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**Evaluation of Implementation of the Girls' Iron Folate
Tablet Programme in
the Accra Metropolis**

by

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON
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DECLARATION

I, Jocelyn Nii Larrey Laryea, declare that this work is the result of my own original research under the supervision of Dr. Samuel Dery and that inclusions of other peoples' research by way of references and literature review have been duly acknowledged. This dissertation, either in whole or in part has not been presented elsewhere for another degree.

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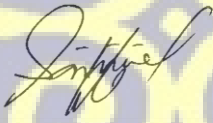


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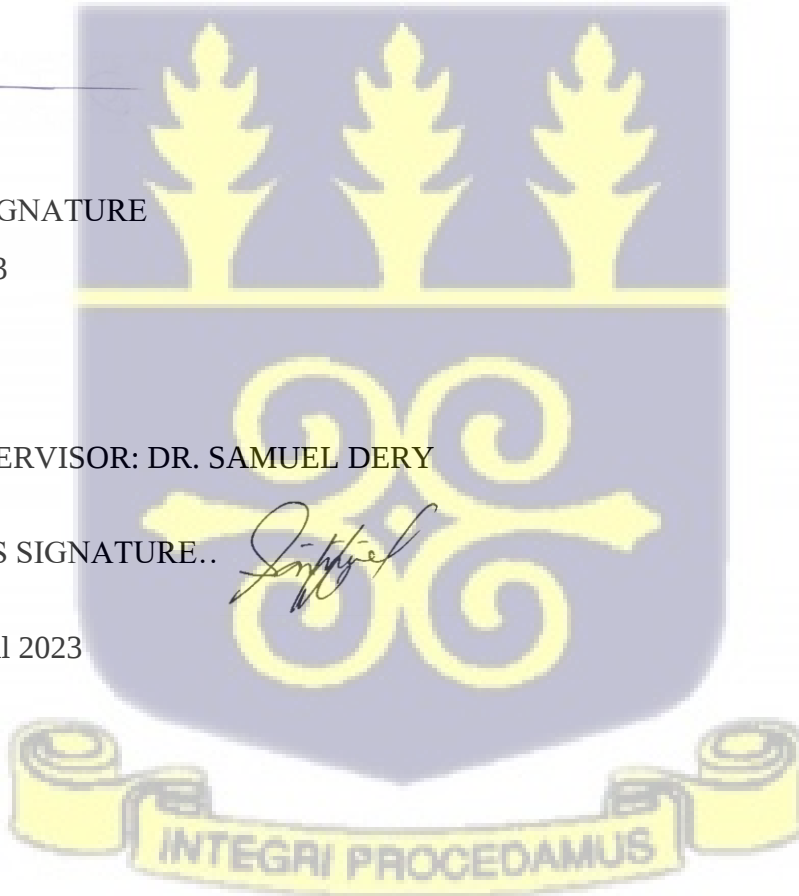
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DATE: 26th April 2023



DEDICATION

This study is dedicated to the Glory of the Almighty God.



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I wish to express my utmost gratitude to God for HIS divine favours. I also thank my family Elizabeth Odonkor (Mum), Justin Laryea, Joseph Laryea, Mabel Adamafio, Yvonne Laryea (Siblings) for their support and encouragement.

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LIST OF ABBREVIATIONS

AMA	Accra Metropolitan Assembly
AMHD	Accra Metro Health Directorate
CBV	Community Based Volunteer
CHN	Community Health Nurse
CHPS	Community-Based Health Planning Services
CHW	Community Health Worker
CV	Curriculum Vitae
DHIMS	District Health Information Management System
DOT	Direct Observation Therapy
GDHS	Ghana Demographic and Health Survey
GES	Ghana Education Service
GHS	Ghana Health Service
GIFT	Girls Iron-Folate Tablet
HB	Haemoglobin
HBM	Help Belief Model
IFA	Iron Folic Acid
IPC	Infection Prevention and Control
MICS	Multiple Indicators Cluster Survey
MOH	Ministry Of Health
PI	Principal Investigator
UNICEF	United Nations International Children's Emergency Fund
WASH	Water Sanitation and Hygiene
WHO	World Health Organization



ABSTRACT

Introduction: Anaemia prevalence among adolescent girls is a problem of public health importance for many Lower Middle-Income Countries, including Ghana. Iron-folate supplementation has been found to be a highly effective intervention in reducing the burden of anaemia among adolescent girls. However, implementation bottlenecks are hindering the success of this intervention.

Objective: The study evaluated implementation of the Girls Iron Folate Tables (GIFT) programme in the Accra Metropolitan Area.

Methods: This study employed a descriptive cross-sectional study design. A mixed data collection approach was used involving a survey of teenage girls, and interview of teachers and health workers involved in the GIFT programme implementation. Sample size was 380 adolescent girls and 12 coordinators. Stata 17 was used for analysis and results presented in table and graphs. Descriptive, Bivariate, and logistic analyses were done to establish the relationship between adherence to GIFT protocol and predictor factors at 95% confidence level and 0.05 p-value. Thematic analysis was used for the qualitative data, and findings presented in a narrative.

Findings: Out of 380 adolescent girls surveyed, 304 were in school and 76 out of school. In addition, 12 facilitators were interviewed for this evaluation. The results showed that GIFT implementation was 57% effective in school and 42% for out school. Being in JHS (AOR=2.1, 95% CI=1.20, 3.83, $p<.01$), adequate knowledge on anaemia (AOR=3.2, 95% CI=1.65, 6.05, $p<.01$) and adequate knowledge on GIFT programme (AOR=5.7, 95% CI=2.50, 12.77, $p<.01$) were significantly associated with implementation effectiveness, while IFA shortage, inadequate awareness in the community, side effects and misconceptions were barriers against programme implementation.

Conclusion: The study found that GIFT implementation effectiveness was slightly better in the in-school, compared to out-school. Programme protocol adherence was severely affected by IFA shortages and other programme bottlenecks. To improve programme implementation effectiveness, IFA availability should be improved, while interventions to increase adherence to the GIFT programme should focus on increasing knowledge about anaemia and the features of the

GIFT programme. Efforts should also be made to improve community awareness of GIFT and education on side effects of IFA to allay the fears of the community.



CHAPTER ONE

1. INTRODUCTION

1.1. Background

In Ghana, anaemia prevalence among adolescent girls remain very high despite numerous interventions to curtail the scourge (Azupogo et al., 2021).

In recent years there has been some improvement in the prevalence, however, the situation remains critical, requiring intensified efforts (Ampiah et al., 2019; Wegmüller et al., 2020). A study in northern Ghana, found 75% of adolescent girls assessed were anaemic, with the mean haemoglobin of all study participants been 11.2g/dl, significantly below the normal threshold of 12.g/dl (Wemakor et al., 2023).

Iron-rich foods are readily available among the local delicacies of many communities in Ghana. However, low knowledge about the benefits and hence low intake has led to high prevalence anaemia in communities where these kinds of food stuff are common (Wiafe et al., 2021).

The knowledge deficit about the nutritional value of various food staples and general nutritional awareness affects incidence of nutritional deficiency diseases and anemia in particular (Adjei-Banuah et al., 2021; Wiafe et al., 2021)

There are myriad of factors that contribute to anaemia prevalence among adolescents. These include socio-demographic characteristics such as family wealth index, mothers' educational level, and family size affects iron-dietary intake (Tandoh et al., 2021; Wiafe et al., 2020).

Anaemia among adolescent girls is more concerning as it can have serious consequences on their growth, school performance, morbidity, and reproductive performance in later life (Abdelrahim et

al., 2009; Bushra et al., 2010). These can impact their unborn children, trigger a vicious cycle of poverty, and affect their entire community.

Iron-folate supplementation has been found to be a highly effective intervention in reducing the burden of anaemia among adolescent girls. However, implementation bottlenecks are hindering the success of this intervention (Gosdin, Sharma, et al., 2021a; Horjus et al., 2005; Kavle & Landry, 2018a).

1.2. Programme Description

The Ghana Health Service (GHS) in collaboration with UNICEF-Ghana, and Ghana Education Service (GES) launched the Girls' Iron-Folic Acid Tablet Supplementation (GIFTS) Programme initially in four regions of Ghana: Brong Ahafo, Northern, Upper East, and Volta in October 2017. It is however currently running in all regions of the country including Greater Accra.

The GIFT programme involves enrolled students receiving an intervention package that includes iron-folic acid (IFA) supplementation at school, whilst their out-of-school peers receive theirs through the health system. The programme package extends beyond just the Iron folate tablets to include health and nutrition education on anemia and malaria prevention, water, hygiene, and sanitation (WASH).

The Iron-folic acid (IFA) tablets are expected to be taken on a weekly basis, with the first dose of four tablets distributed to beneficiaries administered by directly observed therapy (DOT). School health educators/teachers administer the IFA to the adolescent girls and the intervention package is delivered throughout the academic year. The routine IFA tablets consumed once a week by each student is recorded into the "GIFTS register" in each school by the teacher. This monitoring data could also be collated for each selected student (Gosdin, Sharma, et al., 2020, 2021a).

In the community, a Health worker or trained Community health volunteer administers the IFA to the beneficiaries also on Direct Observation (DOT) and records all relevant information in the community GIFT register.

The health administration receives monthly summary reports from the schools and communities on the items such as number of girls on the register, number enrolled, number given IFA, number screened for anaemia and the number who were anaemic.

The GIFT programmatic guidelines adherence in the context of this evaluation considers compliance with the main cardinal guidelines of the GIFT programme. That is. Monthly/4 weekly distribution of IFA tablets to adolescent girls, weekly uptake of IFA tablets by beneficiaries, administration of first by Direct Observation Therapy (DOT), provision of health education by a trained teacher or healthcare worker.

1.3. Purpose of the Study

This study sought to assess whether the GIFT program was being implemented according to the guidelines set out during the initiation of the program. In addition, the study evaluated the facilitators and barriers to the successful implementation of the program in the metropolis. Furthermore, the findings of the study will inform coordinators, implementers, beneficiaries, sponsors, and policy makers on program implementation effectiveness and how to improve it to realize the program goals.

1.4. Problem Statement

Anaemia is a major public health problem in many lower-middle-income countries. In many of these countries, it is a major cause of morbidity and mortality among women (Benson et al., 2021).

Adolescent girls are one of the most vulnerable groups affected by anaemia, due to the rapid physiological changes occurring at this stage and the onset of menstruation (Gebreyesus et al., 2019a). At this stage they are also preparing for childbirth and require adequate nourishment for a successful gestation (Massey-Stokes, 2002).

Anemia among women can also lead to other pregnancy-related complications like post-partum depression, pre-term births, stillbirths and neonatal deaths (Mirza et al., 2018; Wassef et al., 2018).

In their study, Gosdin, Tripp, *et al.*, 2020 found anaemia prevalence among adolescent school girls at 24% in Ghana. This is very alarming and considering the consequences of this condition, no effort must be spared in combating it.

Many interventions have been instituted to curb this menace to varying degrees of success. These include distribution of treated anti-mosquito nets to prevent malaria, routine uptake of folic acid and multivitamins for pregnant women. However, the GIFT programme is the one targeted specifically at adolescent girls.

An evaluation of the impact of the GIFT programme on adolescent girls found significant reduction in anaemia among girls of school going age. The study which was conducted in Northern and Volta region showed a 5% reduction in anaemia among beneficiaries (Gosdin, Tripp, et al., 2020). This shows that the GIFT programme if well implemented will contribute significantly to the reduction of adolescent anaemia and forestall its long-term effect on young women during their reproductive period.

Even though the GIFT programme has been implemented in the Accra metro since 2018, no study has been done to assess whether it is being carried out according to the prescribed protocol. As one of the biggest metropolitan areas in the country, uniquely located at the heart of the capital

city with a very high population density and concentration of schools (GSS, 2021), it is thus very important to conduct an evaluation of the GIFT programme implementation. This will provide unique information on the programme performance in such a cosmopolitan environment.

In the absence of a proper process evaluation of the implementation of this intervention, the opportunity to identify potential bottlenecks that can stall the programme or prevent it from achieving its objectives will be missed. Hence, the intervention may run its full course before these impairments will show; by then, it may be too late to salvage the intervention.

Furthermore, evaluating the programme implementation may identify enabling factors that can be quickly introduced in other parts of the country where the programme is facing difficulties.

Moreover, unintended effects of the intervention can be quickly identified during the process evaluation, to enable programme sponsors and/or implementers to decide whether the programme is worth continuing in its current form.

1.5. Objectives

1.6. General Objective

To evaluate implementation of the GIFT programme in the Accra Metropolitan Area

1.7. Specific Objectives

1. To assess the adherence to the GIFT programme implementation guidelines
2. To determine facilitators of the GIFT Programme
3. To ascertain the barriers to the GIFT programme

1.8. Research Questions

1. What is the level of adherence to the GIFT programme implementation guidelines?
2. What are the facilitators of the GIFT Programme?
3. What are the barriers to the GIFT programme?

1.9. Study Significance

This study is important in ensuring the success of the GIFT program in the Accra Metropolis and beyond. By assessing the level of compliance with program guidelines by participants, the study provides insight into the factors that affect program success. This information can be used to make adjustments and interventions to address any challenges and ensure that progress is being made towards achieving the program's objectives.

Additionally, by identifying bottlenecks, barriers, and enablers of the program implementation, the study enables a more proactive approach to addressing any issues that may arise during implementation. This can help to maintain gains made over the period of implementation and ensure that the program remains on track towards achieving its goals.

The study also assesses the adherence to programme implementation guidelines towards achieving its set objectives of reducing anemia among adolescent girls and improving knowledge on anemia from the perspective of the beneficiaries. This information is crucial for determining the program's overall impact and for making decisions about future programming.

Moreover, the study provides valuable information for the ongoing implementation of the GIFT program and is essential for ensuring that the program is successful in achieving its objectives of reducing anemia among adolescent girls and improving knowledge on anemia.

CHAPTER TWO

2. LITERATURE

2.1. Introduction

This chapter provides an overview of previous studies related to anaemia among adolescent girls, including causes, prevention interventions and consequences. It also examined the implementation of the Girls Folate Tablet (GIFT) programme and factors that affect it. This chapter also presented the need for process evaluation of community-based interventions.

2.2. Anaemia in Adolescent Girls

Anaemia is diagnosed when an adolescent girl records haemoglobin (Hb) of less than 12 g/dl. This is related to the rapid physiological development within this period of their life and the onset of menstruation (Engidaw et al., 2018).

