health facilities.

2.4 Sample Size Determination

Sample size was determined using the Fisher et al formula**.** To get the proportion of the population with desired characteristics (p), the reference indicator used was vitamin A supplementation consumption rate among fully immunized children in Kilifi County, which according to the Kenya Demographic Health Survey (KDHS) 2014, was 74% [15]. A proportion of 0.74 was therefore selected. Assuming an 85% response rate, and 10% of sample size (29) in addition to cater for non-respondents, the sample was calculated as:

$$n = \frac{(1.96)2\ x\ 0.74x\ 0.26}{(0.05)2} = 295$$

295+ 29= 324 participants

2.5 Sampling Techniques

Kilifi County was purposively sampled. Simple random sampling was used to select participants at the facility for Focus Group Discussions (FGDs). Cluster sampling followed by simple random sampling was used to select participants in the community. Health facilities were purposively sampled putting into consideration, 1 to be a level 3 (Mtwapa Health Centre and 1 level 2 (Junju Dispensary) and the fact that one was in an urban area, and the other in the countryside parts of the county. Key informant interviewees were purposively selected.

2.6 Inclusion and Excretion Criteria

Women of reproductive age 15-49 years old, with children less than 24 months, at community and facility level, and six healthcare providers in the selected facilities who gave consent to participate were included in the study.
Women of reproductive age, with children less than 24 months at community and facility who did not give consent or had a very sick child were excluded from the study.

2.7 Study Variables

Independent variables included Individual factors like Social-cultural, economic demographic, misconceptions, IFAS-related, pregnancy-related (parity and gravida), number of ANC visits, knowledge of IFAS/anemia, Health system factors like stockouts, health service quality, distance to facility and queues during antenatal clinics (ANC). The dependent variable was IFAS adherence/non-adherence and the intermediate variables were guidelines on IFAS use, health education about ANC, IFAS, and anemia.

2.8 Pretesting

Pre-testing was done in Vipingo Rural Health Centre located in the same county and in the community. One FGD and two KIIs were done in this facility and 10% of participants of the sample size were interviewed at the community level.

2.9 Validity

Appraisal of study instruments was done by supervisors whereby they were reviewed and appropriate corrections made. The Instruments were pretested, and corrections and additions were done to ensure they were relevant, complete, applicable, and measured what they were intended to measure.

2.10 Reliability

Test-retest method during pretesting ensured the study instruments were of the required standard. Research assistants were qualified diploma holders and were well-trained by the researcher on how to conduct the research exercise.

2.11 Data Collection Methods

Quantitative data was collected by structured questionnaires while qualitative data collection was done using Focus Group Discussion guides (FGDs) and Key Informant Interviews (KIIs) guides (unstructured questions). Total number of days of IFAS intake was determined by self-reporting from participants. A packet of Ferrolic-LF (red in color) and the tablets were presented to each participant and asked to recall about taking them or relate to any events during pregnancy when the tablets were taken, as questions were asked. A guide in the form of a table that included number of ANC visits, number of tablets given in each visit, and the total number of days of IFAS intake weekly and monthly was used. Anemia prevalence was attained by self-reporting and recording the recorded hemoglobin (HB) levels from mother and child booklets. The booklets have a section that contains most information about the mother during antenatal clinic visits. Research assistants were well-trained in the data collection exercise. They were educated on the objectives of the study, how to select study participants and the sampling techniques to be used, to ensure participants give consent before interviews begin, to ask questions correctly without deviation or leading participants to the answers, and how to fill the questionnaires correctly. Both FGDs and KIIs guides included probe questions, follow-up form of questions, and exit questions. All participants were given enough time to give their answers and at the same time ensuring that their time was not wasted. Each FGD had a total of 8 to 10 participants. Informed consent was obtained from each member who participated in the FGDs and KIIs before the commencement of the interviews.

2.12 Data Analysis

Quantitative data was crosschecked and summarized in Excel and then exported to the Statistical Package for Social Sciences (SPSS) version 25 for analysis. Chi-square test analysis and binary logistic regression were used to test for significance of association which was attained at a threshold of p value < 0.05. Odds Ratio (OR) was used to test for the strength of association. Qualitative data was coded and themes made which were used and added in the discussion of the results.

