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About this working paper

This paper, *Literature review on selected factors influencing Iron Folic Acid Supplementation in Kenya and East Africa*, is a review of published literature using a grounded theory approach to better understand what is known about the identified bottlenecks of the delivery system for IFA supplementation during pregnancy and how they affect consumption and adherence to IFA supplements. The desk study sought to generate preliminary theories about factors affecting the consumption of IFA supplements during pregnancy. The goal was to generate a list of factors for each bottleneck that influences consumption of IFA supplements, which could inform future behavioral change interventions. This paper has not been copyedited but has been formatted for publication by 3ie.

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Literature review on selected factors influencing Iron Folic Acid Supplementation in Kenya and East Africa

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Summary

Daily oral iron and folic acid (IFA) supplementation is recommended as part of antenatal care (ANC) to reduce the risk of low birth weight, maternal anaemia and iron deficiency. It should ideally form part of an integrated programme of antenatal and neonatal care that promotes adequate gestational weight gain, and screening of all women for anaemia at prenatal and postpartum visits. Hence adherence to recommended intake is key in realizing these outcomes. In Kenya, the National Policy Guideline on IFA supplementation for pregnant mothers (2013) indicates that it should be part of focused antenatal care (FANC). The Kenya Nutrition Action Plan (KNAP) 2018 – 2022 Common Results Framework, targets to reduce maternal anaemia in pregnancy from current 36% to 21% by the end of the monitoring period (MOH, 2018). For this to happen successfully, both national and county levels must strengthen and organize systems, people, and processes to ensure the IFA supplements are procured, delivered, and appropriately utilized in pregnancy and among women of reproductive age (WRA). Hence bottlenecks and hinderances to optimal IFA supplementation should be identified and appropriately addressed at all levels.

As part of strengthening of the integration of IFA supplementation into FANC, a bottleneck assessment workshop was conducted in December 2018 to collaboratively identify questions for implementation research and develop an inventory of bottlenecks that affect the delivery system of IFA supplementation during pregnancy in the four counties of Kitui, Busia, Marsabit and Samburu. The overall objective of the workshop was to help identify areas and questions for implementation research (IR), within the activities of the Implementation Science Initiative (ISI), based on contextual knowledge and experience of IFA supplementation program in Kenya. The outcome of this assessment included questions for implementation research and an inventory of bottlenecks affecting IFA supplementation at each level of the health delivery system. The inventory of bottlenecks for IFA supplementation consisted of five bottlenecks across the health delivery system (four at community and one at household levels). They were associated with (1) Barriers of access to IFA supplements, (2) Consumption of IFA supplements by pregnant mothers, (3) Counselling for pregnant women, (4) Community level IFA supplementation and, (5) Stock out of IFA supplements. Several proposed activities were listed to address these bottlenecks, however, insufficient information about them did not elucidate a hypothesis that could guide activities to improve consumption of IFA supplements during pregnancy.

We conducted a review of published literature using the “Grounded Theory” approach to better understand what is known about the identified bottlenecks of the delivery system for IFA supplementation during pregnancy and how they affect consumption and adherence to IFA supplements. This process took place within the ISI to replace the IR due to the COVID pandemic. Further, the desk study sought to generate preliminary theories about factors affecting consumption of IFA supplements during pregnancy. Ultimately, we sought to generate a list of factors for each bottleneck that influences consumption of IFA supplements and adapt them for behavior change interventions.

We found that the means by which each of the five identified bottlenecks influence consumption of and adherence to IFA supplements is not mutually exclusive. The key associated factors are interrelated and revolve around the following:

- Beliefs, misconceptions, lack of knowledge and fear of side effects
- Late first ANC and few ANC visits
- Quality of service delivery by Health Care Workers (HCWs) and at the health facility
- Maternal education and economic empowerment
- Maternal age, parity, and history of anaemia
- Maternal social and family support
- Maternal residence and distance from health facility
- Forgetfulness by mothers
- Functioning of community-based platforms
- Stock outs and management of supplies

In view of the documented factors influencing IFA supplementation a strong social and behavior change communication (SBCC) strategy is recommended to provide platforms that convey key messages with corresponding actions targeting various players who influence uptake of IFAS. This may include approaches that target to build capacity at community and facility levels for health care providers to provide services and key messages levelling pregnant women and community members. Embracing the Community Health Strategy and utilizing community-based platforms for the SBC provides an avenue for pregnant mothers to receive group and personalized services including counselling/health education, dialoguing and supplies. Community-based platforms have characteristics of inclusivity and involvement of other members of the community. Such platform may include Baby Friendly Community Initiative and the Community Integrated Management of Childhood Illnesses. A strong monitoring and coordination strategy for IFA supplementation interventions that are integrated with other health services is also recommended. Close monitoring and coordination of IFA supplementation provides information on the targeted number of pregnant women in a health facility, amount of required and available IFA supplements, deficit, and measures for restocking. In large integrated programmes, some interventions face the risk of lack of ownership and their monitoring and coordination is not considered important. Hence a deliberately strong monitoring and coordination strategy for IFA supplementation should be designed to effectively identify gaps/needs for improved quality of services.

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List of Acronyms

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal care
BFCI	Baby Friendly Community Initiative
BNA	Bottleneck Assessment
BNI	Bottleneck Inventory
CHEW	Community Health Extension Worker
CHV	Community Health Volunteer
COM -B	Capability - Opportunity - Motivation Behavior change model
FANC	Focused Antenatal Care
FES	Focused Ethnographic Study
HCW	Health Care Worker
HH	Household
HIV	Human Immunodeficiency Virus
KNAP	Kenya Nutrition Action Plan
IEC	Information, Education and Communication
IFA(S)	Iron Folic Acid (Supplementation)
IR	Implementation Research
ISI	Implementation Science Initiative
KEMSA	Kenya Medical Supplies Agency
KNAP	Kenya Nutrition Action Plan
LBW	Low Birth Weight
MNP	Micronutrient Powder
MOH	Ministry of Health
PIP	Program Impact Pathway
SBCC	Social and Behavior Change
WHO	World Health Organization
WRA	Women of Reproductive Age

1. Background

Daily oral iron and folic acid (IFA) supplementation is recommended as part of antenatal care (ANC) to reduce the risk of low birth weight (LBW), maternal anaemia and iron deficiency. IFA supplementation should ideally form part of an integrated programme of antenatal and neonatal care that promotes adequate gestational weight gain, and screening of all women for anaemia at prenatal and postpartum visits (WHO, 2012).

In Kenya, the National Policy Guideline on combined IFA supplementation for pregnant mothers (2013), indicates that IFA supplementation should be part of focused antenatal care (FANC) where pregnant mothers should receive combined IFA tablets or capsules administered once daily for the duration of pregnancy, ideally from conception to delivery. The Kenya Nutrition Action Plan (KNAP) 2018 – 2022 Common Results Framework, targets to reduce maternal anaemia in pregnancy from current 36% to 21% by the end of the monitoring period (MOH, 2018). For this to happen successfully, both national and county levels must strengthen and organize systems, people, and processes to ensure the IFA supplements are procured, delivered, and appropriately utilized in pregnancy and among women of reproductive age (WRA). Hence bottlenecks and hinderances to optimal IFA supplementation should be identified and appropriately addressed at all levels. A theory-driven process designed to generate learning about factors affecting IFA supplementation program delivery systems is integral to the achievement of the target 40% reduction in maternal anaemia during pregnancy in the KNAP 2018 - 2022.

As part of strengthening of the integration of IFA supplementation into FANC, a bottleneck assessment (BNA) workshop was conducted in December 2018 to collaboratively identify questions for implementation research (IR) and develop an inventory of bottlenecks that affect the delivery system of IFA supplementation during pregnancy in four counties, namely Kitui, Busia, Marsabit and Samburu. The overall objective of the workshop was to help identify areas and questions for the IR activity, within the undertakings of the Implementation Science Initiative (ISI)¹, based on contextual knowledge and experience of IFA supplementation program in Kenya. The rationale for the bottleneck inventory was to address the gap between what is known about efficacious interventions and what is achieved through routine programmatic activities for IFA supplementation in Kenya. The workshop adapted and used the *Program Assessment Guide* (Pelletier et al, 2010) to conduct the comprehensive analysis of the bottlenecks affecting IFA supplementation during pregnancy². This tool entailed mapping the various levels of the health system involved in delivery of IFA supplementation during pregnancy including commodity supplies, ANC services, maternal nutrition counselling, health education and their influence on uptake, utilization, and compliance. The tool also described and analyzed the roles and responsibilities of

¹ The Implementation Science Initiative (ISI) is a collaboration between Kenyan Government Health Sector and Partners, Family Health International (FHI) Partners, and the Society for Implementation Science in Nutrition (SISN), supported by the International Initiative for Impact Evaluation (3ie).

² Iron Folic Acid Supplementation Program Bottleneck Assessment Workshop Report; November 19 – 20, 2018; Naivasha

key stakeholders at various levels of the health system. The assessment sought to identify inputs, activities and system changes that may be necessary to increase coverage and enhance compliance in uptake of IFA supplementation during pregnancy. The insights from the bottleneck assessment workshop helped determine which aspects of the IFA supplementation program required improvement. The supply chain management system was analyzed to identify critical delivery control points to be monitored and evaluated. At the workshop, the participants also identified vulnerable groups who do not have access to the national IFA supplementation program in the target counties.

The outcome of this assessment included questions for IR and an inventory of bottlenecks affecting IFA supplementation at each level of the health delivery system. The inventory of bottlenecks for IFA supplementation consisted of five bottlenecks across the health delivery system (four at community and one at household levels). They were associated with (1) Barriers of access to IFA supplements, (2) Consumption of IFA supplements by pregnant mothers, (3) Counselling for pregnant women, (4) Community level IFA supplementation and, (5) Stock out of IFA supplements.

