Original Research Article

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

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 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 strength of association.

Results: Adherence to iron and folic acid supplementation was low at 31.2%. Values for various variables were; education level of 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 on the supplements, knowledge on anemia, knowledge on the effects of anemia and being anemic. Health system factors associated with adherence were, availability of IFAS and experience of challenges during antenatal clinic visits.

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

1. INTRODUCTION

Irondeficiencyistheleadingnutrientdeficiencyworldwide,affecting over1.9 billion people across all ages accounting to 24.3% prevalence [1].Thisconstitutes 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 anaemia 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 inSoutheast 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 anaemia 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 programmes, adherence ratesseem to remain low. Wellbeing of pregnant women and their children is affected with insufficientiron and folate intake [11]. Maternal iron deficiency causeshemorrhage, 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 cause negative impact on 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 Countydid not clearly identify major factors associated with low IFAS adherence in the county and therefore,needto 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. Research was done at 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 p value, 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 P value of 0.74 was therefore selected. Assuming an 85% response rate, and 10% of sample size (29) addition to cater for non-respondents, sample was calculated as:

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

295+ 29= 324 participants

2.5 Sampling techniques

Kilifi county was purposively sampled. Simple random sampling was used to select participants at facility for Focus Group Discussions (FGDs). Cluster sampling followed by simple random sampling were used to select participants at community. Health facilities were purposively sampled putting into consideration, 1 to be a level 3 (Mtwapa Health Centreand 1 level 2 (Junju Dispensary) and the fact that one was in an urban area, and the other in the interior, poor and drought-stricken 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 at the community. One FGD, two KIIs were done in this facility and 10% participants of the sample size were interviewed at 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, corrections and additions 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 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 guide (FGDs) and Key Informant Interviews(KIIs) guides (unstructured questions). Total number of days of IFAS intake was determined by self-reporting from participants whereby various ways including the cognitive interviewing techniques were employed to help them recall. This contributed to reducing information and recall bias. A packet of Ferolic-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. Aguide in form of a table that included number of ANC visits, number of tablets given in each visit and total number of days of IFAS intake weekly and monthly was used. Anemia prevalence was attained by self-reporting and recording of the recorded hemoglobin (hb) levels from mother and child booklets. The booklets have a section that contains most information of the mother during antenatal clinic visits.

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 strength of association. Qualitative data was coded and themes made which were used and added in discussion of the results.

3. RESULTS AND DISCUSSION

3.1 IFAS adherence rate among participants

As shown in figure.1, IFAS adherence rate 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.

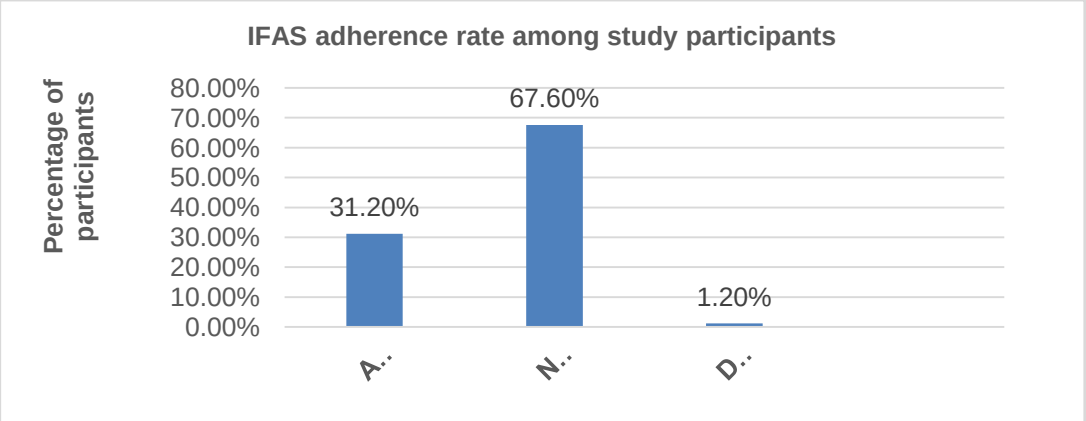

Figure.1: IFAS adherence rate among study participants

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 university/college education while 5.2% did not attended 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 bread winners.

3.3Binary logistic regression analysis ofassociation between individual factors and IFAS intake.

As shown in table 1, using binary logistic analysis regression, with age the *P*=0.039 and OR= 1.265. Monthly income showed*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 chi-square test of association, education level indicated association with values, (P= 0.002, X^2=16.884, df=4).

Table.1: Binary logistic regression analysis ofassociation 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 house hold head	-0.241	-0.241	1.053	1	0.305	0.786
Constant	-3.335	2.094	2.537	1	0.111	0.036

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 pregnancyP=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 and perception of link between IFAS adherence and anemia occurrence P= 0.349.