Anaemia among adolescent girls is a problem of global proportions, that affects many countries, especially among those in the lower to middle income bracket. A situation clearly depicted by the a study that found one in every four young girls in Indonesia to be anaemic (Rah et al., 2021).

Anaemia was diagnosed in about 90% of adolescent girls in a survey of girls of school going age in India. The study showed a significant relationship between the anaemia and physical developmental skills of young girls (Suryana et al., 2020).

In Ethiopia, 29% of adolescent girls survey in three different communities were seen to anaemic. They level of anemia was significant impacted by subject knowledge and food security of the household (Gebreyesus et al., 2019b).

Gosdin, Tripp, *et al.*, (2020) found 24% anaemia rate among young girls of school going age compared with 13% for their male counterparts in Ghana. This study demonstrated clearly how girls are disproportionately affected by anaemia, despite many years of education on nutrition.

2.3. Aetiology of Anaemia

Anaemia has many aetiologies, but Iron deficiency is the most important cause of anaemia in the population. Iron deficiency is caused and attributable to increased demand, decreased intake, decreased or malabsorption, or chronic blood loss (Cappellini *et al.*, 2020).

The increased demand for iron is usually physiologic and common in infants, pre-school children, growth spurts in adolescents and pregnancy especially in the second and third trimesters (Elstrott *et al.*, 2020). The onset of menstruation in adolescent girls also leads to increased demand for iron and hence increased potential for anaemia (Chaparro & Suchdev, 2019).

Decreased absorption of iron is associated with certain dietary practices such as excessive intake food rich in calcium, phytates and tannins (Beck *et al.*, 2014).

Malabsorption of iron is also linked to morbid conditions such as celiac disease, tropical sprue, Crohn's disease which inhibit the normal functioning of the small intestine in its nutrient utilization role (Davidson *et al.*, 2010; Saboor *et al.*, 2015).

2.4. Anaemia Prevention

Prevention is the most efficacious measure to curb the impact of this condition on people and society in general. Over the years preventing anaemia has been tackled from different facets considering the various aetiologies.

Preventing diseases such as malaria and worm infestation has been prioritized in the developing world (Assefa et al., 2021). Malaria is one of the most common causes of anaemia in Africa, where it is endemic (White et al., 2014).

Several interventions are being implemented to stem the rate of malaria infection including chemoprophylaxis for pregnant women and child, distribution of insecticide treated nets, indoor residual spraying among others (Dellicour et al., 2016; Gachelin et al., 2018; Pandey & Shingadia, 2022).

Interventions such as periodic distribution of antihelminth medications for children in selected communities and environmental control measures are undertaken to tackle the high incidence of helminthiasis (Bah et al., 2019; Rohmah et al., 2022).

Other interventions are more specifically targeted at prevention of anaemia; Iron deficiency anaemia or other malnutrition causing anaemia. Many of these interventions are targeted at specific population segments depending on their predisposition to the severe consequence of anaemia (Kulkarni et al., 2021).

2.5. Anaemia Prevention Interventions Targeted at Adolescents

Interventions targeted at reducing anaemia in general and Iron-deficiency anaemia among young children of school going age have been implemented across the globe. In Indonesia, a multi-faceted approach of tackling this menace was adopted involving food-based interventions, nutrient supplementation, and nutrition education (Juffrie et al., 2020).

Daily iron-folate supplementation was found to have a significant impact on haemoglobin level of girls in both community and school interventions. This improvement was directly associated with the interventions as other confounding factors were controlled (Y. H. Handiso et al., 2021).

However, Kumar Gh et al., (2018) postulated that Iron folate alone may not be adequate to reduce anaemia, but in combining it with awareness creation on causes and prevention is more likely to lead to positive results.

An evaluation of the GIFT implementation in Ghana found a significant (25% - 19%) reduction in anaemia among school girls who participated in the program after a year of implementation. The study showed a positive association with haemoglobin level and negative with anaemia, indicative of the effectiveness of the programme (Gosdin, Sharma, et al., 2021b).

2.6. Factors affecting Implementation of the GIFT Programme

Implementation of health interventions are affected by many social, demographic, and economic factors. These factors can impact an intervention both positively and negatively depending on the circumstance (Ftwi et al., 2020; Gashu et al., 2021; Shiferaw et al., 2019). As a public health intervention, the GIFT programme is affected factors such as age, educational level, family size economic status among others (Vir et al., 2008; Wang et al., 2020).

An Ethiopian study among girls in the community found that knowledge about anaemia and positively affected anaemia prevalence among young girls (Gebreyesus et al., 2019a). Also, awareness of anaemia was found to positively affect compliance to the IFA protocol among beneficiaries (Demisse et al., 2021). It was also found that Compliance of the IFA regimen of the GIFT programme in the Temale metropolis was found to be as low as 26.2%. The study also realized a strong association between knowledge on anaemia and IFA with compliance. Furthermore, they identified inadequate participation of teachers and misconceptions as the main barriers to compliance (Dubik et al., 2019b; Gosdin, Sharma, et al., 2021a).

Moreover, some behavioural modification models such as the Help Belief Model (HBM) as demonstrated how people make the decision to participate or comply with an intervention. The perceptions of people about the benefits and effectiveness of an intervention may also influence their behaviour towards it. If they deem the programme to be beneficial to them or people around them, then the likelihood of adherence may improve significantly (Anuar et al., 2020).

Other school related challenges such as adequate training for participating teachers and teachers' perception of implementation difficulty, hence, lack of interest were major barriers to programme implementation. Ability to make up for missed distribution of IFA tablets was also found to affect implementation significantly (Gosdin, Sharma, et al., 2021a).

Community based volunteers were found to be likely to reach a greater number of beneficiaries with IFA within their communities. In addition, these CBVs are also readily able to convey the benefits and compliance with the IFA supplementation to their constituents, that using the traditional health systems structures such as clinics and hospitals (Kavle & Landry, 2018b).

2.7. Conceptual Framework

The conceptual framework adapted from a study to assess the facilitators and barriers to the GIFT programme in the four regions that piloted the intervention (Gosdin, Sharma, et al., 2020). The framework identified five main factors that affect the effectiveness of the GIFT programme; Individual, attitude and practices, capacity, effectiveness and governance systems.

Each of these factors has varying characteristics, which contribute the effect of these factors on the programme. Some factors share common characteristics as in the case of individual and attitude which share have attributes like sex, education, age and religion.

The framework also presents five (5) main activities that drive the implementation of the GIFT programme. Each of these activities is required to be fulfilled in a chronological manner to meet programme objectives. The activities are supply of IFA, school/community delivery of IFA, regular (monthly) distribution of the tablets to beneficiaries, receipt of tablets and consumption. Each of the activities has drivers that need to be present to ensure their execution.

Comprehensively, the framework can be explained as follows:

Governance systems: The inception of the initiative requires a policy framework that directs programme mission and objectives. This level also looks at the infrastructural and financial needs to achieve the set objectives. The main programmatic activity at this level is the supply of IFA and the benchmark is availability.

Capacity: This looks like what is required to set the implementation ball rolling. It pertains to the implementation setup situation. Staff availability, training on health education, training on programme requirement and processes. It also considers logistical issues like storage and transportation.

The main activities here are school/community identification and IFA distribution. The benchmarks are accessibility and acceptability.

Individual: This deals with the beneficiaries of the programme, the adolescent girl. As most of them are still under the care of their parents, the characteristics of the parents and teachers come into play. Attributes such as age, education and religion thus are very relevant at this level.

The main activities are receipt of IFA tablets, consumption of IFA as prescribed and observance of health tips. These are assessed by contact and effectiveness.

Attitude and practices: This is concerned with the individual practice and attitude that affect programme objectives. Socio-demographic characteristics such as age, education, religion are linked to this. This also affects receipt and consumption of the IFA tablets.

Perception: the perception and motivation of key players like teachers, healthcare workers and community members are captured here. The key role these people play in implementation of the programme from selecting sites to actual tablet distribution and provision of health education explains why their perception is very crucial for programme success.

Therefore, address in any issue with these people directly affects appropriateness of programme site and programme service provision.

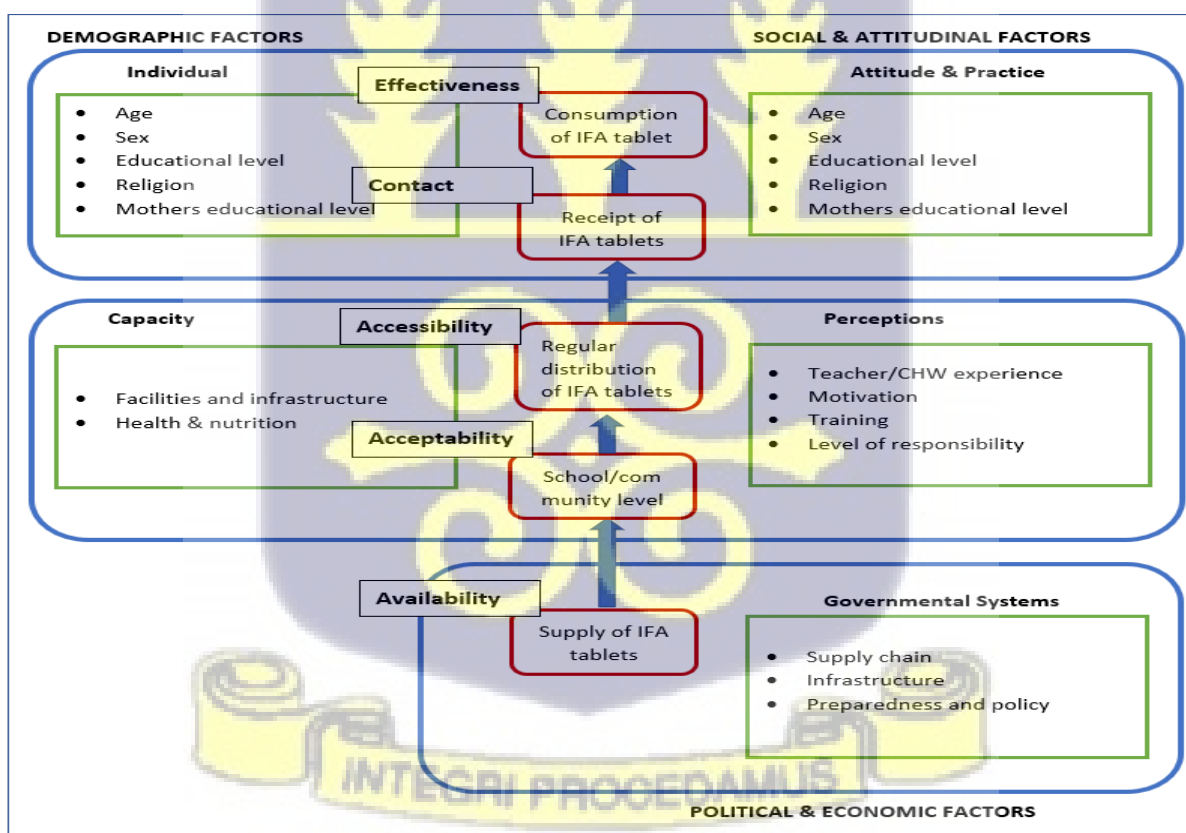


Figure 1: Conceptual Framework adapted from work of Gosdin et al., (2020) in their work on Barriers and Facilitators of Iron and Folic Acid Supplementation within a School-Based Integrated Nutrition and Health Promotion Program among Ghanaian Adolescent Girls.

CHAPTER THREE

3. METHODS AND MATERIALS

3.1. Study Site

The study site was the Accra Metropolitan Area. This covered all three (3) sub-metros. The metropolis is at the centre of the capital city of Ghana. It is composed of urban (residential), peri-urban and deprived communities.

The metropolis has 128 basic schools comprising both public and private, many of which participate in the GIFT programme.

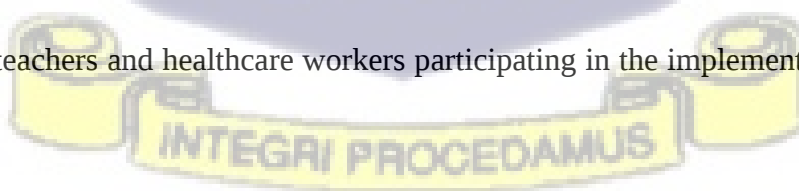
The metro also has sixty-two (62) CHPS zones. All the CHPS zones are enrolled on the programme.

According to the 2020 Ghana Population and Housing Census, Accra metro has 284, 124 residents, out of which 14,746 are adolescents. Girls of adolescent age constitute 51% (7520) of this population.

3.2. Study Population

The study involved adolescent girls in the Accra Metropolis. These were girls between 10 – 19 years old. This included both in-school and out of school girls.

It also involved teachers and healthcare workers participating in the implementation of the GIFT programme.



3.3. Design

This study employed a descriptive cross-sectional study design. A mixed method, involving both quantitative and qualitative data collection approaches were adopted for this study. The quantitative aspect involved a survey of teenage girls and the qualitative engaged teachers and healthcare workers involved in the GIFT programme implementation.

3.4. Sample Size Determination

The Cochran formula for determining sample size of proportional entities was used for this exercise with a 95% confidence level and 5% margin of error. Using proportion of 66%, from the rate of compliance with the GIFT protocol among adolescent girls found in a study among young girls in Ghana (Yidana et al., 2020).

$$n = \frac{z^2 pq}{e^2}$$

Where:

n is the minimum required sample size

$z = 1.96$; $p = 0.66$; $q = (1-0.66) = 0.74$; $e = 0.005$

$n = 345$

Hence, a minimum of 345 respondents are required for the survey. Adding a non-response rate of 10% (35), the total number of respondents for the study was 380.

In addition, four (4) coordinators from each of the clusters were interviewed for the study. For the whole study, twelve coordinators were selected from the six selected clusters.

The sample was shared among the six clusters such that five (5) were allocated 64 respondents and one (1) given 60 to constitute the sample size of 380.