1.1 Rationale

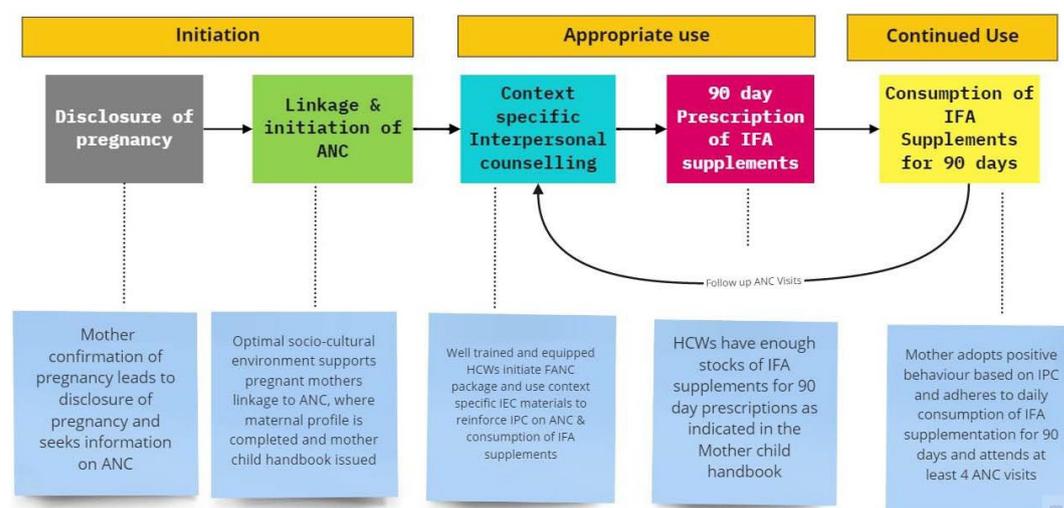
Nutrition-specific interventions including IFA supplements have biological objectives that are mediated through health system, households, and specifically pregnant mothers. Program impact pathways (PIP) developed for nutrition specific programs therefore need to consist of two components representing the processes of (1) program delivery, the pathway from program inputs to handover points (points of interaction) during which the pregnant mothers receive the intervention, and (2) household utilization, the sequence of behaviour by pregnant mothers, that are required to lead to a biological impact on the outcome of the pregnancy and the unborn child (Tumilowicz et al, 2017).

The bottleneck assessment workshop mapped the delivery system for IFA supplementation in collaboration with the respective county teams. This approach provided the basis for identifying the bottlenecks of program delivery and generating hypotheses about factors that could affect implementation fidelity or program integrity of IFA supplementation. The bottlenecks identified were listed in a bottleneck inventory for IFA supplementation. This inventory considered that the process of consumption of IFA supplements during pregnancy is grounded in adherence. Daily oral IFA supplementation with 30 mg to 60 mg of elemental iron and 400 µg (0.4 mg) folic acid is recommended for pregnant women to prevent maternal anaemia, puerperal sepsis, low birth weight, and preterm birth (WHO, 2016).

In the context of IFA supplementation, the process of consumption of IFA can be defined as the extent to which pregnant mothers adhere to consumption of IFA supplements during pregnancy in amounts that are in accordance with recommended protocols. Adherence to consumption of IFA supplements involves three basic elements: (1) initiation (disclosure of pregnancy and initiation of ANC care (2) appropriate use (pregnant mother receiving counselling on importance of IFA supplements, how to manage side effects and receiving prescription or purchasing iron and folic acid supplements for daily oral use) and (3) continued use (pregnant mother consuming IFA tablets for duration of the pregnancy and seeking prescription refill via subsequent ANC

visits). The sequence of these activities is illustrated below as the PIP depicting sequence of pregnant mother behaviour based on recommendations and policy guidance.

Figure 1: Program impact pathway for consumption of IFA supplements by pregnant women



However, the messaging given to pregnant mothers varies due to various factors across the delivery system of IFA supplementation. The bottleneck assessment conducted identified five key factors that influence the consumption of IFA supplements specific to the level of the delivery system. Several proposed activities were listed to address these bottlenecks, however, insufficient information about these factors or bottlenecks did not elucidate a hypothesis that could guide activities to improve consumption of IFA supplements during pregnancy.

Following the workshop in 2018, the IR protocol to study some of the barriers of IFAS consumption during pregnancy, within the ISI was completed and approved³. The approved research protocol focused on two counties (Busia and Kitui) and had four objectives, two of which had incorporated data collection activities to study and resolve some of the bottlenecks. However, the COVID19 pandemic hindered field-based primary data collection activities resulting in the adoption of desk review research strategies. This was to learn from those who have implemented IFA supplementation programs in different contexts and to further investigate some the identified bottlenecks. There was agreement that this process was taking place within ISI to replace the IR, due to the COVID pandemic. A similar process had been done with SISN and the 2 country teams to guide the strengthening of the focused ethnographic study (FES) tools. Kenya has done this process with research assistants as part of building capacity on IS. This report presents the analysis of the published literature and how these results can be adapted for behavior change interventions to improve consumption of IFA supplements during pregnancy. Some recommendations emerged from this review could be applied before new IR takes place.

³ Implementation Research to Support Iron and Folic Acid Supplementation in Counties of Busia and Kitui in Kenya, 2019; Bukania Z., Njoroge B., *et al.*

2. Objectives

Specifically, the review of published literature was meant to better understand what is known about the identified bottlenecks of the delivery system for IFA supplementation during pregnancy and how they affect consumption and adherence to IFA supplements. Further, the desk study sought to and generate preliminary theories about factors affecting consumption of IFA supplements during pregnancy.

The specific objectives included:

- Identify relevant publications based on the identified five bottlenecks of IFA supplementation for pregnant women through literature search.
- Identify and list the barriers and enablers that affect consumption of IFA supplements by reviewing selected relevant literature.
- Map the facilitators and barriers onto the Capability-Opportunity-Motivation Behavior change (COM-B) model (Michie *et al.*, 2011).
- Recommend a blueprint to guide IFA supplementation activities through a program impact pathway that concretizes the points at which the factors identified affect the process of IFA supplementation

3. Methodology

The approach used to review the barriers to consumption of IFA supplements was “Grounded Theory”, a method consisting of systematic, yet flexible guidelines for collecting and analyzing qualitative data to construct theories from the data themselves. Thus, researchers construct a theory ‘grounded’ in their data. The approach begins with inductive data, invokes iterative strategies of going back and forth between data and analysis, uses comparative methods, and keeps you interacting and involved with your data and emerging analysis (Charmaz, Kathy 2018). Ultimately, we sought to generate a list of factors for each bottleneck that influences consumption of IFA supplements and adapt them for behavior change interventions using the COM-B model to improve consumption of IFA supplements during pregnancy.

3.1 Research Approach

With the support of 10 research assistants, we conducted a search for papers of interest based on the five topics informed by the bottlenecks in the inventory namely (1) Barriers of access to IFA supplements, (2) Consumption of IFA supplements by pregnant mothers, (3) Counselling for pregnant women, (4) Community level IFA supplementation and, (5) Stock out of IFA supplements. These five topics were distributed across five research teams as shown in Table 1.

At this stage of the bottleneck inventory activities, we felt that a comprehensive systematic review and analysis would not be feasible but rather a combination of thematic and content analysis, following recommended procedures for qualitative data analysis, would be more productive (Charmaz, 2014).

3.2 Search and selection of literature

The search for literature was based on the following: (a) Search databases - Google scholar, and PubMed; (b) Search dates – January 2000 to May 2020; (c) Inclusion criteria – papers published in Eastern Africa focusing on consumption of IFA supplements during pregnancy; (d) Exclusion criteria – papers focusing on HIV/AIDS, children under five years, non-pregnant adolescents and grey literature. There were no exclusions based on study type; selected research include formative, observational, impact evaluation, and systematic review studies.

Table 1: Bottlenecks, Search Topics and Respective Research Teams

Topic	Bottleneck	Search Synonyms	Research Team
1. Barriers of access to IFA supplements	Lack of regular information on number of households with pregnant women within defined community unit	<ul style="list-style-type: none"> • Determinants/Factors/Influences • Bottlenecks/challenges/Enablers • Perceptions/Reasons 	Group one: <ul style="list-style-type: none"> • Alex Okoth • Cynthia Wakadha
2. Consumption of IFA supplements by pregnant mothers	Poor linkage between Focused ANC package and defined household visits for pregnant women within community unit	<ul style="list-style-type: none"> • Demand • Consumption • Compliance • Household mapping • Initiation of ANC 	Group two: <ul style="list-style-type: none"> • Linda Obwao • Billian Amusala
3. Counselling for Pregnant women	Lack of context specific job aids on integrated community package for FANC plus BFCI with clear actions for CHVs during HH visits	<ul style="list-style-type: none"> • Interpersonal communication • Context specific • Integrated community • Community dialogue • Poor Counselling • Actions for pregnant mothers 	Group three <ul style="list-style-type: none"> • Maria Muithya • Virginia Waswa • Daniel Mwendwa
4. Community level IFA supplementation	Late initiation of ANC	<ul style="list-style-type: none"> • ANC • Community awareness • Role of CHVs • Coverage • Household mapping 	Group four: <ul style="list-style-type: none"> • Esther Salee • Tabitha Njeri • Mary Katuto
5. Stock out of IFA supplements	Lack of regular information on the number of households with pregnant women	<ul style="list-style-type: none"> • Inadequate supply • Demand for IFA supplements • Poor utilization • Use/Utilization • Intake • Coverage 	Group five: <ul style="list-style-type: none"> • Priscilla Kerubo • Martin Ajimbi

We selected a total of 144 papers that constituted our database of analysis. These were distributed across five topics as follows: Topic 1 – 36 papers; Topic 2 – 30 papers; Topic 3 – 27 papers; Topic 4 – 26 papers; and Topic 5 – 25 papers (See Annex 3).

3.2 Data analysis

Based on the methodology developed to derive theories of the sequence of behaviors involved in adherence to use of micronutrient powders (MNPs) (Tumilowicz et al, 2017);

we coded the factors (enablers and barriers) that influence consumption of IFA supplements during pregnancy for selected papers; coding by factors allows for the identification of which factors were most important (ibid). This was followed by content analysis to quantify the results.