3. RESULTS AND DISCUSSION

3.1 IFAS Adherence Rate among Participants

A total of 324 participants were enrolled for the study. Enrolling all participants in the study was a success because of adequate training for research assistants and the help of Community representatives and community health volunteers (CHVs). However, not all questions were answered by study participants. As shown in Fig. 1, IFAS adherence rate was found to be 31.2% while more than half of the participants were not adherent. The study found anemia prevalence to be 69.4%. Both IFAS adherence and anemia prevalence were determined by self-reporting of the participants and by confirmation from the mother and child health booklets.

3.2 Descriptive Statistics on Individual Characteristics of Study Participants

A proportion of 80.2% of the participants were of age 15-30. The mean, median, and mode age were 25, 25, and 22 years respectively. Most of the participants 276 (85.2%) were married. More than half of the participants (52.5%) had attended primary school, 5.2% had attained a university/college education and 5.2% did not attend school. The most dominant religion was Christianity with 71% of the participants. Quite a number (63.6%) of the participants were unemployed. Participants who received monthly income of 1000 shillings and above were 34% while 52.5% did not receive any income. In most households, 267(82.4%) husbands were the breadwinners.

3.3 Binary Logistic Regression Analysis of Association between Individual Factors and IFAS Intake

As shown in Table 1, using binary logistic regression, age showed *P*=0.039 and OR=1.265. Monthly income showed *a P* value of 0.044 and OR was 1.622. Misconceptions affecting IFAS intake showed a *P* value of 0.066 and OR= 1.690. Participants with higher education were 1.2 times more likely to be adherent. However, using the chi-square test of association, education level indicated an association with values, (P= 0.002, X^2=16.884, df=4).

3.4 Chi-square Test of Association between other Individual Factors and IFAS Adherence among Study Participants

Using chi-square test as shown in Table 2, values for variables were; number of ANC visits during pregnancy P=0.000 and OR=3.610 with 54.9% of those who attended ANC four times or more being adherent, side effects P= 0.634 OR=1.121, having knowledge on IFAS and its importance P=0.023, knowledge on anemia P=0.005, being anemic during pregnancy P=0.000, knowledge of side effects of IFAS and how to manage them P=0.807 and perception of link between IFAS adherence and anemia occurrence P= 0.349.

3.5 Chi-square Test of Association between Health System Factors and IFAS Adherence

As shown in Table.3, distance to the facility during ANC visits showed a P value of 0.940 and OR of 1.019 with a large proportion (68.6%) of participants whose residential area was far from the hospital being non-adherent. How participants were treated during ANC showed a P value of 0.382 and an OR of 1.2. Access to the IFAS tablets during pregnancy showed a P value of 0.019 with 33.2% of those who had access being adherent. A large percentage (72.9%) of those who experienced stockouts were non-adherent while quite a number, 33.5% of those who did not experience stockouts at least once during ANC were adherent. Majority of participants (64.9%) who faced challenges during ANC visits were non-adherent. A large proportion of those who experienced long lineups during ANC were non-adherent (67.7%), but from thematic results, most participants reported to have waited to be attended to although it was discouraging at times. Quality of service provided during ANC showed a p value of 0.382 with IFAS adherence with quite a number (33.2%) who received good treatment being adherent.