3.5. Sampling

Two-stage Cluster sampling method was used for this study. A two-stage cluster sampling is a probability sampling method involving a staged procedure. The first involved selecting a set of pre-existing groups (clusters) from the population of interest (Lee et al., 2016; Sutradhar, 2022). This is followed by the random selection of individual respondents from each of the selected clusters. In the Accra metropolis, there are 61 CHPS zones, which serve as clusters. Balloting was used to randomly select six clusters (CHPS zones), two from each of the three Sub-metros of the Accra metropolis. In each selected cluster, the out-of-school and in school registers were combined to form the sampling frame, from which to select respondents. In a cluster with more than one beneficiary school, balloting was used to select one school to participate in the study. Each cluster has one community, so every cluster had one community and school to participate in the study. This was followed by random selection of respondents in each zone. Balloting was used for selecting the respondents, using the GIFT register in the community and school within the CHPS zone as the sampling frame. It was realized that the number of beneficiaries in the community (out of school) was very few, hence, all out of school beneficiaries available were considered for selection as participants barring the need for balloting.

The advantages of using this method are the ease of implementation and effectiveness in generating a representative sample from a study population (Jin et al., 2013).

Teachers and Healthcare workers in the zones selected involved with GIFT were interviewed to solicit information on the programme implementations. As such one Teacher and one community health worker were conveniently selected and interviewed in each of the six selected clusters.

3.6. Study Variable

Table 1: Variables Description

Variable	Classification	Scale of Measurement	Source
Adherence to GIFT protocol	Dependent	Nominal (composite)	Survey
School ownership	Independent	Nominal	Reports
Teacher/trained focal person	Independent	Nominal	Reports
Class/form of student	Independent	Nominal	Survey
Age	Independent	Discrete	Survey
Religion	Independent	Nominal	Survey
Mother's educational level	Independent	Ordinal	Survey
Tablet availability (1 month shortage in last 6 months)	Independent	Nominal	Reports
Knowledge on anemia	Independent	Ordinal (composite)	Survey
Knowledge on GIFT	Independent	Ordinal (composite)	Survey

3.7. Data Collection Tool

A structured questionnaire was used for this study. The tool had five sections. Section one: Socio-demographic characteristics, composed of twelve (12) questions; section two: Knowledge on anaemia, consisted of three questions; section three: Knowledge and attitude towards the GIFT programme, had six questions; section four: Compliance with GIFT protocol having seven questions and section five: Perception on GIFT with five questions.

In addition, a guide was used to conduct in-depth interviews with teachers and health workers involved with the implementation of the programme. The interview guide for the coordinators had two sections. Section: Socio-demographic characteristics, with five questions and section two: GIFT implementation, with six questions. Apart from these questions, Interviewers had the opportunity to explore interesting leads during the interview sessions.

3.8. Quality Control/Assurance

3.8.1. Training of Field staff

In a bid to ensure data quality, field staff were trained on the use of the data collection tools. They were also given a comprehensive tutorial on the content of the questionnaire to ensure that they have adequate understanding of what the questionnaire is expected to elicit from respondents. They were trained on how to protect human participants, confidentiality, and the process of obtaining informed consent.

3.8.2. Pre-testing of Data Collection Tool

The questionnaire and the checklist for data review was pre-tested at the Korle-Klottey Municipality, purposely selected due to its similarity with the dynamics in the Accra Metropolis. During this process, fifteen (15) adolescent girls (beneficiaries of the GIFT programme) were interviewed using the questionnaire. In addition, a Healthcare worker and a teacher were also interviewed with the interview guide. These data collection tools were modified where appropriate to make them more suitable for the study.

3.8.3. Revision of Data Collection Tools/Questionnaires

Responses from participants and results from analysis of the pre-test were used to revise and finalize the data collection tools to ensure that they elicited right responses that will answer the research questions.

3.9. Data Collection

Trained research assistants using an electronic structured questionnaire finalized after pre-testing interviewed all consenting participants. For the schools, prior appointments were taken from the school principal and the class teachers for the survey. Students who consented or assented to participate were then randomly selected and interviewed.

For the out of school, since the numbers on the registers were very few, all beneficiaries who were available and assented or consented to participate in the study were selected and interviewed.

All interviews with the participants were done in either English or any other dialect (Ga and Twi) of the convenience of the respondent.

3.10. Qualitative Data Collection

Twelve (12) Key informants were interviewed, comprising six Teacher and Six Healthcare workers. Interviews were conducted using an interview guide in English or any other dialect of the convenience of the respondent. The interviews were audio-recorded, and notes taken after obtaining consent from the respondents.

3.11. Data Processing and Management

Data collected was checked for completeness and consistency and accuracy. Data cleaning and preparation were done using MS Excel.

3.12. Data storage, safety, and ownership

The consent forms were kept safely in the custody of the Principal Investigator. All electronic data was backed up online using a separate storage drive. Only the PI had access to the study data.

3.13. Data Analysis

Quantitative Data Analysis

The quantitative data was coded and analyzed using STATA 17. Sociodemographic characteristics, level of adherence, and knowledge of anaemia and the GIFT program was first presented in figures, and tables using descriptive statistics such as frequencies and percentages.

All analyses were done to compare results from In-school and out-school respondents. The association between GIFT protocol adherence among these two categories was also assessed.

Bivariate chi-square test was used to determine the association between the sociodemographic characteristics, knowledge of anaemia, and knowledge of the GIFT program and the outcome variable. Logistic regression analysis was done to determine the effect of demographic characteristics, knowledge of anaemia, and knowledge of the GIFT program on adherence level.

Multiple logistic regression analysis was then undertaken for variables that were statistically significant after the bivariate analysis. Crude and adjusted odds ratios with their respective confidence intervals were computed to determine the strength of the association. A P-value of less

than 0.05 is indicative of a significant association between the variables with a confidence level of 95%.

GIFT program implementation guideline adherence was measured by a composite score of the various cardinal components of the GIFT package. These were adherence to IFA regimen, practice of Direct Observation Therapy (DOT), and health education for beneficiaries.

IFA uptake adherence level was measured based on the number of tablets consumed in the past 7 weeks. Adolescent girls who consumed at least five tablets of the expected dose in the previous 7 weeks (1 tablet per week) which is equivalent to consuming 71% of the expected dose before the day of the data collection (Dubik et al., 2019a). Adolescent girls who consumed less than five tablets were considered non-adherent. Records kept by the programme coordinators were used to validate each respondent's adherence status.

Factors affecting adherence considered were demographic characteristics of beneficiaries, knowledge on anaemia, knowledge of the GIFT program, and attitude towards the GIFT programme.

Enabling factors were those variables that positively affected the effectiveness of the program, while barriers were those that negatively affected the effectiveness of the program in the logistic regression model.

Knowledge on anemia was measured by summing up 17 relevant knowledge items on anaemia (3 items on the meaning of anemia, 6 items on signs and symptoms of anemia, and 8 items on prevention of anemia). A correct response was scored "1" and an incorrect response was scored "0" with a maximum score of 9. (Those who scored above the median mark were considered to

have good knowledge of anemia while those who scored below the median mark were considered to have poor knowledge.

Knowledge of the GIFT program was scored by summing up 10 relevant knowledge items on the GIFT program: 5 items on main active ingredient of the tablet, 3 items on frequency of taking IFA tablet and 2 items on tablet uptake. A correct answer was scored "1" and an incorrect answer was scored "0". With a maximum score of 4, those who scored above the median mark were considered to have good knowledge on the GIFT program while those who scored below the median mark were considered to have poor knowledge.

Adherence to GIFT programme protocol was scored by summing 14 items: 2 items on IFA uptake, 3 items on IFA dispensing, 1 item on quantity of IFA received, 1 item on number of IFA consumed, 2 items on DOT, and 5 items on health education. A correct answer was scored "1" and an incorrect answer was scored "0". With a maximum score of 7. Scores above the median were adequate compliance and below was inadequate.

Analysis of Qualitative Data

Thematic analysis approach was used for the qualitative aspect of the study to identify and report themes within the interview transcripts. To obtain a rich thematic description of the experiences of GIFT implementors, the researcher recorded the interview with the consent of the Key informants. Notes were also taken to pick key points during the interview process. The audio recordings were manually transcribed by the researcher and another assistant. Notes were then compared to obtain a representative transcript from the interviews.

The researcher read and re-read the transcripts to grasp the overall information, and codes were allocated to relevant narratives in the process. All the codes were further consolidated into

categories and more comprehensive themes. The researcher then discussed the results with the informants to reach an agreement on the outcome of the interviews.

3.14. Ethical Consideration

3.14.1. Ethical Issues

The protocol for this study was obtained from the ethics review committee of the Ghana Health Service for approval (GHS-ERC 026/01/23). The institution is mandated to undertake ethical review of research in Ghana. Also, permission was obtained from the Accra Health Directorate which has administrative and technical oversight over health activities within the Metropolis including the GIFT programme.

3.14.2. Confidentiality

All information obtained treated were confidential and used only for the purpose of this study. In addition, the information was marked with the ID number and not name of respondents.

3.14.3. Compensation

There was no form of incentives before and after participation. Involvement was solely based on volunteerism. Participants will however be duly acknowledged.

3.14.4. Possible Risks

No harm happened to participants because of their involvement in this study. However, some of the questions to be answered in the questionnaire were sensitive; therefore, participants were at liberty not to answer any question that made them feel uncomfortable.

3.14.5. Rights

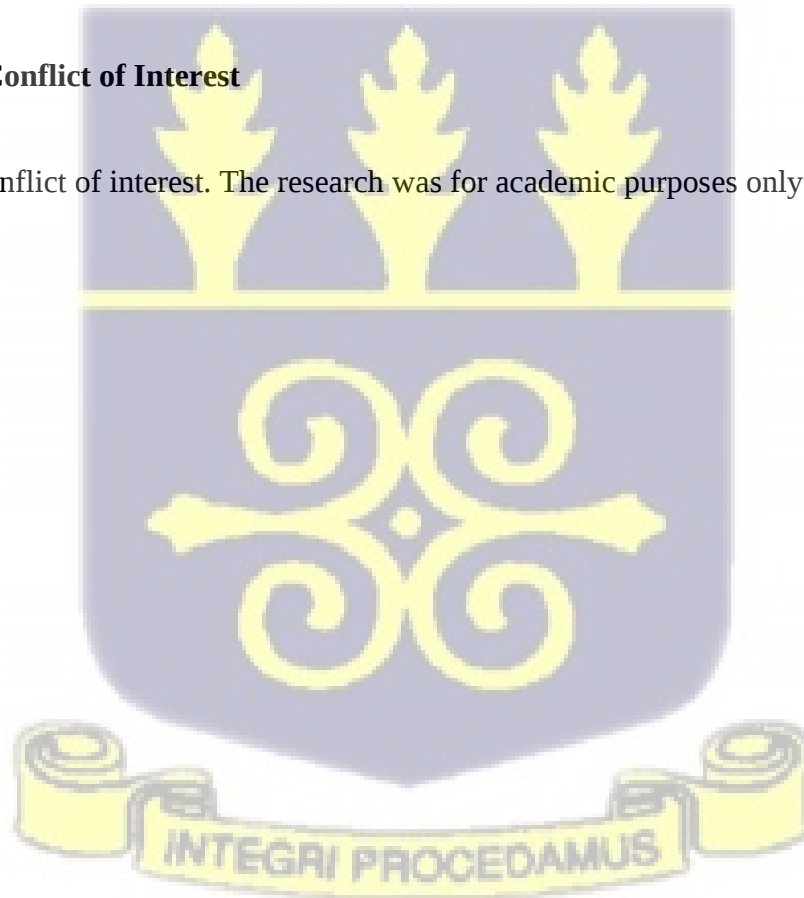
Taking part in this study was voluntary. Respondents could stop participating in the study at any time, even if they had already given consent. Refusal to participate or withdrawal from the study did not involve any penalty.

3.14.6. Benefits

Participation in the study will inform care providers on how to develop specific interventions to help shape the GIFT programme in a way to deliver programme objectives to the benefit of beneficiaries and the community.

3.14.7. Conflict of Interest

There was no conflict of interest. The research was for academic purposes only.



CHAPTER FOUR

4. FINDINGS

4.1. Introduction

The study aimed to evaluate the effectiveness of the Girls Iron-Folate Tablet Supplementation Programme. This chapter presents the results of analysis of study data and provides in-depth description of the results. The chapter is organized into several sections, each focusing on a specific aspect of the research question.

4.2. Socio-Demographic Characteristics of Respondents Surveyed

Table 2: Socio-Demographic Characteristics of Respondents

Variable	In school [N = 304 (%)]	Out school [N=76 (%)]	Total [N=380 (%)]
Cluster			
1	61 (20.1)	3 (4.0)	64 (16.8)
2	54 (17.8)	10 (13.2)	64 (16.8)
3	64 (21.1)	0	64 (16.8)
4	55 (18.1)	9 (11.8)	64 (16.8)
5	20 (6.58)	44 (57.9)	64 (16.8)
6	50 (16.5)	10 (13.2)	60 (15.8)
Age			
10 – 14	204 (67.1)	47 (61.8)	251 (66.1)
15 – 19	100 (32.9)	29 (38.2)	129 (33.9)
Educational level			
Primary	94 (30.9)	24 (31.6)	118 (31.1)
JHS	210 (69.1)	52 (68.4)	262 (68.9)
Region			
Christian	265 (87.2)	66 (86.8)	331 (87.1)
Muslim	39 (12.8)	10 (13.2)	49 (12.9)
Mother's educational level			
None	9 (3.0)	2 (2.6)	11 (2.9)
Primary	47 (15.5)	14 (18.4)	61 (16.1)
JHS	120 (39.5)	26 (34.2)	146 (38.4)
SHS	84 (27.6)	24 (31.6)	108 (28.4)

Tertiary	44 (14.5)	10 (13.2)	54 (14.2)
Father's educational level			
None	8 (2.6)	2 (2.6)	10 (2.6)
Primary	23 (7.6)	10 (13.2)	33 (8.7)
JHS	107 (35.2)	19 (25.0)	126 (33.2)
SHS	114 (37.5)	32 (42.1)	146 (38.4)
Tertiary	52 (17.1)	13 (17.1)	65 (17.1)
Mother's occupation			
Formal	42 (13.8)	10 (13.2)	52 (13.7)
Informal	83 (27.3)	48 (63.1)	131 (34.5)
Others	179 (58.9)	18 (23.7)	197 (51.8)
Father's occupation			
Formal	50 (16.5)	11 (14.5)	61 (16.1)
Informal	87 (28.6)	49 (64.5)	136 (35.8)
Others	167 (54.9)	16 (21.0)	183 (48.2)

Table 2 presents the socio-demographic characteristics of respondents grouped into the two categories of the GIFT programme, that is in-school and out-school. For the clusters, apart from cluster 6 which had 60 (16%), all the others had 64 (17%) respondents. Overall, in-school had 304 (80%) of respondents, compared with 76 (20%) from out-school. Also, for cluster 3, no out-school respondents were included, as no beneficiary was available to partake in the study.