We endeavored to have all the research teams involved in the data analysis process. Thus, the five research teams generated comprehensive list of factors from the content of the documents reviewed for the respective topics that had been informed by the bottleneck assessment. The factors were then broadly categorized according to their described effect on the topic as enablers or barriers, and the four levels of the “socio-ecological model” namely (1) Maternal (Pregnant Mother) (2) Household (3) Health System, and (4) Socio-cultural System. We further mapped the categorized factors onto the Capability-Opportunity-Motivation Behavior change (COM-B) model (Michie *et al.*, 2011) and proposed pathways of interventions.

4. Results

The documents reviewed by topic area are listed in Annex 3. The results are presented for each of the five topics and they preserve and present the form and content of the analytic work rather than spotlighting authors (Charmaz, 2014).

The factors identified under each of the topics and the number of documents that reported the factors are summarized in Figures 2, 3, 4, 5 and 6. The categorization of the factors in line with four levels of the “socio-ecological model” and mapping onto the COM-B model is shown in Tables 2, 3, 4, 5 and 6.

4.1 Topic 1: Barriers of access to IFA supplements

While more than 50 factors were identified to influence access to IFA supplementation (Figure 2) only eight were the most frequently reported barrier mainly maternal and socio-cultural related and founded within the domains of Knowledge, Perceptions, Beliefs, and related factors. These were reported in 9 – 13 of the 36 documents reviewed. Three facilitating factors were most frequently reported and were associated with the household and health system levels.

4.1.1 Hinderances to access to IFA supplements

1. Beliefs, Misconceptions, Lack of Knowledge about IFA Supplements and Fear of Side Effects

Some of the beliefs and misconceptions about IFA supplements are that babies become big resulting to difficulty deliveries and excessive bleeding, and that IFA is for sick pregnant mothers. Experiencing negative side effects of IFA supplementation such as nausea is a barrier to regular consumption of IFA tablets. These factors negatively impact on the women’s ANC services seeking behavior and act as barriers to accessing IFA supplements (n=13). The knowledge of the mother on pregnancy and IFA supplements enables the adoption of positive behaviors towards ANC and access to IFA supplements.

2. Late First ANC Visit

Reluctance to reveal pregnancy status is a maternal factor that hinders early initiation of ANC services and access to IFA supplements (n=11).

4.1.2 Facilitators to access to IFA Supplements

The most frequently reported facilitators of access to IFA supplements were centered around three broad factors:

1. Improved Knowledge on Pregnancy and IFA supplementation at household and community levels

Improving knowledge and general awareness on anaemia and importance of IFAS in pregnancy can be acquired through community level health education sessions and media. Knowledge and general awareness help communities to have a good perception of prevention and treatment of anaemia during pregnancy and facilitates ANC services seeking behaviour and therefore access to IFA supplements (n=13).

2. Promotion of benefits of IFA supplements at household and community levels

Community conversation sessions are important avenues where key community health shortcomings that affect the mothers' autonomy and willingness to seek ANC services can be addressed. Through these meetings health-related issues such as importance of early pregnancy disclosure and ANC registration, IFA supplementation benefits in pregnancy and male involvement and support for their spouse are addressed. More so, it is an opportunity for demystification of myths, beliefs and perceptions that prohibits drugs in pregnancy. Promotion of the benefits of IFA supplements at household and community levels tends to improve ANC services utilization and there is an increase in access to IFA supplements (n=11).

3. Perceived quality of service delivery at facility level

The way health care workers in health facilities relates to the women when they visit for ANC services affects access to IFA supplements either positively or negatively. Poor health services, such as when poor health provider attitude towards the pregnant women like reprimanding them, makes the mothers shy away from subsequent ANC visits (n=9). Some studies (n=2) show that expectant mothers who were stigmatized and intimidated by the healthcare provider at the health facility did not go back for subsequent ANC visits.

Figure 2: Number of documents (n=36) that reported factors affecting access to IFA supplements

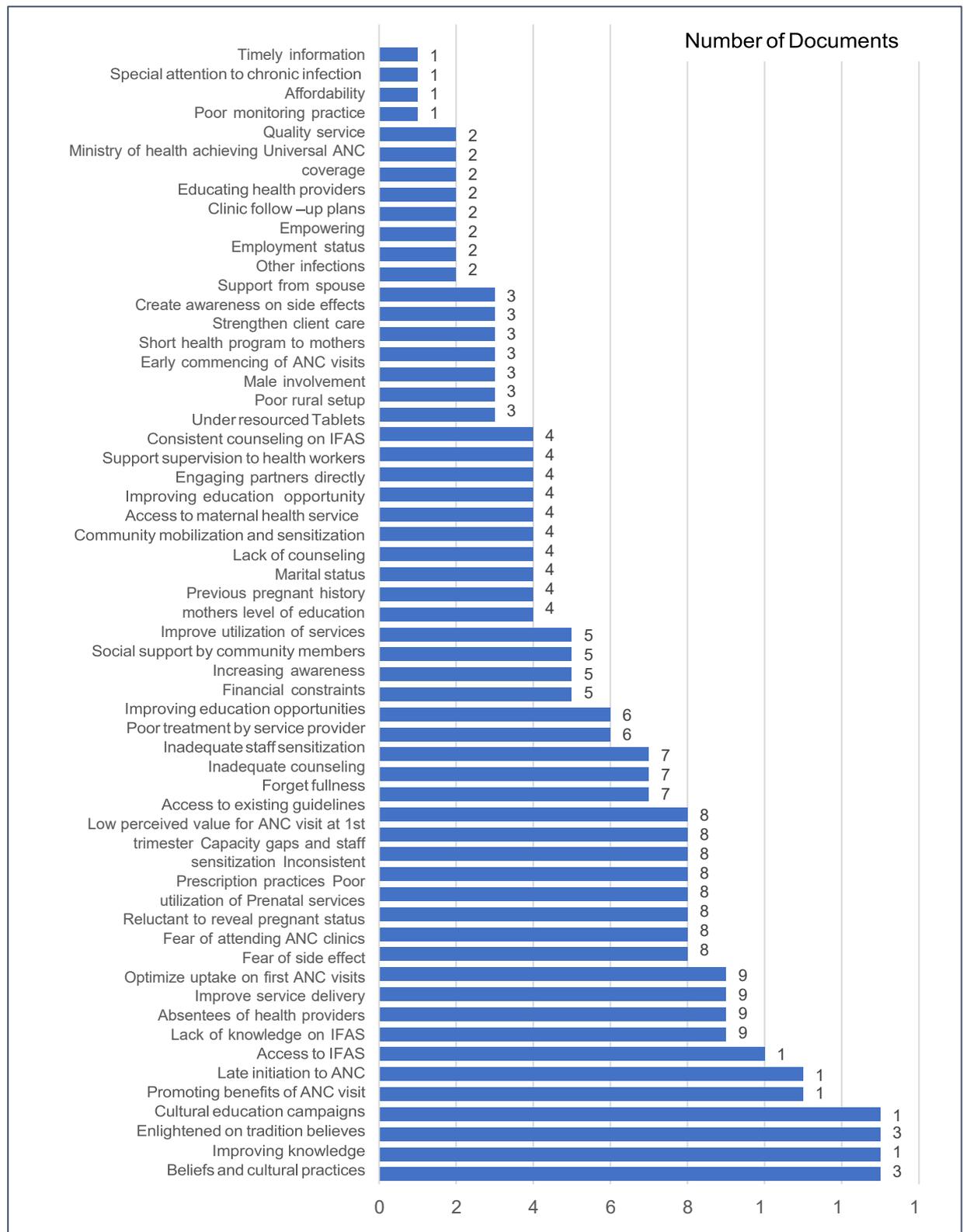


Table 2: Classification of the factors affecting access to IFA supplements in four levels of the “socio-ecological model” and the COM-B model

Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Level 1: Maternal			
Socio-demographic		Employment status	
Pregnancy and health	<ul style="list-style-type: none"> • Knowledge on importance of seeking ANC during the first trimester. • Disclosure of pregnancy publicly during the first trimester. • Forgetfulness to take the tablet. • Fear of side effects 	<ul style="list-style-type: none"> • Fears of attending ANC such as fear of hospitals, HIV testing, or pregnancy confirmation. • Low perceived value and need for ANC visits during pregnancy. • Most women-initiated ANC late. 	<i>Psychological capability Automatic motivation</i> <ul style="list-style-type: none"> • Increasing awareness • Early initiation of ANC visits. • Special attention to chronic infection • Optimize uptake on first ANC visits • Promoting benefits of ANC visits • Early commencing of ANC visits • Educating health providers • Improving knowledge • Create awareness on side effects • Community/family support: reminded by spouse, kids, relative on intake
Knowledge, perceptions, beliefs, and related factors	<ul style="list-style-type: none"> • Making delivery more difficult • Fears that taking too much iron may cause too much blood or a big baby • Beliefs against consuming medications during pregnancy 		<i>Social opportunities</i> <ul style="list-style-type: none"> • Enlightened on tradition believes • Cultural education campaigns • Empowerment
Level 2: Household			
Socio-demographic related factors		Financial constraints related to travel to ANC clinics.	<i>Physical opportunity</i> <ul style="list-style-type: none"> • Proximity to ANC services through outreaches • Affordability of services • Universal ANC coverage

Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Support related	Husband discouraging their wives from early ANC attendance		<i>Social opportunities</i> <ul style="list-style-type: none"> • Social support by community members • Engaging with spouses directly • Male involvement • Empowering the spouse • Improving knowledge
Level 3: Health system			
Environment related factors	<ul style="list-style-type: none"> • Poor knowledge on ANC services by CHVs • Poor access to Health facilities • Poor utilization of ANC services 	<ul style="list-style-type: none"> • Limited access to ANC services • Poor utilization of ANC services • Long waiting times. • Low quality of ANC services 	<i>Physical capability</i> <ul style="list-style-type: none"> • Improve coverage and utilization of ANC services • Defined package of services for ANC mothers • Mentorship of ANC service providers • On job training of ANC service providers
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
	<ul style="list-style-type: none"> • Inadequate counselling or lack of context specific messages given by health workers 	<ul style="list-style-type: none"> • Mistreatment by health care providers. • ANC services did not meet expectations 	<ul style="list-style-type: none"> • Frequent supervision for quality improvement
IFA supplement related factors	<ul style="list-style-type: none"> • IFA supplementation is a priority • Not affordable. • Inadequate supply of IFA supplements • Poor quality of IFA tablets • Poor utilization of IFAS tablets 		<i>Automatic motivation</i> <ul style="list-style-type: none"> • Increasing coverage of four ANC visits • Registration of pregnant mothers to NHIF • Inventory management of IFA tablets • Context specific counseling on IFA Supplements

Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
ANC related factors	<ul style="list-style-type: none"> Lack of on-job training for IFA supplementation Inconsistent prescription of IFA supplements 		<i>Reflective motivation</i> <ul style="list-style-type: none"> Defined package for ANC services Community level quality improvement activities Community level follow-up for pregnant mothers
ANC service provision	<ul style="list-style-type: none"> Health personnel were either not aware of existing ANC guidelines Absence of the skilled health personnel to prescribe the IFA tablets. 		<i>Physical opportunities</i> <ul style="list-style-type: none"> Dissemination of ANC guidelines through on-job training Regular Supportive supervision for community level activities Mentorship of community health workers Strengthening community health information system
Level 4: Sociocultural			
Household related factors	Older adult women discouraged younger women from attending ANC and using medicines during pregnancy	Gender norms for pregnant women	<i>Social opportunity</i> <ul style="list-style-type: none"> Context specific messages for pregnant mothers Use of key opinion leaders to address cultural norms Strengthen social support system for pregnant mothers Community sensitization campaigns
Support related factors	<ul style="list-style-type: none"> Lack of community or family member involvement Marital status spouse (not involved in partners health decision) 		<i>Social opportunity</i> <ul style="list-style-type: none"> Community mobilization and sensitization Household visits by well-trained CHVs Male involvement

4.2 Topic 2: Consumption of IFA supplements by pregnant mothers

We identified 40 factors to potentially influence consumption of IFA supplements by pregnant women (Figure 3). Of these, 18 factors were the most frequently reported as either enablers or barriers of IFA supplements consumption by pregnant mothers as described below and as outlined in Table 3.

4.2.1 Enablers of IFA Supplements Consumption of Pregnant Women

1. Number of ANC visits attended

Mothers who seek early ANC registration (<16 weeks of pregnancy) have high odds of attaining at least 4 ANC visits and are most likely to meet the recommended 90 days of IFA supplementation during the entire gestation period (n=17).

2. Maternal knowledge on anaemia and IFAS

Maternal knowledge and general awareness on anaemia and importance of IFAS in pregnancy can be acquired through nutrition education and counselling sessions at the health care facility and maternal ability to read and access vital health education through social media and attending mother-to-mother support group meetings. Findings from both qualitative and quantitative research indicates that maternal knowledge on anaemia and biological significance of IFAS is positively associated with IFAS compliance (n=17).

3. Initiation of ANC

Women who start ANC early in their pregnancy comply more to IFAS than those who start late since they have a chance to get repeated counselling on importance of IFAS and enhance their knowledge on the benefits of IFAS which promotes adherence to the recommended minimum 90 days of IFAS consumption (n=16).

4. Maternal occupational and educational status

Women empowerment through formal education and employment has been cited as a major facilitator of IFAS compliance (n=12). High levels of maternal education are associated with increased odds of access to information, awareness, and knowledge on iron deficiency anaemia and its consequences. It also increases the woman's ability to access information disseminated through health professionals and media according to these studies. Education increases uptake of information and recommendations given into practice and promotes early pregnancy disclosure and ANC first visits. Highly educated expectant mothers are likely to have a source of income which increases their access to quality health care services and can purchase IFAS in case of shortage in health facilities.

5. Maternal Age >25

Increased age is reported to be associated with IFAS compliance (n=10). Older women who have had at least one pregnancy experience and tend to know the benefits of IFAS from knowledge acquired through previous counseling sessions. Additionally, most of these women are married and have adequate support from their spouse and family. Mothers in their late 30s are aware of dangers associated with old age such as still birth, congenital malformations, anaemia among others that drives them to disclose pregnancy early and adhere to recommendations given by the HCWs including IFA consumption. One study however reported that younger mothers <25 years show good compliance since younger generations are exposed more to information regarding importance of IFAS for healthy pregnancy outcomes.

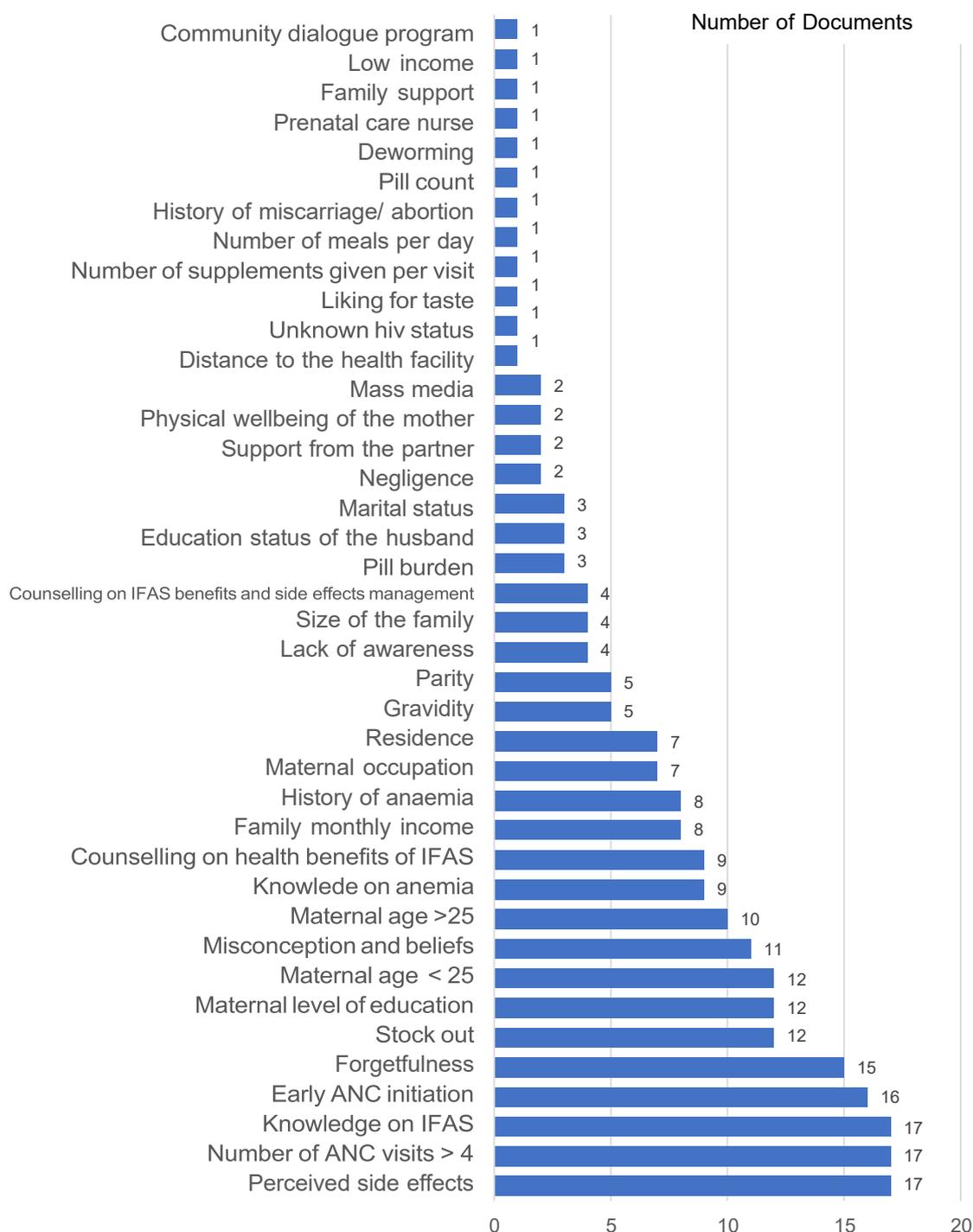
6. *Counselling on IFAS*

High IFAS knowledge has been associated with adequate individualized message sharing and counselling of pregnant women on IFAS and is reported to improve IFA supplement compliance (n=9).

7. *History of anaemia in pregnancy*

Iron and folic acid deficiency anaemia causes preterm birth, low birth weight postpartum hemorrhage, neural tube defects and maternal mortality. Anaemia causes panic and fear among pregnant mothers and act as a driving force to seek for solution to prevent the adverse effects. Mothers diagnosed with anaemia during pregnancy tend to comply more with IFA supplementation especially because they receive comprehensive health talks during treatment on benefits of the supplements (n=8).

Figure 3: Number of documents (n=30) that reported factors affecting consumption of IFA supplements by pregnant mothers



4.2.1 Barriers of IFA Supplements Consumption of Pregnant Women

1. Perceived side effects

The perception of taste and side effects associated with IFA supplements has a negative psychological implication on the pregnant woman resulting in less compliance to IFA supplementation (n=17). Major cited side effects are nausea, vomiting, diarrhea, and heartburn especially among first time mothers.

2. Forgetfulness

Forgetfulness is a major gap identified affecting IFA supplement consumption (n=15). In the typical African family set up, women are engaged in various household chores inclusive taking care of the children. Without proper reminder mechanisms in place, it is hard for the women to remember to take their supplements.

3. Stock out

Inadequate and inconsistent supply of the IFA supplement by the key stakeholders in MOH leads to acute shortage and reduced consumption of the supplements (n=12). Stock outs may be due to poor inventory management, limited funding towards IFA supplements, inadequate supply, and spatial distribution of IFA supplements in health facilities.

4. Misconceptions, beliefs, and myths

This is a major barrier for seeking professional health services, early ANC initiation and utilization of IFA supplements among expectant mothers (n=11). Myths of bad luck surrounding early disclosure of pregnancy greatly hinder timely initiation of ANC. Misconceptions that drugs in pregnancy are harmful to the mother and baby are reported to greatly hinder consumption of IFA supplements, for example that IFAS could lead to excessive bleeding during delivery and macro-babies.