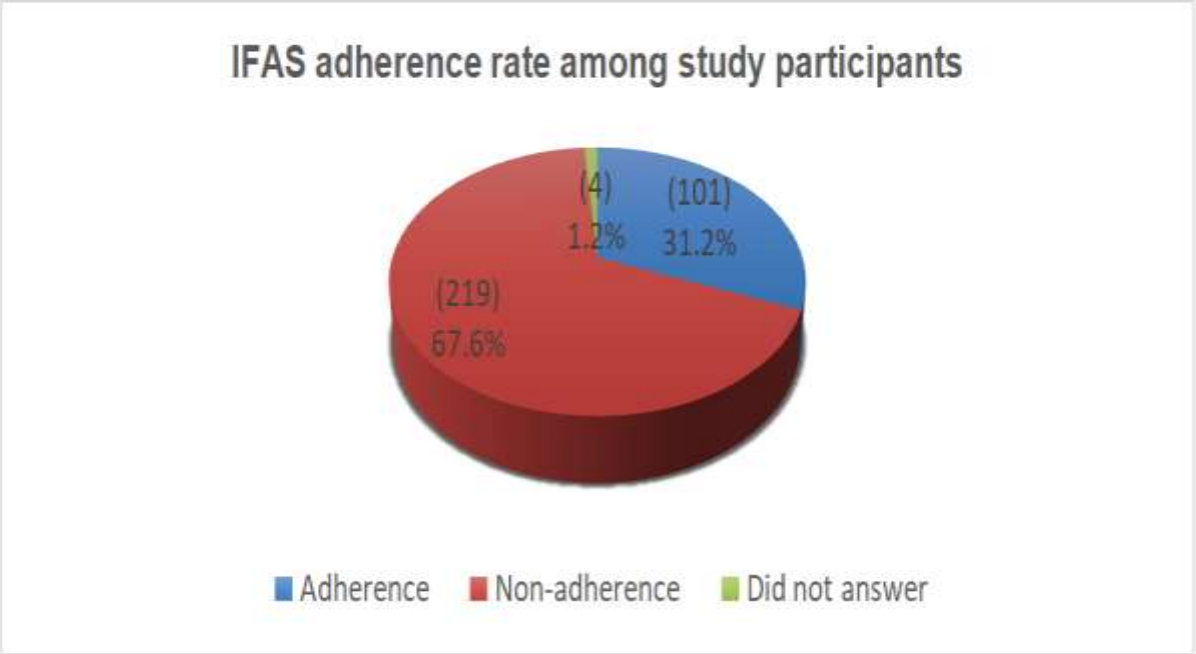

Fig. 1. IFAS adherence rate among study participants

Table 1. Binary logistic regression analysis of association between individual factors and IFAS adherence

Variables	B	Standard error	Wald	df	*P* value	Odds Ratio
Age	0.235	0.114	4.277	1	0.039	1.265
Education	0.246	0.246	2.089	1	0.148	1.279
Monthly income	0.484	0.484	4.072	1	0.044	1.622
Marital status	- 0.046	-0.46	0.187	1	0.666	0.955
Occupation	0.109	0.109	1.150	1	0.283	1.115
Monthly income of the household head	-0.241	-0.241	1.053	1	0.305	0.786
Constant	-3.335	2.094	2.537	1	0.111	0.036

Table 2. Chi-square test of association between other individual factors and IFAS adherence

Variable	Non-adherence 30-89 days	Adherence 90-240 days	OR (95% CI)	Chi-square
Number of ANC visits during last pregnancy				
Once			3.610 (2.429, 5.364)	X^2=84.785
Twice	34 (87.2%)	5 (12.8%)		df=4
Three times	47 (94%)	3 (6%)		P=0.000
Four times or more	63 (95.4%)	3 (4.6%)		
	73 (45.1%)	89 (54.9%)		
Experienced side effects				$X^{2=}$0.226
Yes	119 (69.6%)	52 (30.4%)	1.121 (0.699, 1.798)	df=1
No	100 (67.1%)	49 (32.9%)		P=0.634
Knowledge of IFAS and its benefits				
Yes				
No	169 (65%)	91(35%)	0.423 (0.219, 0.819)	X^2=7.586
Do not remember	45 (83.3)	9 (16.7%)		df= 2
	5 (83.3%)	1(16.7%)		P=0.023
knowledge of the side effects of IFAS and how to manage them.				
Yes				X^2=0.06
No	60(67.4%)	29(32.6%)	0.937(0.55, 1.581)	df=1