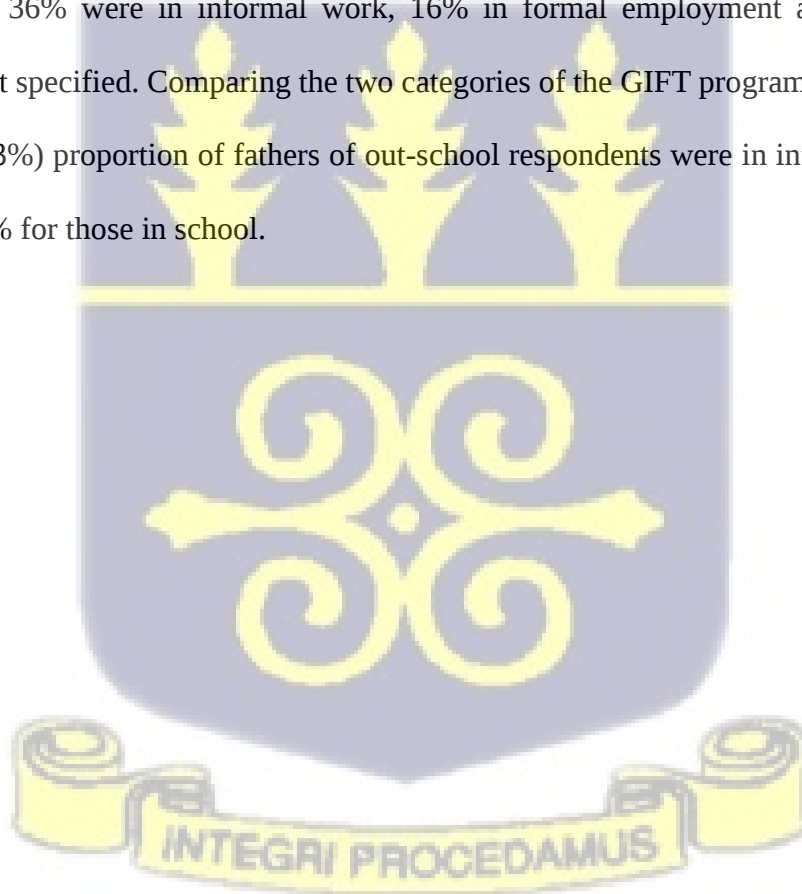
Regarding age, majority of respondents (66%) were in the 10 – 14 years group, while 34% were in 15 – 19 years group. This proportion is reflected in the in-school and out-school categories, where 10-15 years constituted 67% and 62% respectively.

For the educational level of respondents, most (69%) were in Junior High School, and 31% in Primary school. Furthermore, for both in-school and out-school, majority of respondents were also in JHS. Also, regarding the religious affiliation of respondents, 87% were Christians. Among the two categories Christians were 87% for both in-school and out-school.

When it comes to the educational background of respondents' mothers, 97% had formal education, out of which 16%, 38%, 28% and 14% had primary, JHS, SHS and Tertiary respectively. For the fathers, 97% had some formal education, with 9%, 33%, 38% and 17% having Primary, JHS, SHS and Tertiary education respectively.

On parents' occupation, 35% of mothers were engaged in informal work, 14% in formal work and 52% in other occupation not specified. Comparing the two categories, majority (63%) of mothers of out-school respondents were engaged in informal work, while 27% of in-school respondents were into informal occupations.

For the fathers, 36% were in informal work, 16% in formal employment and 48% in other employments not specified. Comparing the two categories of the GIFT programme, it can be seen that a greater (63%) proportion of fathers of out-school respondents were in informal occupation compared to 27% for those in school.



4.3. Knowledge of Respondents

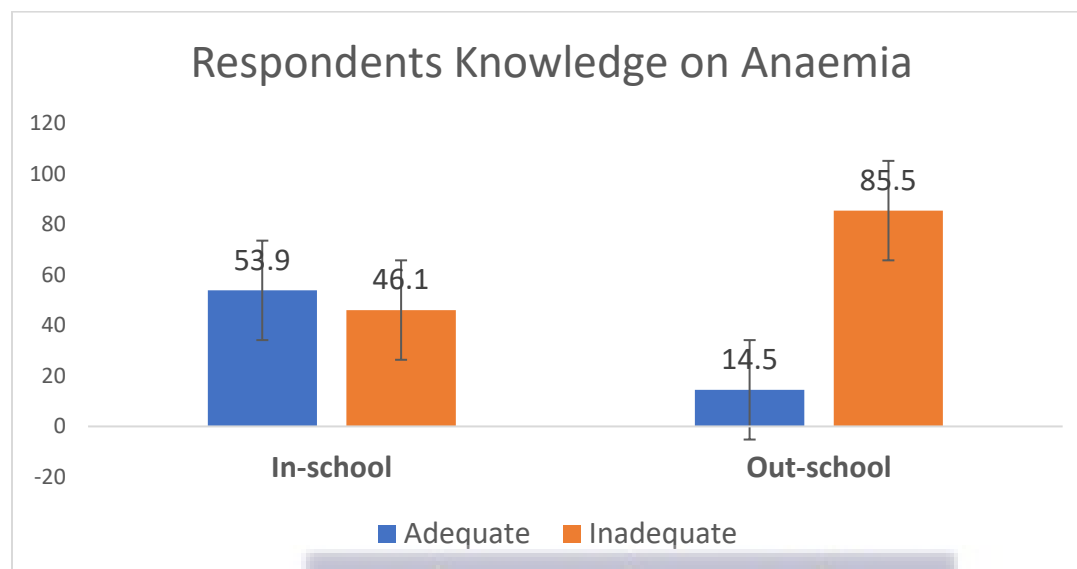


Figure 2: Knowledge of Respondents on Anaemia

Figure 2 depicts the knowledge of respondents on anaemia as compared between in school and out school beneficiaries. It can be deduced that majority (54%) of respondents in-school demonstrated adequate knowledge on anaemia. On the other hand, only 15% of out-school respondents demonstrated adequate knowledge on anaemia.

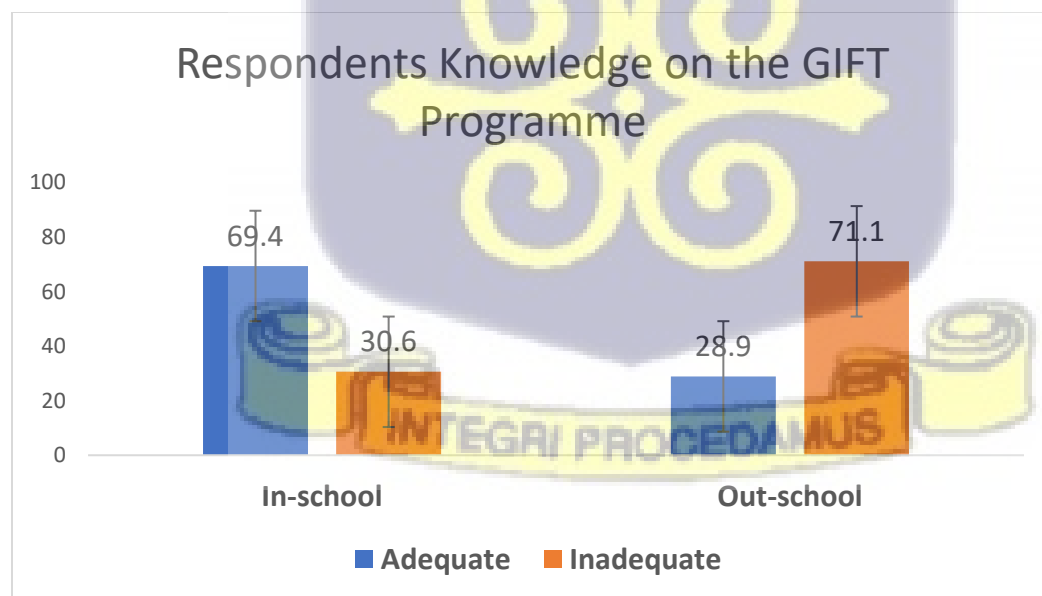


Figure 3: Knowledge of Respondents on GIFT

Figure 3 shows the respondents knowledge on the GIFT programme. It shows that most (69%) respondents in school demonstrated adequate knowledge of the GIFT programme. This contrasted with out-school respondents, where only 29% showed adequate knowledge on GIFT.

Table 3: Attitude of Respondents towards IFA

Variable	In school [N=304 (%)]	Out school [N=76 (%)]	Total [N=380 (%)]
Missed an IFA Table			
Yes	275 (90.5)	74(97.4)	349 (91.8)
No	29 (9.5)	2 (2.6)	31 (8.2)
Why miss IFA tablet***	[N=319 (%)]	[N=122 (%)]	[N=441 (%)]
Shortage of tablets	257 (80.5)	70 (56.5)	327 (74.1)
Side effects	59 (18.5)	50 (41.9)	109 (24.7)
Parental advice	1 (0.3)	0	1 (0.2)
Teacher's advice	1 (0.3)	1 (0.8)	2 (0.4)
Others	1 (0.3)	1 (0.8)	2 (0.4)
Why not miss IFA tablet ***	[N=420 (%)]	[N=94 (%)]	[N=514 (%)]
Due to the benefits	273 (65.0)	72 (76.6)	345 (67.1)
Teacher's advice	109 (25.9)	12 (12.8)	121 (23.5)
Others	29 (6.9)	5 (5.3)	34 (6.6)
Parental advice	4 (1.0)	5 (6.6)	9 (1.8)
Fear of punishment	3 (0.7)	0	3 (0.6)
Its sweet	2 (0.5)	0	2 (0.4)

Note: * Multiple response questions**

Table 3 presents the attitude of respondents towards GIFT. It compares all variables between in-school and out-school. It shows that 92% had missed some tablets (doses). Comparing by category, 97% of out-school missed a dose. Also, 91% of in-school respondents missed a dose of tablet.

On the reason for missing IFA tablets, 76% of them cited shortage of tablets, 24% mentioned side effects of tablets and teachers or parents' advice was cited by 2.4%. Considering the two categories, many (42%) of out-school respondents cited side effects as reason for missing doses compared to 19% for those in school.

For the reason for not missing scheduled tablet doses, 67% cited benefits, 23% said teachers' advice, 1.8% identified parents' advice, and 0.6% mentioned fear of punishment.

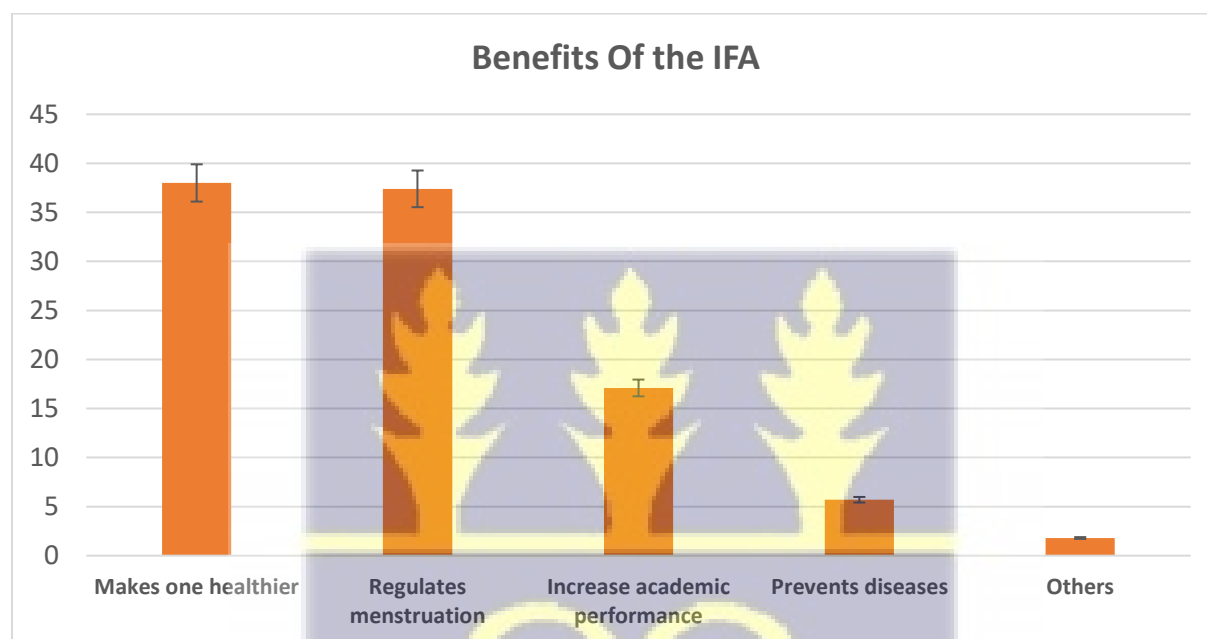


Figure 4: Respondents' assessment of the Benefits of the IFA

Figure 6 illustrates respondents' perception about the benefits derived from the IFA tablets. It shows that respondents identified making a person healthy, regulation of menstrual cycle, improved academic performance, prevents diseases as the main benefits of the IFA tablets by 38%, 37%, 17% and 6% respectively.