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			3.610 (2.429, 5.364)	X^2=84.785 df=4 P=0.000
Once	34 (87.2%)	5 (12.8%)		
Twice	47 (94%)	3 (6%)		
Three times	63 (95.4%)	3 (4.6%)		
Four times or more	73 (45.1%)	89 (54.9%)		
Experienced side effects				$X^{2=}$0.226
Yes	119 (69.6%)	52 (30.4%)	1.121 (0.699,	df=1
No	100 (67.1%)	49 (32.9%)	1.798)	P=0.634
Knowledge of IFAS and its benefits				X^2=7.586
Yes	169 (65%)	91(35%)	0.423 (0.219,	df= 2
No	45 (83.3)	9 (16.7%)	0.819)	P=0.023
Do not remember	5 (83.3%)	1(16.7%)		
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 causes of anaemia				$X^{2=}$14.575 df=1
Yes	95 (58.6%)	67 (41.4%)	0.389(0.238,	*P*=0.000
No	124 (78.5%)	34 (21.5%)	0.636)	
Knowledge of anemia effects in pregnancy				X^2=17.332 df=1
Yes	90 (57.3%)	67 (42.7%)	0.357(0.218,	*P*=0.000
No	128 (79%)	34 (21%)	0.584)	
Diagnosed with anaemia during pregnancy				X^2=22.877 df=1
Yes	171 (76.7%)	52 (23.3%)	3.358 (2.02,	*P*=0.000
No	47 (49.5%)	48 (50.5%)	5.582)	
There is a relationship between adherence and anaemia occurrence			0.789 (1.123,	X^2=2.106
Yes	126 (65.3%)	67 (34.7%)	0.554)	df=2
No	65 (73%)	24 (27%)		*P*=0.349
Do not know	27 (73%)	10 (27%)		

3.5: Chi-square test of association between health system factors and IFAS adherence

As shown in table.3, distance to facility during ANC visits showed P value of 0.940 and OR of 1.019 with a large proportion (68.6%) of participants whose residential area was far from hospital being non adherent. How participants were treated during ANC showed a P value of 0.382 and 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 being 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.

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,	df=1
Was not far	88 (68.2%)	41 (31.8%)	1.649)	*P*=0.940
Long queues during ANC visits				X^2= 0.448
Yes	174 (67.7%)	83 (32.3%)	0.810 (0.437,	df=1
No	44 (72.1%)	17 (27.9%)	1.502)	*P*=0.503
Treatment from healthcareprovider				X^2=1.924
Good	183 (66.8%)	91 (33.2%)	1.205 (2.307,	df=2
Fair	24 (77.4%)	7 (22.6%)	0.629)	*P*=0.382
Bad	10 (76.9%)	3 (23.1%)		
Access to IFAS tablets during ANC visits				X^2= 5.523
	199(66.8%)	99(33.2%)	0.201(0.46,	df=1
Yes	20 (90.9%)	2 (9.1%)	0.877)	*P*=0.019
No				
Experienced stockouts				X=1.270
Yes	70(72.9%)	26(27.1%)	1.355(2.302,	df=1
No	147(66.5%	74(33.5%)	0.798)	*P*=0.26
Faced challenges			0.537	$X^{2=}$ 4.717
During ANC	150 (64.9%)	81 (35.1%)	(0.305,	df=1
Yes	69 (77.5%)	20 (22.5%)	0.946)	*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 lower adherence rate of 17.2% [17]. Higher findings were reported Kakamega county, Kenya where adherence was documented at 60.6% [18]. Some of the reasons for lack of similarity could be different study techniques, use of different study methodologyand different health systems resulting in different health outcomes.

This study found anemia Prevalence to be 69.9%. Lower findings were recorded in Kwale county, Kenya [19] where prevalence was documented at 62.8%. Being anemic was

significantly associated with adherence (*P*=0.000, OR=3.358 at 95% CI). 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 that non educated women [21].Amount ofmonthly income showed 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 positive impact in increasing IFAS intake. Age showed 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 in agreement with that of a 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 significance association with IFAS adherence. Among the participants who had been educated on IFAS, 35% were adherent. Thematic results indicated that mothers who had knowledge on IFAS, its importance and dosage were likely to adhere to IFAS intake than those who did not. Findings were in agreement with those of a study done in Ethiopiawhereby, pregnant women who had knowledge on IFAS were 3 times more likely to adhere to IFAS than those who did not [20]. Having knowledge on anemia and its causes in pregnancy was positively associated with adherence. These findings were close to those of a studydone in Ethiopia where women with high knowledge on anemia were 2.3 times more likely to adhere than those who did not [23].

Distance from home to health facility during ANC visitswas 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 cost to attend ANC every month. There was some similarity of these findings with those of a study done in Tanzaniawhereby, 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 knowhow, 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, odds for 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 [24].

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

5 CONCLUSIONS

Anemia in pregnancy in Kilifi subcounty 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, number of ANC visits, having knowledge on IFAS and its importance during pregnancy, knowledge on anemia and its causes, knowledge on the effects of anemia during pregnancy and being anemic. The greatest impediments of IFAs adherence were iron-folic acid related side effects, forgetfulness, ignorance, bad smell/taste of the iron-folic acid tablets and late first ANC visits. Health system factors significantly associated with IFAS adherence were, availability of IFAS and experience of challenges during antenatal clinic visits. Routine education on the importance of iron-folic acid during ANC visits have 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.

ETHICAL APPROVAL AND CONSENT

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

ABBREVIATIONS

ANC: Antenatal Clinic
FGD: Focus group discussions
Hb: Haemoglobin
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

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