5. Residence

Women staying in urban centers are more compliant to IFAS consumption than women staying in rural areas (n=7). Women in urban set ups have easier access to health information through mass media and have more ability to seek professional health guidance on ANC services, they are empowered through formal education and employment and have easy access to better health care services.

Table 3: Categorized of factors influencing consumption of IFA supplements by pregnant mothers in four levels of the “socio-ecological model” and the COM-B model

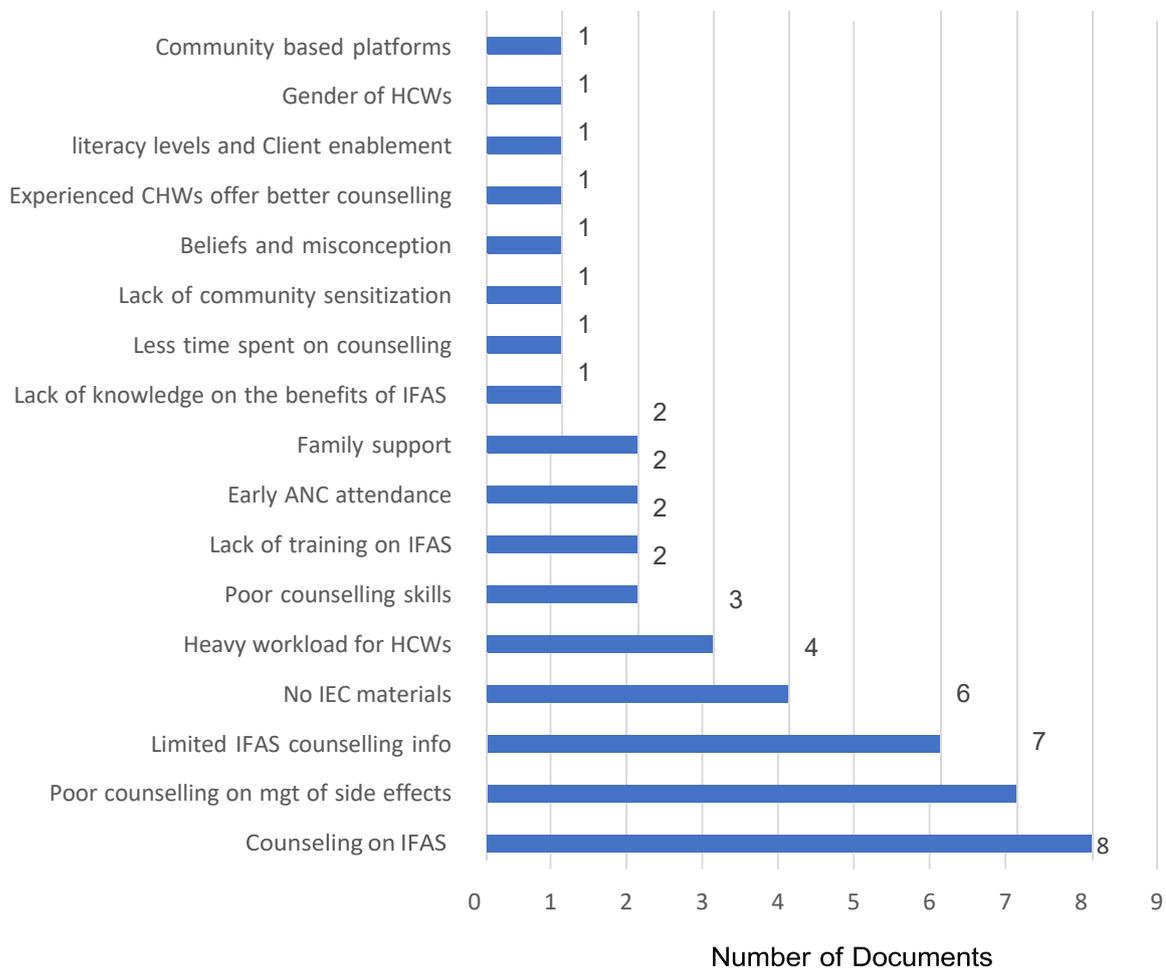
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Level 1: Maternal			
Socio-demographic	<ul style="list-style-type: none"> • Marital status, • Age of the mother 	<ul style="list-style-type: none"> • Occupational status, • Level of education 	Social opportunity
Pregnancy and health	<ul style="list-style-type: none"> • Gestation age at first ANC, • Number of ANC visits attended, • History of abortion/ Miscarriage, • Gravidity, • Birth interval 	<ul style="list-style-type: none"> • History of anaemia in pregnancy, • Co-morbidities, • Side effects of the drug • Maternal physical wellbeing 	<ul style="list-style-type: none"> • Physical capability • Psychological capability
Knowledge, perceptions, beliefs, and related factors	Perceived quality of care from the health facility	<ul style="list-style-type: none"> • Maternal knowledge on anaemia, • Maternal knowledge on IFAS, • Maternal perception of being healthy, • Maternal perception of taste associated with IFAS, • Perceived no benefits on pregnancy outcome 	<ul style="list-style-type: none"> • Social opportunity • Psychological opportunity • Reflective motivation
Others	<ul style="list-style-type: none"> • Negligence • Unknown HIV status 	<ul style="list-style-type: none"> • Forgetfulness • Access to mass media 	<ul style="list-style-type: none"> • Psychological capability • Automatic motivation • Social opportunity
Level 2: Household			
Socio-demographic related factors	<ul style="list-style-type: none"> • Time taken to reach health facility • Perceived quality of service from the health facility 	<ul style="list-style-type: none"> • Residence • Size of family • Number of meals consumed per day 	<ul style="list-style-type: none"> • Physical opportunity • Social opportunity
Support related	<ul style="list-style-type: none"> • Support from the spouse, • Support from the family 	<ul style="list-style-type: none"> • Education level of the husband, • Lack of knowledge on consumption of IFA 	<ul style="list-style-type: none"> • Social opportunity. • Automatic motivation

Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Level 3: Health system			
Environment related factors	<ul style="list-style-type: none"> • Problems experienced at the health facility during visit, • Community conversation programs • Distance to the health facility, 	Intake of deworming tablets by pregnant mothers	<ul style="list-style-type: none"> • Social opportunity • Physical opportunity • Automatic motivation
IFA supplement related factors	<ul style="list-style-type: none"> • Supply chain management, • Pill count, • Number of pills given per visit 	<ul style="list-style-type: none"> • Stock out, • Pill burden, • Type of supplement given 	
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
ANC related factors	Lack of community ANC awareness programs,		Psychological capability
ANC service provision	<ul style="list-style-type: none"> • Number of ANC staff, • Prenatal nurse or midwife 	Counselling on IFAS benefits and associated side effects	Psychological capability
Level 4: Sociocultural			
Household related factors	<ul style="list-style-type: none"> • Residence • Religion prohibition 	<ul style="list-style-type: none"> • Beliefs that consumption of drugs during pregnancy is harmful to the mother, • Too many drugs harmful to the fetus, • Belief that IFA could lead to excessive bleeding during delivery, • Belief that IFA could lead to big babies 	<ul style="list-style-type: none"> • Physical opportunity • Social opportunity • Reflective motivation
Support related factors	Mass media		Social opportunity,

4.3 Topic 3: Counselling for Pregnant Women

Seventeen (17) factors were identified as possible influencers of nutrition counselling for pregnant women as either barriers or enablers from the 27 documents that were reviewed (Figure 4). The most mentioned enabler was counselling on IFA supplements (n=8) and had a positive correlation with adherence to IFA supplementation. Early ANC attendance and family support were the second- most mentioned (n=2 each) enablers of nutrition counselling of pregnant women. Reported barriers to nutrition counselling of pregnant women include gaps in advice on side effects and their management (n=7), limited IFA supplementation counselling information (n=6), lack of IEC materials (n=4), heavy workload for health care workers (n=3), and poor counseling skills and lack of training (n=2 each) for health care workers ranked in that order.

Figure 4: Number of documents (n=27) that reported factors affecting counselling of pregnant women on IFA supplementation



4.3.1 Enablers of counseling for pregnant women

1. Counseling on IFA supplements had a correlation with adherence

Eight (8) of the research papers reviewed reported that pregnant women who were counselled on IFA supplements were more likely to adhere to their consumption than those who were not counselled. According to one of the studies, women who had a high knowledge of IFAS were more likely to adhere to the program compared to women who had low knowledge. Adequate context-specific interpersonal counselling on IFA supplements together with their prescription helps to dispel fears and doubts about the supplements and enables pregnant women to initiate their intake. Some studies (n=7) report highest compliance to IFA supplementation among women counselled and advised on side effects and their management.

2. Early ANC attendance

It is recommended that the first contact of the pregnant woman with the ANC be made within the first trimester of pregnancy. Key among the services that mothers are to receive during each are nutrition counselling on the appropriate maternal diet and supplement use during pregnancy. Therefore, early ANC attendance enables nutrition counselling of pregnant women, improves knowledge on IFA supplementation and hence increases adherence IFA consumption (n=2).

3. Family support

The social nature of the families has been identified as a key enabler to IFA supplementation adherence among women. It is reported (n=2) that the kind of support women receive from their families contributes to IFA supplementation adherence. Support from a male partner drives early pregnancy disclosure leading to early ANC linkage, counselling on nutrition in pregnancy and timely initiation of IFA supplementation. Support from family members and close relatives also helps women to attend ANC and comply with the recommended IFA tablet intake prescription.

4. Community-based platforms

Community-based platforms provide an avenue for pregnant mothers to receive personalized counselling on and hold discussions managing side effects (n=1). This also creates an opportunity for involving and educating other members of the household fostering male involvement. Being the link between the facility and community, CHVs play a crucial role in mobilization of the community.

4.3.2 Barriers on Counseling Pregnant Women

1. Poor counseling on side-effects and their management

Compliance with IFA supplementation was reported highest among women advised on side effects and their management (n=3). At the same time, major reasons given by pregnant women for discontinuing IFA supplements intake was experiencing side effects (n=7). This shows that poor counselling on side effects and their management is a barrier to adequate nutrition counselling during pregnancy.