4.4. Effectiveness of Implementation of the GIFT Programme

Table 4: Compliance to GIFT Protocol by Beneficiaries

Variable	In-school [N=304 (%)]	Out of school [N=76 (%)]	Total [N=380 (%)]
Still Take IFA Tablet			
Yes	161 (53.0)	42 (55.3)	203 (53.4)
No	143 (47.0)	34 (44.7)	177 (46.6)
Who dispenses IFA Tablets			
Teacher	287 (94.4)	0	287 (75.5)
Healthcare Worker	16 (5.3)	76 (100)	92 (24.2)
Others	1 (0.3)	0	1 (0.3)
Frequency of IFA taking Tablets			
1 daily	74 (24.3)	53 (69.7)	127 (33.4)
1 weekly	230 (75.7)	23 (30.3)	253 (66.6)
How many IFA Tablets have you Taken in the Last 7 weeks			
0 – 2	224 (73.7)	75 (98.7)	299 (78.7)
3 – 4	46 (15.1)	1 (1.3)	47 (12.4)
5 and above	34 (11.2)	0	34 (8.9)
Did You Take the First IFA Tablet under Direct Observation/Supervision			
Yes	301 (79.8)	76 (100)	377 (99.2)
No	3 (20.2)	0	3 (0.8)
Given Health Education			
Yes	304 (100)	72 (80.8)	376 (98.9)
No	0	4 (19.2)	4 (1.1)
Provider of Health education			
Teacher	204 (61.0)	0	204 (56.2)
Healthcare Worker	97 (39.0)	62 (100)	159 (43.8)
Has issue(s) with the GIFT Programme			
Yes	105 (63.6)	60 (92.6)	165 (43.4)
No	199 (36.4)	16 (7.4)	215 (56.6)
The GIFT Programme is Beneficial			
Yes	296 (79.6)	76 (100)	362 (95.3)
No	8 (20.4)	0	8 (4.7)

Table 4 presents compliance to the GIFT protocol as outlined by programme developers. It also compares all variables between the two categories. On whether respondents were still taking tablets, 53% respondents responded in the affirmative, while 46% had stopped taking. 43% of in-school are still on the tablet, compared to 55% for out-school.

Regarding the tablet dispenser, 76% reported Teachers, 42% mentioned Healthcare workers and 0.3% said others. For the out-school, all mentioned healthcare workers, but among those in school, 94% cited Teacher, 5% healthcare workers and 0.3% others.

On respondents answer to the required frequency of the IFA tablets, 67% correctly indicated weekly, while 33% said daily. Among in-school, 76% indicated weekly, but for those out of school, 30% said weekly compared to 70% who mentioned daily.

For the number of IFA tablets taken in the past 7 weeks prior to the study, 78% had taken 0-2 tablets, 12% had 3-4 tablets and 9% had taken 5 or more tablets. For those in school, 11% had taken 5 plus tablets, 15% had 3 -4 tablets and 74% had taken 0-2 tablets. On the other hand, for those out of school, none had more than 4 tablets. 98% had 0-2 tablets and 1% had taken 3-4 tablets.

With regards to Direct Observation Therapy, 99% of respondents observed the protocol. All respondents out of school observed DOT, but 20% of those in school did not observe DOT.

As to whether health education was provided to beneficiaries, it was done in 99% of the instances. All those in school had health education. However, 19% of out-school did not have the benefit of health education. For the cadre who provided the health education, teachers were mentioned in 56% of cases, and Healthcare workers 44%. For out-school, education was provided by only healthcare workers, but in school, 61% by Teachers and 39% by healthcare workers.

On whether beneficiaries experienced any issues with the GIFT programme, 43% said yes, while 57% said no. For in-school, 64% indicated they had issues, while 97% of out-school also reported experiencing issues.

As to whether the GIFT programme was beneficial, 95% responded to the affirmative. All out-school respondents indicated the programme was beneficial, but 20% of those in school said it was not beneficial to them.

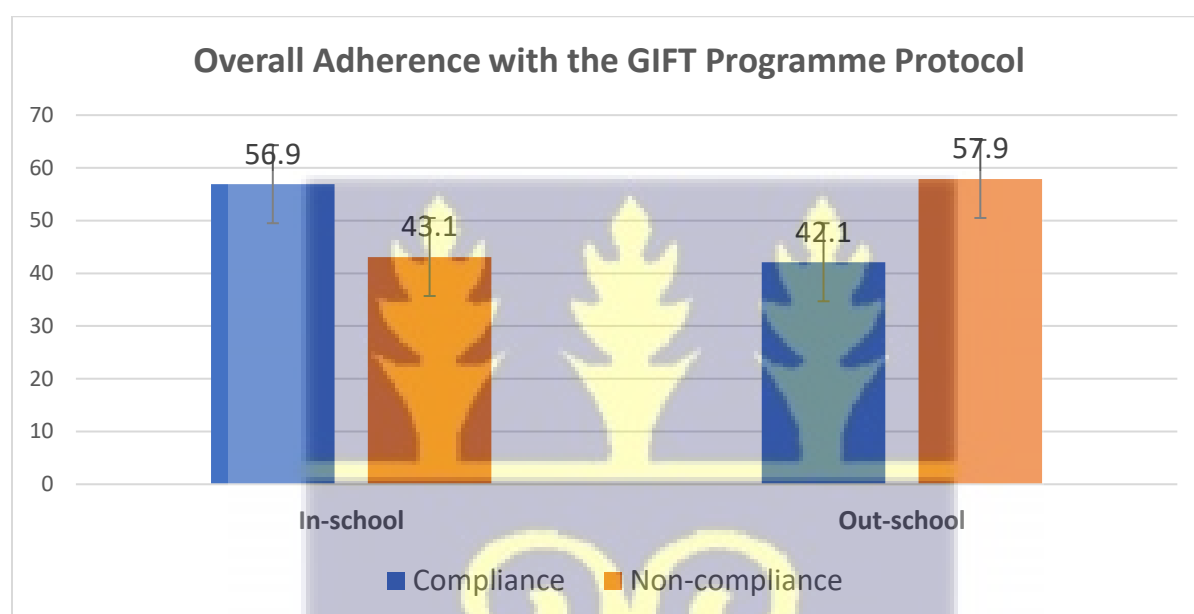


Figure 5: Overall Adherence with the GIFT Protocols

Figure 5 shows adherence to GIFT programme protocols. It also compares the results for in-school and out-school beneficiaries. It can be seen that compliance was more (57%) among in-school, compared to 42% for those out of school. A chi-square test of the association between these categories of beneficiaries regarding adherence to the GIFT protocols showed a significant relationship ($\chi^2(1) = 5.36, p = .02$).

4.5.Factors Effecting Programme Implementation Effectiveness

Table 5: Relationship Between Socio-demographic Characteristics of Beneficiaries and Adherence to the GIFT Protocol

Variable	In-school GIFT Protocol		X ² , P-value	Out-school GIFT Protocol		X ² , P-value
	Adherence	Non-adherence		Adherence	Non-adherence	
Age						
10-14	98 (56.6)	106 (80.9)	19.891, <.01*	20 (62.5)	27 (61.4)	.010, .920
15-19	75 (43.4)	25 (19.1)		12 (37.5)	17 (38.6)	
Educational Level						
Primary	33(21.7)	61 (46.6)	26.375, <.01*	8 (25.0)	16 (36.4)	1.107, .293
JHS	119 (78.3)	70 (53.4)		24 (75.0)	28 (63.6)	
Religion						
Christian	146 (84.4)	119 (90.8)	2.770, .096	29 (90.6)	37 (84.1)	0.692, .405
Muslim	27 (15.6)	12 (9.2)		3 (9.4)	7 (15.9)	
Mother's Educational Level**						
None	5 (2.9)	4 (3.1)	<.01*	0	2 (4.5)	.141
Primary	20 (11.6)	27 (20.6)		3 (9.4)	11 (25.0)	
JHS	55 (31.8)	65 (49.6)		10 (31.3)	16 (36.4)	
SHS	59 (34.1)	25 (19.1)		14 (43.8)	10 (22.7)	
Tertiary	34 (19.6)	10 (7.6)		5 (15.6)	5 (11.4)	
Father's Educational Level**						
None	3 (2.2)	5 (4.3)	.012*	1 (3.1)	1 (2.3)	.447
Primary	8 (5.8)	15 (13.1)		3 (9.4)	7 (15.9)	
JHS	54 (39.4)	53 (46.1)		6 (18.8)	13 (29.5)	
SHS	72 (52.6)	42 (36.5)		14 (43.8)	18 (40.9)	
Tertiary	36 (20.8)	16 (12.2)		8 (25.0)	5 (11.4)	

Mothers Occupation						
Formal	32 (18.5)	10 (7.6)	28.991, <.01*	5 (15.6)	5 (11.4)	.838
Informal	62 (35.8)	21 (16.1)		19 (59.4)	29 (65.9)	
Others	79 (45.7)	100 (76.3)		8 (25.0)	10 (22.7)	
Father's Occupation						
Formal	34 (19.7)	16 (12.2)	19.887, <.01*	7 (21.9)	4 (9.1)	.261
Informal	63 (36.4)	24 (18.3)		18 (56.3)	31 (70.5)	
Others	76 (43.9)	91 (69.5)		7 (21.9)	9 (20.4)	

Note: * p-value<0.05; **Fisher's Exact Test



Table 5 shows the relationship between socio-demographic characteristics of respondents and adherence to the GIFT protocols. The results were disaggregated by the category of the GIFT programme, either in-school or out-school.

For the in-school, age of respondents was significantly associated with adherence ($\chi^2(1) = 19.89$, $p < .01$), such that adherence was more (57%) for those in the group 10-14 years.

Educational level of respondents was also found to be significantly associated with adherence ($\chi^2(1) = 26.38$, $p < .01$), with adherence more (78%) for those in JHS.

Mothers' education level was significantly associated with adherence ($p < .01$), such that adherence was highest (34%) for those whose mothers' highest educational attainment was SHS and lowest (3%) for no formal education.

Fathers' educational level was also significantly associated with adherence ($p=.012$), such that adherence was highest (53%) for those whose fathers' highest educational attainment was SHS and lowest (2%) for no formal education.

Both parent's occupation was significantly associated with adherence ($p<.01$), with adherence more for those in the informal sector (36%).

For the out-school, none of the socio-demographic characteristics showed any statistically significant association with adherence to the GIFT protocols.



Table 6: Relationship Between Beneficiaries Knowledge and Adherence to the GIFT Protocol

Variable	In-school		X ² , P-value	Out-school		X ² , P-value
	GIFT Protocol			GIFT Protocol		
	Adherence	Non-adherence		Adherence	Non-adherence	
Knowledge on anaemia						
Adequate	129 (74.6)	35 (26.7)	68.701, <.01*	29 (90.6)	36 (81.8)	1.161, .281
Inadequate	44 (25.4)	96 (73.3)		3 (9.4)	8 (18.2)	
Knowledge on GIFT						
Adequate	87 (50.3)	6 (4.6)	73.354, <.01*	22 (40.7)	32 (72.7)	.142, .709
Inadequate	86 (49.7)	125 (95.4)		10 (45.5)	12 (27.3)	

Note: * p-value<0.05



Table 6 shows the relationship between adherence and knowledge on anaemia and GIFT protocol among in-school and out-school adolescents.

For in-school, knowledge on anaemia was significantly associated with adherence to the GIFT programme protocols ($\chi^2(1) = 68.70$, $p < .01$). Also, adherence was more (75%) among respondents with adequate knowledge on anaemia.

Regarding knowledge on the GIFT programme, there was significant association ($\chi^2(1) = 73.35$, $p < .01$) with adherence, such that programme adherence was almost even between respondents with adequate knowledge (50.3%) and those with inadequate knowledge (49.7%).

For those respondents out of school, there was no significant association between knowledge on either anaemia or GIFT programme and adherence.



Table 7: Logistic Regression Model of Factors Affecting Adherence to Girl Iron Folate Tablet programme Protocols

Variable	Unadjusted Odds Ratio			Adjusted Odds Ratio		
	OR	95% C.I.	P-value	OR	95% C.I.	P-value
Age						
10-14	Ref.			Ref.		
15-19	2.3347	1.4977, 3.6393	<.01*	1.5041	.8736, 2.5896	.141
Educational Level						
Primary	Ref.			Ref.		
JHS	3.1428	1.9958, 4.9492	<.01*	2.1444	1.2017, 3.8265	.01*
Mother's Educational Level						
None	Ref.			Ref.		
Primary	0.7263	.1990, 2.6514	.628	.8618	.1985, 3.8375	.843
JHS	.9630	.2812, 3.2974	.952	.9177	.2194, 3.8375	0.481
SHS	2.5028	.7147, 8.7652	.151	1.6972	.3893, 7.3984	.481
Tertiary	3.12	.8270, 11.7712	.8270	1.6871	.1912, 14.8886	.638
Father's Educational Level						
None	Ref.			Ref.		
Primary	.75	.1746, 3.2215	.699	1.788	.1911, 8.2914	.859
JHS	1.3636	.3670, 5.0669	.643	1.5845	.3028, 8.2914	.586
SHS	2.15	.5816, 7.947	.251	2.4178	.4538, 12.8813	.301
Tertiary	3.1428	.8004, 12.340	.101	2.5182	.31930, 19.8609	.301
Mothers Occupation						
Formal	Ref.					
Informal	.6567	.3275, 1.317	.236	.8877	.1759, 4.4786	.885
Others	.3206	.1653, .6220	<.01*	1.724	.3506, 8.4727	.503

Father's Occupation						
Formal	Ref.					
Informal	.7184	.3808, 1.355	.307	.5552	.1440, 2.1404	.393
Others	.4049	.2203, .7442	<.01*	1.4824	.3998, 5.4965	.556
Knowledge on anaemia						
Inadequate	Ref.			Ref.		
Adequate	4.9242	3.1589, 7.6760	<.01*	3.1542	1.6458, 6.0454	<.01*
Knowledge on GIFT						
Inadequate	Ref.					
Adequate	4.0935	2.6046, 6.4333	<.01*	5.6545	2.5037, 12.7703	<.01*

Note: * p-value<0.05

Table 7 shows the results of the unadjusted logistic regression model involving socio-demographic factors and respondents' knowledge, which were significantly associated with GIFT programmatic protocols adherence in the bivariate analysis using Chi-square test.

The Hosmer-Lemeshow test of goodness-of-fit for the logistic regression model showed the Hosmer-Lemeshow chi-squared statistic was 5.95, with a p-value of 0.654, suggesting that the model fits the data adequately, since the p-value is greater than 0.05 statistical significance threshold ($\chi^2(10) = 5.94$, $p = 0.654$).

Respondents' age (OR = 2.3347, 95% CI = 1.9958, 4.9492, $p < .01$), educational level (OR = 3.1428, 95% CI = 1.9958, 4.9492, $p < .01$), knowledge on anaemia (OR = 3.1589, 95% CI = 3.1589, 7.6760, $p < .01$), and knowledge on the GIFT programme (OR = 4.0935, 95% CI = 2.6046, 6.4333, $p < .01$) were significantly associated with GIFT protocol adherence.

Table 7 also presents the output of the adjusted logistic regression model. After adjusting for all the variables that were significant in the bivariate analysis, the results show that for respondents

educational level, adherence was 1.2 (Adjusted Odds Ratio [AOR] = 1.2, 95% CI = 1.20, 3.83 < .01) times more likely in respondents in JHS compared to those in the primary.