	159(68.8%)	72 (31.2%)		P=0.807
Knowledge of anemia disease				X^2=8.02
Yes	129 (62.9%)	76(37.1%)	0.471(0.279, 0.798)	df=1
No	90 (78.3%)	25 (24.8%)		*P*=0.005
Knowledge of anemia causes				$X^{2=}$14.575
Yes	95 (58.6%)	67 (41.4%)	0.389(0.238, 0.636)	df=1
No	124 (78.5%)	34 (21.5%)		*P*=0.000
Educated on anemia effects in pregnancy.				
Yes				X^2=17.332
No	90 (57.3%)	67 (42.7%)	0.357(0.218, 0.584)	df=1
	128 (79%)	34 (21%)		*P*=0.000
Diagnosed with anemia during pregnancy.				X^2=22.877
Yes				df=1
No	171 (76.7%)	52 (23.3%)	3.358 (2.02, 5.582)	*P*=0.000
	47 (49.5%)	48 (50.5%)		
Variable	**Non-adherence 30-89 days**	**Adherence 90-240 days**	**OR (95% CI)**	**Chi-square**
There is a relationship between adherence and anemia occurrence.				
Yes				
No	126 (65.3%)	67 (34.7%)	0.789 (1.123, 0.554)	X^2=2.106
Do not know	65 (73%)	24 (27%)		df=2
	27 (73%)	10 (27%)		*P*=0.349

Table 3. Chi-square test of association between health system factors and IFAS adherence

Variable	Non-adherence 30-89 days	Adherence 90-240	OR (95% CI)	Chi-square
Distance to the facility				X^2=0.006
Was far	129 (68.6%)	59 (31.4%)	1.019 (0.629, 1.649)	df=1
Was not far	88 (68.2%)	41 (31.8%)		*P*=0.940
Long queues during ANC visits				
Yes				X^2= 0.448
No	174 (67.7%)	83 (32.3%)	0.810 (0.437, 1.502)	df=1
	44 (72.1%)	17 (27.9%)		*P*=0.503
Treatment from a healthcare provider				
Good				X^2=1.924
Fair	183 (66.8%)	91 (33.2%)	1.205 (2.307, 0.629)	df=2
Bad	24 (77.4%)	7 (22.6%)		*P*=0.382
	10 (76.9%)	3 (23.1%)		
Access to IFAS tablets during ANC visits				X^2= 5.523
Yes	199(66.8%)	99(33.2%)	0.201(0.46, 0.877)	df=1
No	20 (90.9%)	2 (9.1%)		*P*=0.019
Experienced stockouts				
Yes				X=1.270
No	70(72.9%)	26(27.1%)	1.355(2.302, 0.798)	df=1
	147(66.5%	74(33.5%)		*P*=0.26
			0.537 (0.305, 0.946)	
Faced challenges				$X^{2=}$ 4.717
During ANC	150 (64.9%)	81 (35.1%)		df=1
Yes	69 (77.5%)	20 (22.5%)		*P*= 0.030
No				

4. DISCUSSION

From this study, 31.2% of participants adhered to taking IFAS which is below the required rate of 65% by WHO [8]. Findings were close to those of a study done in Kiambu, Kenya which documented a prevalence of 32.7% [16]. Studies done in Tanzania on the same topic indicated a lower adherence rate of 17.2% [17]. Higher findings were reported in Kakamega County, Kenya where adherence was documented at 60.6% [18]. Some of the reasons for the lack of similarity could be different study techniques, use of different study methodologies, and different health systems resulting in different health outcomes.

This study found anemia Prevalence to be high at 69.9%. Lower findings were recorded in Kwale County, Kenya where prevalence was documented at 62.8% [19]. Being anemic was significantly associated with adherence. Similar findings were seen in Ethiopia, whereby anemic pregnant women were 2.3 times more likely to adhere to IFAS adherence than those who were not anemic [20].

Education level showed significance of association when using chi-square test analysis with *P*=0.002. Similar findings from a study done in Ethiopia indicated that educated women were more likely to adhere than non-educated women [21]. Amount of monthly income showed a significance of association with IFAS adherence with 1.6 times higher odds of adherence. Similar findings were reported in West Africa [22] where having more income had a positive impact on increasing IFAS intake. Age showed a significance of association with IFAS adherence. Thematic results indicated that young mothers were more likely to adhere than older mothers. This was probably because they were cautious about having healthy pregnancies and wanted to deliver their babies safely unlike older mothers who already had previous successful pregnancies, therefore having a perception that current pregnancy will still be healthy. Number of antenatal clinic visits was significantly associated with adherence. This finding was similar to that of research carried out in Eritrea in 2018 whereby mothers who attended ANC 3 times or more were 4 times more likely to adhere to IFAS [13]. This was probably because they got health education and were issued with IFAS tablets in each visit. Having knowledge of IFAS had a significant association with IFAS adherence. Among the participants who had been educated on IFAS, 35% were adherent. Thematic results indicated that mothers who had knowledge of IFAS, its importance, and dosage were more likely to adhere to IFAS intake than those who did not. Findings were similar to that of a study done in Ethiopia whereby, pregnant women who had knowledge of IFAS were three times more likely to adhere to IFAS than those who did not [20]. Having knowledge of anemia and its causes in pregnancy was positively associated with adherence. These findings were close to those of a study done in Ethiopia where women with high knowledge of anemia were 2.3 times more likely to adhere than those who did not [23]. Experiencing side effects did not show any significant association with adherence. However, from qualitative findings, some participants mentioned that at times they had to stop taking IFAS because of the side effects. Some of the side effects mentioned were nausea, vomiting, stomach pains, a bad taste in the mouth and a change in stool color. Majority of the mothers who experienced side effects were not adherent. This could be because they did not know how to manage them. On the other hand, mothers who did not experience side effects were more likely to adhere. These findings were close to those of a study carried out in 2020 in India where adherence rate was higher among women who did not experience side effects [24].

Distance from home to health facility during ANC visits was not associated with IFAS adherence. However, thematic results indicated that mothers who lived near the facility were more likely to seek health services, hence attending ANC more. Most mothers whose homes were far from the hospital stated that they could not afford transport costs to attend ANC every month. There was some similarity of these findings with those of a study done in Tanzania whereby, women who lived 60 minutes away from the facility were less likely to attend ANC than those living closer to the facility with the reason being unaffordable transport costs [11]. On the contrary, some participants who lived near the facility did not attend all ANC clinics due to lack of know-how, ignorance, laziness, and lack of time. Accessibility to the supplements during ANC was significantly associated with adherence. From thematic results, mothers who received IFAS sufficiently were able to adhere unlike those who experienced stockouts or missed monthly ANC visits. Regarding those who experienced stockouts at least once during ANC visits, the odds of being non-adherent were 1.4 times higher. This finding was suggestive in

showing similarity to those of a study done in Uganda whereby experiencing stockouts contributed to non-adherence [25].

According to qualitative findings, the use of IFAS guidelines during counseling sessions, sensitization on the importance of IFAS, health promotion, and creating community awareness on the importance of IFAS had a positive impact on IFAS adherence. Community Health Volunteer program of issuing IFAS from door to door in the villages and educating women contributed to increasing intake.

5. CONCLUSIONS

Anemia in pregnancy in Kilifi sub-county was found to be high. However, most mothers reported positive changes in their hemoglobin levels by the time they were giving birth. Adherence to IFAS intake in Kilifi South subcounty was low. Individual factors positively associated with adherence were education level, age, monthly income, number of ANC visits, having knowledge of IFAS and its importance during pregnancy, knowledge of anemia and its causes, knowledge of the effects of anemia during pregnancy and being anemic. The greatest impediments of low IFAS adherence discovered from qualitative findings were iron and folic acid-related side effects, forgetfulness, ignorance, laziness, bad smell/taste of the iron-folic acid tablets, and late first ANC visits. Health system factors significantly associated with IFAS adherence were the availability of IFAS and experience of challenges during antenatal clinic visits. Routine education on the importance of iron and folic acid during ANC visits has a positive influence on IFAS intake. Findings from the study showed likeliness for intake of the required dose of iron and folic acid supplements or more, to improve hemoglobin levels, hence preventing anemia.

CONSENT AND ETHICAL APPROVAL

Approval was sought from the Kenyatta University Board of Post Graduate School. Clearance was sought from the Kenyatta University Ethical Review Committee. Approval was given by the National Commission for Science, Technology, and Innovation (NACOSTI), application identification number (269138). Additional authorization was requested from the Kilifi County & sub-county government research departments. A written informed consent was provided and explained to all participants. Confidentiality for all information given by participants was ensured.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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