2. Limited IFAS and anaemia counselling information

Reviewed documents reported that counselling information content on IFA supplements and anaemia provided to the pregnant women in health facilities varied possibly due to lack of a standard way of counseling since most health

facilities lacked counseling guides for health care workers (n=6). The counselling that some of the pregnant women received did not include content on side effects of IFA supplements and their management, the causes of anaemia and the increased nutritional requirement during pregnancy (n=4). The limited counseling information may affect the mothers' ability to adhere to the consumption of IFA supplements.

3. Lack of IEC materials

Lack of IEC materials in health facilities such as the health workers' counseling guides, mothers' calendars and brochures on IFA supplements were reported as barriers to nutrition counselling (n=4). This may affect the quality of counseling in terms of content of counseling information that the health care workers provide hence affecting level of knowledge on IFA supplements. As part of FANC, the HCWs are expected to provide counseling together with the IFA supplements. The IEC materials guide to HCWs and the pregnant women to acquire knowledge on IFA supplementation, its benefits and management of side effects which, in turn, affects compliance to the supplement's intake.

4. Heavy workload for health care providers

In many health facilities, heavy workload of the HCWs was reported to affect the quality of counseling and time spent to counsel pregnant mothers resulting in limited knowledge on IFA supplements and their utilization (n=3). Key reason for overwhelmed HCWs is inadequate staff coupled with high volume of clients. For example, in Kitui County, Kenya, HCW to patient ratios are far below the recommendations of the World Health Organization (WHO).

5. Lack of training and poor counselling skills of HCWs and CHVs on IFA supplementation

Training on IFA supplementation influences the quality of knowledge shared to women by health care providers. Lack of IFA Supplementation specific training for health care providers resulted in huge knowledge gap and poor messaging of personalized health information on IFA supplementation (n=2). Lack of training also results in poor counselling skills negatively influencing the quality of knowledge shared and adherence to IFA supplementation (n=2). One paper indicated that women were told to take IFA supplements with meals to minimize side effects, but they were not given specific information on side effects. Other women reported that health care provider had not discussed the benefits of IFA supplementation and this led to poor uptake of the supplement. On the contrary, Health care providers reported counselling during ANC on specific IFA supplementation benefits and side effects [n=1]. This could mean the health care providers did not identify knowledge gaps among the women to offer the appropriate counselling.

6. Other barriers Lack of knowledge on the benefits of IFA supplements

Other factors reported to hinder nutrition counselling of pregnant women are lack of knowledge on the benefits of IFA supplementation, lack of community sensitization on seeking early ANC services and gender of health care workers (n=1).

Table 4: Factors influencing counselling of pregnant women on IFA supplementation categorized in four levels of the “socio-ecological model” and mapped to the COM-B model

Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B
Level 1: Maternal			
Socio-demographic			
Pregnancy and health	Early ANC attendance	Counseling on side-effects and their management	Psychological Capability
Knowledge, perceptions, beliefs, and related factors		<ul style="list-style-type: none"> • Lack of knowledge on the benefits of IFAS • Lack of counselling on IFAS 	Psychological Capability
Others			
Level 2: Household			
Socio-demographic related factors			
Support related	Lack of community sensitization on seeking early ANC for timely IFAS.	<ul style="list-style-type: none"> • Community based platform provide an opportunity for educating and involving key decision makers in the household • Family support 	Social Opportunity
Level 3: Health system			
Environment related factors			
IFA supplement related factors			
ANC related factors	No IEC materials for HCWs		• Physical Opportunity
ANC service provision	<ul style="list-style-type: none"> • Varied content for counselling • Poor counselling skills • High workload for health care providers • The time spent to educate women about the importance of IFAS was not enough 	<ul style="list-style-type: none"> • Lack of easily understandable information on IFAS for HCWS • Limited IFAS counselling information • Gaps in the content of IFAS advice in relation to IFAS side effects and their management. • Lack of IFA supplementation-specific training for facility and community HCWs • Experienced CHWs offer better counselling • Lack of association between high literacy levels and client enablement • Female CHWs counsel and enable clients better than their male counterparts 	<ul style="list-style-type: none"> • Physical Capability • Physical opportunity
Level 4: Sociocultural			
Household related factors		Beliefs and misconception of IFA supplementation due to lack of knowledge/proper counseling	Reflective Motivation
Support related factors			

4.4 Topic 4: Community level IFA supplementation

Community level IFA supplementation takes place when local community members embrace uptake of the supplements among women of reproductive age (WRA). It is characterised by good coverage, awareness, widespread knowledge, supportive structures at household, social cultural and health systems levels for optimal utilisation of the IFA supplements and associated maternal services. We reviewed 26 publications in which over 50 factors were identified to affect community level IFA supplementation in one way or another (Figure 5). The factors that were extensively reported ($n \geq 4$) and considered important are summarized below.

4.4.1 Enablers of community level IFA supplementation

1. Embracing the community health strategy

Making use of community-based structures contributes to increased uptake of IFAS services (7). Use of community-based distribution channels has been shown to improve utilization of IFA supplements ($n=4$). Community health extension workers (CHEWs) and community health volunteers (CHVs) live and operate amongst the local community and easily reach them regularly. Engaging them to do social mobilization, advocacy and hold general meetings with pregnant women and their husbands focusing on IFA supplementation has been seen to lead to increased knowledge and awareness and thus better coverage of IFA supplementation at community level ($n=2$). One study indicates that use of CHVs and CHEWs is effective in providing referral services and linkage of pregnant women with HCWs for timely ANC and IFA supplementation services (19). Moreover, use of CHVs and other community agents to identify pregnant women, distribute IFA supplements and follow up has been found to increase adherence to IFA supplements ($n=4$).

2. Age and parity of the mother

Age and parity of pregnant women is cited as an enabler of community level IFA supplementation ($n=6$). Increased maternal age (30 years and above) and parity (>1) are associated with high knowledge on IFA supplementation and more ANC services utilization. Hence older pregnant women and women of parity >1 will tend to embrace community level IFA supplementation.

3. Knowledge on FANC and awareness on anaemia and IFA supplementation

Women's knowledge about ANC is an important enabler to utilization of ANC and other associated services like community level IFA supplementation ($n=6$)

4. Higher level of education of mothers

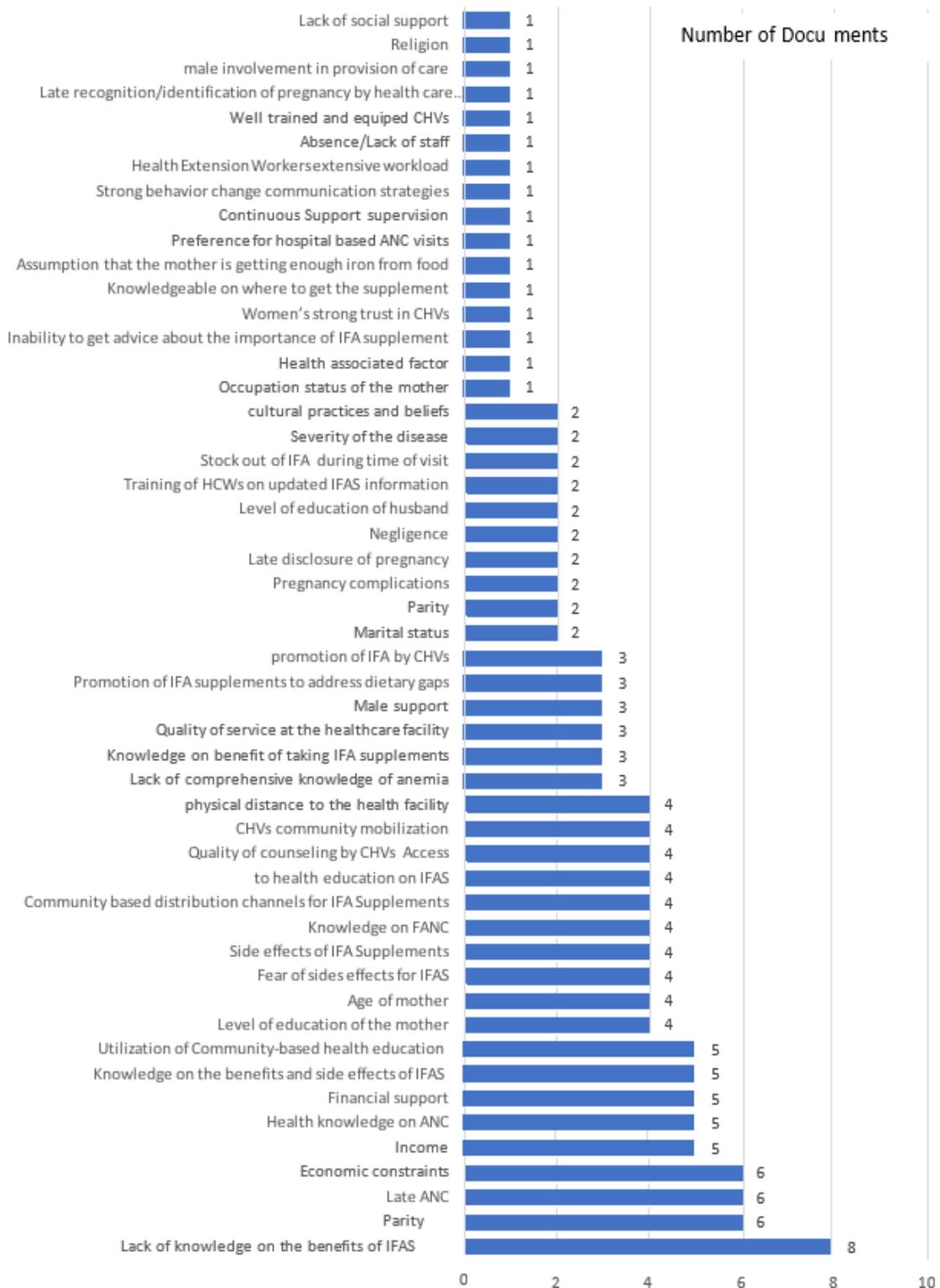
Due to high levels of awareness and knowledge on ANC services, educated women are reported to be more receptive to IFA supplementation ($n=5$).

5. Training of health care workers, community health volunteers and focal persons

Regular training and updating of HCWs and CHVs on IFA supplementation information equips them with correct and sufficient knowledge for pregnant mothers on IFA supplements, anaemia and nutrition during pregnancy ($n=3$). On the job trainings strengthen their counselling skills and confidence to provide mentorship to pregnant women thus increasing uptake of both facility and community level IFA supplementation ($n=2$). Additionally, training of focal persons such as Traditional Birth Attendants, religious leaders and opinion leaders to

work in collaboration with existing community structures and health services can be effective in promoting early and frequent utilization and coverage of ANC services at community level [5].

Figure 5: Number of documents (n=26) that reported factors affecting community level IFA supplementation



4.4.2 Barriers of community level IFA supplementation

1. Low quality of ANC services

Low quality of ANC services negatively influences their utilization resulting in late first ANC visits (n=10). Often, pregnant women complain of nonexistent, incomplete, and inadequate services. For instance, mothers return home from the health facility without being served due to insufficient staff, poor patient-service provider relations, and payments for supplies and services (drugs, cards and diagnostic tests), when they are supposed to be free of charges (n=2).

2. Lack of knowledge on anaemia and IFA supplementation

Lack of knowledge on ANC services, anaemia and IFA supplementation among pregnant women is an important barrier to IFA supplementation uptake as cited in 9 of the 26 articles reviewed. Contact with health care providers is the main source of information to pregnant women. This means that first time pregnant women are likely to lack information on IFA supplementation until they start attending health education during ANC visits and community level talks.

3. Age and parity of the mother

Age and parity of pregnant women has been cited as an important barrier to IFA supplements uptake (n=8) at community level. Age of pregnant woman is closely related to the parity of the woman which has also been cited to be a factor in utilization of IFA supplements (n=4). Young and teenage pregnant women lack knowledge on benefits of IFA supplements while multi-parous and older women (>25 years) start their ANC late since they assume that they have great level of experience, making them feel more confident and consider ANC less important (n=2).

4. Low level of education/income/occupation of the mother

Low level of education has been cited to be a barrier in 7 out of 26 reviewed articles. Women with low level of education have less knowledge about, limited access to and less utilization of ANC services. Relatively low education of below secondary education presents a challenge in accessing information and ability to comprehend and make informed choice on use of IFA supplements. Maternal and husband's education is highly associated with social-economic status and household income which affect the utilization of ANC. Accessing ANC and IFA supplements require some money to cater for transport and purchase of IFA supplements in case of stock out or country cost sharing policy of which pregnant women from lower income households may not afford (n=3).

5. Long distance to health facility

Long distance to health facility combined with financial constraints is identified as an important barrier to the use of IFA supplements especially in rural areas (n=7). This is because pregnant mothers find it difficult to walk for long distances or take two or more taxis to seek ANC services where IFA supplements are mostly provided.

6. Lack of family support, misconceptions, beliefs, and religious reasons

Pregnant women's decision to utilize IFAS has been associated to some influencers who include husbands, peers, mother in laws and religious leaders (n=6). Some studies indicate that pregnant women without partner support at household level are not likely to utilize IFA supplements (n=3). Misconceptions such as IFA supplements are associated with large babies and difficulties in delivery (n=2), religious and cultural beliefs also act as barriers to IFA supplementation (n=2).

7. IFAS supplements side effects

As discussed in previous sections, many pregnant women tend to discontinue taking IFA supplements due to fear or experience of side effects (n=4) which is frequently considered as a major obstacle to compliance with IFA supplement intake.

8. Stock out of IFA supplements

Stock out of IFA supplements is cited as a barrier to IFA supplementation (n=3) and is attributable to inadequate supply and inefficient distribution systems.

Table 5: Classification of factors influencing community level IFA supplementation in four levels of the “socio-ecological model” and mapped to the COM- B model

Level 1: Maternal			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Socio-demographic	<ul style="list-style-type: none"> • Age of the mother • Level of education of the mother • Parity • Marital status • Occupation status/income 	<ul style="list-style-type: none"> • Age of the mother • Level of education of the mother • Parity • Knowledge on anaemia • Knowledge on the benefits of IFA supplementation during pregnancy 	<ul style="list-style-type: none"> • Capability -Physical • Capability - Psychological
Pregnancy and health	<ul style="list-style-type: none"> • Health associated factors(anaemia) • Feeling better after taking supplements are 	<ul style="list-style-type: none"> • Reproductive loss (miscarriage or stillbirth) • Late ANC • Lack of ANC attendance • Late recognition of pregnancy • Late disclosure of the pregnancy 	<ul style="list-style-type: none"> • Capability - Psychological • Motivation - Reflective • Capability - Physical
Knowledge, perceptions, beliefs, and related factors	<ul style="list-style-type: none"> • lack of comprehensive knowledge of anaemia • Inability to get advice about the importance of IFA supplement • Lack of knowledge or ignorance on the benefits of IFAS • Fear of sides effects for IFAS • Complaints on side effects (unpleasant taste, diarrhea, vomiting, gastric irritation, nausea, and constipation) • Knowledgeable on where to get the supplement • Dislike the taste of IFAS • Assumption that the mother is getting enough iron from food • Negligence • Women preferred receiving ANC at health centers rather than health posts/outreaches 		<ul style="list-style-type: none"> • Opportunity - Social • Capability - Physical • Capability-Psychological • Motivation - Reflective • Motivation - Automatic

Level 2: Household			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Socio-demographic related factors	Economic constraints	Opportunity - Physical	
Support related	Supportive partner/spouse		Opportunity - Social
Level 3: Health system			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Environment related factors	Lack of access to health education on IFA supplementation	Lack of access to health institutions	Opportunity - Physical
IFA supplement related factors	Unavailability of iron tablet in the health facility during time of visit		Opportunity - Physical
ANC related factors		Late recognition of pregnancy	Capability – Physiological
ANC service provision	<ul style="list-style-type: none"> • Lack of awareness on the benefits and side effects of IFAS • Health Extension Workers extensive workload • Absence/Lack of staff • Anticipated difficulty carrying IFA supplies by CHVs 	<ul style="list-style-type: none"> • Awareness on • Poor quality of services 	<ul style="list-style-type: none"> • Opportunity - Social • Opportunity-Physical • Motivation - Automatic
Level 4: Sociocultural			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Household related factors	Low level of education of husband	Religious reasons	<ul style="list-style-type: none"> • Capability – Physiological • Opportunity - Social
Support related factors	Lack of social support		Opportunity - Social

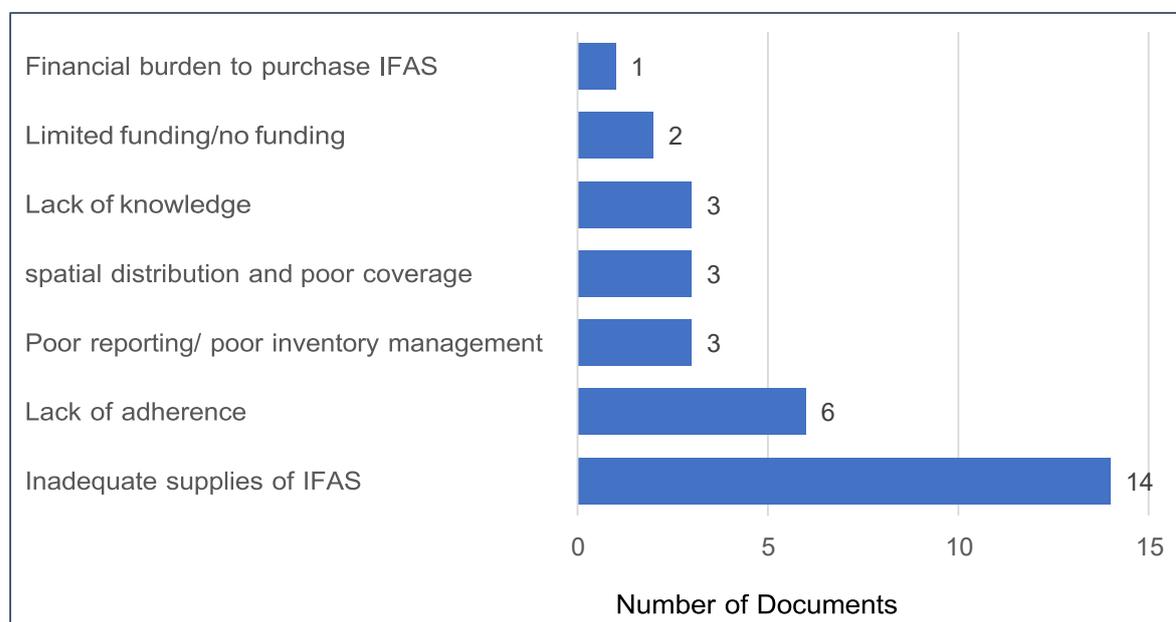
4.5 Topic 5: Stock out of IFA supplements

We reviewed 25 publications under this topic. The quality of health care and the satisfaction realised by pregnant women visiting ANC is determined by the availability of quality services and supplies. Adequate supply of IFA supplements calls for a sound logistics system that provides timely and adequate quantities of the tablets at all levels of the system (n=4). Seven (7) factors were identified as possible contributors to IFA supplements stock outs. The most frequently reported factor is limited or inadequate supply of IFA supplements (n=14). Other factors include: lack of adherence (n=6), limited funding (n=3), poor inventory management (n=3), spatial distribution (n=3), lack of knowledge (n=3), and limited funding/financial burden (n=3).

1. *Limited or inadequate IFA supplements supply*

While limited or inadequate supply is the most reported factor contributing to IFA supplements stock outs (n=14) it could be as a result of many factors including challenges in supply chain procedures at both national and sub-national levels, procurement systems, sub-national requisition plans and the facility ordering and consumption reports. Lack of providers knowledge in terms of reporting skills and quantification of IFA supplements results in procuring less supplements causing stock shortages. Delays experienced from supply agencies such as the Kenya Medical Supplies Agency (KEMSA) contribute to increased days of IFA supplements stock out (n=4).

Figure 6: Number of documents (n=25) that reported factors affecting regular information on demand for IFA supplementation



2. *Poor inventory management*

Inventory management involves control of routine monitoring, timely reporting on consumption, restocking and ordering of essential and non-essential medicines in addition to micronutrients of importance such as IFA supplements. Poor inventory management of IFA supplements regularly results in stock outs of the supplements (n=3).

3. *Spatial distribution of health care facilities*

This refers to the geographical distribution and catchment area of health care facilities that are points of dispensing IFA supplements. When facilities are far apart and large populations within a wide geographical area rely entirely on a single facility, stock outs are frequently experienced (n=3).

4. *Limited funding*

Limited or no funding towards IFA supplements procurement, distribution, and storage results to perennial stock outs in health facilities (n=2). This exacerbates the problem of compliance and utilization of IFA supplements among pregnant women as some of them are financially constrained and not able to purchase the supplements or travel to ANC (n=5).

5. *Lack of Knowledge*

Lack of knowledge on IFA supplementation among women of reproductive age is reported as a barrier to IFA consumption (n=3). Although not a direct contributor to stock out, knowledge gap is linked to both demand and supply constraints that hinder the consumption of IFA supplements for the recommended period. When women are knowledgeable on the importance of consuming IFA supplements and of seeking ANC services early in pregnancy, then they will be ready to disclose their pregnancy as early as possible. This enables timely requisition of appropriate amount of IFA supplements at associated ANC health facilities.

Table 6: Classification of factors influencing stock outs of IFA supplements in four levels of the “socio-ecological model” and mapped to the COM-B model

Level 1: Maternal			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Socio-demographic			
Pregnancy and health			
Knowledge, perceptions, beliefs, and related factors	<ul style="list-style-type: none"> • Lack of adherence • Lack or limited knowledge • Noncompliance 	<ul style="list-style-type: none"> • Poor uptake • Poor utilization 	Psychological capability
Level 2: Household			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Socio-demographic related factors		Financial burden to buy IFAS	Physical opportunity
Support related			
Level 3: Health system			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Environment related factors		Spatial distribution and poor	Physical opportunity
IFA supplement related factors	Limited /no funding	Inadequate supply of IFAS	Physical opportunity
ANC related factors	Poor inventory management		Physical capability
ANC service provision			
Level 4: Sociocultural			
Category of Factors	Individual factors (ANC)	Individual factors (IFAS)	Categories of the COM-B model
Household related factors			
Support related factors			

5. Discussion

The results of the BNI show that how each of the five initially identified bottlenecks influence consumption of and adherence to IFA supplements is not mutually exclusive.

The key associated factors revolve around the following:

- Beliefs, misconceptions, lack of knowledge and fear of side effects
- Late first ANC and few ANC visits
- Quality of service delivery by HCWs and at the health facility
- Maternal education and economic empowerment
- Maternal age, parity, and history of anaemia
- Maternal social and family support
- Maternal residence and distance from health facility
- Forgetfulness by mothers
- Functioning of community-based platforms
- Stock outs and management of supplies

The review reveals that the mechanisms of effect of these factors are interwoven along the impact pathway of IFA supplements consumption in varying degrees.

Beliefs, misconceptions, lack of knowledge and fear of side effects impacts the utilization of IFA supplements along the entire program impact pathway. At the initiation stage, these factors hinder mothers from disclosing their pregnancy and from initiating early ANC visits. Should IFA supplements intake be initiated within appropriate timing, lack of knowledge and fear of side effects among the mothers will impact negatively on appropriate and continued use of the supplements resulting to low consumption and adherence. However, appropriate counselling of mothers by knowledgeable and skilled health service providers to demystify these issues, improve maternal knowledge on benefits and management of side effects of IFA supplements has been shown to improve utilization of the supplements.

Quality of service delivery is influenced by the knowledge and skills of HCWs, availability of job aids including IEC materials, availability of supplies, workload of HCWs and the working environment. High quality service delivery will attract mothers to the facility and improve early initiation of ANC. Knowledge and skills of HCWs, availability of job aids and HCWs work load influences the quality of context-specific interpersonal counselling and affects the appropriate use of IFA supplements. In addition, when HCWs have enough stocks of the supplements, the 90-day prescriptions are made possible and mothers can continue use of the supplements to attain the recommended threshold.

Education is an opportunity to empower women not only to gain knowledge but also to increase their opportunities to earn an income. Empowered women have greater confidence and capability to make decision to use modern health care services for themselves and for their children. Knowledge has a positive relationship with maternal health care utilization because educated mothers tend to have greater awareness of the existence and benefits of maternal health care services. Maternal education above secondary level is associated with increased odds of access to information, awareness, and knowledge on iron deficiency anaemia and its consequences. It increases the woman's ability to access information disseminated through health professionals and

media. Income increases women access to quality health care services and enables them to honor ANC appointments. Incomes equally means the mother has ability to purchase IFAS in case of shortage at the health centre.

Maternal age, parity, and history of anaemia impact utilization of IFA supplements mainly through the initiation stage of ANC. Age and parity can delay pregnancy disclosure and therefore hinder early initiation of ANC. History of anaemia, on the other hand, promotes IFA supplements intake since the mother has experienced the negative effects of not taking the supplements. Maternal social and family support including male partner encourages pregnant mothers to disclose their pregnant status as soon as they confirm and promotes early initiation of ANC. Social and family support depicts social acceptance of the pregnancy and provides comfort that subsequently drives the willingness for early disclosure of pregnancy and utilization of health services by pregnant mothers. This kind of support can help address the barriers of maternal age, especially for teenage and elderly mothers, and parity. In addition, this kind of support can also address the problem of mothers forgetting to take their supplement. Women's busy schedules and workloads could lead to forgetfulness especially if the mother is in good health.

In Kenya, IFA supplementation is provided at the health facilities offering ANC services. Long distances to the facilities discourage mothers from initiating and attending ANC sessions, and act as barriers to accessing the supplements. Most urban set-ups have more health facilities inclusive of the private and public health facilities giving women more options to seek ANC services unlike their counterparts in most rural areas. Hence early initiation, appropriate use and continued use of IFA supplements by pregnant women is likely to be negatively affected in rural areas and in areas where health facilities are sparsely distributed. However, well-functioning community-based platforms close to the mothers can be utilized as alternatives to bring services close to the people and to ease access to the supplements.

6. Recommendations

Considering the identified and discussed key factors influencing consumption of and adherence to IFA supplements, the following recommendations are drawn:

6.1 Develop strong behavior change communication strategy

A strong behavior change communication strategy will provide platforms that convey key messages with corresponding actions targeting various players who influence uptake of IFAS. The strategy should include approaches that target to:

- Build capacity at community and facility levels for health care providers to provide services and key messages levelling pregnant women, women of reproductive age, male partners, other family members and community members; as well as sensitize community opinion and administrative leaders.
- Continuously build capacity of commodity managers to monitor and manage stocks for seamless supply of IFA supplements.

When implemented well, behavior change communication strategy will contribute to increase knowledge and awareness on IFAS, increased support and demand for IFAS leading to early initiation, proper and continued use of IFAS.

6.2 Embracing the Community Health Strategy and Utilize Community-Based Platforms

Community-based platforms provide an avenue for pregnant mothers to receive group and personalized services including counselling/health education, dialoguing and supplies. Community-based platforms have characteristics of inclusivity and involvement of other members of the community. Services and health promotion messages are brought closer to the members of the community. This provides a platform for members to discuss issues affecting the community, giving them an opportunity to come up with solutions for the challenges faced.

Community platforms such as those for the implementation of the Baby Friendly Community Initiative (BFCl) (e.g. mother-to-mother-support groups) and the Community Integrated Management of Childhood Illnesses (cIMCl) could be considered for integration of ANC and IFA supplementation services. This will also serve mothers residing far from health facilities offering ANC services.

6.3 Strong monitoring and coordination strategy for IFA supplementation interventions integrated with other health services

Close monitoring and coordination of IFA supplementation provides information on the targeted number of pregnant women in a health facility, amount of required and available IFA supplements, deficit, and measures for restocking. In large integrated programmes, some interventions face the risk of lack of ownership and their monitoring and coordination is not considered important. Hence a deliberately strong monitoring and coordination strategy for IFA supplementation should be designed to effectively identify gaps/needs for improved quality of services.

Appendix A: Description of Literature Search

Database search

- PubMed /MEDLINE,
- Google Scholar,
- Bibliographies of retrieved publications, etc.

Language English

Search date Start 01 January 2000 to 30 April 2020

Search Terms

Focus	Bottleneck	Synonyms	Teams
Barriers of access to IFA supplements	Lack of regular information on number of households with pregnant women within defined community unit	<ul style="list-style-type: none"> • Determinants/Factors/Influences • Bottlenecks/challenges/Enablers • Perceptions/Reasons 	Alex Cynthia
Consumption of IFA supplements by pregnant mothers	Poor linkage between Focused ANC package and defined household visits for pregnant women within community unit	<ul style="list-style-type: none"> • Demand • Consumption • Compliance • Household mapping • Initiation of ANC 	Linda Billian
Counselling for Pregnant women	Lack of context specific job aids on integrated community package for FANC plus BFCI with clear actions for CHVs during HH visits	<ul style="list-style-type: none"> • Interpersonal communication • Context specific • Integrated community • Community dialogue • Poor Counselling • Actions for pregnant mothers 	Maria Virginia Daniel
Community level IFA supplementation	Late initiation of ANC	<ul style="list-style-type: none"> • ANC • Community awareness • Role of CHVs • Coverage • Household mapping 	Esther Tabitha Mary
Stock out of IFA supplements	Lack of regular information on the number of households with pregnant women	<ul style="list-style-type: none"> • Inadequate supply • Demand for IFA supplements • Poor utilization • Use/Utilization • Intake • Coverage 	Priscilla Martin

Appendix B: Bibliography Listing per topic area

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