Again, for knowledge on anaemia, adherence was 4.9 (Adjusted Odds Ratio [AOR] = 4.9, 95% CI = 3.16, 7.68, $P < .01$) times more likely among respondents with adequate knowledge compared with those who demonstrated inadequate knowledge.

For knowledge on the GIFT programme, adherence was 4.1 (Adjusted Odds Ratio [AOR] = 4.1, 95% CI = 2.60, 6.43, $P < .01$) more likely for respondents with adequate knowledge compared with those with inadequate knowledge.



4.6. Findings of Key Informants Interview

The qualitative part of the study interviewed twelve people, including six (6) teachers and healthcare workers involved in the GIFT programme. Eight (67%) of the interviewees were female. Also, interviewees were within the age range of 27 – 38 years and median of 32 years. 9 (75%) of the respondents had Diploma and 3 (25%) had at least first degree.

80% were trained on the GIFT programme and their role as facilitators, and 30% had registers for documenting beneficiaries and tablets dispensed, the rest reported using improvised registers. 82% keep an inventory of IFA tablets received and dispensed for reporting. However, all facilitators experienced more than four weeks of stockout of IFA.

4.6.1. IFA Tablets Availability

All interviewees reported several weeks of shortage of IFA due to the expiration of existing stocks and delay in resupply from the higher level.

...we have not received any tablets for several weeks since the stock we had got expired. We are ready to dispense, as soon as we receive some tablets. [Teacher, age 29]

...many IFA tablets expired some weeks back, and we have not received resupply since then. [Healthcare worker, age 31]

...the few tablets we received were given to the children, and we don't have any more in stock. The Directorate has been informed, but we have not had any feedback. [Teacher, age 29]

4.6.2. Importance of IFA for Beneficiaries

All respondents gave positive impressions about benefits of the IFA and the GIFT programme as a whole. Their main challenge is the rumor about the tablets being family planning pills and can prevent the girls from getting pregnant in the future.

...the programme is good for the girls. There is visible improvement in the physical appearance of those who are consistent with taking the tablet. They also reported improved menstrual flow. [Teacher, age 28].

...due to poor nutrition among many of the girls, the IFA tablets are a great boost for the health of the girls. It improves their blood supply and keeps them healthy through their “period”. [Healthcare worker, age 31]

4.6.3. Factors Impeding Programme Implementation

The teachers also complained about the lack of material motivation for participation in the GIFT programme. They think there should be some form of remuneration for the extra work.

...they need to motivate us. Its not easy distributing the tablets and giving health education to these children. We have a lot of work on hand. This makes us too tired. [Teacher, age 30].

Healthcare workers involved with the out-school category of the programme pointed out the low patronage of adolescents in the community. They attributed the situation to inadequate awareness creation and stakeholder involvement prior to programme introduction. They also attributed the low community patronage to rumors about the IFA being a family planning pill or fertility inhibitor.

... people think we are giving the girls family planning pills. The girls do not feel comfortable being seen taking the tablets. They complain people will gossip about them.

[Healthcare worker, age 32]



CHAPTER FIVE

5. DISCUSSIONS

5.1.Introduction

Anaemia among adolescent girls and women in their reproductive age is a major public health concern, as the consequences of this condition do not affect just the individual girl or women but their offspring and the community as a whole (Engidaw & Feyisa, 2020; Rah et al., 2021). It is therefore of utmost relevance to ensure any intervention aimed at alleviating the scourge of anaemia among adolescent girls is given adequate attention to ensure its success. Studies have shown that just food and supplement alone are not enough to stem the incidence of anamia among adolescents, but should be in combination with other interventions, including health education and sensitization (Juffrie et al., 2020; Kumar et al., 2020; Rohmah et al., 2022). The Girls Iron-Folate Tablet supplementation programme is one of the widely implemented interventions in this regard (Gosdin, Amoaful, et al., 2021; Y. Handiso et al., 2021). Therefore, this evaluation aims to assess the effectiveness of the implementation of this important programme in the Accra Metropolitan Area of Ghana. The study utilized a cross-sectional design and involved a survey of adolescent girls, as well as interviews with teachers and healthcare workers involved in the implementation of the GIFT programme.

The study population consisted of adolescent girls between the ages of 10 -19 years in the Accra Metropolitan Area, including both in school and out of school girls. The study also included teachers and healthcare workers participating in the implementation of the GIFT programme. There were six (6) clusters from which respondents were drawn; between 60 and 64 beneficiaries were selected from each cluster. Overall, 380 beneficiaries were surveyed, consisting of 304 (80%)

in school and 76 (20%) out school girls. Most of the respondents (66%) were in the age group 10 – 14 years, and 69% were in Junior High School, and the remainder in primary school.

5.2. Effectiveness of Implementation of the GIFT Programme

The results showed that 53% of the adolescent girls were still taking IFA (Iron Folic Acid) tablets, while the remaining 47% had stopped. Although the majority were still on IFA, the proportion that had stopped is very concerning since the intervention is being offered for free. This result does not conform to many of the studies done on the GIFT programme in Ghana and elsewhere, which found a high proportion of up to 83% still on the IFA (Dhikale et al., 2015; Dubik et al., 2019a). The divergence of the findings may be attributed to the reported shortage of IFA tablets in the Accra metropolis prior to the study. The majority of respondents received their IFA tablets from either a teacher (76%) or healthcare worker (34%), in conformity with what Dhikale et al., (2015) found in India. In terms of the number of tablets taken in the last 7 weeks prior to the study, most respondents (79%) took 0-2 tablets, while 12% took 3-4 tablets and 9% took 5 or more tablets. The coverage of the optimal quantity of 5 and above IFA tablets was significantly lower than the 26% Dubik et al., (2019) found in the Temale metropolitan area. This vast difference may be because the Temale study concentrated on just schools, which as demonstrated in this study outperform their out of school counterparts. This study found 34% of in school girls took the optimal quantity of IFA, however, no out schools reached the target.

Most respondents (99%) took their first IFA tablet under direct observation/supervision (DOT). There was a clear distinction between the two categories, without school getting 100% under DOT, while 80% of in school observed it. Almost (99%) all respondents were given health education, which is similar to the finding of the evaluation done in the first batch of implementing regions in

Ghana (Gosdin, Amoafu, et al., 2021; Gosdin, Sharma, et al., 2021b). The majority of respondents (56%) received health education from a teacher, while the remaining 44% received it from a healthcare worker. This result highlights the important role teachers play in GIFT implementation at the school level as illustrated by the evaluation done in India by Dhikale et al., (2015) and Gosdin, Sharma, et al., (2021a) in Ghana.

The study found overall compliance with the Girls Iron Folic Acid Tablet (GIFT) Supplementation Programme protocol at 54%. This was a result of the computation of the principal guidelines of the GIFT programme. The indicators considered for the assessment were Monthly/4 weekly distribution of IFA tablets to adolescent girls, weekly uptake of IFA tablets by beneficiaries, administration of first by Direct Observation Therapy (DOT), and provision of health education by a trained teacher or healthcare worker. Despite these positive results, it is very clear that in many instances, the protocols were not fully complied with by beneficiaries and facilitators.

However, comparing the two categories, compliance was optimal in majority (57%) of in school, while majority of out school cases were non-compliant. This showed that implementation is more effective for the in-school compared to the out school. This may be due to the difficulties surrounding implementing the programme in the community including rumors, low patronage, lack of community support among other factors.

5.3.Facilitators of Implementation of the GIFT Programme

The effectiveness of the GIFT programme is directly linked to the adherence to the key guidelines of the programme. Upon assessing various possible factors affecting programme protocol adherence among the programme categories, no variable was significantly associated with compliance to the GIFT guidelines among those out of school.

On the other hand, age and educational level of beneficiaries, parents' educational level and occupation were all significantly associated with adherence to the GIFT guidelines among those in school. These findings are consistent with what (Dubik et al., 2019a; Gosdin, Sharma, et al., 2021b) in the schools they studied. It was also found that beneficiary's knowledge on anaemia and the GIFT protocols were significantly related to the adherence to the GIFT protocols for those in school. Again, Dubik et al., (2019b) came to a similar conclusion.

Beyond adolescent girls, an Ethiopian study on adherence to IFA regimen among pregnant women also found that beneficiaries knowledge on anaemia and the IFA affects their adherence (Arega Sadore et al., 2015).

For the factors that facilitate adherence to the GIFT programme protocols, adherence was 2.3 times more likely among beneficiaries between 15 to 19 age group (OR = 2.3347, 95% CI = 1.4977-3.6393, $p < .01$). This group of beneficiaries were in their late adolescent years, hence may have attached more importance to following the guidelines. In addition, this group may have experienced the benefits of the IFA, since they may have started menstruating compared with their younger counterparts.

Adherence was 2.1 times more likely for beneficiaries in Junior High School (Adjusted Odds Ratio [AOR]=1.2, 95% CI=1.20-3.83, $p < .01$) compared with those in Primary School. This may also be due to factors including the age of this group and their level of maturity. They may be able to conform more to the guidelines once they have been explained to them, coupled with the benefits they deem to gain from the programme.

The effect of age, educational level and knowledge of beneficiaries on adherence can further be explained using the Health Belief Model (HBM), a behavioural intervention model which suggests

that a person's belief in a personal threat of an illness or disease together with a person's belief in the effectiveness of the recommended health behaviour or action will predict the likelihood the person will adopt the behaviour (Anuar et al., 2020).

Furthermore, adherence was 4.9 times more like among beneficiaries who demonstrated adequate knowledge on anaemia (Adjusted Odds Ratio [AOR]=4.9,95% CI=3.16-7.68,p<.01), a result corroborated by Dubik et al., (2019a) among school beneficiaries and (Dhikale et al., 2015) among pregnant women. Both studies found knowledge of anaemia significantly impacts adherence to IFA programme positively.

In addition, adherence was 4.1 times more likely among beneficiaries who displayed adequate knowledge on the GIFT programme (Adjusted Odds Ratio [AOR]=4.1,95% CI=2.60-6.43, P<.01). Knowledge of programme guidelines and the benefits of adherence likely contribute to the increase among beneficiaries with more knowledge. This result is consistent with similar studies carried out in other parts of the country and elsewhere (Dubik et al., 2019a; Horjus et al., 2005).

Moreover, programme implementors mentioned motivation and adequate training on the programme as possible enablers of programme effectiveness in the metropolis. The need for some form of motivation is more acute at the schools where teachers perceive the IFA administration and health education as additional tasks requiring some form of remuneration.

5.4.Barriers to the Implementation of the GIFT Programme

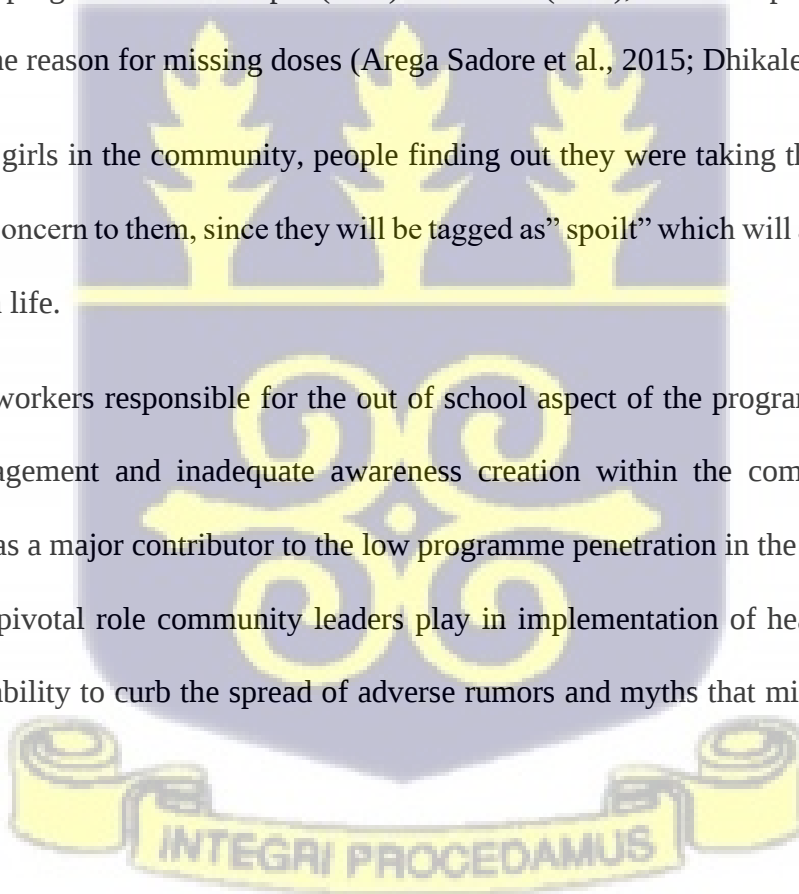
Regarding factors that militate against GIFT implementation effectiveness, the results showed that shortages of tablets was a major issue, with 73.8% of respondents citing this as a reason for missing doses. Additionally, issues with transportation, storage, and distribution of tablets were identified as contributing factors. Teacher/school coordinators also highlighted the lack of motivation as a

major obstacle to programme implementation effectiveness. A study on Educators perception on the GIFT programme conducted in the initial implementing regions identified concerns about lack of incentives for school facilitators of the programme (Gosdin, Amoafu, et al., 2021).

Concerns about side effects of the IFA was another bottleneck identified, disproportionately affecting out of school implementation. The issue about community members and some adolescents misconstruing the IFA tablets as affecting fertility, that it either promotes fertility or inhibits it was a major obstacle that requires urgent attention. Misconceptions about the side effect of the IFA tablet, especially on fertility has been cited in other studies on the Iron-folate supplementation programme in Ethiopia (39%) and India (22%), where respondents mentioned side effects as the reason for missing doses (Arega Sadore et al., 2015; Dhikale et al., 2015).

For many of the girls in the community, people finding out they were taking the IFA tablets is a source of major concern to them, since they will be tagged as "spoilt" which will affect their marital prospects later in life.

The Healthcare workers responsible for the out of school aspect of the programme cited lack of community engagement and inadequate awareness creation within the communities prior to implementation as a major contributor to the low programme penetration in the community. They emphasized the pivotal role community leaders play in implementation of health interventions, especially their ability to curb the spread of adverse rumors and myths that militate against such interventions.



CHAPTER SIX

6. RECOMMENDATIONS AND CONCLUSION

6.1.Recommendations

Based on the findings of this evaluation, the following interventions, activities, and actions are recommended to maintain the gains, rectify the issues, and improve the effectiveness of Girls Iron-Folate Supplementation Programme implementation in the Accra Metropolis.

1. The Ghana Health Service should provide additional training or support for teachers and healthcare workers to ensure that they are able to effectively dispense IFA tablets and provide health education to beneficiaries.
2. Ghana Health Service and partners should intensify awareness creation efforts on anaemia and GIFT among targeted beneficiaries, potentially through targeted health education campaigns in the communities. This could help to increase understanding of the importance of taking IFA tablets and the potential benefits of the GIFT programme.
3. The Ghana Health Service should hold consultation with the Ghana Education Service to discuss the issue of motivation and other pertinent concerns regarding in school GIFT implementation in the metropolis.
4. The programme Coordinators should regularly analyze implementation data to identify potential patterns or correlations between socio-demographic characteristics and adherence to the GIFT programme and use this information to inform outreach efforts and program design.

5. The Ghana Health Service should evaluate the effectiveness of the current delivery model for the GIFT programme, including the use of DOT, and consider alternative models that may be more effective in increasing compliance with the programme.
6. The Ghana Health Service and its partners should address the most cited reasons for not taking IFA tablets, including shortages of tablets and side effects, to improve compliance with the GIFT programme.
7. Collaborate with other stakeholders, such as Community leaders and local healthcare providers, to promote the GIFT programme and increase its visibility within the community.

6.2. Conclusion

In conclusion, this study evaluated the implementation of the GIFT programme in the Accra metropolis, which aims to provide Iron and Folic Acid (IFA) tablets to female adolescents to improve their health and well-being. The findings indicated that adherence to the GIFT programme protocols was barely adequate. While most respondents had adequate knowledge of anaemia and the GIFT programme, only about half of the beneficiaries still took IFA tablets, with shortages of tablets and side effects being the most common reasons for missing doses. Out-school participation was found to be very low due to inadequate community engagement on the programme. Increasing knowledge of anaemia and the GIFT programme, addressing issues with supplies and intensive community engagement could help improve implementation effectiveness and ultimately improve the health and well-being of female adolescents in the Accra Metropolis and beyond.

REFERENCES

- Abdelrahim, I. I., Mahgoub, H. M., Mohamed, A. A., Ali, N. I., Elbashir, M. I., & Adam, I. (2009). Anaemia, folate, zinc and copper deficiencies among adolescent schoolgirls in eastern Sudan. *Biological Trace Element Research*, 132(1–3), 60–66. <https://doi.org/10.1007/S12011-009-8397-7>
- Adjei-Banuah, N. Y., Aduah, V. A., Ziblim, S.-D., Ayanore, M. A., Amalba, A., & Mogre, V. (2021). Nutrition Knowledge is Associated With the Consumption of Iron Rich Foods: A Survey Among Pregnant Women From a Rural District in Northern Ghana. *Nutrition and Metabolic Insights*, 14, 117863882110394. <https://doi.org/10.1177/11786388211039427>
- Ampiah, M. K. M., Kovey, J. J., Apprey, C., & Annan, R. A. (2019). Comparative analysis of trends and determinants of anaemia between adult and teenage pregnant women in two rural districts of Ghana. *BMC Public Health*, 19(1). <https://doi.org/10.1186/s12889-019-7603-6>
- Anuar, H., Shah, S. A., Gafor, H., Mahmood, M. I., & Ghazi, H. F. (2020). Usage of Health Belief Model (HBM) in health behavior: A systematic review. *Malaysian Journal of Medicine and Health Sciences*, 16(November), 201–209.
- Arega Sadore, A., Abebe Gebretsadik, L., & Aman Hussen, M. (2015). Compliance with Iron-Folate Supplement and Associated Factors among Antenatal Care Attendant Mothers in Misha District, South Ethiopia: Community Based Cross-Sectional Study. *Journal of Environmental and Public Health*, 2015. <https://doi.org/10.1155/2015/781973>
- Assefa, A., Erko, B., Gundersen, S. G., Medhin, G., & Berhe, N. (2021). Co-infections and Comorbidities of Multiple Parasites and Hepatitis B Virus Infections in the Lowland Area of Western Ethiopia: Implications for Integrated Approaches. *Journal of Multidisciplinary*

Healthcare, 14, 3369–3383. <https://doi.org/10.2147/JMDH.S341100>

Azupogo, F., Abizari, A.-R., Aurino, E., Gelli, A., Osendarp, S. J., Bras, H., Feskens, E. J., & Brouwer, I. D. (2021). Trends and factors associated with the nutritional status of adolescent girls in Ghana: a secondary analysis of the 2003-2014 Ghana demographic and health survey (GDHS) data. *Public Health Nutrition*, 1–16.

<https://doi.org/10.1017/S1368980021003827>

Bah, Y. M., Bah, M. S., Paye, J., Conteh, A., Saffa, S., Tia, A., Sonnie, M., Veinoglou, A., Amon, J. J., Hodges, M. H., & Zhang, Y. (2019). Soil-transmitted helminth infection in school age children in Sierra Leone after a decade of preventive chemotherapy interventions. *Infectious Diseases of Poverty*, 8(1). <https://doi.org/10.1186/S40249-019-0553-5>

Beck, K. L., Conlon, C. A., Kruger, R., & Coad, J. (2014). Dietary Determinants of and Possible Solutions to Iron Deficiency for Young Women Living in Industrialized Countries: A Review. *Nutrients*, 6(9), 3747. <https://doi.org/10.3390/NU6093747>

Benson, C. S., Shah, A., Stanworth, S. J., Frise, C. J., Spiby, H., Lax, S. J., Murray, J., & Klein, A. A. (2021). The effect of iron deficiency and anaemia on women's health. *Anaesthesia*, 76(S4), 84–95. <https://doi.org/10.1111/ANAE.15405>

Bushra, M., Elhassan, E. M., Ali, N. I., Osman, E., Bakheit, K. H., & Adam, I. I. (2010). Anaemia, zinc and copper deficiencies among pregnant women in central Sudan. *Biological Trace Element Research*, 137(3), 255–261. <https://doi.org/10.1007/s12011-009-8586-4>

Cappellini, M. D., Musallam, K. M., & Taher, A. T. (2020). Iron deficiency anaemia revisited. *Journal of Internal Medicine*, 287(2), 153–170. <https://doi.org/10.1111/JOIM.13004>

- Chaparro, C. M., & Suchdev, P. S. (2019). Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. *Annals of the New York Academy of Sciences*, 1450(1), 15–31. <https://doi.org/10.1111/NYAS.14092>
- Davidson, J., Plumb, A., & Burnett, H. (2010). Adult intestinal failure. *Clinical Radiology*, 65(5), 395–402. <https://doi.org/10.1016/J.CRAD.2010.01.011>
- Dellicour, S., Hill, J., Bruce, J., Ouma, P., Marwanga, D., Otieno, P., Desai, M., Hamel, M. J., Kariuki, S., & Webster, J. (2016). Effectiveness of the delivery of interventions to prevent malaria in pregnancy in Kenya. *Malaria Journal*, 15(1), 221. <https://doi.org/10.1186/s12936-016-1261-2>
- Demisse, B., Temesgen, H., Dessie, B., & Kassa, G. M. (2021). Adherence status to iron with folic acid supplementation and associated factors among pregnant women receiving antenatal care at public health facilities in Northwest Ethiopia. *SAGE Open Medicine*, 9, 20503121211049936. <https://doi.org/10.1177/20503121211049934>
- Dhikale, P., Suguna, E., Thamizharasi, A., & Dongre, A. (2015). Evaluation of Weekly Iron and Folic Acid Supplementation program for adolescents in rural Pondicherry, India. *International Journal of Medical Science and Public Health*, 4(10), 1360. <https://doi.org/10.5455/ijmsph.2015.14042015280>
- Dubik, S. D., Amegah, K. E., Alhassan, A., Mornah, L. N., & Fiagbe, L. (2019a). Compliance with Weekly Iron and Folic Acid Supplementation and Its Associated Factors among Adolescent Girls in Tamale Metropolis of Ghana. *Journal of Nutrition and Metabolism*, 2019. <https://doi.org/10.1155/2019/8242896>
- Dubik, S. D., Amegah, K. E., Alhassan, A., Mornah, L. N., & Fiagbe, L. (2019b). Compliance

- with Weekly Iron and Folic Acid Supplementation and Its Associated Factors among Adolescent Girls in Tamale Metropolis of Ghana. *Journal of Nutrition and Metabolism*, 2019, 1–12. <https://doi.org/10.1155/2019/8242896>
- Elstrott, B., Khan, L., Olson, S., Raghunathan, V., DeLoughery, T., & Shatzel, J. J. (2020). The role of iron repletion in adult iron deficiency anemia and other diseases. *European Journal of Haematology*, 104(3), 153–161. <https://doi.org/10.1111/EJH.13345>
- Engidaw, M. T., & Feyisa, M. S. (2020). Prevalence of Anemia and Its Associated Factors Among Adult Diabetes Mellitus Patients at Debre Tabor General Hospital, Northcentral Ethiopia. *Diabetes, Metabolic Syndrome and Obesity : Targets and Therapy*, 13, 5017–5023. <https://doi.org/10.2147/DMSO.S286365>
- Engidaw, M. T., Wassie, M. M., & Teferra, A. S. (2018). Anemia and associated factors among adolescent girls living in Aw-Barre refugee camp, Somali regional state, Southeast Ethiopia. *PloS One*, 13(10), e0205381. <https://doi.org/10.1371/journal.pone.0205381>
- Ftwi, M., Gebretsadik, G. G.-E., Berhe, H., Haftu, M., Gebremariam, G., & Tesfau, Y. B. (2020). Coverage of completion of four ANC visits based on recommended time schedule in Northern Ethiopia: A community-based cross-sectional study design. *PloS One*, 15(8), e0236965. <https://doi.org/10.1371/journal.pone.0236965>
- Gachelin, G., Garner, P., Ferroni, E., Verhave, J. P., & Opinel, A. (2018). Evidence and strategies for malaria prevention and control: A historical analysis. *Malaria Journal*, 17(1), 1–18. <https://doi.org/10.1186/S12936-018-2244-2/METRICS>
- Gashu, K. D., Gelaye, K. A., & Tilahun, B. (2021). Adherence to TB treatment remains low during continuation phase among adult patients in Northwest Ethiopia. *BMC Infectious*

Diseases, 21(1), 725. <https://doi.org/10.1186/s12879-021-06428-6>

Gebreyesus, S. H., Endris, B. S., Beyene, G. T., Farah, A. M., Elias, F., & Bekele, H. N. (2019a).

Anaemia among adolescent girls in three districts in Ethiopia. *BMC Public Health*, 19(1).

<https://doi.org/10.1186/s12889-019-6422-0>

Gebreyesus, S. H., Endris, B. S., Beyene, G. T., Farah, A. M., Elias, F., & Bekele, H. N. (2019b).

Anaemia among adolescent girls in three districts in Ethiopia. *BMC Public Health*, 19(1).

<https://doi.org/10.1186/s12889-019-6422-0>

Gosdin, L., Amoafu, E., ... D. S.-C., & 2021, U. (2021). A Qualitative Analysis of Program

Fidelity and Perspectives of Educators and Parents after Two Years of the Girls' Iron-Folate Tablet Supplementation (GIFTS). *Academic.Oup.Com*.

<https://academic.oup.com/cdn/article-abstract/5/7/nzab094/6313278>

Gosdin, L., Sharma, A. J., Tripp, K., Amoafu, E. F., Mahama, A. B., Selenje, L., Jefferds, M. E.,

Martorell, R., Ramakrishnan, U., & Addo, O. Y. (2021a). A School-Based Weekly Iron and Folic Acid Supplementation Program Effectively Reduces Anemia in a Prospective Cohort of Ghanaian Adolescent Girls. *Journal of Nutrition*, 151(6), 1646–1655.

<https://doi.org/10.1093/jn/nxab024>

Gosdin, L., Sharma, A. J., Tripp, K., Amoafu, E. F., Mahama, A. B., Selenje, L., Jefferds, M. E.,

Martorell, R., Ramakrishnan, U., & Addo, O. Y. (2021b). A School-Based Weekly Iron and Folic Acid Supplementation Program Effectively Reduces Anemia in a Prospective Cohort of Ghanaian Adolescent Girls. *The Journal of Nutrition*, 151(6), 1646–1655.

<https://doi.org/10.1093/JN/NXAB024>

Gosdin, L., Sharma, A. J., Tripp, K., Amoafu, E. F., Mahama, A. B., Selenje, L., Jefferds, M. E.,

- Ramakrishnan, U., Martorell, R., & Addo, O. Y. (2020). Barriers to and Facilitators of Iron and Folic Acid Supplementation within a School-Based Integrated Nutrition and Health Promotion Program among Ghanaian Adolescent Girls. *Current Developments in Nutrition*, 4(9). <https://doi.org/10.1093/cdn/nzaa135>
- Gosdin, L., Tripp, K., Mahama, A. B., Quarshie, K., Amoafu, E. F., Selenje, L., Sharma, D., Jefferds, M. E., Sharma, A. J., Whitehead, R. D., Suchdev, P. S., Ramakrishnan, U., Martorell, R., & Addo, O. Y. (2020). Predictors of anaemia among adolescent schoolchildren of Ghana. *Journal of Nutritional Science*, 9, 1–11. <https://doi.org/10.1017/jns.2020.35>
- GSS. (2021). *2021 Population and Housing Census - Ghana Statistical Service*. General Report on Population and Housing Census 2021. <https://census2021.statsghana.gov.gh/>
- Handiso, Y., Belachew, T., Abuye, C., Reports, A. W.-S., & 2021, U. (2021). trial providing weekly iron-folic acid supplementation increased serum-ferritin,-folate and hemoglobin concentration of adolescent girls in southern Ethiopia. *Nature.Com*. <https://www.nature.com/articles/s41598-021-89115-5>
- Handiso, Y. H., Belachew, T., Abuye, C., Workicho, A., & Baye, K. (2021). A community-based randomized controlled trial providing weekly iron-folic acid supplementation increased serum- ferritin, -folate and hemoglobin concentration of adolescent girls in southern Ethiopia. *Scientific Reports 2021 11:1*, 11(1), 1–7. <https://doi.org/10.1038/s41598-021-89115-5>
- Horjus, P., Aguayo, V. M., Roley, J. A., Pene, M. C., & Meershoek, S. P. (2005). School-based iron and folic acid supplementation for adolescent girls: Findings from Manica Province,

Mozambique. *Food and Nutrition Bulletin*, 26(3), 281–286.

<https://doi.org/10.1177/156482650502600305>

Jin, Z., Zhu, H., Yu, B., & Gao, G. (2013). *A monte-Carlo simulation investigating the validity and reliability of two-stage cluster sampling survey with sensitive topics*. 17(3), 1019.

Juffrie, M., Dcn, S. H., & Hakimi, M. (2020). Nutritional anemia in Indonesia children and adolescents: Diagnostic reliability for appropriate management. *Asia Pac J Clin Nutr*, 29(1), 18–31. [https://doi.org/10.6133/apjcn.202012_29\(S1\).03](https://doi.org/10.6133/apjcn.202012_29(S1).03)

Kavle, J. A., & Landry, M. (2018a). Community-based distribution of iron-folic acid supplementation in low- and middle-income countries: A review of evidence and programme implications. *Public Health Nutrition*, 21(2), 346–354. <https://doi.org/10.1017/S1368980017002828>

Kavle, J. A., & Landry, M. (2018b). Community-based distribution of iron–folic acid supplementation in low-and middle-income countries: A review of evidence and programme implications. *Public Health Nutr.*, 21(2), 346–354. <https://doi.org/10.1017/s1368980017002828>

Kulkarni, A., Khade, M., Arun, S., Badami, P., Kumar, G. R. K., Dattaroy, T., Soni, B., & Dasgupta, S. (2021). An overview on mechanism, cause, prevention and multi-nation policy level interventions of dietary iron deficiency. <https://doi.org/10.1080/10408398.2021.1879005>. <https://doi.org/10.1080/10408398.2021.1879005>

Kumar Gh, M., Patnaik, S., Selvaraj, K., & Anbalagan, J. (2018). Evaluation of Weekly Iron and Folic Acid Supplementation Program for Adolescents in Rural Kanchipuram, India.

Scholar.Archive.Org, 7, 101–103. <https://doi.org/10.26727/NJRCM.2018.7.2.101-103>

Kumar, K., Kumar, V., ... P. K.-S. L. J. C., & 2020, undefined. (2020). Prevalence of folate deficiency among adolescent school girls in rural areas of Mysuru district, Karnataka, India. *Sljch.Sljol.Info*, 49(3), 230–234. <https://doi.org/10.4038/sljch.v49i3.9139>

Lee, S. E., Lee, P. R., & Shin, K.-I. (2016). A composite estimator for stratified two stage cluster sampling. *Communications for Statistical Applications and Methods*, 23(1), 47–55. <https://doi.org/10.5351/csam.2016.23.1.047>

Massey-Stokes, M. (2002). Adolescent Nutrition: Needs and Recommendations for Practice. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 75(6), 286–291. <https://doi.org/10.1080/00098650209603957>

Mirza, F. G., Abdul-Kadir, R., Breymann, C., Fraser, I. S., & Taher, A. (2018). Impact and management of iron deficiency and iron deficiency anemia in women's health. In *Expert Review of Hematology* (Vol. 11, Issue 9, pp. 727–736). Taylor and Francis Ltd. <https://doi.org/10.1080/17474086.2018.1502081>

Pandey, A., & Shingadia, D. (2022). Treatment and prevention of malaria in children. In *Paediatrics and Child Health (United Kingdom)* (Vol. 32, Issue 6, pp. 207–212). <https://doi.org/10.1016/j.paed.2022.03.001>

Rah, J. H., Melse-Boonstra, A., Agustina, R., van Zutphen, K. G., & Kraemer, K. (2021). The Triple Burden of Malnutrition Among Adolescents in Indonesia: <https://doi.org/10.1177/03795721211007114>, 42(1_suppl), S4–S8. <https://doi.org/10.1177/03795721211007114>

- Rohmah, F. A., Setiawan, R., Adriyani, R., & Shaharuddin bin Mohd Sham. (2022). Personal Hygiene as a Risk Factors of Helminthiasis Among Primary School Students in Asia and Africa: A Literature Review. *JURNAL KESEHATAN LINGKUNGAN*, 14(3), 139–152. <https://doi.org/10.20473/jkl.v14i3.2022.139-152>
- Saboor, M., Zehra, A., Qamar, K., & Moinuddin. (2015). Disorders associated with malabsorption of iron: A critical review. *Pakistan Journal of Medical Sciences*, 31(6), 1549. <https://doi.org/10.12669/PJMS.316.8125>
- Shiferaw, M. B., Endalamaw, D., Hussien, M., Agegne, M., Amare, D., Estifanos, F., & Temesgen, D. (2019). Viral suppression rate among children tested for HIV viral load at the Amhara Public Health Institute, Bahir Dar, Ethiopia. *BMC Infectious Diseases*, 19(1), 419. <https://doi.org/10.1186/s12879-019-4058-4>
- Suryana, Madanijah, S., Sukandar, D., Fitri, Y., & Ahmad, A. (2020). Assessment of Anemia Status on Physical Development Skills of Children Under Two Years Old in Aceh, Indonesia. *Journal of Nutritional Science and Vitaminology*, 66(Supplement), S463–S467. <https://doi.org/10.3177/jnsv.66.S463>
- Sutradhar, B. C. (2022). Cluster Correlations and Complexity in Binary Regression Analysis Using Two-stage Cluster Samples. *Sankhya A* 2022, 1–56. <https://doi.org/10.1007/S13171-022-00281-8>
- Tandoh, M. A., Appiah, A. O., & Edusei, A. K. (2021). Prevalence of Anemia and Undernutrition of Adolescent Females in Selected Schools in Ghana. *Journal of Nutrition and Metabolism*, 2021. <https://doi.org/10.1155/2021/6684839>
- Vir, S. C., Singh, N., Nigam, A. K., & Jain, R. (2008). Weekly iron and folic acid

supplementation with counseling reduces anemia in adolescent girls: A large-scale effectiveness study in Uttar Pradesh, India. *Food and Nutrition Bulletin*, 29(3), 186–194.

<https://doi.org/10.1177/156482650802900304>

Wang, K., Xie, Y., Wang, D., Bishop, N. J., Tooker, E. M., & Li, Z. (2020). Socioeconomic correlates of adherence to mineral intake recommendations among pregnant women in north China: Findings from a cross-sectional study. *Asia Pacific Journal of Clinical Nutrition*, 29(1), 127–135. [https://doi.org/10.6133/apjcn.202003_29\(1\).0017](https://doi.org/10.6133/apjcn.202003_29(1).0017)

Wassef, A., Nguyen, Q. D., & St-André, M. (2018). Anaemia and depletion of iron stores as risk factors for postpartum depression: a literature review.

<https://doi.org/10.1080/0167482X.2018.1427725>, 40(1), 19–28.

<https://doi.org/10.1080/0167482X.2018.1427725>

Wegmüller, R., Bentil, H., Wirth, J. P., Petry, N., Tanumihardjo, S. A., Allen, L., Williams, T. N., Selenje, L., Mahama, A., Amoah, E., Steiner-Asiedu, M., Adu-Afarwah, S., & Rohner, F. (2020). Anemia, micronutrient deficiencies, malaria, hemoglobinopathies and malnutrition in young children and non-pregnant women in Ghana: Findings from a national survey. *PloS One*, 15(1), e0228258. <https://doi.org/10.1371/journal.pone.0228258>

Wemakor, A., Kwaako, M., & Abdul-Rahman, A. (2023). Nutritional, health and socio-demographic determinants of anaemia in adolescent girls in Kumbungu District, Ghana.

BMC Nutrition, 9(1), 1–11. <https://doi.org/10.1186/S40795-023-00749-2/TABLES/8>

White, N. J., Pukrittayakamee, S., Hien, T. T., Faiz, M. A., Mokuolu, O. A., & Dondorp, A. M. (2014). Malaria. *Lancet*, 383(9918), 723–735. [https://doi.org/10.1016/s0140-6736\(13\)60024-0](https://doi.org/10.1016/s0140-6736(13)60024-0)

- Wiafe, M. A., Apprey, C., & Annan, R. A. (2020). Patterns of Dietary Iron Intake, Iron Status, and Predictors of Haemoglobin Levels among Early Adolescents in a Rural Ghanaian District. *Journal of Nutrition and Metabolism*, 2020. <https://doi.org/10.1155/2020/3183281>
- Wiafe, M. A., Apprey, C., & Annan, R. A. (2021). Knowledge and practices of dietary iron and anemia among early adolescents in a rural district in Ghana. *Food Science and Nutrition*, 9(6), 2915–2924. <https://doi.org/10.1002/fsn3.2249>
- Yidana, A., Azongo, T. B., & Mohammed, A. (2020). Iron and Folic Acid Supplementation Compliance among Adolescent Girls in Karaga District , Ghana. *Public Health Research*, 10(5), 133–142. <https://doi.org/10.5923/j.phr.20201005.01>



Appendices

Appendix I (Questionnaire for adolescents)

ID:.....

Cluster Number:.....

Instructions

Kindly answer the following questions by ticking (✓) or writing, when necessary, in the spaces provided.

Serial #	Question	Options	Response
Section 1: Socio-demographic Characteristics			
1.1	GIFT category	In-school	
		Out-school	
1.2	If in-school, School ownership	Public	
		Private	
1.3	Age		
1.4	Educational level	None	
		Primary	
		JHS	
		SHS	
		Tertiary	
1.5	Religion	Christian	
		Muslim	
		Others	
1.6	Lives with parents	Yes	
		No	
1.7	Mother's educational level	None	
		Primary	
		JHS	
		SHS	
		Tertiary	
1.8	Mother's occupation	None	
		Formal	
		Informal	
		Others	
1.9	Father's educational level	None	
		Primary	
		JHS	
		SHS	
		Tertiary	
1.10	Father's occupation	None	
		Formal	
		Informal	
		Others	
1.11	Guardian's educational level	None	
		Primary	
		JHS	
		SHS	

		Tertiary	
1.12	Guardian's occupation	None	
		Formal	
		Informal	
		Other	
Section 2: Knowledge of Anaemia			
2.1	What is anaemia	Low body blood (haemoglobin) level	
		Low body water level	
		High body fat	
2.2	What are the symptoms of anaemia	Fatigue	
		Weakness	
		Pale or yellowish skin	
		Dizziness or light headedness	
		Cough	
		Fever	
2.3	How do you prevent anaemia	Drinking more water	
		Protein rich food	
		Nutrient supplements	
		Eating balanced diet	
		Exercise	
		More carbohydrate rich food	
		Calcium rich food	
	Sleeping well		
Section 3: Knowledge about Tablet			
3.1	Which of the following are ingredients of the IFA tablet	Calcium	
		Iron	
		Folate	
		Vitamins	
		Fats and oil	
3.2	How many times do you take IFA tablets	1 everyday	
		1 every week	
		1 every month	
3.3	Have you missed a tablet in the last 7 weeks	Yes	
		No	
3.4	If you have missed a tablet, what are the reasons for missing	Side effect	
		Bad taste of tablet	
		Religious	
		Parental ban	
		Teacher advice	
		No tablet	
		Others	
3.5	If you have not missed a tablet why, what are the reasons	Benefits	
		Sweet	
		Fear of punishment	
		Parental advice	
		Teacher's advice	

		Others	
3.6	What are the benefits of taking the IFA tablets	Makes one healthier	
		Regulate menstruation	
		Increased performance	
		Prevents disease	
		Others, specify	
Section 4: GIFT Adherence			
4.1	Do you still take IFA tablets	Yes	
		No	
4.2	Who dispensed the IFA tablet to you	Teacher	
		Prefect	
		Health worker	
4.3	How many IFA tablets were you given		
4.4	How many tablets have you taken (last 7 weeks)		
4.5	Did you take the first tablet under direct observation	Yes	
		No	
4.6	Were you given education on nutrition and hygiene	Yes	
		No	
4.7	If given education, who provided the education/talk	Teacher	
		Health worker	
		Others (specify)	
Section 5: Perception on GIFT programme			
5.1	Do you face any challenge with the GIFT package	Yes	
		No	
5.2	What are the challenges		
5.3	Do you think the GIFT package is beneficial	Yes	
		No	
5.4	What are the benefits		
5.5	What do you recommend should be done to improve the GIFT programme		

Thank you



Appendix II (Interview guide for Key Informants)

ID:..... Cluster number:.....

Instruction

Kindly answer the following questions by ticking (✓) or writing, when necessary, in the spaces provided.

Serial #	Question	Options	Response
Section 1: Socio-demographic Characteristics			
1.1	GIFT category	In-school	
		Out-school	
1.2	If in-school, School ownership	Public	
		Private	
1.3	Age		
1.4	Educational level	Secondary	
		Tertiary	
1.5	Religion	Christian	
		Muslim	
		Others	
Section 2: GIFT Implementation			
2.1	Trained on GIFT	Yes	
		No	
2.2	Have registers for documenting IFA uptake	Yes	
		No	
2.3	keeps inventory of IFA (show evidence)	Yes	
		No	
2.4	Experienced IFA shortage for upto 4 weeks in the last 6 months	Yes	
		No	
2.5	Do you have any challenges with the GIFT programme implementation	Yes	
		No	
2.6	If yes, specify		
2.7	What recommendation will you give to improve GIFT implementation		



Appendix III (Ethical Clearance)

In case of reply the number and date of this Letter should be quoted

My Ref. GHS/RDD/ERC/Admin/App **123/110**
Your Ref. No.

Jocelyn Nii Lartey Laryea
14 PMB, TUC HQ
Accra



GHANA HEALTH SERVICE
Your Health. Our Concern.

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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Email: ethics.research@ghs.gov.gh
13th February, 2023

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 026/01/23
Study Title	Evaluation of Implementation of the Girls Iron-Folate Tablet Programme in the Accra Metropolis
Approval Date	13 th February, 2023
Expiry Date	12 th February, 2024
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months.
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if the study cannot be implemented or is discontinued and the reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols for the prevention of COVID-19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol



SIGNED.....
Dr. Naa-Korkor Allotey
(Ag. Head, Ethics & Research Management Department)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra