THE GIRLS' IRON-FOLIC ACID TABLET SUPPLEMENTATION (GIFTS) PROGRAMME:

An Integrated School-Based Nutrition and Health Intervention.
Baseline and Follow-On Impact Evaluaton in Northern
and Volta Regions, Republic Of Ghana, 2017-2018

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A. FOREWORD

Globally and in Ghana, anaemia remains a major public health problem which affects a large segment of the population. Its effects particularly on women, children under five years of age, and adolescents have been well documented in several surveys and literature. Known multifactorial causes of anaemia include poor infant and young child nutrition (feeding practices); consumption of meals with low iron bioavailability, poor content of animal source foods, iron absorption enhancers (e.g. Vitamin C-rich foods) and high content of iron absorption inhibitors. Other causes are repeated malaria and other parasitic infections such as helminthic infestation, diarrhoeal diseases; monthly loss of blood through menstruation in adolescent girls and women of childbearing age, and conditions like sickle cell trait and HIV/AIDS.

Individuals with anaemia have less energy and reduced physical capacity and work performance. Particularly for adolescents, anaemia also reduces learning capacity and physical performance, and further exposes adolescents who are pregnant to additional risks of preterm birth, low birth weight and maternal mortality. Anaemia also reduces cognitive development in children, which has important, long-term effects on educational achievement, and consequently affects their income earning potential during adulthood.

In Ghana, 48 percent of adolescent girls aged 15-19 years were reported to be anaemic (2014 Ghana Demographic and Health Survey). To address the high prevalence of anaemia in this age group, the Ghana Health Service (GHS) and Ghana Education Service (GES), with technical and funding support from UNICEF, United States Centres for Disease Control and Prevention (US CDC)-Atlanta, Korea International Cooperation Agency (KOICA) and the Government of Canada is implementing a phased Iron and Folic Acid (IFA) Supplementation programme called "Girls' Iron-Folate Tablet Supplementation (GIFTS)" for menstruating girls/women aged 10-19 years. The GIFTS Programme aims to improve haemoglobin (Hb) levels of adolescent beneficiaries through free weekly IFA supplementation for in-school and out-of-school adolescent girls, and improved nutritional status through health and nutrition education sessions given to both boys and girls. Additionally, the programme is expected to contribute to strengthening the existing IFA supplementation programme for pregnant women.

The GIFTS Programme, the first of its kind in the sub-Saharan region, commenced in Ghana in October 2017 in four phase-1 regions (Brong-Ahafo, Northern, Upper East, Volta). To assess programme impact, performance and nutritional status of in-school adolescent girls in the programme, a US CDC-led impact evaluation was conducted over the 2017/18 academic year in 60 schools from 2 phase-I regions (Northern and Volta). The evaluation results showed the GIFTS Programme was associated with a 26 percent adjusted reduction in anaemia prevalence over the period and average Hb concentration increased. The IFA supply chain was strong, and knowledge on IFA, anemia, the GITFS Programme and healthy lifestyles had also increased among survey participants.

We are grateful to UNICEF, US CDC-Atlanta, KOICA, Canada and the entire survey team for the technical and funding support for the GIFTS evaluation and the implementation of the GIFTS Programme in Ghana.

The success of the GIFTS Programme as shown in the strong positive outcomes in terms of improved Hb levels and reduced anaemia prevalence among the adolescent girls is very encouraging and exciting. Our expectation is the lessons learnt as well as the partnerships that have been created while developing and rolling out this intervention will be brought to bear as we scale up nationwide to reach more adolescents and use this delivery platform to address other health related concerns.

We look forward to strengthening the existing collaboration between GHS, GES, UNICEF and other development partners and call on the Private Sector and Civil Society Organizations to join us in the implementation of the GIFTS Programme to collectively improve the health, nutrition and wellbeing of adolescents in Ghana.

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Disclaimer: The findings and conclusions of this report do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention, the United Nations International Children's Emergency Fund (UNICEF) or the Republic of Ghana's Ministry of Health or Ministry of Education.

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D. LIST OF ABBREVIATIONS

BMIZ   BMI-for-Age Z-score

BMI   Body Mass Index

CDC   Centers for Disease Control and Prevention

DHS   Demographic Health Survey

DNO   District Nutrition Officer

FFQ   Food Frequency Questionnaire

GIFTS   Girls' Iron-Folic acid Tablet Supplementation

GMS   Ghana Micronutrient Survey

HAZ   Height-for-Age Z-Score

Hb   Hemoglobin

IFA   Iron-Folic Acid

IOTF   International Obesity Task Force

JHS   Junior High School

KAP   Knowledge, Attitude, and Practice

MOH   Ministry of Health

MOE   Ministry of Education

PPS   Proportional to Population Size

RNO   Regional Nutrition Officer

SD   Standard Deviation

CI   Confidence Interval

SHS   Senior High School

KOICA   Korea International Cooperation Agency

UNICEF   United Nations Children's Fund

USA   United States of America

WHO   World Health Organization

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E. SUMMARY RESULTS TABLE

Impact evaluation of a school-based integrated adolescent nutrition and health Programme with Iron and Folic-Acid supplementation intervention among adolescent girls from 60 Selected Schools in Northern and Volta Regions Ghana, 2017-2018.

Programme Domains	Indicator / Measure	Baseline (September 2017) (N=1551)	Follow-on (July 2018) (N=1412)
		Value	
KAP - Anemia	Percentage of Ever Heard of Anemia	63.8	90.9
IFA Knowledge	Percentage of Ever Heard of IFA	26.7	92.1
Reported Dietary Intakes	Mean [1]Dietary Diversity Score (1-10)	3.3	3.9
	Percentage with [2]Good Source of Heme Iron	17.1	24.1
	Percentage with [3]Fair Source of Heme Iron	71.5	78.7
	Percentage with [4]Source of Non-Heme Iron	66.6	71.9
Anthropometric Indicators	Percentage of Thinness (IOTF)	0.9	0.8
	Percentage of Overweight (IOTF)	18.9	19.8
	Percentage with Obesity (IOTF)	2.9	3.3
	Mean BMI-for-Age Z-Score	0.01	0.06
IFA Consumption	[5]Mean cumulative IFA tablets per eligible student/academic year	22.2	
	Percentage of eligible students that ever-consumed an IFA tablet	95.0	
	Percentage of eligible students that consumed at least 10 IFA tablets/academic year	74.6	
Micronutrient Biomarker	Percentage of Anemia (hemoglobin <12y: <11.5 g/dL; ≥12y: <12.0 g/dL).	25.0	19.5
	Mean Hemoglobin (g/dL),	12.8	13.0

KAP: Knowledge, Attitudes, and Practices; IFA: Iron-Folic Acid. IOTF: International Obesity Task Force. [1]Dietary diversity score based on 10-food groups 1. [2]Good sources of heme iron included red meats and organ meats. [3]Fair sources of heme iron included white meats and poultry, fish, and eggs. [4]Sources of non-heme iron included dark green leafy vegetables and legumes. [5]IFA tablets recorded into the GIFTS register and consumed by eligible adolescent girls from the 60 schools selected for this evaluation, among those who had ever received IFA tablet.

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F. SUMMARY AND KEY FINDINGS

Background: The Ghana Health Service (GHS) in collaboration with UNICEF-Ghana, and Ghana Education Service (GES) launched phase I of the Girls' Iron-Folic Acid Tablet Supplementation (GIFTS) Programme in four regions of Ghana: Brong Ahafo, Northern, Upper East, and Volta in October 2017. This effort is timely as the Demographic Health Survey (DHS) 2014-Ghana data indicated that over 40% of adolescent girls 15-19 years suffered from anemia2, which is a severe problem of public health significance (WHO 2011). As part of a national anemia reduction strategy, the GIFTS targets adolescent girls enrolled in Junior High School (JHS), Senior High School (SHS), Technical Education and Vocational Training (TVET), as well all as out-of-school adolescent girls aged 10-19 years living in the communities.

Programme Description: Enrolled students received an intervention package that included iron-folic acid (IFA) supplementation at school, whilst their out-of-school peers received theirs through the health system. No adolescent girl received an IFA supplement before Programme rollout in October 2017. The integrated school-based adolescent nutrition and health Programme was implemented in all eligible schools in all 4 phase-I regions. It comprised of health and nutrition education on anemia and malaria prevention, water, hygiene and sanitation (WASH); and finally, a weekly IFA supplementation by directly observed therapy (DOT). School health educators/teachers administered the IFA to the adolescent girls and the intervention package was delivered throughout the academic year, from October 2017- July 2018 and currently ongoing. Over the period, routine IFA tablets consumed once a week to each student was recorded into the "GIFTS register" in each school by the teacher. This intensive monitoring data could also be collated for each selected student.

Programme Evaluation: Nested monitoring and impact evaluation were carried-out to assess Programme performance in 60 schools selected from the Northern and Volta regions. The two regions were selected by GHS for Programmematic purposes. The key objectives of this integrated Programme evaluation were to assess: a) Programme implementation fidelity, b) changes in anemia and IFA knowledge/awareness, and c) changes in anemia prevalence among adolescent girls at the end of the school year. To evaluate these aims, in-country implementers (GHS and GES) and UNICEF-Ghana, with technical assistance (TA) from Emory University and the U.S. Centers for Disease Control and Prevention (CDC), conducted a longitudinal study that assessed students at baseline and follow-up. This in-school Programme evaluation collected data at both the student and school health teacher/-implementer level. The baseline survey occurred in September 2017, before the IFA Programme rollout and at beginning of the academic year. The second survey data was collected in July 2018. Based on a sample size and power calculation, a total of 1740 adolescents were needed and a two stage-sampling strategy was followed. First, probability proportional to size (PPS) sampling was used to select 60 schools within the 2 regions prior to the start of the 2017-18 academic year. A maximum of twenty nine (29) eligible adolescent girls within the 60 schools were then selected by simple random sampling based on school enrollment. The baseline and follow-on surveys were carried out only among the students randomly selected at baseline in each school. This monitoring and evaluation (M&E) design focused on the in-school component only, and from the selected schools from Northern and Volta regions. Last, one health teacher per school was systematically selected to report on individual and school experiences related to the GIFTS Programme.

All reported estimates of Programme indicators for students were weighted and accounted for clustering so as to be representative of the adolescent girls' population in the schools in the region at baseline. Adjusted generalized mixed linear models (repeated measures analyses) was used to assess adjusted student-specific change in key indicators between baseline and follow-on. This adjusted-change estimate was expressed as percentage change above or below baseline prevalence.

Key Results: The baseline survey response rate was high (95%). Lost to follow-up was low such that 91% of 1551 adolescents that had participated at baseline, responded to the follow-on survey after 8 months.

Teacher-Implementer Experience and IFA Supply: Operational fidelity of the IFA Programme and supply chain in all 60 schools surveyed was high (>90%) and only 6.7% (4 out of 60) of schools had ever missed a weekly IFA distribution due to a stock-out. Tools for Programme implementation and intensive monitoring were available at the schools, including routine IFA monitoring registers to track student intake of weekly doses and IFA tablet availability within each school. There was a parent-teacher IFA sensitization event in 61.7% of the schools and 13.3% of the school health educators/teacher-respondents reported they experienced IFA implementation difficulties from the community, such as misconceptions that the IFA were birth control. Over 71% of the teachers said communication materials (e.g., posters and flyers) would improve the acceptability of the Programme, 78.8% and 13.3% found IFA implementation time consuming and hard to implement, respectively. However, 78.8% said it was important for the health of the girls, and that boys should be included.

Student Nutrition and Health Knowledge and Awareness: At follow-on, 45.9% of student reported they had received any health and nutrition talk in during the current academic year, but only 17% could name the 'GIFTS' Programme. Students reported receiving health talks topics such as 'Eating iron rich foods", "eating local foods could prevent anemia" and "menstruation can cause anemia". Relatedly, the number of students that mentioned eating dark green leafy vegetables to prevent anemia changed by 21 percentage points between baseline and follow-on surveys (from 34.2% to 55.5%). Further, those who had ever heard of anemia changed from 64% at baseline to 90.9%, and those who had ever heard of IFA more than tripled - from 27% to 92% over the period.

Student IFA Experiences: In the overall population, a cumulative average of 22.2 IFA tablets were consumed per student per academic year and recorded for the randomly selected girls who had ever consumed IFA (from 60 selected schools) that participated in both surveys. IFA weekly monitoring data indicated that 95% (n=1329) of adolescents had ever consumed IFA, and among them, 74.6% consumed at least 10 IFA tablets over the school year. When disaggregated, students who had not received any IFA varied by term and around the 6-8th week of term 3 (during follow-on data collection), 8.0% of students had zero doses (Northern 11.0%, Volta 3.3%). Some of the Northern region IFA distribution schedule in schools was impacted by Ramadan as IFA supplementation was not consumed in schools due to the religious observance of fasting during the day.

Student Hemoglobin Levels and Anemia: Baseline anemia prevalence was 25.0% among adolescent girls and was 19.5% at the follow-on survey. After adjustment for student age, this represented a 26% adjusted population prevalence decrease over the period. Further, hemoglobin concentrations increased over the 8-months in the surveyed schools.

In conclusion, 75% of adolescent girls received 10 or more weekly IFA doses during the academic year in the 60 selected junior and senior high schools in Northern and Volta Regions of Ghana. Programme participation is associated with changes in student knowledge and awareness on some aspects of anemia prevention, higher hemoglobin concentration and lower population prevalence of anemia. Teachers reported that supply chain of the IFA tablet and tools for monitoring and evaluation were available within the schools during the academic year but Programme sensitization was weak. Teachers also stated that weak sensitization at the community levels which could impact anemia reduction efforts in this target population of Ghanaian adolescents.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND

Adult final size and functional capacity is often determined by growth during adolescence. Poor nutrition during this sensitive period can have long-term human capital consequences for any country, especially those in the low-to-middle income settings [3,4]. Anemia is a leading cause of death and disability worldwide[5] and a major public health problem in Ghana affecting 42% of women and 66% of children as shown in the 2014 Ghana Demographic and Health Survey (DHS)[2]. The World Health Assembly has set a target of reducing anemia prevalence among women of childbearing age by 50 percent by the year 2025 in all member countries (WHO 2014). While iron and folic acid (IFA) supplementation is recommended by the WHO for treatment and prevention of anemia[6], current interventions in Ghana have focused mainly on provision of IFA for pregnant women via healthcare delivery channels, and iron supplementation to children identified as anemic in clinical settings. Even though the WHO recommends an intermittent IFA in all menstruating women; especially in countries where anemia is highly prevalent[7], there is no currently large scale implementation platform for providing IFA to adolescent girls in Ghana.

An IFA Programme in this target age group has a high potential return on investment for Ghana since anemia is associated with poor growth, reduced concentration and learning ability, physical fitness and work productivity[3,8-11]. Providing IFA to adolescent girls, in addition to supporting their own growth and well-being, could confer multiple intergenerational benefits. This is because anemia during pregnancy is associated with low birthweight, perinatal and maternal mortality[12-14]. Further, folate deficiency is associated with neural tube defects and stillbirths[15,16]. Thus, an IFA Programme could potentially reduce anemia (due to iron deficiency), as well folate deficiency and their combined relations with pregnancy outcomes.

To tackle this health disparity, the Ghana Ministries of Health (MOH) and Education (MOE) and United Nations Children's Fund, (UNICEF-Ghana) collaborated on a multi-phase national IFA supplementation Programme that began in September 2017. The rollout phase I (2017-19) involved 4 regions (Upper East, Volta, Northern, and Brong Ahafo), and the intervention will be scaled-up to the remaining 6 regions of the country in phase II. As part of an integrated nutrition education package, a weekly IFA supplement is given to adolescent girls attending junior high school (JHS), senior high schools (SHS) and Technical Education and Vocational Training (TVET) Schools. Utilizing the existing school health education Programme, each girl is given a weekly IFA supplement by directly observed therapy (DOT) by a teacher or class prefect through-out the school year. The Programme is the first of its kind in the West Africa sub region and requires evidence of its effectiveness before scale-up. To evaluate the Programme, the MOH, MOE, and UNICEF with technical assistance from the CDC conducted an impact evaluation of the first year of the Programme's implementation.

1.2 Introduction to the Programme

In an effort to address the high levels of anemia in menstruating girls/women 10-19 years [including in-school and out-of-school adolescent girls], UNICEF is supporting the MOH and MOE in the implementation of a multi-phase national iron and folic acid (IFA) supplementation Programme for in-school adolescent girls in JHS and SHS, and out-of-school adolescent girls aged 10-19 years using a combined iron–folic acid tablet containing 182.4mg ferrous fumarate (60mg of elemental iron) and 0.40mg folic acid. Phase I began in four regions—Brong Ahafo, Northern, Upper East and Volta—in September 2017 (Figure 1.1). In-school adolescent girls are given one iron/folic acid tablet by DOT once weekly after meals on a selected day in all eligible schools in the four regions. For out-of-school adolescent girls aged 10-19 years, one IFA tablet is taken by DOT at the nearest health facility or community outreach event, and the remaining month's supply of IFA tablets is given to the beneficiary or her guardian to be taken once weekly after meals at home. The Programme also includes anemia prevention education for all adolescents as well health and nutrition education; clean water, sanitation, and hygiene promotion; malaria prevention education; and education

on the IFA tablet. Teachers and school health education Programme (SHEP) coordinators implement the Programme in schools. For the out-of-school adolescent girls, the Programme is implemented by health facility staff-primarily community health nurses.

Figure 1.1 - Map of Phase I Intervention Regions, Impact evaluation of a school-based integrated nutrition and health education Programme with Iron and Folic-acid supplementation intervention among in-school adolescent girls in 4 Regions of Ghana, 2017-2018.

GIFTS: Girls Iron Folic-Acid Tablet Supplementation.

Table 1.1 - Roles and Responsibilities of Intervention Delivery Staff for the Out-of-School and In-School Components, Impact evaluation of a school-based integrated nutrition and health Programme with Iron and Folic-acid supplementation intervention among in-school adolescent girls in Ghana, 2017-2018.

	Out-of-School	In-School
Distribution of Tablets	Community Health Nurses	Teachers / Class Prefects
Anemia Prevention Education	Community Health Nurses	SHEP Coordinators / Health Teachers
Sensitization	Community Health Nurses and District Nutrition Officers	SHEP Coordinators / Others who received GIFTS training
Supervision	District and Regional Nutrition Officers	District/Regional Nutrition Officers, and Circuit SHEP coordinators
IFA Tablet Supply Chain	Ghana Health Service and UNICEF	Ghana Health Service and UNICEF
School/Community-level Monitoring and Reporting	Community Health Nurses	Teachers and SHEP Coordinators
Programme Monitoring	Ghana Health Service and UNICEF	Ghana Health Service and UNICEF

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Evaluation	No formal evaluation	Ghana Health Service and UNICEF with CDC

Iron and folic acid, IFA; School Health Education Programme, SHEP; Girls Iron Folic-Acid Tablet Supplementation, GIFTS; United Nations Children Fund, UNICEF, Centers for Disease Control and Prevention (CDC).

1.3 Survey Objectives

As part of the Programme evaluation a baseline and follow-on survey were conducted in 2 out of the 4 phase I regions: Northern and Volta (Figure 1.2). The two regions chosen provide insight into the potential to scale up to the remainder of the country in Phase II because each region represents unique socio-demographic characteristics, operational challenges, and healthcare performance metrics like immunization, antenatal care, and vitamin A coverage, geography, among others. Even though the Programme has been implemented for all adolescent girls, the impact evaluation was designed to assess the impact of the Programme only for the in-school portion. The baseline (BL) was carried out in September 2017, and the follow-on (FO) survey was carried out in June and July 2018. The evaluation also included abstraction of IFA consumption data from school-based registers used in routine monitoring.

Figure 1.2 – Monitoring and Evaluation Scheme and Programme Timeline in 60 selected Junior and Senior High schools from Northern and Volta Regions of Ghana.
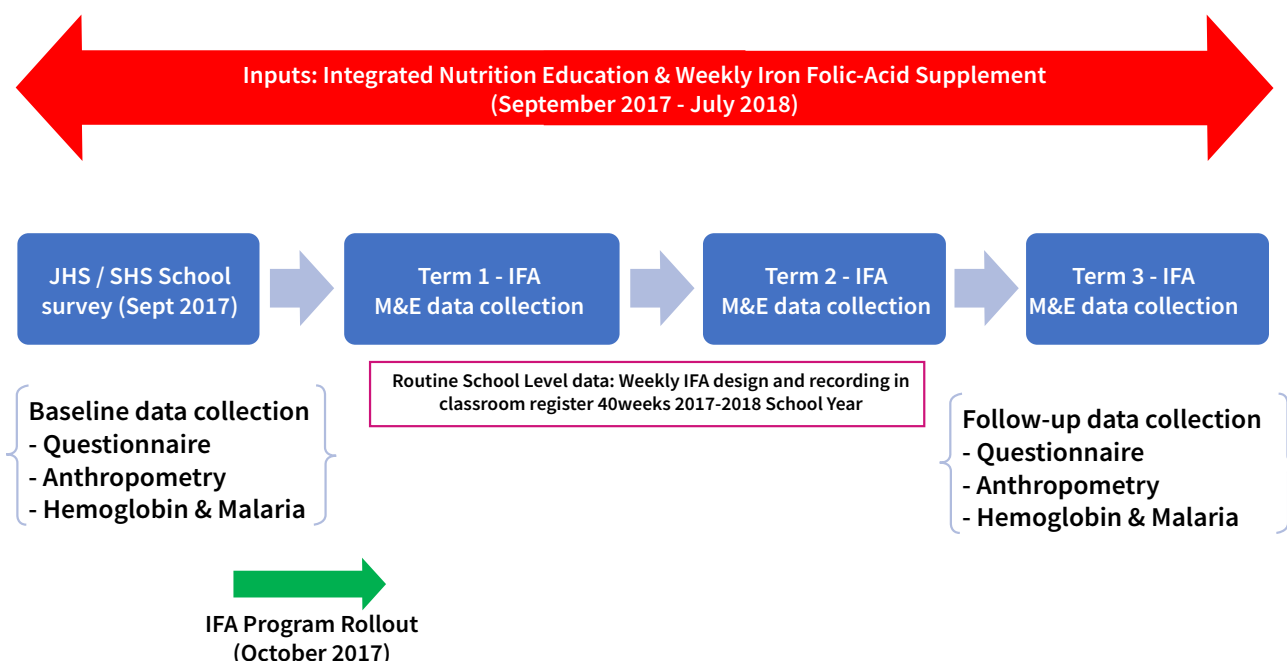
The specific objectives of the evaluation were as follows:

1. Assess changes in prevalence of anemia and malaria in randomly selected girls 10-19 years of age at baseline and follow-on

2. Determine prevalence and changes in anthropometric indicators (stunting, wasting and underweight) between baseline and follow-on

3. Assess changes in students' knowledge, attitudes and practices (KAP) related to anemia at baseline and follow-on

4. Quantify cumulative weekly IFA consumption of selected girls participating in the surveys

5. Examine associations between cumulative doses of the IFA tables and prevalence of anemia among the selected adolescent girls

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CHAPTER 2: METHODS

6. Examine IFA Programme implementation coverage and fidelity data from 60 selected schools included in this evaluation

To evaluate the specific objectives outlined above, two different questionnaires were administered at each school – a student questionnaire and a school-teacher questionnaire (as detailed in Chapter 2.5).

2.1 Survey Design

The impact evaluation assessment followed a pre-post, longitudinal survey design. Two repeated measurements at baseline and then at follow-on were collected from each selected adolescent girl 10-19 years of age. Participants were from junior and senior high schools in both regions. A stratified two-stage cluster sampling design was used to select the participating schools of Ghana. All schools in the phase-I regions implemented the integrated Programme. However, the impact evaluation Programme was carried out in   only the selected schools in Volta and Northern Regions. The selected schools were well spread-out geographically throughout the 2 regions.

2.2 Target Population

A representative sample of adolescent girls enrolled in JHS, SHS, and vocational schools in the Northern and Volta regions was used in this evaluation. The sampling frame was based on enrollment data of public and private schools and their 2016-17 academic year enrollment of girls provided by the MOE.

2.2.1 Inclusion Criteria

Only adolescent girls enrolled in forms 1 or 2 of the 2017-18 academic year were included in the surveys. School stage nomenclature in Ghana follows the British education format. Form 1 and 2 are equivalent to 7th and 8th grades in the North American system. To be eligible for a survey data collection, each girl had to have been randomly selected, be present on the day(s) of the survey, had a parental/guardian consent, and verbal assent.

2.2.2 Exclusion Criteria

Girls enrolled in form 3 of JHS and SHS were excluded due to their exam schedule that would have prevented follow-on data collection at the end of the academic year. Girls who enrolled after random selection were ineligible to participate in the survey.

2.3 Sample size determination

To detect a 10% minimum change in anemia based on an estimated background prevalence rate of 40%, at a fixed power of 80% and a 2-sided 95% significance level, a sample of 776 adolescent girls per region was required. To account for an estimated 10% refusal rate, the final calculated sample size was 870 (per region) for a total of 1740.

2.4 Sampling Frame

A two-stage sampling design was followed.

2.4.1 First Stage: Selection of Junior and Senior High Schools

The first stage involved selection of schools treated as clusters or primary sampling units, PSU. In each of the two selected regions, 30 schools were chosen. Probability proportional to size sampling(PPS) was used to select 15 JHS and 15 SHS in each region based on the school enrollment data for girls from the previous academic year see figure 2.2. This resulted in a total of 60 schools. Some of the senior high schools were also boarding schools.

2.4.2 Second Stage: Selection of School Girls

The second stage involved selection of girls from the selected schools. A total of 29 girls were randomly

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selected from each school by the School Health Education Programme (SHEP) Coordinator with help from the District (DNO) or Regional Nutrition Officer (RNO). The SHEP coordinator or other school teacher or prefects put names of all the enrolled girls on slips of paper into a receptacle such as a box or bowl. Twenty-nine (29) slips were then randomly selected. In schools where there were ≤ 30 girls enrolled, all girls were selected. At follow-on, only the same girls were surveyed.

Figure 2.2 - Sample Selection

Region	Type of school	#School girls
NORTHERN	15 Junior high 15 Senior high	29 girls per school
Northern region	30 schools	870 girls total
VOLTA	15 Junior high 15 Senior high	29 girls per school
Volta region	30 schools	870 girls total
Both regions	60 schools	1740 girls total

2.5 Data Collection and Survey Instruments

Student and School Teacher Questionnaires:

Two different questionnaires were administered at each school – a *student questionnaire* and a *school-teacher questionnaire*. Both questionnaires were electronic and administered via an android tablet interface. Questionnaires were written and administered in English. When the respondent was not comfortable speaking or had difficulty understanding English, the questionnaire was verbally translated by enumerators into a local language. All questionnaires are in Annex 2 and 3.

The Student Questionnaire:

This questionnaire collected information on:

a)   the student's household socio-demographic characteristics, water, sanitation and hygiene;

b)   Knowledge, Attitudes, and Practices (KAP); health and nutrition education talks,

c)   dietary diversity and practices as well as

d)   anthropometry; and malaria and anemia assessments. The follow-on survey included an additional module on the IFA supplementation and the GIFTS Programme.

1.   *Dietary Intake:* Diet was assessed by a modified food frequency questionnaire (FFQ) focusing on iron-rich foods. The baseline and follow-on FFQ had a 24-hour recall period. The follow-on FFQ had an additional 7-day recall plus two questions concerning fried foods and sugary beverages.

2.   *Anthropometric Measurements:* Standardized anthropometric protocols were followed. Height was measured using a height -measuring board (Shorr board) and weight with a lightweight electronic SECA digital scale (UNICEF Electronic Scale or Uniscale). The results of anthropometric measurement were recorded on the electronic questionnaire, as well as the child and lab-tracking sheet. Both height and weight were measured once and reported to 1 decimal place.

3.   *Blood Collection:* The field laboratory technician collected capillary blood samples through a finger from all eligible adolescent girls. The first drop of blood was wiped away and then a few drops of blood was collected onto a parafilm. One drop of blood from the parafilm was used for determining hemoglobin concentration and the remaining blood was then used for the malaria testing. The field laboratory technicians were allowed two attempts to collect the blood from the girl.

4.   *Hemoglobin Concentration:* The hemoglobin (Hb) concentration in girls using HemoCue® Hb-301 photometer (HemoCue® Ltd., Anglhom Sweden). Immediately after obtaining 2-3 large drops of blood on the parafilm, the microcuvette was placed into the blood at a 45-degree angle and blood was drawn into it filling it. Excess blood was removed from the side of the microcuvette using a sterile Kim wipe. Technician were trained to complete the outlined steps (from finger prick to photometer within 20 seconds). The result is recorded onto the lab and child tracking sheet, and on a result slip given to the girl explaining what the result meant and those with moderate-severe anemia (Hb <10.0 g/dl) were given a referral slip to the nearest health facility.

5.   *Malaria Testing:* Malaria was tested using a malaria antigen (HRP2/pLDH) combo rapid diagnostic test kit (RDT) for *Plasmodium falciparum and vivax.* The cassette contains a membrane pre-coated with two monoclonal antibodies as two separate lines across the test strip: one for P. falciparum and the other for P. vivax. From the blood on the parafilm, 5μL of blood was drawn into the pipette and place into the test cassette and two drops of assay buffer solution added into the buffer well. A timer was set for 20 minutes and the result was read recorded immediately after the 20 minutes. The result is recorded onto the child and lab-tracking sheets and also on a result slip given to each girl explaining what the result meant. Those with positive malaria tests were referred to the nearest health facility. Adolescents with positive anemia and or malaria tests referred to the health facility were not excluded from subsequent statistical analyses.

At the end of data collection in each school, hemoglobin and malaria test results written on the child and lab-tracking sheet were then entered into the tablet for each student data file. A picture of this sheet was also taken and uploaded into the electronic tablet.

The Teacher Questionnaire:

The teacher-questionnaire was administered to a school teacher/representative, often the school health

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coordinator (SHEP coordinator) as the primary respondent. When the SHEP Coordinator was unavailable, the school headmaster or mistress or a teacher knowledgeable about the GIFTS Programme was chosen as the respondent. The teacher-questionnaire collected information on the characteristics of the school, nutrition and health promotion Programmes and several additional domains similar to the student questionnaire module. The survey team leads administered the school teacher questionnaire.

2.6 Iron Folic-Acid (IFA) Data Collation and Abstraction within the Selected Schools

In all 4 phase I regions and over the academic 2017-2018-year, weekly IFA tablets given to adolescent school girls 10-19y by DOT were entered into the GIFTS-monitoring register at each school. IFA tablets consumed by students were recorded by a school teacher into this register, which was kept in each school. On the day of the follow-on survey prior to arrival of the survey team in the 60 schools selected for this evaluation, all IFA GIFTS registers of the entire school were gathered. A school-health teacher and/or the district nutrition officer identified the 29 girls selected per school for the evaluation in the GIFTS register. The survey team abstracted the IFA dosing information for each of the 29 girls from the GIFTS registers. IFA dose abstraction was done with assistance from a 2nd enumerator to ensure data abstraction was correctly read and recorded onto the IFA abstraction sheet. A picture of the abstracted IFA dosing sheet were taken and uploaded with the school data files for that school before moving unto the next school.

2.7 Survey Team

The survey team was recruited by GHS. CDC and Emory University carried out the survey training at baseline and follow-on. There were 6 field teams. At baseline, 3 teams of 2 interviewer-anthropometrists and 1 laboratory technician carried out data collection in each region; one enumerator served as a supervisor. The follow-on survey had an additional enumerator-anthropometrist making a total of 4 per team (3 interviewer/anthropometrists and 1 laboratory technician). This was because the survey content was lengthier and included the abstraction of routine/intensive monitoring IFA data from the school GIFTS' registers for each of the randomly selected students.

2.8 Training and Fieldwork

At baseline, a 5-day training was held the week before data collection began at a central location. Enumerators were trained on the purpose of the evaluation, ethical considerations and safety, inclusion and exclusion criteria, data collection workflow, and anthropometry. Interviewers trained on interviewing techniques and role-playing, while the laboratory technicians trained on the collection of blood specimens, universal precautions, the rapid malaria diagnostic test, and use of the HemoCue®. On the fourth day of training, the full complement of survey instrument, including data collection with real students and teachers was piloted for the baseline survey in two local schools near the training center in the Volta region. The final day of training was used to address issues discovered during the pilot and prepare for travel to the field.

All staff returned for training for the follow-on survey except for one laboratory technician. Additional staff included two new interviewers and one new laboratory technician. The high retention of survey staff enabled us to shorten the training to four days during the follow-on survey training. The follow-on training was similar to the baseline training schedule. Piloting was done in the same schools and students used for the baseline work.

In both surveys, fieldwork commenced 2-3 days after completion of the survey training, factoring in road

travel time to the regions. There was 10 days of data collection. Each team visited a total of 10 schools a day. Teams visited each school once, except in schools when more than 5 girls were absent. In that case, teams returned within the next day or two. At follow-on, girls who had participated in baseline but were no longer in the surveyed school and could be located in the community or another school were either asked to come to the school or the teams visited their house to collect the data.

2.9 Quality Control

Enumerator-anthropometrists were trained on proper questionnaire administration to ensure a clear understanding of all questions and responses. The questionnaire was piloted and amended as needed. The electronic data collection platform had an in-built algorithm for instantly checking to prevent clerical errors and entry of implausible or incompatible values. Prior to field work, each anthropometrists had standardization training with respect to reliability and validity against an expert measurement. All personnel passed the standardization with a percent technical error of measurement less than 5%. Known weights were used to check the calibration of the weight scales, and height boards were inspected for damage at each school every morning. Prior to field work, the calibration of all HemoCue® machines was validated with HemoCue® liquid controls at CDC, Atlanta, and additionally, during training in-country sessions. Laboratory technicians followed a standard protocol for every subject. Any abnormal occurrences during data collection were reported and assessed.

2.10 Ethical Considerations

Both surveys were conducted in compliance with ethical and human rights standards. Survey procedures were designed to protect participants' privacy and confidentiality and allow for voluntary participation. The Ghana MOH Ethical Review Board approved the Programme protocol.

2.10.1 Consent

A letter from MOH/MOE was sent to the parent/guardian of each selected girl with an informed consent form and a contact number for additional questions. Only girls with the parent/guardian signature on the informed consent form could participate in the surveys. The informed consent letter detailed potential benefits and risks. Additionally, each girls was given an opportunity to ask any questions about the survey. Girls provided verbal assent for participation before any information was collected from her. Girls were informed if she had moderate-severe anemia(Hb <10 g/dL) or a positive malaria test that they would be given a referral to the nearest health facility for treatment.

2.10.2 Confidentiality

To ensure the confidentiality, survey enumerators and staff were trained to keep participants' information private by conducting interviews and labs in a private location and refraining from discussing results. All survey data were protected with encrypted passwords on the electronic devices (android tablets). Further, entered data was inaccessible to Field teams and supervisors at the end of each day when data was transferred to the data analysis team in the USA. The completed questionnaires and photos of lab/ child tracking sheet, abstracted student IFA doses were uploaded via secure servers. Only members of the survey team assigned to data management and analysis had access to the de-identified dataset stored on password-protected computers. Biological samples were immediately discarded in biohazard waste bags after field tests. Written results and referral cards were given only to the participant.

2.11 Data Cleaning, Processing and Statistical Analyses

Data was collected on tablet computers using Open Data Kit (ODK) Collect. Enumerators abstracted and entered IFA consumption data for selected girls from termly registers in each school. Ghana follows the British education calendar and runs a 3-term school year. Each term spans about 12-15 weeks followed by a school break. Positive malaria tests were dichotomized as yes or no malaria. Anemia was defined

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using age-specific cutoffs for hemoglobin concentration – girls 10-11 years of age: <11.5 g/dL, and <12 g/dL for those 12 years and older. No adjustment for altitude was warranted as Ghana has no mountains or habitable settlements above 1000m.

Height and weight of each participant was converted into z-scores using the WHO Growth 2007 reference growth charts. Anthropometric indicator definitions were as follow: short stature is a height-for-age z-score (HAZ) <-2 SD, thinness as BMI -for-age z-score (BAZ) <-2 SD, overweight was BAZ >+1 SD, and obesity is BAZ >+2 SD. We also used the International Obesity Task Force (IOTF) BMI-for-age cut-offs to define thinness (<-1SD), overweight (>+1), and obesity (>+2SD).[17,18] The IOTF reference population only includes girls up to 18 years of age; therefore, girls ≥18 years were compared to 18-year-olds.

A dietary diversity score was derived from food groups consumed in the previous 24-hours. The food groups were adapted from the Women's Dietary Diversity Score (WDDS).[1]

Post-Stratification Weighting and Variance Estimation.

We generated sampling weights reflective of actual enrollment of girls in each school at the beginning of the 2017-2018 academic year. This was important as the school selection sampling scheme by PPS was based on school enrollment data from the previous school year. In all analyses, robust standard errors were calculated using the Taylor-series approximation. Complex survey adjusted Rao Scott chi-square tests for categorical proportions, and design-based t-tests for mean differences in continuous variables, where applicable. Statistical significance was defined at p-value <0.05 alpha.

All analyses were completed using SAS version 9.4 (SAS Institute, Cary NC, USA). All reported proportions and 95% confidence intervals (CI) from the student questionnaire module are weighted and accounted for clustering. Reported counts (sample sizes, n, in all tables) are all unweighted. When prevalence was zero or 100%, CI were not estimable. The PPS selection of the schools were was based on student enrollment and not the teachers. As a result, all school educator health (N=60) analyses were unweighted as they were treated as a systematic sampling of teachers in the respective regions.

2.11 Programme Impact Evaluation Analyses

Adjusted generalized mixed linear models (repeated measures analyses) was used to assess adjusted student-specific differences in Programme indicators from baseline to follow-on. Models accounted for nesting of repeated measures per student and students within a school (cluster) as random intercept and 3 additional fixed-effects covariates (age, rural residence, and household socio-economic ranking), based on a conceptual framework.

An in-country data manager carried out initial data management for the baseline and follow-on surveys in Accra in real-time. The statistical analyses for the Programme impact evaluation and report writing was conducted at Emory University and the CDC.

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CHAPTER 3: RESPONSE RATES AND CHARACTERISTICS OF RESPONDENTS

All 60 schools selected agreed to participate in the survey. Five of the schools (4 JHS and 1 SHS) had fewer than 29 girls resulting in 1,638 eligible participants (figure 3.1). Baseline response rate was 95%. Lost to follow-up was low, such that 91% of 1551 adolescents that had participated at baseline also participated in the follow-on survey after 8 months. Reasons for student refusal/lost to follow-up included parent/guardian refusal, absenteeism, dropping out of school, child not traceable or dead (1 adolescent died between baseline and follow-on). The response rate for the teacher questionnaire was 100%, and 62% of the respondents were the same teacher who had responded at baseline.

3.1 Response Rates

Figure 3.1: Participant Flow Diagram for Adolescent Schoolgirls from 60 Selected Schools in Northern and Volta regions Ghana, 2017-2018
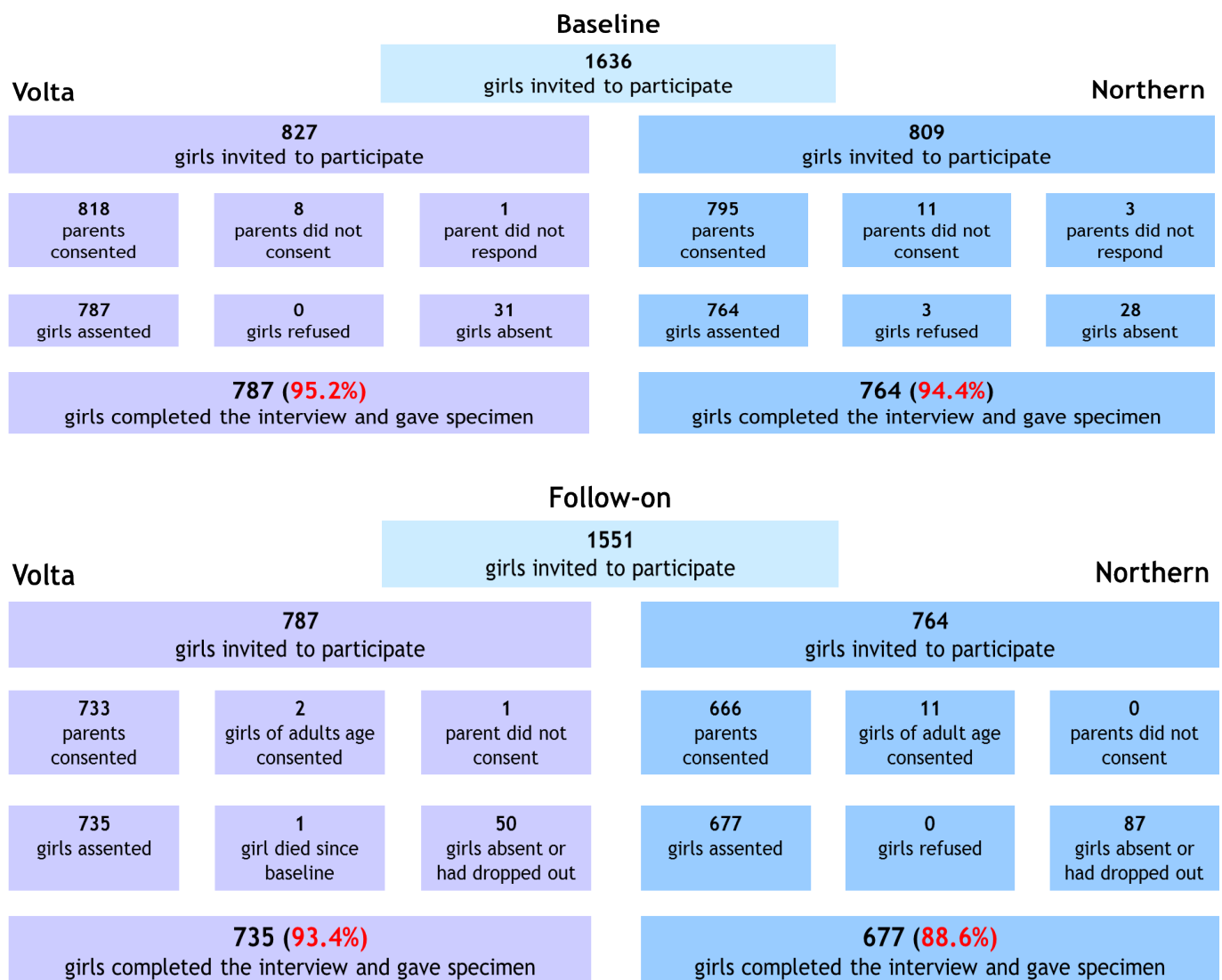
3.2 Demographic and Socioeconomic Characteristics of Participants

The mean age of participants was 15.7 years at baseline and 16.1 years at follow-on (Table 3.2.1). At follow on, mean age of JHS students was 14.7 years whereas that of the SHS girls was 17.5 years.

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Table 3.2.1: Students Ages at Baseline and Follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Age group (years)	Northern				Volta				Overall (Northern + Volta)					
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Junior High School (JHS)	N=393		N=351		N=382		N=358		N=775		N=709		
10-14	184	45.4 (34.7, 56.2)	146	40.0 (29.5, 50.5)	213	62.6 (49.2, 76.0)	155	52.4 (36.6, 68.3)	397	52.5 (42.8, 62.2)	301	45.2 (35.3, 55.2)	0.01
15-19	208	54.2 (43.7, 64.8)	205	60.0 (49.5, 70.5)	168	37.2 (23.9, 50.6)	201	47.2 (31.6, 62.9)	376	47.3 (37.6, 56.9)	406	54.6 (44.7, 64.6)	
>19	1	0.3 (0.0, 0.9)	0	-	1	0.1 (0.0, 0.5)	2	0.3 (0.0, 1.0)	2	0.2 (0.0, 0.6)	2	0.1 (0.0, 0.4)	
Senior High School (SHS)	N=371		N=326		N=405		N=377		N=776		N=703		
10-14	6	2.4 (0.0, 5.2)	4	2.0 (0.0, 5.0)	15	4.4 (2.3, 6.4)	6	1.6 0 (0.0, 3.3)	21	3.2 (1.3, 5.1)	10	1.8 (0.0, 3.7)	<0.01
15-19	356	95.4 (91.7, 99.1)	300	91.4 (85.5, 97.3)	371	91.7 (87, 96.4)	338	90.5 (84.5, 96.5)	727	93.9 (90.9, 96.9)	638	91.0 (86.8, 95.3)	
>19	9	2.2 (0.0, 5.1)	22	6.6 (2.1, 11.2)	19	3.9 (0.6, 7.3)	33	7.8 (3, 12.6)	28	2.9 (0.6, 5.1)	55	7.1 (3.8, 10.4)	
Overall (JHS + SHS)	N=764		N=677		N=787		N=735		N=1551		N=1412		
10-14	190	8.1 (3.2, 13.0)	150	7.0 (2.4, 11.7)	228	12.2 (5.2, 19.2)	161	8.5 (1.9, 15.1)	418	9.8 (5.6, 13.9)	311	7.6 (3.8, 11.5)	<0.01
15-19	564	90 (84.6, 95.4)	505	87.2 (81, 93.5)	539	84.4 (76.5, 92.3)	539	84.7 (76.7, 92.7)	1103	87.7 (83.1, 92.3)	1044	86.2 (81.2, 91.1)	
Junior High School (JHS)	N=393		N=351		N=382		N=358		N=775		N=709		
>19	10	1.9 (0.0, 4.5)	22	5.7 (1.8, 9.7)	20	3.4 (0.6, 6.3)	35	6.8 (2.7, 10.9)	30	2.5 (0.6, 4.5)	57	6.2 (3.3, 9.1)	

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Mean age (years)	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)	N	Mean (95% CI)	P-value
JHS	393	14.6 (14.2, 15.0)	351	14.8 (14.4, 15.2)	382	14.0 (13.5, 14.6)	358	14.6 (14.1, 15.1)	775	14.3 (14.0, 14.6)	709	14.7 (14.4, 15.0)	
SHS	371	17.2 (16.9, 17.5)	326	17.6 (17.4, 17.9)	405	16.8 (16.5, 17.1)	377	17.4 (17.1, 17.7)	776	17.0 (16.8, 17.2)	703	17.5 (17.3, 17.7)	<0.01
Overall	764	15.9 (15.6, 16.1)	677	16.2 (16.0,16.5)	787	15.4 (15.1, 15.7)	735	16.0 (15.7, 16.3)	1551	15.7 (15.5, 15.9)	1412	16.1 (15.9, 16.3)	
% post Menarche	631	94.4 (91.3, 97.5)	595	96 (93.8, 98.3)	687	95.3 (91.6, 98.9)	672	96.9 (94.4, 99.4)	1318	94.8 (92.4, 97.1)	1267	96.4 (94.7, 98.1)	<0.01

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population. Sample sizes might vary slightly due to missing data. All estimates have been weighted and counted clustering.

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Table 3.2.2: School Form (Grade) of Students at Baseline and Follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

By way of student composition at follow-on, 63% of the survey participants were in form 2 (either JHS/SHS) with the remainder in form 1. This was consistent across the two regions for both surveys.

Form	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
Junior High School (JHS)		N=393		N=351		N=382		N=358		N=775		N=709	
1	178	42.1 (31.9, 52.2)	160	42.8 (32.5, 53)	196	49.5 (44.0, 55.1)	178	48.7 (44.3, 53.1)	374	45.1 (38.5, 51.7)	338	45.3 (38.8, 51.7)	
2	215	57.9 (47.8, 68.1)	191	57.2 (47.0, 67.5)	186	50.5 (44.9, 56.0)	180	51.3 (46.9, 55.7)	401	54.9 (48.3, 61.5)	371	54.7 (48.3, 61.2)	
Senior High School (SHS)		N=371		N=326		N=405		N=377		N=776		N=703	
1	113	33.5 (24.3, 42.6)	104	34.9 (25.4, 44.3)	151	37.1 (21, 53.3)	127	36.9 (22.0, 51.8)	264	35 (26.6, 43.3)	231	35.7 (27.5, 43.9)	
2	258	66.5 (57.4, 75.7)	222	65.1 (55.7, 74.6)	254	62.9 (46.7, 79)	250	63.1 (48.2, 78)	512	65 (56.7, 73.4)	472	64.3 (56.1, 72.5)	
Overall (JHS + SHS)		N=764		N=677		N=787		N=735		N=1551		N=1412	
1	291	34.6 (26.6, 42.6)	264	35.9 (27.7, 44.1)	347	38.8 (24.6, 53)	305	38.5 (25.4, 51.6)	638	36.3 (29, 43.7)	569	37.0 (29.8, 44.2)	
2	473	65.4 (57.4, 73.4)	413	64.1 (55.9, 72.3)	440	61.2 (47, 75.4)	430	61.5 (48.4, 74.6)	913	63.7 (56.3, 71)	843	63.0 (55.8, 70.2)	

Sample sizes might vary slightly due to missing data. All estimates have been weighted and counted clustering. Form 1 and 2 are equivalent to 7th and 8th grades in the North American Educational system.

Table 3.2.3. Area of Residence of Students in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Based on existing Ghana statistical service maps, student area of residence were classified into rural, peri-urban, or urban setting based on the district of their school (Table 3.2.3). At baseline and follow-on, around 28-29% of the adolescents went to school in a rural setting.

Table 3.2.3: Area of Residence based School Location

Residence	Overall			
	Baseline		Follow-on	
	n	%(95% CI)	n	%(95% CI)
Junior High School (JHS)	**N=775**		**N=709**	
Rural	556	62.1 (40.4,83.8)	505	61.4 (39.4,83.3)
Peri-Urban	111	15.2 (0.4,30)	103	15.3 (0.5,30.2)
Urban	108	22.7 (2.1,43.3)	101	23.3 (2.2,44.4)
Senior High School (SHS)	**N=776**		**N=703**	
Rural	270	22.9 (6.1,39.7)	253	23.6 (6.3,40.9)
Peri-Urban	327	51.4 (28.8,74.1)	298	51.3 (28.7,73.9)
Urban	179	25.7 (5.2,46.1)	152	25.1 (4.8,45.4)
Overall (JHS + SHS)	**N=1551**		**N=1412**	
Rural	826	28.1 (12.7,43.5)	758	28.7 (12.9,44.4)
Peri-Urban	438	46.6 (26.5,66.8)	401	46.5 (26.4,66.5)
Urban	287	25.3 (7.3,43.2)	253	24.9 (7.1,42.7)

Sample sizes might vary slightly due to missing data. All estimates have been weighted and counted clustering.

Table 3.2.4: Inventory of Reported Household Assets at Baseline of Students in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

An inventory of reported household assets and demographics are shown in Table 3.2.4. Most of the students (>94%) in each region and overall reported the presence of a mobile phone in their household. Electricity was present in 84.6% of the households of students from the Northern region; in Volta the figure was 93.9%. Among students from the Northern region, 51.5% had 8 or more persons in their household, and in Volta the proportion was 18.0%.

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Table 3.2.4: Inventory of Reported Household Assets at Baseline

Items	Northern		Volta		Overall	
	n	%(95% CI)	n	%(95% CI)	n	%(95% CI)
Assets	**N=764**		**N=787**		**N=1551**	
Radio	452	62.5 (56.8,68.3)	563	72.9 (66,79.8)	1015	66.8 (61.8,71.7)
CD player or stereo	299	46.4 (38.2,54.6)	301	48.4 (39.6,57.1)	600	47.2 (41.1,53.3)
Television	445	67.2 (59.2,75.3)	569	78.4 (71.9,84.9)	1014	71.8 (65.9,77.7)
Mobile telephone	691	94.4 (91.3,97.4)	767	98.4 (97.3,99.6)	1458	96.0 (94.2,97.9)
Electric or LPG Cooker	125	20.6 (14.3,26.9)	267	46.5 (34.6,58.5)	392	31.1 (22.4,39.9)
Chair	604	83.0 (76.6,89.5)	750	96.5 (93.9,99.2)	1354	88.5 (83.9,93.1)
Sofa set	258	39.5 (29.4,49.6)	280	41.9 (35.0,48.9)	538	40.5 (33.8,47.2)
Bed	287	79.0 (72.4,85.6)	379	94.5 (90.0,99.0)	666	85.3 (79.9,90.7)
Air Conditioner	25	4.0 (1.4,6.5)	14	3.9 (0.0,8.0)	39	4.0 (1.7,6.2)
Bicycle	503	66.1 (56.8,75.4)	324	34.1 (28.6,39.6)	827	53.1 (43.9,62.2)
Motorcycle or scooter	400	52.7 (44.5,61)	213	21.9 (14.2,29.6)	613	40.2 (31.8,48.7)
Animal drawn cart	40	3.1 (0.8,5.4)	4	0.3 (0.0,0.6)	44	2.0 (0.6,3.3)
Car or truck	100	14.3 (6.4,22.1)	117	19.7 (14.1,25.4)	217	16.5 (11.0,22.0)
Satellite dish (Multi TV)	248	35.2 (25.5,44.9)	352	53.9 (44.2,63.6)	600	42.8 (34.4,51.2)
Generator	29	4.2 (2.1,6.3)	27	6.0 (1.3,10.8)	56	4.9 (2.5,7.3)
Refrigerator	200	31.8 (25.4,38.2)	310	49.6 (39.1,60.1)	510	39.1 (31.9,46.2)
Tricycle	38	3.0 (1.1,4.8)	14	1.3 (0.2,2.3)	52	2.3 (1.1,3.4)
Electricity	602	84.6 (79.8,89.4)	703	93.9 (90.3,97.4)	1305	88.4 (84.9,91.9)
Number who sleep in household						
1-3	32	4.2 (2.2,6.1)	124	16.2 (13,19.5)	156	9.1 (6.2,11.9)
4-7	308	44.3 (36.7,52)	502	65.8 (59.6,72)	810	53.1 (46.4,59.7)
≥8	424	51.5 (43.3,59.7)	161	18.0 (12.2,23.7)	585	37.9 (29.5,46.3)

Table 3.2.5: Students Head of Household at Baseline in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

During the baseline survey and in the overall population (JHS + SHS) over 80 % of the students had their mother or father as the head of household. Approximately 6% reported a grandparent and 5% reported a sibling as head of household.

Table 3.2.5: Head of Household at Baseline

Head of Household	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Junior High School (JHS)	**N=393**		**N=382**		**N=775**	
Father	300	73.0 (64,81.9)	218	58.5 (52,65)	518	67.0 (60.7,73.3)
Mother	23	6.5 (3.1,9.8)	84	22.1 (17.4,26.7)	107	12.9 (8.6,17.1)
Grandparent	18	5.4 (3.2,7.6)	37	9.1 (5.5,12.6)	55	6.9 (4.9,8.9)
Sibling	16	4.5 (2.2,6.7)	4	0.8 (0.0,1.7)	20	3.0 (1.3,4.6)
Aunt/Uncle	32	9.5 (5.3,13.6)	29	7.6 (5.2,10)	61	8.7 (6,11.4)
Other relative	0	-	6	1.2 (0.0,2.4)	6	0.5 (0.0,1.0)
Self	0	-	0	-	0	-
Other	4	1.2 (0.0,2.6)	4	0.8 (0.0,1.5)	8	1.0 (0.1,1.9)
Senior High School (SHS)	**N=371**		**N=405**		**N=776**	
Father	239	63.6 (56,71.1)	234	55.7 (48.7,62.8)	473	60.4 (54.8,66)
Mother	55	15.0 (9,21)	84	23.3 (17.1,29.5)	139	18.4 (13.3,23.4)
Grandparent	21	6.8 (3.8,9.9)	18	4.2 (1.6,6.7)	39	5.8 (3.5,8)
Sibling	24	5.6 (3.1,8.0)	19	5.0 (3.0,7.0)	43	5.3 (3.7,7)
Aunt/Uncle	24	6.2 (3.5,8.9)	30	7.7 (4.8,10.5)	54	6.8 (4.8,8.7)
Other relative	4	1.3 (0.0,2.8)	6	1.7 (0.2,3.2)	10	1.4 (0.4,2.5)
Self	0	-	12	2.0 (0.4,3.6)	12	0.8 (0.1,1.5)
Other	4	1.6 (0.4,2.8)	2	0.4 (0.0,1.1)	6	1.1 (0.3,1.9)

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Head of Household	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Overall (JHS + SHS)	**N=764**		**N=787**		**N=1551**	
Father	539	64.8 (58.2,71.5)	452	56.1 (50.0.0,62.3)	991	61.3 (56.3,66.2)
Mother	78	13.9 (8.6,19.1)	168	23.1 (17.7,28.5)	246	17.6 (13.2,22.0)
Grandparent	39	6.7 (4.0,9.3)	55	4.8 (2.4,7.2)	94	5.9 (4.0,7.9)
Sibling	40	5.4 (3.3,7.6)	23	4.4 (2.7,6.2)	63	5.0 (3.6,6.5)
Aunt/Uncle	56	6.6 (4.2,9)	59	7.7 (5.1,10.2)	115	7.0 (5.3,8.8)
Other relative	4	1.1 (0.0,2.4)	12	1.6 (0.3,2.9)	16	1.3 (0.4,2.3)
Self	0	-	12	1.8 (0.4,3.1)	12	0.7 (0.1,1.3)
Other	8	1.5 (0.4,2.6)	6	0.5 (0.0,1.1)	14	1.1 (0.3,1.8)
Other included aunt's husband, brother-in-law, foster father, guardian, mother's friend, sister-in-law, step aunt, and uncle's wife.						

Table 3.2.6: Head of Household Occupation of Students at Baseline in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Agriculture was the predominant head of household occupation for 37.1% of the students in the overall population of both regions combined. In the Northern region, this proportion was 47.2% whilst in Volta it was 22.5%.

Table 3.2.6: Occupation of Head of Household at Baseline

Occupation of Head of Household	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Junior High School (JHS)	**N=393**		**N=382**		**N=775**	
Professional/technical/ managerial	30	9.0 (3.1,14.8)	46	18.9 (6.6,31.2)	76	13.0 (6.2,19.9)
Clerical	9	2.6 (0.0,6.4)	6	1.3 (0.0,2.8)	15	2.1 (0.0,4.4)
Sales and service	44	12.7 (7.6,17.9)	86	22.1 (17.3,26.9)	130	16.6 (12.6,20.5)
Skilled manual	21	6.7 (2.7,10.8)	58	16.5 (9.6,23.4)	79	10.7 (6.6,14.9)
Unskilled manual	20	6.1 (2.7,9.5)	28	6.6 (2.1,11.1)	48	6.3 (3.6,9)
Agricultural	250		57.3 (41.5,73.1)		139	

Occupation of Head of Household	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Other	19	5.6 (2.6,8.5)	19	5.9 (2.3,9.5)	38	5.7 (3.4,8)
Senior High School (SHS)	**N=371**		**N=405**		**N=776**	
Professional/technical/ managerial	58	14.4 (6.5,22.3)	65	23 (14.2,31.9)	123	17.9 (11.2,24.6)
Clerical	12	4.3 (0.9,7.6)	9	3.5 (1.5,5.5)	21	4.0 (1.8,6.1)
Sales and service	83	23.8 (17.1,30.5)	88	21.9 (15.2,28.6)	171	23.0 (18.2,27.9)
Skilled manual	13	2.7 (0.3,5.1)	67	20.7 (16.0,25.4)	80	10.0 (5,15)
Unskilled manual	15	3.7 (2.5,4.8)	22	5.2 (2.5,7.8)	37	4.3 (3,5.6)
Agricultural						
Other	14	5.5 (0.4,10.7)	20	4.3 (1.2,7.3)	34	5.0 (1.6,8.4)
Overall (JHS + SHS)	**N=764**		**N=787**		**N=1551**	
Professional/technical/ managerial	88	13.7 (6.8,20.6)	111	22.5 (14.5,30.4)	199	17.3 (11.4,23.1)
Clerical	21	4.0 (1.1,7.0)	15	3.2 (1.4,5.0)	36	3.7 (1.8,5.6)
Sales and service	127	22.4 (16.4,28.3)	174	21.9 (16.1,27.7)	301	22.2 (17.9,26.4)
Skilled manual	34	3.2 (1.0,5.5)	125	20.1 (15.8,24.4)	159	10.1 (5.7,14.5)
Unskilled manual	35	4.0 (2.8,5.1)	50	5.4 (3.0,7.7)	85	4.5 (3.3,5.8)
Agricultural	426	47.2 (37.8,56.5)	273	22.5 (12.2,32.7)	699	37.1 (28.3,46)
[1]Other	33	5.5 (1.0,10)	39	4.5 (1.8,7.2)	72	5.1 (2.2,8.0)

[1]Other includes student, retired/pensioner, driver, imam, pastor, lotto seller, remittance from family, teacher, technical advisor, trader, and unemployed.

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Table 3.2.7: Household Socio-economic Status of Students in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Household asset ranking (tertiles) as derived by principal components analysis (PCA) of household assets are shown in table 3.2.7. At both surveys for JHS and SHS combined, around 40% of the respondents were in the low asset ranking category.

Table 3.2.7: Household Socio-economic status

	Overall (Northern + Volta)			
	Baseline		Follow-on	
	n	%(95% CI)	n	%(95% CI)
Junior High School (JHS)	N=775		N=709	
High	295	35.7 (25.6,45.9)	263	34.8 (24.1,45.6)
Middle	259	32.4 (26.8,38)	243	33.1 (27.6,38.6)
Low	221	31.9 (21.6,42.1)	203	32.1 (21.4,42.7)
Senior High School (SHS)	N=776		N=703	
High	221	25.9 (18.3,33.5)	201	26.1 (18.3,33.9)
Middle	258	33.1 (28.4,37.7)	232	32.0 (27.7,36.3)
Low	297	41.0 (31.9,50.2)	270	41.9 (32.9,50.8)
Overall (JHS+ SHS)	N=1551		N=1412	
High	516	27.2 (20.4,34)	464	27.3 (20.3,34.2)
Middle	517	33.0 (28.9,37.1)	475	32.1 (28.4,35.9)
Low	518	39.8 (31.7,47.9)	473	40.6 (32.6,48.5)

3.3 Proximity to Healthcare for Students

Table 3.3.1: Usual Mode of Transport to Nearest Health Facility for Students in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Over half (50.8%) of the students in each region and overall regions combined reported they lived near or within walking distance to a health facility. In terms of duration, 27.9% of Northern region students (JHS and SHS overall) walked more than 40 minutes to the nearest health facility. In Volta region, 10.7% of these school girls lived >40-minute walk.

Table 3.3.1: Usual Mode of Transport and Duration to Nearest Health Facility

Mode of Transport	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Overall (JHS + SHS)	N=764		N=787		N=1551	
Walking	422	51.3 (42.5,60.1)	346	50.0 (35,64.9)	768	50.8 (42.8,58.7)
Personal vehicle	15	2.6 (1.1,4.2)	14	2.0 (0.7,3.4)	29	2.4 (1.3,3.5)
Commercial vehicle	127	25.0 (14.1,35.8)	231	27.4 (19.9,35)	358	26.0 (18.9,33)
Bicycle	45	4.1 (2.5,5.8)	6	0.2 (0.0,0.6)	51	2.6 (1.4,3.7)
Motor bike	151	16.5 (11.3,21.7)	175	19.2 (6.4,32)	326	17.6 (11.5,23.7)
[1]Other	4	0.5 (0.0,1.1)	15	1.1 (0.1,2.2)	19	0.7 (0.2,1.3)
Duration (minutes)[2]	n	% (95% CI)	n	% (95% CI)	n	%(95% CI)
Junior High School (JHS)	N=393		N=382		N=775	
≤10	53	13.6 (7.1,20.1)	129	33.5 (26.1,40.9)	182	21.8 (15.5,28)
10-20	66	16.2 (11.6,20.7)	84	21.4 (15.5,27.2)	150	18.3 (14.6,22)
21-40	98	24.5 (18.8,30.1)	72	22.0 (15.7,28.3)	170	23.5 (19.3,27.6)
>40	89	23.0 (15.5,30.5)	46	9.3 (3.6,15)	135	17.4 (11.3,23.4)
Don't know	82	21.9 (13.4,30.4)	50	13.6 (3.8,23.3)	132	18.5 (11.8,25.2)
Senior High School (SHS)	N=371		N=405		N=776	
≤10	45	13.4 (10.7,16.1)	119	36.2 (27.3,45.2)	164	22.7 (15.7,29.6)
10-20	75	19.8 (13.0,26.6)	82	23.6 (16.3,30.8)	157	21.3 (16.1,26.5)
21-40	112	31.1 (26.3,35.8)	86	20.0 (13.0,27.0)	198	26.6 (21.5,31.7)
>40	103	28.6 (22.7,34.6)	58	10.9 (5.6,16.2)	161	21.4 (15.4,27.4)
Don't know	33	6.6 (2.9,10.4)	60	9.3 (2.4,16.1)	93	7.7 (4.2,11.3)
Overall (JHS + SHS)	N=764		N=787		N=1551	
≤10	98	13.4 (11,15.9)	248	35.9 (28,43.8)	346	22.5 (16.5,28.6)
10-20	141	19.3 (13.4,25.2)	166	23.3 (16.8,29.7)	307	20.9 (16.3,25.5)

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Mode of Transport	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
21-40	210	30.2 (25.8,34.6)	158	20.3 (14.1,26.5)	368	26.2 (21.7,30.6)
>40	192	27.9 (22.6,33.2)	104	10.7 (6.0,15.3)	296	20.9 (15.6,26.2)
Don't know	115	8.7 (4.7,12.6)	110	9.9 (3.6,16.1)	225	9.1 (5.7,12.6)

[1]"tricycle", "never been there", "can't remember", and "sometimes walks and sometimes car". 2 Time in minutes by usual mode of transport

3.4 Survey Respondents for School Health Educator/Teacher Questionnaire

At both baseline and follow-on, a high proportion (73.3 -83.3%) of the school teacher survey questionnaire respondents were the SHEP coordinators.

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Table 3.4.1: Survey Respondents: School Health Educator Questionnaire

| Age group (years) | Northern | | | | Volta | | | | Overall (Northern + Volta) | | | |
| | Baseline | | Follow-on | | Baseline | | Follow-on | | Baseline | | Follow-on | |
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)
Overall (JHS + SHS)		N=60		N=60		N=60		N=60		N=60		N=60
SHEP Coordinator	23	76.7 (61.3, 92)	23	76.7 (61.3, 92)	25	83.3 (69.8, 96.9)	22	73.3 (57.3, 89.4)	48	80.0 (69.7, 90.3)	45	75.0 (63.9, 86.1)
Headmaster/mistress	4	13.3 (1.0.0, 25.7)	4	13.3 (1, 25.7)	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	5	8.3 (1.2, 15.4)	5	8.3 (1.2, 15.4)
Teacher	2	6.7 (0.0, 15.7)	1	3.3 (0.0, 9.8)	3	10.0 (0.0, 20.9)	2	6.7 (0.0, 15.7)	5	8.3 (1.2, 15.4)	3	5.0 (0.0, 10.6)
Other	1	3.3 (0.0, 9.8)	2	6.7 (0.0, 15.7)	1	3.3 (0.0, 9.8)	5	16.7 (3.1, 30.2)	2	3.3 (0.0, 7.9)	7	11.7 (3.4, 19.9)

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CHAPTER 4: SCHOOL ENVIRONMENT

As the delivery platform for the intervention, the school environment and related factors may be associated with outcomes for this evaluation. In order to better understand some of these factors, data were collected on mode of transportation to school and commute duration, school enrollment size, availability of school meals, and access to health services and sanitation facilities.

4.1 Usual Mode of Transportation to School of the Students in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Over 90% (91.7%) of the girls overall in both regions combined resided within walking distance from their school (JHS and SHS schools combined). This proportion was consistent across the two school categories – junior (93%) or senior (91.4%) high school.

Table 4.1.1: Mode of Transportation to School

Mode	Northern		Volta		Overall (Northern + Volta)	
	n	%(95% CI)	n	%(95% CI)	n	%(95% CI)
Junior High School (JHS)	**N=393**		**N=382**		**N=775**	
Walking	368	92.7(87.7,97.7)	367	93.6(88.7,98.5)	735	93.1(89.6,96.6)
Vehicle	1	0.4(0.0,1.0)	11	5.6(0.3,10.8)	12	2.5(0.0,5.2)
Bicycle	19	5.3(0.4,10.2)	2	0.5(0.0,1.1)	21	3.3(0.2,6.5)
Motor bike	5	1.6(0.0,3.5)	2	0.3(0.0,0.9)	7	1.1(0.0,2.3)
Other	0	-	0	-	0	-
Senior High School (SHS)	**N=371**		**N=405**		**N=776**	
Walking	321	89.8(82.5,97.2)	367	93.8(89.2,98.4)	688	91.4(86.6,96.3)
Vehicle	22	3.7(0.4,7.0)	13	3.2(0.1,6.3)	35	3.5(1.2,5.8)
Bicycle	17	3.7(0.2,7.2)	6	0.4(0.0,1.3)	23	2.4(0.2,4.5)
Motor bike	11	2.8(0.3,5.3)	12	2.2(0.0,4.7)	23	2.5(0.7,4.4)
Other	0	-	7	0.3 (0.0,0.8)	7	0.1 (0.0,0.3)
Overall (JHS + SHS)	**N=764**		**N=787**		**N=1551**	
Walking	689	90.2(83.8,96.6)	734	93.8(89.7,97.8)	1423	91.7(87.5,95.8)
Vehicle	23	3.3(0.4,6.1)	24	3.5(0.7,6.3)	47	3.4(1.3,5.4)
Bicycle	36	3.9(0.8,7)	8	0.4(0.0,1.2)	44	2.5(0.6,4.4)
Motor bike	16	2.6(0.4,4.8)	14	2.0(0.0,4.1)	30	2.4(0.8,3.9)
Other	0	-	7	0.3(0.0,0.7)	7	0.1(0.0,0.3)
Other includes those who live in a dormitory at the school.						

Table 4.1.2: Proximity to School of Students in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Overall, 16.6% of JHS and 9.9% of SHS students walked >40 minutes to school. Similarly, 24.9% JHS and 61% of SHS students walked <10 minutes to school.

Table 4.1.2: Duration of Travel to School by Usual Means of Transportation

Time (minutes)	Northern		Volta		Overall (Northern + Volta)	
	n	%(95% CI)	n	%(95% CI)	n	%(95% CI)
Junior High School (JHS)		N=393		N=382		N=775
≤10	74	17.4(13.4,21.3)	152	35.8(25.2,46.4)	226	24.9(19.2,30.7)
10-20	81	21.3(16.6,25.9)	93	25.5(20.6,30.4)	174	23.0(19.5,26.6)
21-40	85	21.6(15.5,27.7)	94	27.9 (19.5,36.4)	179	24.2 (18.8,29.6)
>40	90	24.0(19.4,28.7)	25	6.0(1.4,10.6)	115	16.6(11.4,21.9)
Don't know	63	15.7(9.3,22.1)	18	4.7(0.5,8.9)	81	11.2(6.5,15.9)
Senior High School (SHS)[1]		N=371		N=405		N=776
≤10	234	67.9(56.9,78.8)	197	50.9(41.4,60.3)	431	61.0(52.4,69.6)
10-20	33	9.1(6.7,11.6)	67	19.5(14.0,25.0)	100	13.3(9.5,17.1)
21-40	40	9.0(4.3,13.8)	63	16.2(9.7,22.8)	103	12(7.7,16.2)
>40	44	10.6(5.3,15.8)	50	9.0(4.1,13.9)	94	9.9(6.2,13.6)
Don't know	19	3.4(1.3,5.5)	28	4.4(0.8,7.9)	47	3.8(1.9,5.7)
Overall (JHS + SHS)		N=764		N=787		N=1551
≤10	308	61.2(49.7,72.7)	349	48.8(40.1,57.6)	657	56.2(47.7,64.6)
10-20	114	10.7(8.2,13.3)	160	20.3 (15.6,25)	274	14.6 (11.2,18)
21-40	125	10.7(6.1,15.3)	157	17.8(11.7,23.9)	282	13.6(9.6,17.6)
>40	134	12.3(7.4,17.3)	75	8.6(4.4,12.8)	209	10.8(7.4,14.2)
Don't know	82	5.0(2.6,7.4)	46	4.4(1.3,7.6)	128	4.8(2.9,6.7)

[1]Duration of travel denoted travel between a dormitory and the classrooms for some senior high students that attended a boarding school.

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4.2 School Enrollment

Table 4.2.1: Distribution of School Enrollment of Girls in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Student enrollment data, for the 2017-2018 school year was collected at the time of the baseline survey. This data was provided by the health teacher in each school. Among the SHS selected for the survey overall across both regions, 43.3% of the SHS   schools had >500 enrolled girls students. For JHS overall across both regions, 70.0% of the school enrollment population was less than 100 girls.

Table 4.2.1: Total Enrollment of Girls in Each School Category

Number of Girls Enrolled	Northern		Volta		Overall (Northern + Volta)	
	N	Unweighted % (95% CI)	N	Unweighted % (95% CI)	N	Unweighted % (95% CI)
Junior High School (JHS)	**N=15**		**N=15**		**N=30**	
<30	-	xx	-	xx	4	13.3 (0.8,25.9)
30 - 99	-	xx	-	xx	17	56.7 (38.4,74.9)
100 - 299	-	xx	-	xx	9	30.0 (13.1,46.9)
Senior High School (SHS)	**N=15**		**N=15**		**N=30**	
<30	-	xx	-	xx	2	6.7 (0.0,15.9)
30 - 99	-	xx	-		1	3.3 (0.0,9.9)
100 - 299	-	xx	-	xx	9	30.0 (13.1,46.9)
300 - 500	-	xx	-	xx	5	16.7 (2.9,30.4)
>500	-	xx	-	xx	13	43.3 (25.1,61.6)
Overall (JHS + SHS)	**N=30**		**N=30**		**N=60**	
<30	3	10.0 (0.0,21.1)	3	10.0 (0.0,21.1)	6	10.0 (2.2,17.8)
30 - 99	7	23.3 (7.8,38.9)	11	36.7 (18.9,54.4)	18	30.0 (18.1,41.9)
100 - 299	10	33.3 (16.0,50.7)	8	26.7 (10.4,43)	18	30.0 (18.1,41.9)
300 - 500	2	6.7 (0.0,15.9)	3	10.0 (0.0,21.1)	5	8.3 (1.1,15.5)
>500	8	26.7 (10.4,43)	5	16.7 (2.9,30.4)	13	21.7 (10.9,32.4)
xx. Percentage estimates not shown due to low denominators n < 25.						

Table 4.2.2 Student Health and Available School Facilities in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

In both regions at follow-on, 83.3% and 68.3% of the schools respectively had a functioning toilet/latrine or a handwashing station. These proportions did not differ from baseline to follow-on (each p >0.05). In both JHS and SHS, schools had several handwashing facilities (veronica bucket, 63.4%, and/or tippy tap 63.4%, and/or a washing bowl, 19.5%) at follow-on. The number of school health clubs was 38.3% at baseline and 55.0% at follow-on, but this increase was not statistically significant. A high (>90%) proportion of the students said they self-report their health concerns at both baseline and follow-up.

Table 4.2.2 Student Health Problems and School Facilities

Overall (JHS + SHS)	Overall (Northern + Volta)				P-value
	Baseline		Follow-on		
	N=60		N=60		
	N	Unweighted % (95% CI)	N	Unweighted % (95% CI)	
How students with health problems are identified in the school					
Medical check for admission	5	8.3 (1.2,15.4)	12	20.0 (9.7,30.3)	0.07
Anemia screening	0	-	5	8.3 (1.2,15.4)	-
Students self-report health concerns	54	90.0 (82.3,97.7)	55	91.7 (84.6,98.8)	0.75
Parent report	15	25.0 (13.9,36.1)	23	38.3 (25.9,50.8)	0.17
Teacher reports	28	46.7 (33.9,59.5)	41	68.3 (56.4,80.3)	0.02
Other	15	25.0 (13.9,36.1)	16	26.7 (15.3,38.0)	0.84
School health clubs and toilet and handwashing facilities					
School has health clubs	23	38.3 (25.9,50.8)	33	55.0 (42.2,67.8)	0.07
School has functioning toilets or latrines	48	80.0 (69.7,90.3)	50	83.3 (73.8,92.9)	0.64
School has handwashing facilities	36	60.0 (47.4,72.6)	41	68.3 (56.4,80.3)	0.34
Type of handwashing facilities, among those schools which have them (Multiple response question)					
Tippy tap	19	52.8 (36.1,69.5)	26	63.4 (48.3,78.5)	0.35
Veronica bucket	23	63.9 (47.8,79.9)	26	63.4 (48.3,78.5)	0.97
Sink and tap with running water	3	8.3 (0.0,17.6)	2	4.9 (0.0,11.6)	0.54
Washing bowl	6	16.7 (4.2,29.1)	8	19.5 (7.1,31.9)	0.75
Other	2	5.6 (0.0,13.2)	2	4.9 (0.0,11.6)	-

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4.3 School Meals

Table 4.3.1: Meals Provided in Senior High Schools in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

At follow-on, 83.3% of SHS provided meals to some or all students but only 2 JHS (6.7%, table not shown) did. Among the SHS that provided the meals at school at follow-on, 73-83% provided a single meal alone or a combination of breakfast, lunch, dinner or snack. Meal content had a wide variety of food groups. At follow-on, for example, the predomination foods served were fish (46.7%), dark leafy vegetables (26.7%), legumes/nuts/seeds (43.3%) and bread/flour products (46.7%). Sugary drinks and fried foods were not part of the meals provided in 96.7% (29 out of 30) senior high schools surveyed at follow-on (data not shown).

Table 4.3.1: Meals Provided in Senior High School (SHS)

| | Overall (Northern + Volta) | | | | |
| | Baseline | | Follow-on | | |
	N	Unweighted % (95% CI)	N	Unweighted % (95% CI)	[1]P-value
Senior High School (SHS)		**N=30**		**N=30**	
Meals provided to all students	6	20.0 (5.5,34.5)	7	23.3 (8.0, 38.7)	0.670
Meals provided to some students	16	53.3 (35.2,71.4)	18	60.0 (42.2,77.8)	0.670
Among those who provided meals, type of meal provided					
Breakfast	21	70.0 (53.4,86.6)	22	73.3 (57.3,89.4)	0.774
Lunch	22	73.3 (57.3,89.4)	25	83.3 (69.8,96.9)	0.35
Dinner	22	73.3 (57.3,89.4)	22	73.3 (57.3,89.4)	-
Snack	1	3.3 (0.0,9.8)	1	3.3 (0.0,9.8)	-
Among those who provided meals, foods provided in meals on previous school day					
Meats such as beef, pork, lamb, goat	4	13.3 (1,25.7)	0	-	-
Poultry	2	6.7 (0.0,15.7)	4	13.3 (1,25.7)	0.39
Fish	18	60.0 (42.2,77.8)	14	46.7 (28.6,64.8)	0.30
Organ meats	1	3.3 (0.0,9.8)	0	-	-
Eggs	4	13.3 (1.0,25.7)	2	6.7 (0.0,15.7)	0.39
Dark green leafy vegetables	10	33.3 (16.2,50.4)	8	26.7 (10.6,42.7)	0.57
Citrus fruits	15	50.0 (31.8,68.2)	0	-	-
Legumes, nuts, or seeds	2	6.7 (0.0,15.7)	13	43.3 (25.3,61.3)	<0.01
Bread or flour products	12	40 (22.2,57.8)	14	46.7 (28.6,64.8)	0.60
Tea	4	13.3 (1.0,25.7)	3	10.0 (0.0,20.9)	0.69

[1]P-values tests for differences between baseline and follow-on proportions by chi-square test.

CHAPTER 5: KNOWLEDGE, ATTITUDES, AND PRACTICES ON ANEMIA AND MALARIA

In addition to the IFA tablet, the GIFTS Programme included a nutrition and health education component aimed at improving knowledge, attitudes, and practices (KAP) related to anemia prevention and treatment. The results presented below show differences in KAP baseline and follow-on for both girls and a school teacher-respondent.

5.1 Student Anemia Knowledge

Figure 5.1.1: Student Knowledge (%): Ever Heard of Anemia– Overall Population in the baseline and follow-on impact evaluation of a school-based integrated nutrition and health education Programme with Iron and Folic-acid supplementation intervention among adolescent girls in Volta and Northern Regions of Ghana, 2017-2018.For both JHS and SHS combined, 63.8% of girls had ever heard of anemia at baseline, and this proportion significantly higher during follow-on (each p<.0001) at 91% (Figure 5.1.1) in the overall sample. At baseline in Northern region, overall, 49% of the girls had ever heard of anemia but at follow-on it was 85%. See Annex 4 for additional detailed information for Figure 5.1.1.

Figure 5.1.1: Student Knowledge (%): Ever Heard of Anemia– Overall Population
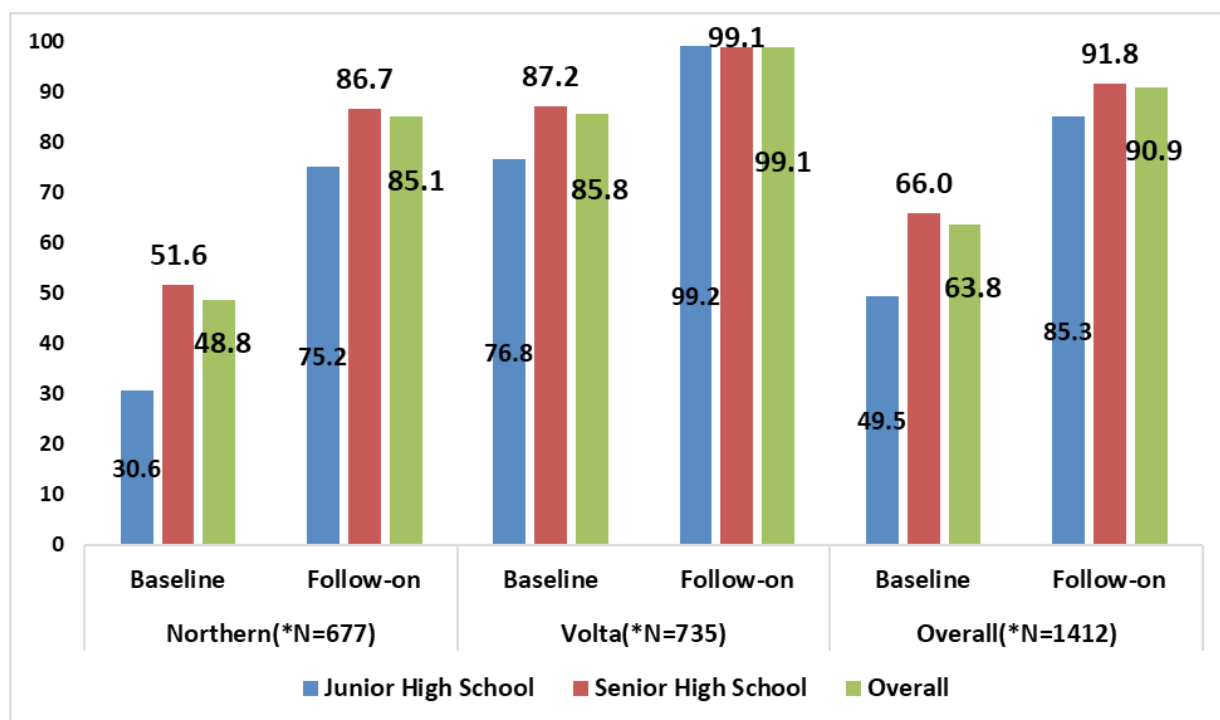
*Overall and region specific denominators denote follow-on survey numbers. Please refer to table 5.2.1 for the baseline, and junior and senior high school specific denominators.

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Figure 5.1.2: Student Knowledge: Signs of Anemia – Overall Population in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Adolescent girls were asked to describe the signs someone is suffering from anemia. In all schools overall, there was a significant difference in the percent of girls who reported "pale eyes, nails and tongue" 39.5 vs 51.8%; p<.0001 as displayed on figure 5.1.2. All other were not significantly different over the 2 periods. See Annex 4 for additional detailed information for Figure 5.1.2.

Figure 5.1.2: Student Knowledge(%): Signs of Anemia – Overall Population
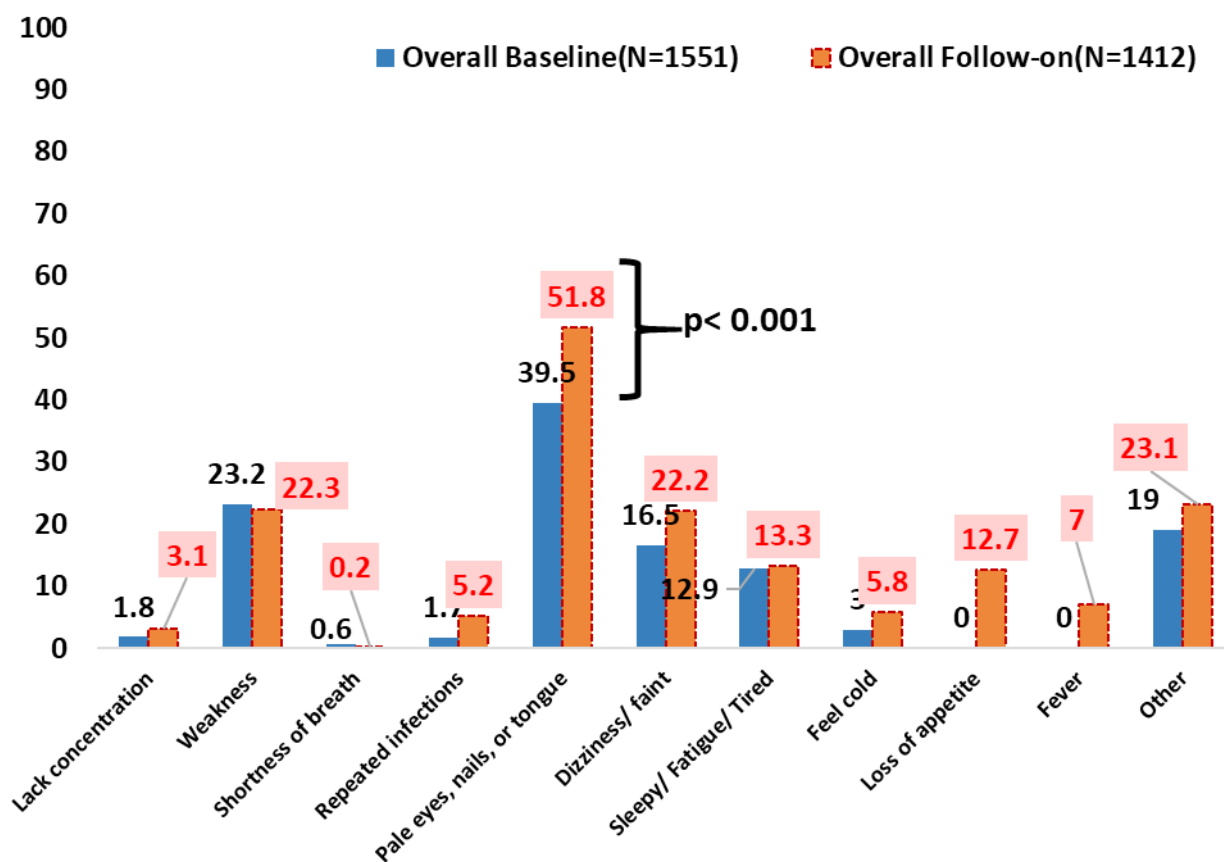
Note: Other includes monthly blood loss, anorexia, blood pressure, blood/lab tests, headache, cough, weight loss/gain, does not lose blood when he or she gets cuts, don't know, dry skin, vomiting, feels sick, feels sick of malaria, irregular menstruation, lack of blood, reddish hair, big belly, body pains, rashes, diarrhea, rapid heartbeat, the person will be dull, "you don't talk plenty when you anemia." P-values tests for differences between baseline and follow-on proportions by Rao-Scott chi-square test.

Figure 5.1.3: Student Knowledge: Causes of Anemia – Overall Population in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Poor diet was identified as a cause of anemia by 42.3% of the girls at baseline and 62.6% at follow-on, a +20.0% significant increase from baseline p<.0001(Figure 5.1.3 below, for overall sample). Less than 5% named specific elements of the diet or nutrients that contribute to anemia. The second most-common cause identified was heavy loss of blood (19.4% at baseline and 23.6% at follow-on), but the increase in prevalence was not statistically significant. See Annex 4 for additional detailed information for Figure 5.1.3.

Figure 5.1.3: Student Knowledge (%): Causes of Anemia – Overall Population
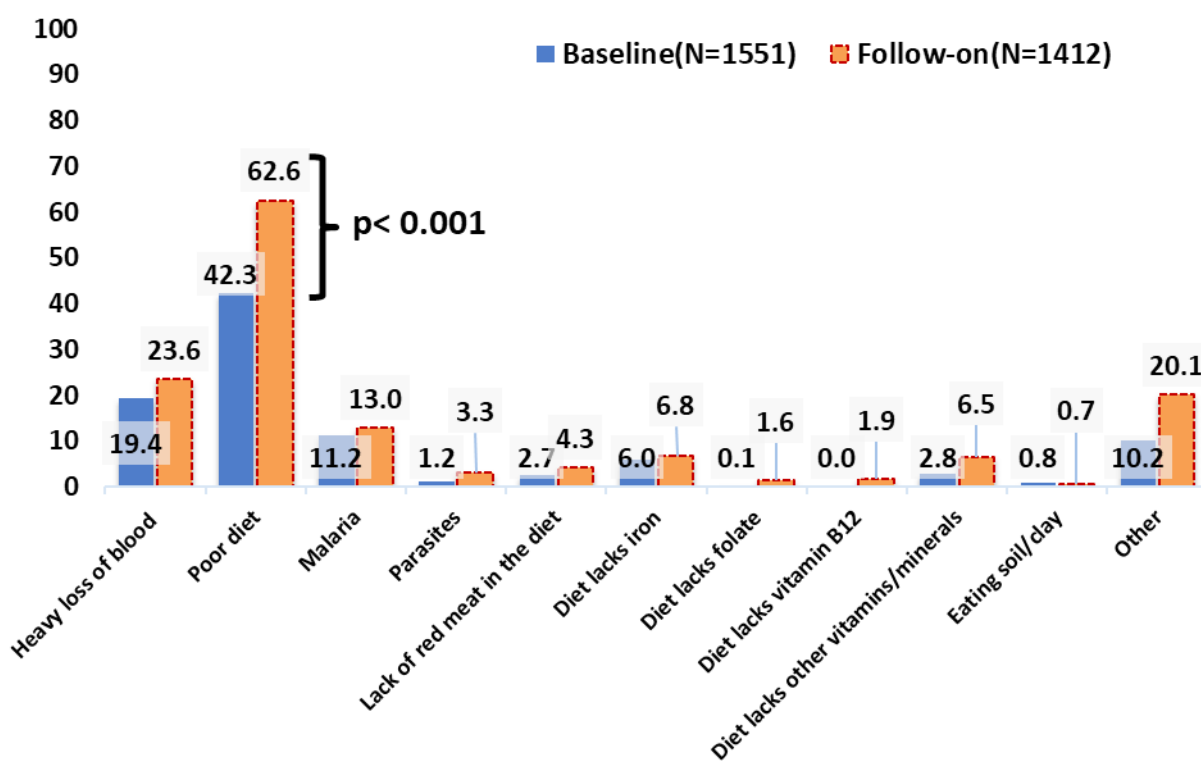
Note: Other includes alcohol, smoking, drugs, bed bugs, being under sun always, bushy/dirty environment. P-values tests for differences between baseline and follow-on proportions by Rao-Scott chi-square test.

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Figure 5.1.4: Student Knowledge: Ways to Prevent Anemia– Overall Population in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Figure 5.1.4 shows reported student knowledge on ways to prevent anemia in all students. The proportion that mentioned eating dark green leafy vegetables (DGLV) was 21 percentage points higher between baseline and follow-on surveys (34.2% vs. 55.5%, p<.0001). Data on consumption of red meats or organ meats; sleeping under a bed net and taking IFA or multi-vitamins are shown in Annex 4 with detailed information and p-values for Figure 5.1.4).

Figure 5.1.4: Student Knowledge (%): Ways to Prevent Anemia– Overall Population
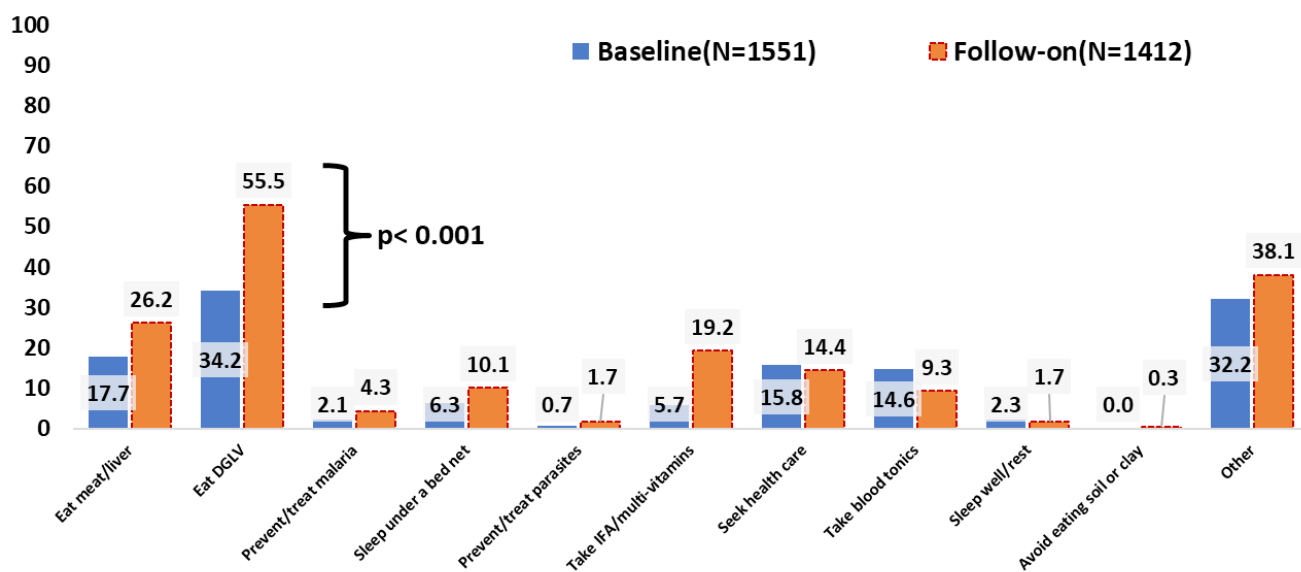
Note: Other includes adhere to medication, after menstruation you need to take malt or egg, always eat on time, stop swimming in rivers, not taking tramadol, educate the public on anemia, energy drinks, Coca-Cola with thin tomatoes, take paracetamol and penicillin, wash hands before eating, use of mosquito coil/insecticide, cook food well, and stop shouting. P-values tests for differences between baseline and follow-on proportions by Rao-Scott chi-square test.

Figure 5.1.5: Student Knowledge: Ways to Improve One's Blood– Overall Population in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Eating green leafy vegetables to improve one's blood was reported by 41.1% of the students at baseline but the proportion was higher (p<.0001) 62.1% at follow-on. There were significant differences in the proportion reporting that eating red meat (15.3% to 31.2%, p<.0001) and taking IFA supplements improve blood (10.4% to 42.4%, p<.0001, see Annex 4 for detailed information for figures 5.1.5).

Figure 5.1.5: Student Knowledge (%): Ways to Improve One's Blood– Overall Population
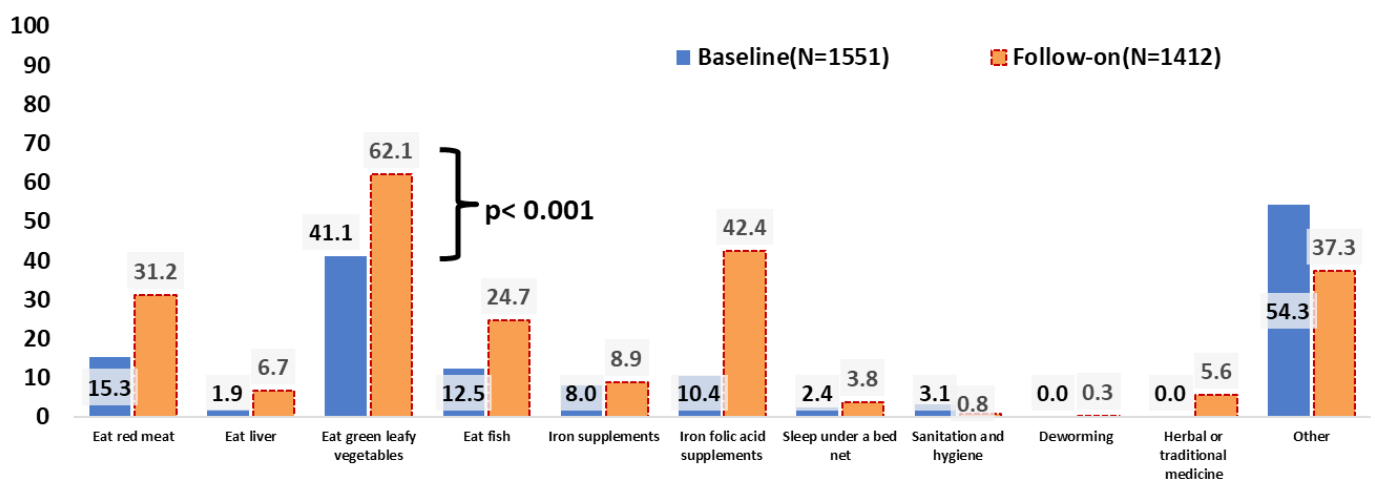
Other included eating foods that contain all the essential nutrients/balanced diet, avoid eating fatty foods, exercise, eating beans, eggs, palm oil,yam, tomatoes, milk, or other local food, blood infusion, medical check-up, and not menstruating. P-values tests for differences between baseline and follow-on proportions by Rao-Scott chi-square test.

5.2 Student Experiences with Anemia

Girls were asked if they had experienced anemia at any time before the baseline, and between baseline and follow-on survey. In the overall population at baseline, 10.7% of girls reported they had suffered anemia before. Only 3% (50 girls) reported they had anemia between baseline and follow-on timeframe. Thirty-seven (37, 50.1%) sought treatment which included iron/tablets or syrup, iron/folic acid supplement, micronutrient supplement, blood transfusion and herbal medicine (Table 5.2.1).

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Table 5.2.1: Student Experiences with Anemia in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Overall (JHS + SHS)	Northern Baseline n	% (95% CI)	Northern Follow-on n	% (95% CI)	Volta Baseline n	% (95% CI)	Volta Follow-on n	% (95% CI)	Overall (Northern + Volta) Baseline n	% (95% CI)	Overall (Northern + Volta) Follow-on n	% (95% CI)
Reported ever had anemia	16	4.3 (0.9, 7.8)			107	16.0 (11.5, 20.5)			123	10.7 (6.6, 14.8)	50	
Reported ever had anemia since baseline[1]	-	-	16	27 (1.3, 4.1)	-	-	34	3.4 (1.9, 4.9)	-	-	50	30 (2.0.0, 4.0)
Among those who had anemia[1]												
Reported anemia to school	-	-	3	17.2 (0.0, 44.3)	-	-	11	19.8 (0.7, 38.8)	-	-	14	18.6 (2.5, 34.8)
Sought treatment	12	85.9 (67.9, 100.0)	13	40.1 (5.7, 74.4)	94	79.1 (65, 93.3)	24	58.2 (36.9, 79.6)	106	80.4 (68.1, 92.7)	37	50.1 (29.2, 70.9)
Form of treatment, among those who sought treatment												
Iron tablets or syrup	-	xx	-	xx	41	51.1 (31.4, 70.7)	15	68.2 (42.6, 93.8)	43	45.0 (26.7, 63.2)	24	63.9 (37.9, 89.9)
Iron/folic acid supplement	-	xx	-	xx	12	12.6 (4.9, 20.2)	5	15.7 (0.0, 36.4)	14	15.3 (6.7, 23.9)	8	28.2 (6.4, 49.9)
Multiple micronutrient supplement	-	xx	-	xx	2	1.6 (0.0, 4.3)	4	13.1 (0.0, 33.3)	4	7.0 (0.0, 15.2)	6	19.5 (0.0, 42.2)
Blood transfusion	-	xx	0	-	9	10.3 (1.6, 19)	1	1.2 (0.0, 3.8)	11	10.0 (2.4, 17.5)	1	0.8 (0.0, 2.4)
Herbal or traditional medicine	-	xx	0	-	3	0.7 (0.0, 1.8)	2	1.5 (0.0, 3.9)	3	0.6 (0.0, 1.4)	2	1.0 (0.0, 2.4)
Other[2]	-	xx	3	xx	27	26.5 (9.4, 43.6)	5	6.8 (0.0, 15.4)	30	24.9 (10.4, 39.3)	8	11.0 (1.5, 20.5)

[1]Student reported having anemia since baseline. [2]Malt, milk, blood tonic, unnamed drug, cough syrup, counseled to take green leafy vegetables, turkey berry, anti-malarial drugs, paracetamol, and other drugs. xx Percentage estimates not shown due to low denominators n <25.

5.3 School Health Educator: Anemia Knowledge

School health educator reported knowledge on three anemia themes (signs, causes and ways to prevent) are shown in Tables 5.3.1 to 5.2.3. At baseline and follow-on, all school health educators (100.0%) had heard of anemia. At follow-on, reported signs of anemia in the overall population included "pale eyes/ nails or tongue"; "weakness/unable to work;" and "dizziness/easy to faint" by 93.3, 55.5% and 53.3%, respectively. This proportions did not change (p>0.05) from baseline. Poor diet was identified as a cause of anemia by 91.7% of teacher/respondents at follow-on, which is more than a 10.0% increase (p=0.04) from baseline (78.1%). At follow-on, heavy loss of blood was identified (56.7%) but this percent was not statistically different (p=0.27) from the baseline (46.7%). There were significant changes in the percent of school health educators identified "eating green leafy vegetables" (from 53.3 to 80.0% p<0.01) and "taking IFA tablets or multi-vitamin" (from 40.0% to 61.7%, p=0.02) on ways to prevent anemia.

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Table 5.3.1 School Health Educator's Reported Anemia Knowledge: Signs of Anemia in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Age group (years)	Northern				Volta				Overall (Northern + Volta)				P- value
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	
Overall (JHS + SHS)		N=30		N=30		N=30		N=30		N=60		N=60	
Heard of anemia	30	100.0	30	100.0	30	100.0	30	100.0	60	100.0	60	100.0	--
Signs of anemia													
Lack of concentration	8	26.7 (10.6, 42.7)	9	30.0 (13.4, 46.6)	1	3.3 (0.0, 9.8)	0	-	9	15.0 (5.8, 24.2)	9	15.0 (5.8, 24.2)	--
Weakness/ unable to work	17	56.7 (38.7, 74.7)	22	73.3 (57.3, 89.4)	15	50.0 (31.8, 68.2)	11	36.7 (19.2, 54.2)	32	53.3 (40.5, 66.1)	33	55.0 (42.2, 67.8)	0.86
Shortness of breath	3	10.0 (0.0, 20.9)	6	20.0 (5.5, 34.5)	2	6.7 (0.0, 15.7)	2	6.7 (0.0, 15.7)	5	8.3 (1.2, 15.4)	8	13.3 (4.6, 22.1)	0.39
Repeated infections	3	10.0 (0.0, 20.9)	5	16.7 (3.1, 30.2)	0	-	4	13.3 (1.0, 25.7)	3	5.0 (0.0, 10.6)	9	15.0 (5.8, 24.2)	0.07
Pale eyes, nails, or tongue	25	83.3 (69.8, 96.9)	27	90.0 (79.1, 100)	27	90.0 (79.1, 100.0)	29	96.7 (90.2, 100.0)	52	86.7 (77.9, 95.4)	56	93.3 (86.9, 99.7)	0.227
Dizziness/ Easy to faint	11	36.7 (19.2, 54.2)	14	46.7 (28.6, 64.8)	9	30.0 (13.4, 46.6)	18	60.0 (42.2, 77.8)	20	33.3 (21.2, 45.4)	32	53.3 (40.5, 66.1)	0.03

Age group (years)	Northern				Volta				Overall (Northern + Volta)				P- value
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	
Sleepy/Fatigue/Tired	11	36.7 (19.2, 54.2)	15	50.0 (31.8, 68.2)	7	23.3 (8, 38.7)	8	26.7 (10.6, 42.7)	18	30.0 (18.2, 41.8)	23	38.3 (25.9, 50.8)	0.34
Feel cold	1	3.3 (0.0, 9.8)	4	13.3 (1, 25.7)	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	2	3.3 (0.0, 7.9)	5	8.3 (1.2, 15.4)	0.24
Loss of ap-petite	-	-	7	23.3 (7.8, 38.9)	-	-	8	26.7 (10.4, 43.0)	-	-	15	25.0 (13.7, 36.3)	--
Fever	-	-	4	13.3 (0.8, 25.9)	-	-	2	6.7 (0.0, 15.9)	-	-	6	10.0 (2.2, 17.8)	--
Other	2	6.7 (0.0, 15.7)	4	13.3 (1.0, 25.7)	7	23.3 (8, 38.7)	1	3.3 (0.0, 9.8)	9	15.0 (5.8, 24.2)	5	8.3 (1.2, 15.4)	0.26

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population. Other includes abdominal pains, headache, dry skin, fast heartbeat, sleepless night, frequently falling sick, wasting, and yellowish eyes.

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Table 5.3.2 School Health Educator's Reported Anemia Knowledge: Causes of Anemia in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Age group (years)	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	P-value
Overall (JHS + SHS)		N=30		N=30		N=30		N=30		N=60		N=60	
Causes of anemia													
Heavy loss of blood	13	43.3 (25.3, 61.3)	16	53.3 (35.2, 71.4)	15	50.0 (31.8, 68.2)	18	60.0 (42.2, 77.8)	28	46.7 (33.9, 59.5)	34	56.7 (43.9, 69.4)	0.27
Poor diet	23	76.7 (61.3, 92)	29	96.7 (90.2, 100.0)	24	80.0 (65.5, 94.5)	26	86.7 (74.3, 99)	47	78.3 (67.8, 88.9)	55	91.7 (84.6, 98.8)	0.04
Diet lacks iron	13	43.3 (25.3, 61.3)	12	40.0 (22.2, 57.8)	7	23.3 (8.0, 38.7)	11	36.7 (19.2, 54.2)	20	33.3 (21.2, 45.4)	23	38.3 (25.9, 50.8)	0.56
Diet lacks vitamins	6	20.0 (5.5, 34.5)	8	26.7 (10.6, 42.7)	2	6.7 (0.0, 15.7)	4	13.3 (1.0, 25.7)	8	13.3 (4.6, 22.1)	12	20.0 (9.7, 30.3)	0.32
Malaria	15	50.0 (31.8, 68.2)	12	40.0 (22.2, 57.8)	12	40.0 (22.2, 57.8)	12	40.0 (22.2, 57.8)	27	45.0 (32.2, 57.8)	24	40.0 (27.4, 52.6)	0.56
Parasites	6	20 (5.5, 34.5)	5	16.7 (3.1, 30.2)	4	13.3 (1, 25.7)	5	16.7 (3.1, 30.2)	10	16.7 (7.1, 26.2)	10	16.7 (7.1, 26.2)	-
Lack of red meat in the diet	3	10.0 (0.0, 20.9)	10	33.3 (16.2, 50.4)	4	13.3 (1, 25.7)	1	3.3 (0.0, 9.8)	7	11.7 (3.4, 19.9)	11	18.3 (8.4, 28.3)	0.30
Eating soil/clay	0	-	3	10.0 (0.0, 20.9)	1	3.3 (0.0, 9.8)	2	6.7 (0.0, 15.7)	1	1.7 (0.0, 5.0)	5	8.3 (1.2, 15.4)	0.09
Other	6	20.0 (5.5, 34.5)	4	13.3 (1.0, 25.7)	5	16.7 (3.1, 30.2)	3	10.0 (0.0, 20.9)	11	18.3 (8.4, 28.3)	7	11.7 (3.4, 19.9)	0.30

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population. Other includes caffeine, diarrhea, eating sugary food, genetic disease like sickle cell, hard physical work, ignorance/lack of education, unsanitary conditions, and lack of appetite.

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Table 5.3.3 School Health Educator's Reported Anemia Knowledge: Ways to Prevent Anemia in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Age group (years)	Northern				Volta				Overall (Northern + Volta)					
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P- value
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	
Overall (JHS + SHS)		N=30		N=30		N=30		N=30		N=60		N=60	
Ways to prevent anemia													
Eating meat/liver	14	46.7 (28.6, 64.8)	18	60.0 (42.2, 77.8)	12	40.0 (22.2, 57.8)	17	56.7 (38.7, 74.7)	26	43.3 (30.6, 56.1)	35	58.3 (45.7, 71)	0.10
Eating green leafy vegetables	16	53.3 (35.2, 71.4)	22	73.3 (57.3, 89.4)	16	53.3 (35.2, 71.4)	26	86.7 (74.3, 99)	32	53.3 (40.5, 66.1)	48	80.0 (69.7, 90.3)	<0.01
Preventing and treating malaria	10	33.3 (16.2, 50.4)	14	46.7 (28.6, 64.8)	6	20.0 (5.5, 34.5)	6	20.0 (5.5, 34.5)	16	26.7 (15.3, 38)	20	33.3 (21.2, 45.4)	0.43
Sleeping under a bed net	10	33.3 (16.2, 50.4)	9	30.0 (13.4, 46.6)	6	20.0 (5.5, 34.5)	9	30.0 (13.4, 46.6)	16	26.7 (15.3, 38)	18	30.0 (18.2, 41.8)	0.69
Preventing and treating worms/parasites	5	16.7 (3.1, 30.2)	5	16.7 (3.1, 30.2)	3	10.0 (0.0, 20.9)	1	3.3 (0.0, 9.8)	8	13.3 (4.6, 22.1)	6	10.0 (2.3, 17.7)	0.57
Taking IFA tablets or multi-vitamins	12	40.0 (22.2, 57.8)	19	63.3 (45.8, 80.8)	12	40.0 (22.2, 57.8)	18	60.0 (42.2, 77.8)	24	40.0 (27.4, 52.6)	37	61.7 (49.2, 74.1)	0.02
Seeking health care	9	30.0 (13.4, 46.6)	9	30.0 (13.4, 46.6)	5	16.7 (3.1, 30.2)	14	46.7 (28.6, 64.8)	14	23.3 (12.5, 34.2)	23	38.3 (25.9, 50.8)	0.08

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Age group (years)	Northern				Volta				Overall (Northern + Volta)					
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P- value
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	
Taking blood tonics	7	23.3 (8, 38.7)	7	23.3 (8, 38.7)	6	20.0 (5.5, 34.5)	6	20.0 (5.5, 34.5)	13	21.7 (11.1, 32.2)	13	21.7 (11.1, 32.2)	-
Sleeping well/ resting	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	2	6.7 (0.0, 15.7)	2	3.3 (0.0, 7.9)	3	5.0 (0.0, 10.6)	0.65
Avoiding eating soil or clay	-	-	2	6.7 (0.0, 15.9)	-	-	2	6.7 (0.0, 15.9)	-	-	4	6.7 (0.2, 13.2)	-
Other	16	53.3 (35.2, 71.4)	11	36.7 (19.2, 54.2)	13	43.3 (25.3, 61.3)	2	6.7 (0.0, 15.7)	29	48.3 (35.5, 61.2)	13	21.7 (11.1, 32.2)	<0.01

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population. Other includes adequate/balanced diet, avoid food containing caffeine, eating beans soya, maize, eggs, melon seeds, dawadawa, tubers, fruits, soups, fish protein, carbohydrates, milk, or snails, blood transfusion, education, and good hygiene.

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5.4 Student Malaria Knowledge Attitudes and Practices

Table 5.4.1 Students Reported Malaria Knowledge on Treatment and Prevention in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Overall, most students, 97.3% at follow-on, reported they can get treatment for malaria when needed, and 21.8% said they had malaria since baseline survey. There were significant differences (p=0.01) in proportion that slept under a bed the previous night, at baseline 40.5% vs. 49.1% at follow-on. At follow-on overall among those who did not sleep under a net, the top 3 reasons for not sleeping under a bed were "I don't have one" (29.2%), "uncomfortable" (19.6%) and "Nowhere to tie/fix it" 22.6%. Results of stratified results by region and school level are shown in annex table 4.6.

Table 5.4.1 Students Reported Malaria Knowledge on Treatment and Prevention

Characteristic	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Overall (JHS + SHS)		N=764		N=677		N=787		N=735		N=1551		N=1412	
Think they could get malaria treatment	701	93.8 (90.4, 97.1)	647	96.7 (94.9, 98.6)	767	98.8 (97.9, 99.7)	717	98.1 (97, 99.3)	1468	95.8 (93.6, 98)	1364	97.3 (96.1, 98.6)	0.08
Reported they had malaria since baseline	-	-	121	20.6 (16.5, 24.7)	-	-	184	23.5 (18.3, 28.7)	-	-	305	21.8 (18.6, 24.9)	-
Slept under a bed net the previous night	302	37.9 (30.5, 45.3)	308	47.1 (34, 60.1)	411	44.4 (30.4, 58.3)	410	51.9 (39.3, 64.5)	713	40.5 (33.4, 47.7)	718	49.1 (39.9, 58.3)	0.01
[1]Reason for not sleeping under a bed net the previous night (among those who did not)													
		N=462		N=369		N=376		N=325		N=838		N=694	
I don't have one	187	42.1 (35.5, 48.6)	136	38.9 (28.1, 49.6)	68	22.1 (17.3, 26.9)	32	13.7 (8.6, 18.9)	255	34.4 (28.3, 40.4)	168	29.2 (20.6, 37.7)	
Uncomfortable	69	11.1 (5.4, 16.8)	65	13.1 (6.4, 19.8)	98	30.6 (25.6, 35.5)	96	29.8 (19.3, 40.3)	167	18.6 (11.8, 25.3)	161	19.6 (12.8, 26.3)	
It's damaged	8	0.7 (0.0, 1.3)	6	1.0 (0.0, 2.5)	11	1.8 (0.0, 4.2)	4	0.7 (0.0, 1.7)	19	1.1 (0.1, 2.1)	10	0.9 (0.0, 1.9)	
Someone else uses it	16	3.4 (1.0, 5.8)	5	0.4 (0.0, 0.9)	9	0.6 (0.0, 1.2)	1	0.1 (0.0, 0.2)	25	2.3 (0.6, 4.0)	6	0.3 (0.0, 0.6)	
I use a fan	2	0.2 (0.0, 0.6)	4	1.8 (0.0, 4.0)	4	0.6 (0.0, 1.5)	4	0.8 (0.0, 1.8)	6	0.4 (0.0, 0.8)	8	1.4 (0.0, 2.9)	
Nowhere to tie/fix it	51	23.5 (11.4, 35.7)	48	25.5 (9.3, 41.8)	31	16.9 (6.1, 27.6)	46	18.0 (11.8, 24.1)	82	21.0 (12.4, 29.5)	94	22.6 (11.9, 33.3)	
The weather is too hot	4	0.5 (0.0, 1.3)	3	0.2 (0.0, 0.6)	16	3.0 (0.7, 5.3)	22	6.5 (2.7, 10.4)	20	1.5 (0.3, 2.6)	25	2.7 (0.8, 4.5)	

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Characteristic	Northern				Volta				Overall (Northern + Volta)					
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
I use another method (coils, spray, repellant)	13	2.2 (0.4, 3.9)	34	6.8 (3.3, 10.3)	16	3.5 (0.0, 7.3)	36	8.1 (5.3, 10.9)	29	2.7 (0.9, 4.5)	70	7.3 (4.9, 9.8)	
Other	77	16.4 (9.5, 23.3)	65	12.3 (7.5, 17.1)	110	20.9 (11.4, 30.5)	72	22.2 (10.7, 33.7)	187	18.1 (12.7, 23.6)	137	16.1 (9.7, 22.6)	

[1] Denominator refers to students who *did not* sleep under mosquito net the previous night. P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population. Other includes "I don't like it", laziness, no mosquitoes, someone told me I could not, bed bugs, it is dirty/being washed, allergic reaction, did not sleep at home/in own room, "It looks local to sleep in it", "Mosquitoes don't bite me", and bed net is hanged at the entrance of the room.

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CHAPTER 6: SCHOOL HEALTH AND NUTRITION EDUCATION

In all students, 45.9% of the students reported having health and nutrition talks in the current academic year but only 17% could name the 'GIFTS' Programme. For JHS students 57% reported having health talks but only 6.5% could name the GIFTS Programme while 44.1% of SHS reported having health talks and 18.5% could name GIFTs (Table 6.1.1).

Table 6.1.1: Current Year Nutrition and Health Education in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Characteristic	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Junior High School (JHS)	**N=351**		**N=358**		**N=709**	
Had Health Talks	156	47.3 (35.3,59.3)	247	70.7 (65.0,76.4)	403	57.1 (48.0,66.2)
Know 'GIFTS Programme'	13	3.4 (0.0,8.2)	39	10.7 (3.7,17.6)	52	6.5 (2.1,10.8)
Senior High School (SHS)	**N=326**		**N=377**		**N=703**	
Had Health Talks	121	36.2 (29.3,43.0)	221	55.4 (52.3,58.6)	342	44.1 (38.1,50.2)
Know 'GIFTS Programme'	52	19.5 (10.6,28.5)	56	17.0 (9.7,24.3)	108	18.5 (12.4,24.6)
Overall (JHS + SHS)	**N=677**		**N=735**		**N=1412**	
Had Health Talks	277	37.6 (31.3,43.9)	468	57.5 (54.1,60.9)	745	45.9 (40.3,51.4)
Know 'GIFTS' Programme'	65	17.4 (9.2,25.6)	95	16.2 (9.6,22.7)	160	16.9 (11.3,22.4)

Table 6.1.2: School Health and Nutrition Promotion Talks in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

As per the GIFTS Programme protocol, and the national school health education Programme (SHEP), students were supposed to receive a health talk per week over the academic year. Results of nutrition and health promotion talks received by the students in this evaluation work are shown in Table 6.1.2.

At the follow-on, 82.6% of students reported they received at least 1 health talk in the overall population. In terms for frequency of talks received by students, 53.5% reported receiving at least 3 talks during the current academic year. The reported percent of regular health talks however, significantly decreased from baseline to follow-on. In the overall population, percent of girls who received a health talk on 'Eat iron rich foods' changed from 33.5 to 48.1% (p<0.001) over the period.

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Table 6.1.2: Health and Nutrition Promotion Talks in During Academic Year

	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Overall (JHS + SHS)		N=764		N=677		N=787		N=735		N=1551		N=1412	
At least 1 talk	719	91.9 (87.9, 95.8)	605	81.9 (78, 85.8)	740	89.8 (84, 95.6)	693	83.6 (80.3, 86.8)	1459	91.0 (87.7, 94.4)	1298	82.6 (80, 85.2)	<0.01
At least 3 talks	464	60.0 (54.1, 65.9)	380	50.1 (43.0, 57.3)	548	58.2 (47.5, 68.9)	540	58 (53.3, 62.7)	1012	59.3 (53.7, 64.8)	920	53.4 (48.6, 58.1)	0.17
Health Topics													
Anemia	197	26.4 (16, 36.8)	235	33.8 (27.5, 40)	307	29 (21.9, 36.1)	482	53.3 (47.8, 58.7)	504	27.5 (20.7, 34.3)	717	41.8 (36.8, 46.9)	<0.01
Malaria	499	63.3 (55.1, 71.6)	361	51.3 (44, 58.6)	557	60 (51.7, 68.4)	475	53 (45.2, 60.8)	1056	62.0 (56, 68)	836	52.0 (46.7, 57.3)	0.02
Deworming	228	30.0 (22.9, 37.2)	173	21.8 (15, 28.6)	364	39.9 (32.7, 47)	244	26.2 (21.2, 31.1)	592	34 (28.4, 39.6)	417	23.6 (19.1, 28.1)	<0.01
Clean Water	559	70.2 (64.6, 75.8)	446	64.5 (55.4, 73.5)	586	62.8 (51, 74.6)	535	62.0 (56.5, 67.5)	1145	67.2 (61.2, 73.2)	981	63.4 (57.6, 69.3)	<0.31
Menstruation	567	78.5 (74.4, 82.5)	495	72.2 (67.1, 77.3)	640	77.6 (69.1, 86.1)	631	76.8 (71.6, 82.0)	1207	78.1 (73.9, 82.3)	1126	74.1 (70.5, 77.7)	<0.19
Eat iron rich foods	268	32.7 (25.2, 40.2)	330	42.3 (35.9, 48.7)	327	34.7 (27, 42.4)	446	56.3 (51.0, 61.6)	595	33.5 (28.0, 39.0)	776	48.1 (42.7, 53.5)	<.01
Hand washing	605	75.5 (69.5, 81.5)	526	73.9 (66.7, 81.2)	671	77.3 (67.4, 87.2)	588	69.9 (64.9, 74.9)	1276	76.2 (70.8, 81.6)	1114	72.3 (67.4, 77.2)	0.20
Avoid eating clay or soil	0	--	257	30.8 (23.6, 38)	-	--	301	30.7 (20.9, 40.6)	0	--	558	30.8 (24.9, 36.7)	--

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population. 1-- denotes that no student mentioned or recalled eating clay or soil in the health promotion talks at baseline.

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6.2. Content of School Health Talks on Anemia and Malaria

Table 6.2.1: Content of Specific Anemia Talks in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Among the girls who had received an anemia specific talk, the common themes among the group overall were: "eating local foods could prevent anemia" (19.4%), "menstruation can cause anemia" (22.9%), "anemia can make you tired/weak or sleepy".

Table 6.2.1: Topics of Anemia Talks at Follow-on

Overall (JHS + SHS)	Northern		Volta		Overall (Northern + Volta)	
Topics/Contents Covered[1] Among those who had received an anemia related health talk	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Eat local foods	53	28.6 (14.4,42.9)	57	11.1 (4.5,17.8)	110	19.4 (10.5,28.3)
Improve your diet	111	49.3 (37.7,60.9)	151	35.8 (27.0,44.6)	262	42.2 (34.5,49.9)
Menstruation can cause anemia	41	25.3 (14.5,36)	85	20.8 (12.9,28.8)	126	22.9 (16.2,29.6)
Anemia can make you tired, weak, and/ or sleepy	31	16.5 (6.6,26.4)	83	22.2 (12.2,32.2)	114	19.5 (12.4,26.7)
Anemia can make you do poorly in school	18	7.4 (0.0,14.9)	18	7.6 (2.5,12.6)	36	7.5 (3.0,11.9)
Anemia can make you have low blood during pregnancy	6	4.5 (0.0,9.2)	9	3.6 (0.1,7.1)	15	4.0 (1.1,6.9)
Anemia can make your menstruation irregular	17	10.7 (5.2,16.3)	16	6.5 (4.2,8.8)	33	8.5 (5.4,11.6)
Take deworming medication	9	5.5 (0.0,11.2)	1	0.6 (0.0,1.8)	10	2.9 (0.0,6.0)
[2]Other	60	21.8 (14.1,29.5)	156	28.6 (18.6,38.7)	216	25.4 (18.8,32)

[1]Respondents could report multiple responses. [2]Take IFA tablet, should bath with hot water when menstruating, disease caused by eating contaminated foods, anemia can't be treated, anemia causes dizziness, anemia is about shortage of blood, anemia is caused by drug abuse, anemia brings about sickness, anemia can be caused by lack of vitamins and nutrients in the body, anemia can make you slim, avoid eating clay/soil, can't remember, undefined consequences of anemia, eat more fruits, beans, eggs, berries, or other specific foods, girls are most-affected by anemia and that's why they are given IFA tablets, tablet helps blood flow during their menstrual period, "If we don't eat on time too we can get anemia", sanitation and hygiene can prevent anemia, mosquitoes cause anemia, sleep in a bed net, to not be over working.

Table 6.2.2: Content Malaria Specific Talks during the school year in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Mosquito bed net use was the most frequent malaria health topic recalled (88.8%) by students overall, followed by several environmental/sanitation topics concerning mosquito control, such as keeping areas tidy (49.6%) and eliminating standing water (32.0%), and other topics.

Overall (JHS + SHS)	Northern		Volta		Overall (Northern + Volta)	
Topic	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Topics/Contents Covered[1]		N=361		N=475		N=836
Use your bed net	302	90.3 (85.7, 94.9)	391	86.6 (80.7, 92.6)	693	88.8 (85.0, 92.6)
Keep areas around your quarters/compound tidy	170	57.2 (46.5, 67.8)	160	39.3 (30.9, 47.7)	330	49.6 (41.8, 57.5)
Eliminate standing water	116	38.9 (29.9, 47.8)	107	22.7 (17.7, 27.6)	223	32.0 (25.2, 38.9)
Use another method of mosquito control	79	23.5 (14.2, 32.8)	70	17.9 (12.1, 23.7)	149	21.2 (15.1, 27.2)
Do not sleep outside	74	18.4 (12.5, 24.4)	43	11.2 (0.0, 22.8)	117	15.4 (9.3, 21.5)
[2]Other	32	10.4 (5.7, 15.1)	59	11.9 (6.3, 17.6)	91	11.1 (7.4, 14.7)

[1]Among those who reported receiving malaria related health talk. [2]Symptoms of malaria, adhere to malaria treatment, avoid drinking dirty water, can't remember, causative organism is plasmodium, cover water pots/food, female anopheles mosquitoes cause malaria, go for check-up regularly, go to hospital when we are sick, how to shade dry our nets, if you eat unripe mangoes you can contract malaria, malaria can kill you, malaria can lead to anemia, do not walk in the sun, personal hygiene, proper disposal of tins, stop eating cold foods, and wear clothes that covers every part of our body during the night.

Table 6.3.1: Meals at School: Purchased or provided during the school year in Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

In all schools overall, 46.6% of the students were not provided meals by their school but >88% reported purchasing meal on the school compound most school days of the week. Results by region and the 2-school categories (JHS/SHS) stratified analyses are shown in annex 3.3.

Table 6.3.1: Frequency Meals are Purchased or Provided on School Compound

	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Overall (JHS + SHS)		N=677		N=735		N=1412
Meals provided by the school						
0 days/week	482	42.6 (26.6,58.6)	538	52.1 (42.2,62.0)	1020	46.6 (35.9,57.2)
1-3 days/week	31	9.4 (5.3,13.5)	24	7.6 (3.3,12.0)	55	8.7 (5.6,11.7)
4-6 days/week	50	16.2 (8.9,23.6)	31	7.6 (4.2,10.9)	81	12.6 (7.6,17.7)

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	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
7 days/week	114	31.8 (20.8,42.7)	142	32.7 (23.7,41.7)	256	32.1 (24.7,39.6)
Meals purchased[1] on the school compound						
0 days/week	141	12.5 (7.0,17.9.0)	85	10.6 (6.4,14.8)	226	11.7 (8.1,15.3)
1-3 days/week	223	34.6 (30.3,39)	227	35.8 (30.4,41.2)	450	35.1 (31.7,38.5)
4-6 days/week	253	36.5 (27,46.1)	381	40.3 (28.7,51.8)	634	38.1 (30.8,45.4)
7 days/week	60	16.4 (10.8,22.0)	42	13.3 (0.5,26.0)	102	15.1 (8.9,21.3)

6.4 Health Education Sessions Given to Students: Frequency, Content and Mode of delivery

Table 6.4.1: Frequency of Health Talks during the school year in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

As per national school health education Programme (SHEP) guidelines, school educators are required to give regular health talks to students on a variety of health topics over the school year. The GIFT Programme developed structured behavior change communication (BCC) materials in collaboration with the MOE that was incorporated into the SHEP curriculum for the 4-phase I regions. School health educators were trained on these GIFTS materials in August 2017, prior to roll-on out in October 2017.

The frequency, content, and mode of delivery of these SHEP health talks given to students by teachers in each of the selected schools are shown in (Tables 6.4.1 to 3). Baseline and follow-on results in these tables pertained to the previous and current academic year respectively. At the follow-on survey, enumerators were specifically trained to make a reference to the baseline survey. By prefacing questions with "since a member of our team last interviewed you" in both school teacher and student questions.

At follow-on, only 8.3% reported having weekly health education talks. Once a month and once a term were reported by 31.7% and 20.0% respectively.

Table 6.4.1 Frequency of Health Talks during Previous and Current Academic Year

Overall (JHS + SHS)	Northern				Volta				Overall (Northern + Volta)			
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
	N=30		N=30		N=30		N=30		N=60		N=60	
Every week	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	4	13.3 (1.0, 25.7)	2	3.3 (0.0, 7.9)	5	8.3 (1.2, 15.4)
Every two weeks	2	6.7 (0.0, 15.7)	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	1	3.3 (0.0, 9.8)	3	5.0 (0.0, 10.6)	2	3.3 (0.0, 7.9)
Once per month	1	3.3 (0.0, 9.8)	10	33.3 (16.2, 50.4)	9	30.0 (13.4, 46.6)	9	30.0	504	27.5 (20.7, 34.3)	717	41.8 (36.8, 46.9)
(13.4, 46.6)	10	16.7 (7.1, 26.2)	19	31.7 (19.7, 43.6)	557	60 (51.7, 68.4)	475	53 (45.2, 60.8)	1056	62.0 (56, 68)	836	52.0 (46.7, 57.3)
Once a term	13	43.3 (25.3, 61.3)	6	20.0 (5.5, 34.5)	6	20.0 (5.5, 34.5)	6	20.0 (5.5, 34.5)	19	31.7 (19.7, 43.6)	12	20.0 (9.7, 30.3)
Once or twice a term	3	10.0 (0.0, 20.9)	10	33.3 (16.2, 50.4)	3	10.0 (0.0, 20.9)	8	26.7 (10.6, 42.7)	6	10.0 (2.3, 17.7)	18	30.0 (18.2, 41.8)
Never	10	33.3 (16.2, 50.4)	2	6.7 (0.0, 15.7)	10	33.3 (16.2, 50.4)	2	6.7 (0.0, 15.7)	20	33.3 (21.2, 45.4)	4	6.7 (0.3, 13.1)

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Table 6.4.2: Content of Health Talks Given to Students in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Results of the main topics covered in the school health talks were under four key domains: anemia, malaria, reproductive health and water sanitation and hygiene. Talks on anemia screening were reported by 1.9% of the health teacher-respondents at baseline but at follow-on it was significantly higher at 43.3% (p<0.001). No teacher mentioned micronutrient supplementation and IFA counseling at baseline, but at follow-on 95.0% and 65.0% respectively of the teachers reported these two topics in the was in their anemia talks.

Table 6.4.2 Content of Health Talks Given to Students during the previous and current Academic Year

Overall (JHS + SHS)	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	N=30		N=30		N=30		N=30		N=60		N=60		
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Activities related to anemia													
Deworming	8	29.6 (12.1, 47.1)	11	36.7 (19.2, 54.2)	8	30.8 (12.8, 48.8)	6	20.0 (5.5, 34.5)	16	30.2 (17.6, 42.7)	17	28.3 (16.8, 39.9)	0.83
Nutritional counselling	10	37.0 (18.5, 55.5)	11	36.7 (19.2, 54.2)	12	44.4 (25.4, 63.5)	17	56.7 (38.7, 74.7)	22	40.7 (27.4, 54)	28	46.7 (33.9, 59.5)	0.52
Anemia screening	1	3.7 (0.0, 10.9)	4	13.3 (1.0, 25.7)	0	-	22	73.3 (57.3, 89.4)	1	1.9 (0.0, 5.6)	26	43.3 (30.6, 56.1)	<.031
Iron supplementation	0	-	2	6.7 (0.0.0, 15.7)	0	-	7	23.3 (8.0, 38.7)	0	-	9	15.0 (5.8, 24.2)	
Malaria control counselling	14	51.9 (32.7, 71)	16	53.3 (35.2, 71.5)	19	73.1 (55.8, 90.4)	17	56.7 (38.7, 74.7)	33	62.3 (49, 75.5)	33	55.0 (42.2, 67.8)	0.43
Supplementation with other micronutrients	-	-	27	90 (78.9,100.0)	-	-	30	100.0	0	-	57	95.0 (89.3,100.0)	-
Counselling on anemia	-	-	8	26.7 (10.4, 43.0)	-	-	23	76.7 (61.1, 92.2)	-	-	31	51.7 (38.6, 64.7)	-
Counselling on IFA	-	-	11	36.7 (18.9, 54.4)	-	-	28	93.3 (84.1,100.0)	-	-	39	65.0 (52.6, 77.4)	-
Other	0	-	1	3.6 (0.0,10.6)	2	7.4 (0.0, 17.4)	2	6.9 (0.0, 16.3)	2	3.7 (0.0, 8.8)	3	5.3 (0.0, 11.2)	0.69

| | Northern | | | | Volta | | | | Overall (Northern + Volta) | | | | |
| | Baseline | | Follow-on | | Baseline | | Follow-on | | Baseline | | Follow-on | | P-value |
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Activities related to malaria													
Bed net distribution	0	-	7	23.3 (7.8, 38.9)	0	-	12	40.0 (22.0, 58.0)	0	-	19	31.7 (19.6, 43.8)	
Counselling on use of bed nets	0	-	17	56.7 (38.5, 74.9)	1	33.3 (0.0, 88.1)	19	63.3 (45.6, 81)	1	16.7 (0.0, 47.3)	36	60.0 (47.3, 72.7)	0.04
Counselling on malaria prevention	0	-	16	53.3 (35, 71.7)	1	33.3 (0.0, 88.1)	23	76.7 (61.1, 92.2)	1	16.7 (0.0, 47.3)	39	65.0 (52.6, 77.4)	0.02
Identifying symptoms of malaria	0	-	9	30.0 (13.2, 46.8)	0	-	18	60.0 (42.0, 78.0)	0	-	27	45.0 (32.1, 57.9)	
Counselling on removal of stagnant water	0	-	11	36.7 (19, 54.4)	1	33.3 (0.0, 88.1)	22	73.3 (57.1, 89.6)	1	16.7 (0.0, 47.3)	33	55 (42.1, 67.9)	0.07
Other	0	-	0	-	0	-	1	3.3 (0.0, 9.9)	0	-	1	1.7 (0.0.0, 5.0)	
Activities related to reproductive health													
Group counselling	17	63.0 (44.5, 81.5)	18	60.0 (42.2, 77.8)	20	74.1 (57.3, 90.9)	18	60.0 (42.2, 77.8)	37	68.5 (55.9, 81.1)	36	60.0 (47.4, 72.6)	0.34
Peer to peer groups	4	14.8 (1.2, 28.4)	6	20.0 (5.5, 34.5)	4	15.4 (1.3, 29.5)	7	23.3 (8.0, 38.7)	8	15.1 (5.3, 24.9)	13	21.7 (11.1, 32.3)	0.37
One-on-one counselling	7	25.9 (9.1, 42.7)	3	10.0 (0.0, 20.9)	17	65.4 (46.8, 84)	19	63.3 (45.8, 80.8)	24	45.3 (31.7, 58.9)	22	36.7 (24.3, 49)	0.35
Provision of condoms	2	7.4 (0.0, 17.4)	2	6.7 (0.0, 15.7)	0	-	0	-	2	3.8 (0.0, 9.0)	2	3.3 (0.0, 7.9)	0.90
Other	0	-	0	-	1	3.8 (0.0, 11.4)	1	3.3 (0.0, 9.9)	1	1.9 (0.0, 5.6)	1	1.7 (0.0, 5.0)	0.93
Activities related to water, sanitation, and hygiene													

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| | Northern | | | | Volta | | | | Overall (Northern + Volta) | | | | |
| | Baseline | | Follow-on | | Baseline | | Follow-on | | Baseline | | Follow-on | | P-value |
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Counselling on clean and safe water	15	55.6 (36.5, 74.6)	13	43.3 (25.3, 61.3)	19	70.4 (52.9, 87.9)	22	73.3 (57.3, 89.4)	34	63.0 (49.9, 76)	35	58.3 (45.7, 71.0)	0.61
Handwashing with soap	15	55.6 (36.5, 74.6)	23	76.7 (61.3, 92)	19	70.4 (52.9, 87.9)	28	93.3 (84.3, 100)	34	63.0 (49.9, 76)	51	85.0 (75.8, 94.2)	0.01
Counselling on use of toilets/latrines	14	51.9 (32.7, 71)	11	36.7 (19.2, 54.2)	20	74.1 (57.3, 90.9)	27	90.0 (79.1,100.0)	34	63.0 (49.9, 76.0)	38	63.3 (51.0,75.7)	0.97
Other	0	-	0	-	8	30.8 (12.8, 48.8)	2	6.7 (0.0, 15.7)	8	15.1 (5.3, 24.9)	2	3.3 (0.0, 7.9)	0.03

Table 6.4.3. Health Talks Topics and Delivery Methods during the school year in the Impact Evaluation of a School-based Integrated

Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

At follow-on overall, 33.3% of the teacher-respondents said they chose what health topics to give to the students. Morning assembly was the most common time for the health talks. All (100%) of the teacher-responded utilized this time and other teachers, while 53.3% reported they gave the talks during an IFA distribution (Table 6.2.3).

Table 6.4.3. Health Talks Topics and Delivery Methods

Overall (JHS + SHS)	Northern		Volta		Overall (Northern + Volta)	
	Follow-on (N=30)		Follow-on (N=30)		Follow-on (N=60)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
How do you decide on health topics to teach?(Multiple options apply)						
I decide what is important to discuss and prepare talks	17	56.7 (38.4,74.9)	3	10.0 (0.0, 21.1)	20	33.3 (21.1,45.6)
The headmaster/mistress decides	7	23.3 (7.8,38.9)	2	6.7 (0.0, 15.9)	9	15.0 (5.7,24.3)
Other teachers at the school decide what should be discussed	1	3.3 (0.0, 9.9)	8	26.7 (10.4, 43)	9	15.0 (5.7,24.3)
Other	5	16.7 (2.9, 30.4)	17	56.7 (38.4, 74.9)	22	36.7 (24.1,49.2)
When health talks are given. (Multiple options apply)						
Morning assembly	30	100.0	30	100.0	60	100.0
Afternoon assembly	14	46.7 (28.3, 65)	21	70 (53.1, 86.9)	35	58.3 (45.5, 71.2)
During your classes	2	6.7 (0.0,15.9)	7	23.3 (7.8, 38.9)	9	15.0 (5.7, 24.3)
At special events or assemblies	11	36.7 (18.9, 54.4)	8	26.7 (10.4, 43)	19	31.7 (19.5, 43.8)
When IFA is distributed	18	60.0 (42, 78)	14	46.7 (28.3, 65)	32	53.3 (40.3, 66.3)
During worship	20	66.7 (49.3, 84)	14	46.7 28.3, 65)	34	56.7 (43.8, 69.6)

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CHAPTER 7: STUDENT DIETARY INTAKE AND PRACTICES

7.1 Dietary Diversity and Consumption of Iron-rich Foods

At baseline and follow-on, the modified food frequency questionnaire had a 24-hour recall period. At the follow-on survey a 7-day recall of the same food groups was also asked.

The foods groups were: a) Red meats such as beef, pork, lamb, goat, wild game, b) Poultry/white meat such as chicken, duck, turkey, Guinea fowl or other birds, or meat products like sausage or kebabs, c) Fish, d) Organ meats such as liver, kidney, or heart; e) Eggs; f) Dark green leafy vegetables such as nkontomire, cassava leaves, bean leaves, ademe, gboma, pumpkin leaves, or spinach; g) Fruits: Oranges, lemons, sour sap (Aluguntugui), African star fruit (Alasa), pineapple, sweet apple (sweet sup), pawpaw, mango, or baobab pulp, h) Cow pea, pigeon pea, soya beans, groundnuts, or melon seeds (agushie); i) Bread or flour products like brofrot, atsormor, polo, meat pie, cake, or tart; j)Tea; and k) Fortified drinks or cereals such as Milo, Ovaltine, Cerelac, Yumvita, or Nido.

Table 7.1.1: Dietary Intake over Previous 24-hours in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

There were marked changes in the percent reported intake of the various food groups over the 24h consumption period. In the overall population for example, the reported consumption of dark leafy vegetables increased by 12 percentage points (31.7 vs. 43.7; p <0.001), as did red meat (from 15.7 to 21.8%, p=0.0228) over the period. At follow-on, the predominant reported protein consumed was fish (58.0%) and 65.1% had a bread or flour product in the past 24hr. Results by region and the 2-school categories (JHS/SHS) stratified analyses are shown in annex table 7.2.

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Table 7.1.1: Dietary Intake over Previous 24-hours

	Northern				Volta				Overall (Northern + Volta)					
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Overall (JHS + SHS)	N=764		N=677		N=787		N=735		N=1551		N=1412		
[1]Red meats	156	19.3 (13.7, 24.9)	202	27.6 (19.3, 35.8)	95	10.5 (6.3, 14.6)	133	13.6 (8.3, 19)	251	15.7 (11.8, 19.6)	335	21.8 (15.9, 27.8)	0.02
[2]Poultry/white meat	95	13.5 (4.6, 22.3)	188	29.5 (19.4, 39.6)	238	32.8 (22.1, 43.5)	278	41.7 (33.9, 49.5)	333	21.3 (13.3, 29.4)	466	34.5 (27, 42)	<.01
Fish	299	34.5 (21.8, 47.1)	340	44.3 (35.5, 53)	649	78.1 (71.4, 84.8)	585	77.5 (69.3, 85.6)	948	52.2 (40.7, 63.7)	925	58.0 (49.3, 66.7)	0.19
[3]Organ meats	17	1.7 (0.4, 3.1)	51	6.1 (3.5, 8.6)	15	2.5 (0.6, 4.5)	32	2.8 (0.1, 5.5)	32	2.0 (0.9, 3.2)	83	4.7 (2.8, 6.6)	0.01
Eggs	135	22.6 (10.4, 34.7)	192	26.8 (18, 35.5)	153	21.3 (12.9, 29.6)	187	17.4 (11.7, 23.1)	288	22.0 (14.1, 30)	379	22.9 (16.8, 28.9)	0.88
[4]Dark green leafy vegetables	253	25.9 (21.1, 30.8)	425	41.5 (30.6, 52.4)	320	40.0 (32.3, 47.8)	396	46.7 (39.8, 53.6)	573	31.7 (26.4, 36.9)	821	43.7 (36.4, 50.9)	<0.01
[5]Fruits	197	19.1 (13.1, 25.1)	326	42.5 (35.2, 49.8)	292	29.7 (23.4, 36.1)	262	23.7 (14.9, 32.5)	489	23.4 (18.5, 28.4)	588	34.7 (27.7, 41.8)	0.02
[6]Pulses	390	54.3 (46.4, 62.2)	392	54.6 (47, 62.2)	426	55.4 (49.5, 61.3)	458	57.8 (44.3, 71.3)	816	54.8 (49.5, 60.0)	850	55.9 (48.8, 63.0)	0.79
[7]Bread or flour products	362	52.4 (43.3, 61.4)	398	62.4 (51.8, 72.9)	494	73.7 (64.8, 82.7)	482	68.9 (60.4, 77.4)	856	61.0 (53.1, 68.9)	880	65.1 (57.7, 72.4)	0.46
Tea	173	21.9 (13.1, 30.6)	277	36.6 (29.9, 43.2)	39	8.3 (0.2, 16.4)	47	3.5 (1.3, 5.7)	212	16.4 (10.4, 22.3)	324	22.9 (16, 29.8)	0.12
[8]Fortified drinks or cereals	214	35.7 (23.1, 48.4)	301	51.9 (40.8, 63.1)	240	49.1 (37.8, 60.5)	312	56.2 (45.2, 67.2)	454	41.2 (31.4, 50.9)	613	53.7 (45.5, 61.9)	<.01

[1]Red meats such as beef, pork, lamb, goat, wild game. [2]Poultry/white meat such as chicken, duck, turkey, guinea fowl or other birds, or meat products like sausage or kebabs.[3]Organ meats such as liver, kidney, or heart.[4]Dark green leafy vegetables such as nkontomire, cassava leaves, ademe, gboma, pumpkin leaves, or spinach.[5]Fruits: Oranges, lemons, sour sap (Alunguntugui), African star fruit (Alasa), pineapple, sweet apple (sweet sup), pawpaw, mango, or baobab pulp.[6]Cow pea, pigeon pea, soya beans, groundnuts, or melon seeds (agushie).[7]Bread or flour products like brofrot, atsormor, polo, meat pie, cake, or tart.[8]Fortified drinks or cereals such as Milo, Ovaltine, Cerelac, Yumvita, or Nido

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Table 7.1.2: Dietary Intake over Previous 7-days at follow-on survey in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

At the follow-on survey, students were asked an additional dietary intake question concerning their most commonly consumed foods over the week are shown in table 7.1.2. Fish was consumed by >79% of the girls 1-7days a week, as were pulses (79.8%), bread/flour products (84.7%), and fruits (55.0%). The uncommonly (zero days/week) consumed foods were: Tea (65.0%), red meat (50.7%), poultry (41.9%) and organ meats (91.1%).

Table 7.1.2: Dietary Intake over Previous 7-days

	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Overall (JHS+ SHS)	N=677		N=735		N=1412	
¹**Red meats**						
0 days/week	268	36.7 (26.7,46.7)	461	70.5 (61.4,79.6)	729	50.7 (40.2,61.2)
1-3 days/week	341	54.8 (45.9,63.7)	238	25.2 (17.9,32.6)	579	42.6 (33.2,51.9)
4-6 days/week	40	4.7 (2.1,7.3)	23	2.3 (0.4,4.2)	63	3.7 (2.0,5.5)
7 days/week	28	3.8 (1.8,5.8)	13	1.9 (0.2,3.7)	41	3.0 (1.6,4.4)
²**Poultry/white meat**						
0 days/week	360	50.2 (37.4,63.0)	259	30.1 (22.7,37.5)	619	41.9 (32.5,51.3)
1-3 days/week	279	42.7 (30.9,54.6)	396	54.1 (49.8,58.3)	675	47.4 (39.8,55)
4-6 days/week	25	4.9 (2.4,7.5)	55	9.6 (6.6,12.6)	80	6.9 (4.7,9.0)
7 days/week	13	2.2 (0.7,3.6)	25	6.3 (3.2,9.3)	38	3.9 (1.9,5.8)
Fish						
0 days/week	211	26.9 (19.9,33.9)	56	11.8 (4.0,19.7)	267	20.7 (15.4,26)
1-3 days/week	344	59.9 (52.5,67.4)	271	36.4 (30.5,42.4)	615	50.2 (43,57.4)
4-6 days/week	59	6.4 (4.3,8.6)	136	16.2 (10.5,21.9)	195	10.5 (7.4,13.5)
7 days/week	63	6.7 (4.3,9.2)	272	35.5 (26.9,44.2)	335	18.7 (12.1,25.3)
³**Organ meats**						
0 days/week	583	88.1 (84.9,91.3)	682	95.4 (92.2,98.5)	1265	91.1 (88.4,93.8)
1-3 days/week	84	11.1 (8.4,13.8)	52	4.6 (1.4,7.7)	136	8.4 (6.0,10.8)
4-6 days/week	6	0.5 (0.0,1.2)	1	0.1 (0.0,0.3)	7	0.3 (0.0,0.8)
7 days/week	4	0.3 (0.0,0.7)	0	-	4	0.2 (0.0,0.4)
Eggs						
0 days/week	312	35.1 (24.6,45.6)	300	41.2 (33.6,48.8)	612	37.6 (30.4,44.8)
1-3 days/week	331	60.1 (49.6,70.5)	404	55.3 (47.8,62.8)	735	58.1 (51.0,65.2)
4-6 days/week	25	3.2 (1.4,4.9)	25	2.7 (1.4,3.9)	50	3.0 (1.8,4.1)
7 days/week	9	1.7 (0.0,3.8)	6	0.8 (0.0,1.8)	15	1.3 (0.0,2.6)

	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
[4]Dark green leafy vegetables						
0 days/week	139	32.7 (23.8,41.6)	164	27.1 (20.4,33.8)	303	30.4 (24.2,36.5)
1-3 days/week	387	57.5 (51,64)	444	58.7 (52,65.3)	831	58 (53.3,62.7)
4-6 days/week	81	5.2 (2.2,8.2)	77	7.8 (5.9,9.7)	158	6.3 (4.2,8.4)
7 days/week	70	4.6 (2.1,7.2)	50	6.4 (4.4,8.3)	120	5.3 (3.5,7.1)
[5]Fruits						
0 days/week	233	41.0 (34.1,48)	297	52 (43.8,60.2)	530	45.6 (39.6,51.5)
1-3 days/week	346	48.3 (41,55.6)	376	42.4 (35.9,48.8)	722	45.8 (40.5,51.1)
4-6 days/week	68	7.4 (4.5,10.2)	39	3.5 (1.2,5.8)	107	5.8 (3.7,7.8)
7 days/week	30	3.3 (1.7,5)	23	2.1 (0.4,3.8)	53	2.8 (1.6,4)
[6]Pulses						
0 days/week	159	22.1 (16.8,27.4)	103	15.1 (8.8,21.4)	262	19.2 (15.1,23.3)
1-3 days/week	430	67.1 (64,70.2)	462	64.3 (61.9,66.7)	892	65.9 (63.7,68.1)
4-6 days/week	57	6.9 (4.6,9.1)	116	16.2 (11.6,20.7)	173	10.7 (7.9,13.6)
7 days/week	31	4 (2,5.9)	54	4.4 (1.6,7.2)	85	4.1 (2.5,5.8)
[7]Bread or flour products						
0 days/week	175	20.1 (10.7,29.5)	106	12.0 (7.6,16.4)	281	16.7 (10.7,22.7)
1-3 days/week	345	55 (48.2,61.8)	442	61.8 (54.1,69.5)	787	57.8 (52.5,63.2)
4-6 days/week	71	12.6 (5.8,19.4)	96	11.6 (9.2,14)	167	12.2 (8,16.3)
7 days/week	86	12.3 (6.3,18.4)	91	14.6 (8.4,20.8)	177	13.3 (8.9,17.7)
Tea						
0 days/week	305	46.2 (40.2,52.1)	631	91.6 (88,95.2)	936	65.0 (55.6,74.4)
1-3 days/week	227	36.6 (30.8,42.3)	77	6.6 (3.8,9.5)	304	24.2 (17.3,31.0)
4-6 days/week	56	5.9 (4,7.9)	14	0.8 (0.1,1.5)	70	3.8 (2.4,5.3)
7 days/week	89	11.3 (7.9,14.8)	13	1 (0.2,1.9)	102	7.1 (4.3,9.9)
[8]Fortified drinks or cereals						
0 days/week	312	37.2 (25.7,48.8)	272	26.2 (17.5,34.9)	584	32.7 (24.4,40.9)
1-3 days/week	244	42.9 (35.4,50.4)	337	48.8 (41,56.6)	581	45.3 (39.7,50.9)
4-6 days/week	45	7.5 (5.4,9.6)	52	9.4 (6.4,12.3)	97	8.3 (6.5,10.1)
7 days/week	76	12.3 (7.4,17.3)	74	15.6 (9.5,21.7)	150	13.7 (9.7,17.7)

[1]Red meats such as beef, pork, lamb, goat, wild game. [2]Poultry/white meat such as chicken, duck, turkey, Guinea fowl or other birds, or meat products like sausage or kebabs.[3]Organ meats such as liver, kidney, or heart.[4]Dark green leafy vegetables such as nkontomire, cassava leaves, bean leaves, ademe, gboma, pumpkin leaves, or spinach,[5]Fruits: Oranges, lemons, sour sap (Aluguntugui), African star fruit (Alasa), pineapple, sweet apple (sweet sup), pawpaw, mango, or baobab pulp.[6]Cow pea, pigeon pea, soya beans, groundnuts, or melon seeds (agushie).[7]Bread or flour products like brofrot, atsormor, polo, meat pie, cake, or tart.[8]Fortified drinks or cereals such as Milo, Ovaltine, Cerelac, Yumvita, or Nido

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7.2 Consumption of Sugary Beverages and Fried Foods at follow-on survey in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Table 7.2.1: Consumption of Sugary Beverages and Fried Foods

In the overall population (JHS+SHS), 36.0% of the girls reported consuming a local sugary drink within 24h preceding the follow-on survey, 45.4% had it 1-3days a week, and 4.0% consumed it daily. For fried foods, 33.5% of the girls overall reported consuming them within 24h preceding the follow-on survey, 45.1% had them 1-3 days/week, and 1.2 0% consumed fried foods every day of the week. Results of the region and the 2-school categories (JHS/SHS) stratified analyses are shown in annex table 7.3.

Table 7.2.1: Consumption of Sugary Beverages and Fried Foods

	Northern		Volta		Overall (Northern + Volta)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Overall (JHS+ SHS)	N=677		N=735		N=1412	
[1]Local sugary drinks						
24-hours	307	40.1 (32.6,47.7)	250	30.2 (17.5,42.8)	557	36.0 (28.8,43.3)
0 days/week	281	44.4 (38.0,50.8)	305	44.8 (35.9,53.7)	586	44.6 (39.3,49.8)
1-3 days/week	324	45.9 (39.1,52.6)	352	44.7 (38.6,50.7)	676	45.4 (40.7,50.0)
4-6 days/week	47	5.6 (4.0,7.2)	52	6.7 (3.5,9.9)	99	6.1 (4.4,7.7)
7 days/week	25	4.2 (2.4,6)	26	3.8 (1.7,6.0)	51	4.0 (2.6,5.4)
Fried Foods[2]						
24-hours	253	35.4 (24.6,46.2)	258	30.8 (20.2,41.4)	511	33.5 (25.8,41.2)
0 days/week	339	52.1 (42.1,62.2)	312	44.0 (35.5,52.5)	651	48.8 (41.6,55.9)
1-3 days/week	288	42.8 (33.9,51.8)	356	48.4 (40.1,56.6)	644	45.1 (38.7,51.6)
4-6 days/week	36	4.5 (0.8,8.1)	48	5.5 (3.8,7.2)	84	4.9 (2.6,7.2)
7 days/week	14	0.6 (0.1,1.1)	19	2.1 (0.7,3.6)	33	1.2 (0.5,2)

[1]Hausa beer, Sobolo, Tamarind juice, Asaana or other sugary drinks. 2 Fried plantain chips, yam chips, Flour products (atsormor, polo, brofrot), Kose(fried blackeyed peas pastry), or meat pies

7.3 Geophagy

Table 7.3.1 Practice of Geophagy in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Geophagy, a subset of pica, is the practice of consuming soil or clay and practiced widely in Ghana. In the overall population 23-29% of the girls reported practicing or consuming clay during the school year. Prevalence of geophagy overall was not different between baseline and follow-on surveys (26.6% vs 23.1% p=0.33). At follow-on, among girls overall who engaged in geophagy 20.8% said they practiced it weekly and the common reason (39.6%) was that it smelt good. Results of region and the 2-school categories (JHS/SHS) stratified analyses are shown in annex table 7.4.

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Table 7.3.1 Practice of Geophagy, Frequency and Reasons

Overall (JHS + SHS)	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
	N=764		N=677		N=787		N=735		N=1551		N=1412		
Practice Geophagy	187	24.7 (17.9, 31.5)	125	22.1 (15.6, 28.7)	268	29.3 (22.4, 36.2)	179	24.4 (20.7, 28.1)	455	26.6 (21.6, 31.5)	304	23.1 (19, 27.2)	0.33
Frequency, among those who engage in geophagy													
Every day	-	-	7	5.3 (0.7, 9.8)	-	-	19	4.3 (0.5, 8.1)	-	-	26	4.8 (1.7, 8.0)	-
Every week	-	-	27	16.5 (10.9, 22.1)	-	-	52	26.3 (17.4, 35.1)	-	-	79	20.8 (15.8, 25.8)	-
Once or twice a month	-	-	32	27.6 (18.1, 37)	-	-	47	28.6 (20.6, 36.7)	-	-	79	28.0 (21.6, 34.4)	-
A few times per year	-	-	52	45.9 (31.0, 60.7)	-	-	40	29.7 (16.5, 42.9)	-	-	92	38.8 (28.9, 48.7)	-
Other	-	-	7	4.8 (0.3, 9.2)	-	-	21	11.1 (3.2, 19.1)	-	-	28	7.6 (3.2, 12.0)	-
Reasons, among those who engage in geophagy													
Hungry	-	-	2	0.3 (0.0, 0.8)	-	-	3	1.5 (0.0, 3.5)	-	-	5	0.8 (0.0, 1.7)	-
Nauseated	-	-	7	8.4 (4.1, 12.7)	-	-	17	9.9 (1.8, 18.1)	-	-	24	9.1 (4.9, 13.3)	-
It tastes good, sweet, or appetizing, I crave it.	-	-	90	7.7 (5.6, 9.8)	-	-	86	5.5 (4.2, 6.8)	-	-	176	6.8 (5.4, 8.3)	-
It smells good	-	-	42	36.2 (25.5, 47)	-	-	63	43.9 (29.6, 58.3)	-	-	105	39.6 (30.7, 48.6)	-
Other	-	-	16	1.7 (1.0, 2.4)	-	-	31	1.9 (1.1, 2.6)	-	-	47	1.7 (1.2, 2.2)	-

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population.. [1]Two years ago, anytime it is available, anytime a friend is eating it, occasionally, and when the ground is wet. [2]Aids in digestion, any time I have a cough, to reduce blood flow in menstruation, dizziness, diarrhea, vomiting, to clean teeth, thicken blood, to be healthy/strong, friends also consume it, "I just feel like it", prevent indigestion, and no cos

CHAPTER 8: Programme IMPLEMENTATION

8.1 Student and Teacher Programme Experiences and Intake of IFA Consumption

Weekly IFA tablets was given to adolescent school girl's 10-19y by DOT in the presence of a teacher to confirm that it has been swallowed by the student. Overall the Programme achieved high IFA intake such that 1329 students (94.8%) had ever consumed IFA tablet given by a teacher at school. Among them, 74.6% consumed at least 10 IFA tablets over the school year (Figure 8.1.1). Overall, 91.4% reported that they usually eat before taking IFA (Annex 5.1). The reasons for missing doses were no distribution that week, girl was absent, or girl chose not to take IFA tablet for various reasons (e.g., side effects and ideas about IFA), the teacher was unwilling to distribute IFA tablets, and there were insufficient IFA tablets.

Figure 8.1.1: IFA Tablets Consumption among Students in Schools-During School Year in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

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Figure 8.1.2: Student IFA Experiences: Regularity of distribution and Student Non-compliance those who had consumed at Least 1 IFA tablet – During School Year in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Figure 8.1.2 displays Programme intensity and regularity of dosing, among girls who had ever consumed an IFA tablet during the school year. In the pooled sample, 68.6% of girls surveyed had an IFA dose in the previous 2 weeks preceeding the follow-on survey date. This proportion was 90.6% among the JHS level girls. The proportion of girls that ever refused an IFA dose was 20.8% and 13.0% ever refused to swallow an IFA tablet at a single distribution.

Figure 8.1.2: Regularity of distribution and student Non-compliance among those who had ever consumed IFA during School Year (Among ever consumed IFA n=1329)
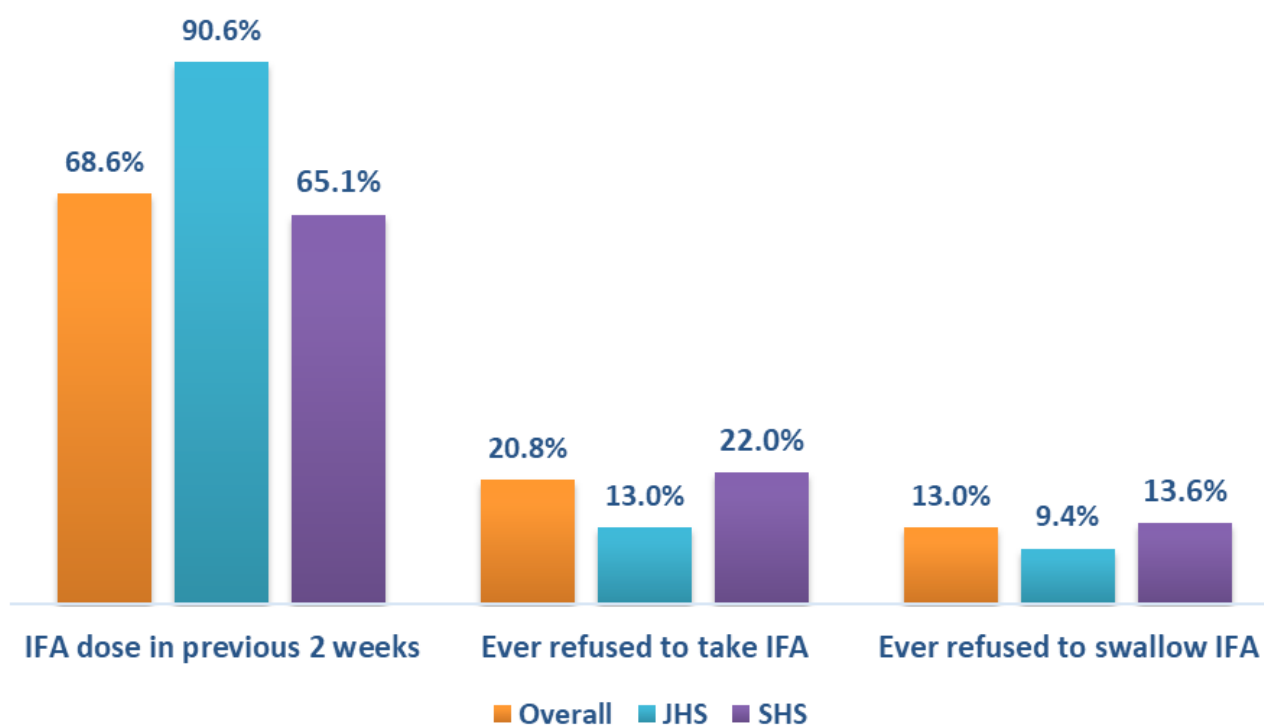
Figure 8.1.3: Distribution of Students who consumed at least 1(Panel A), and at least 6 IFA (Panel B) Tablet During School Year in the impact evaluation of a school-based integrated nutrition and health education Programme with Iron and Folic-acid supplementation intervention among adolescent girls in Volta and Northern Regions of Ghana, 2017-2018.

In the Northern region schools, the proportion of girls that consumed at least 1 IFA tablet were: 94.5% for 1st the term, 93.1% for the 2nd term, and 66.6% for between the 6-8th week of 3rd term (data collection started before the end of term 3). In the Volta region, the proportions were respectively 79.9%, 59.6% and 55.8%. Figure 8.1.3 panel B shows the proportion of girls who had consumed at least 6 IFA tablets. For the Northern region, it was 80.4% for the 1st term, 55.1% for the 2nd term, and 27.7% for up to the 6-8th week of 3rd term (data collection started before the end of term 3). In the Volta region, the proportions were respectively 45.3%, 33.9% and 19.1%.

Figure 8.1.3 Distribution of Students who had consume one (A) or at least 6 IFA (B) tablets by School Terms Overall population (among ever consumed IFA n=1329)

Panel A: At least 1 IFA tablet per school

Panel B: At least 6 IFA tablets per school term

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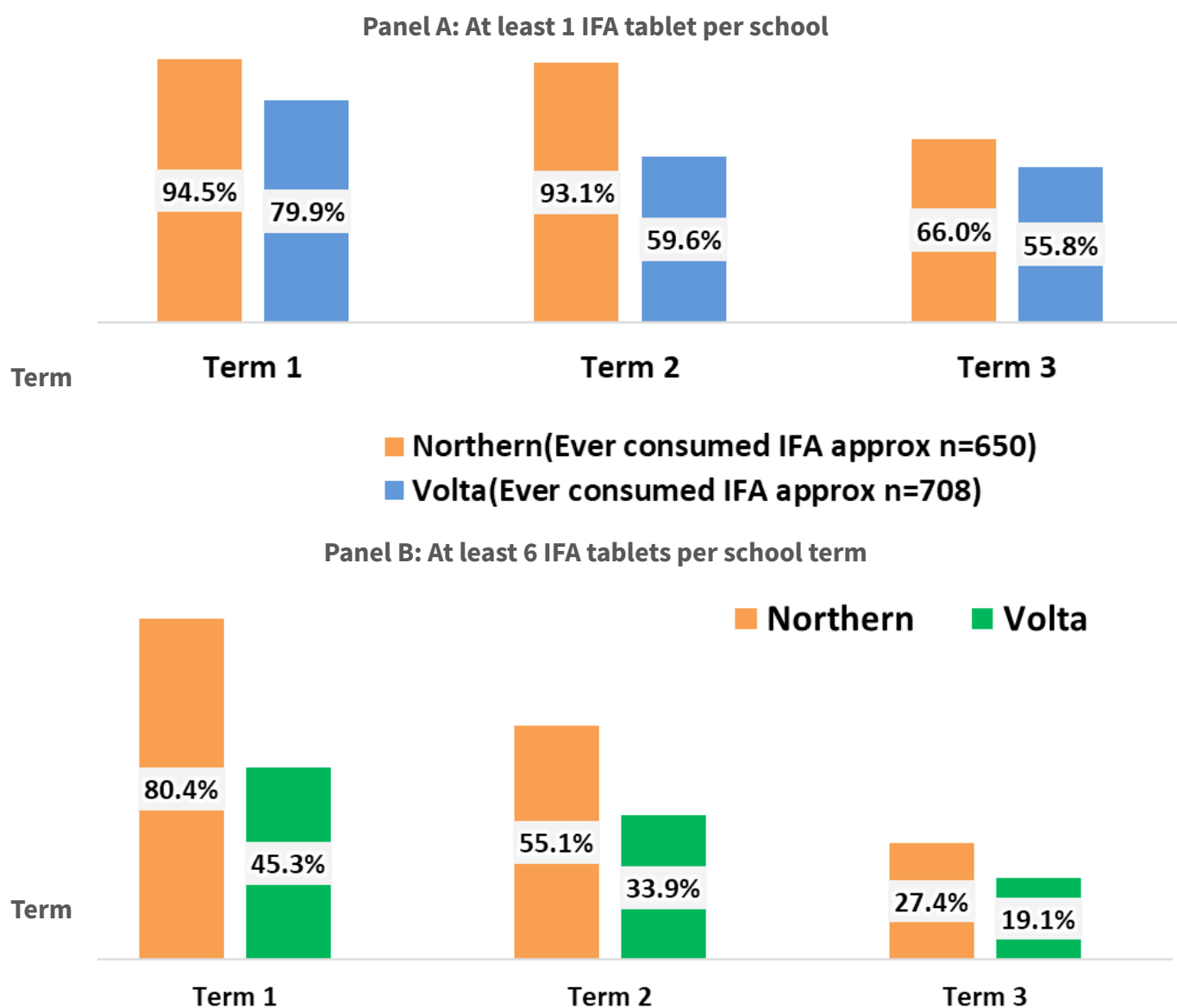
Figure 8.1.4: Experiences and Perceptions around IFA, and Reasons for Consuming IFA During school Year in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

At follow-on, among the students who had ever consumed IFA, 91.4% said they usually ate food before taking the tablet, 87.5% 'liked' IFA, and 69.7% said they noticed changes in their body after taking the IFA during the school year. In terms of reason for taking IFA, two common responses were improving my blood (79.7%) and improve menstruation (29.7%) as shown in figure 8.1.5.

Figure 8.1.4: Distribution of Selected IFA Experiences Reported by Students – Overall Population (among ever consumed IFA n=1329)
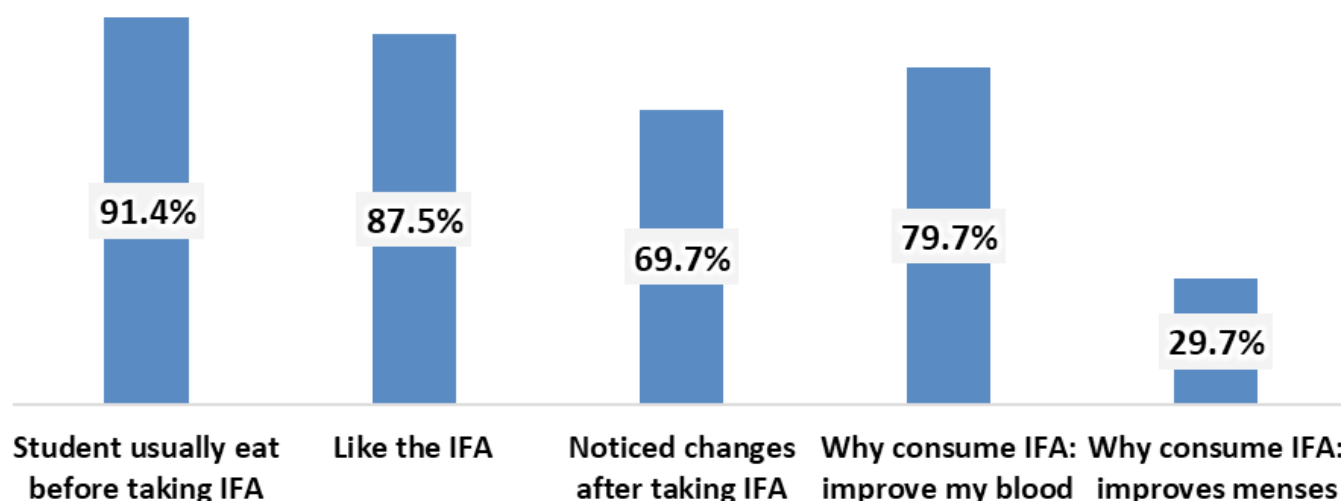
Figure 8.1.5: Student IFA Experience: Noticed Changes Notices after taking IFA – During School Year in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Student were asked if they had noticed any changes over the school year after consuming IFA – this was a yes/no question with a skip pattern. If a student said yes, she was then asked to list what those changes were. This was a multiple response question and enumerators did not read out options to participations.

Adolescent girls reported changes noticed after taking IFA at follow-on. Some of the changes for this sub-population are shown in figure 8.1.6. Desirable attributes reported included improved health (21.7%), made me stronger 12.8%, less sleepy (5.3%), increased appetite (22.1) and less than 5% said helped me concentrate. The undesirable changes were: "made me dizzy," nauseous, stomach pains, headaches, constipation, dark/smelly stool, as well as "made me too hungry." The girls reported some changes noticed as both desirable and undesirable. On menstruation, some said it was heavier/longer (28%), and 33% said it made their menses regular.

Figure 8.1.5: Distribution (%) and kinds changes noticed among those who noticed an IFA-related change – Overall population (among ever consumed IFA and noticed changes, n=908)

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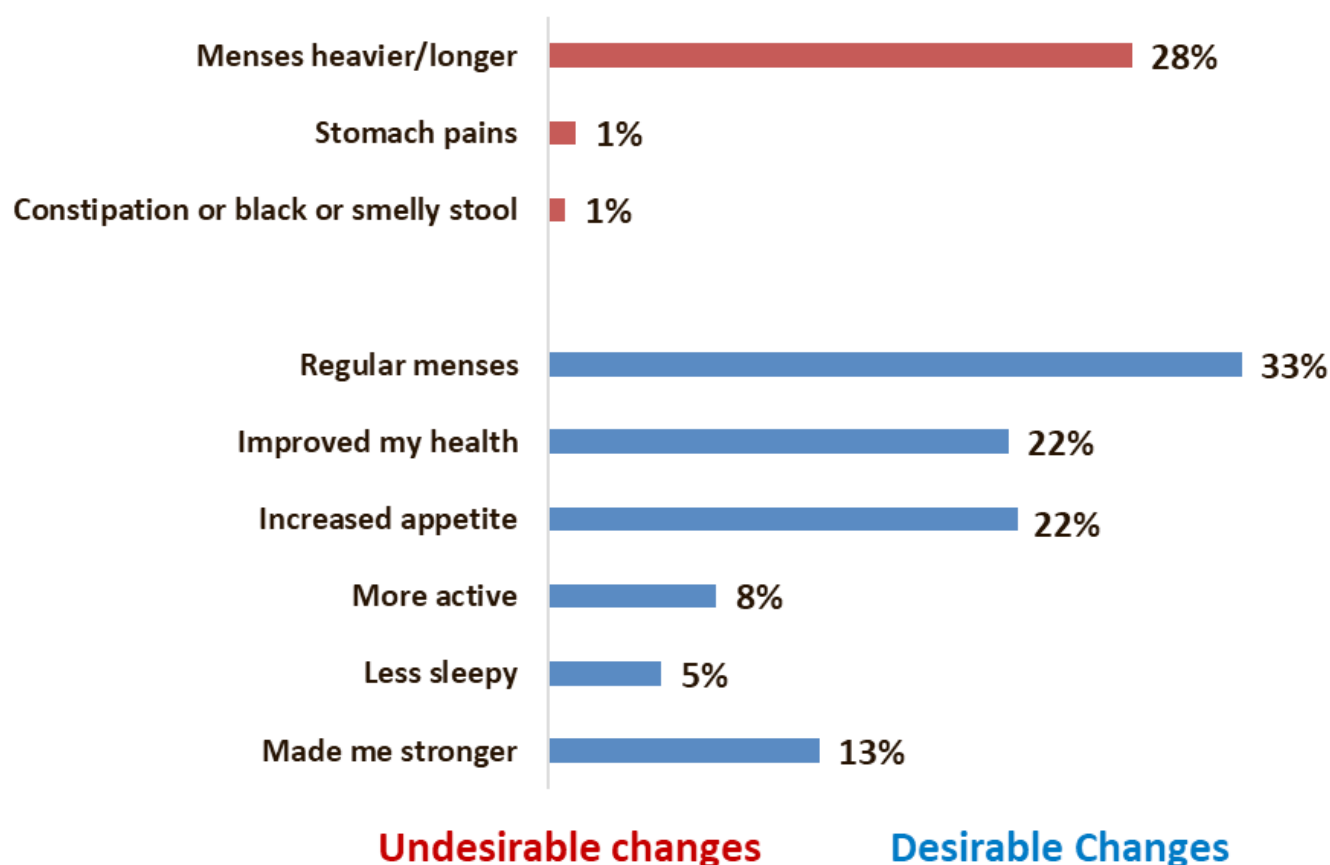
Figure 8.1.7: Student IFA Experience: Missed IFA distribution and Opportunity to make-up missed dose-During School Year in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

As per GIFTS Programme protocol, students who missed an IFA distribution for various reasons in a school week were given a chance to receive/consume their IFA before the following week's distribution cycle. As shown in figure 8.1.7, 74.5% of the girls reported they had another opportunity to take their weekly tablets if they missed a regular distribution time. When this happened 56.6% of the student got and consumed their weekly IFA consignment from their teacher.

Figure 8.1.7. Opportunity to make-up missed weekly IFA distribution cycle and mode of receipt by students- Overall population (among ever consumed IFA n=1329)
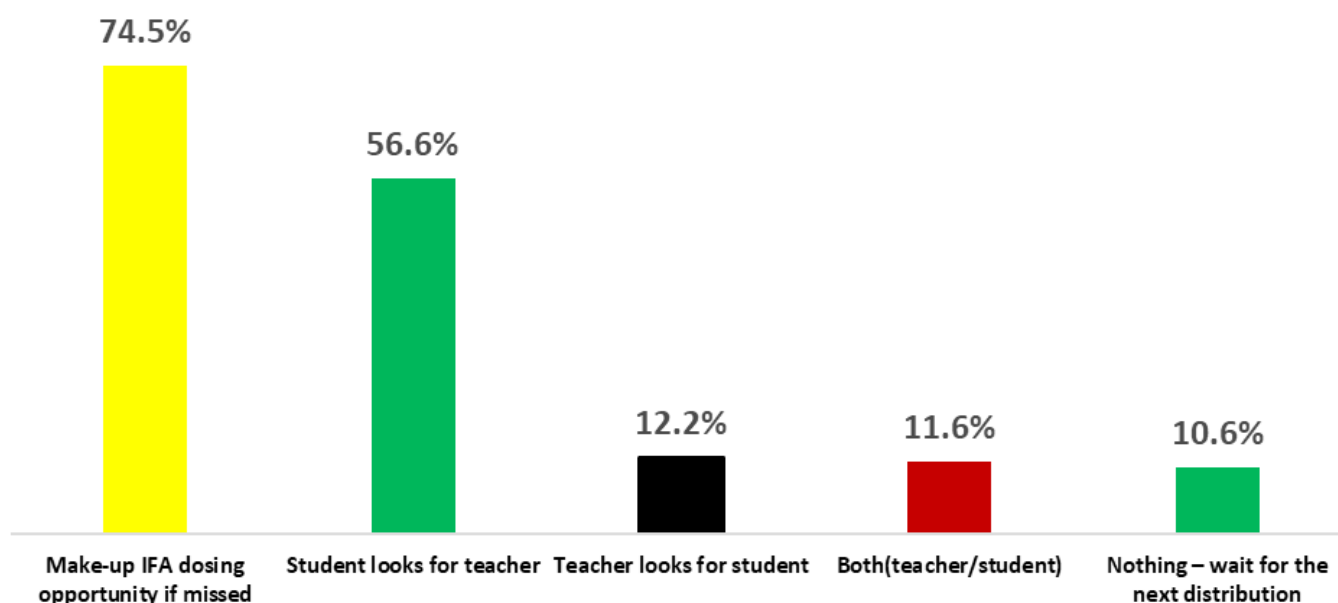
8.2 School/Health Teacher Training on IFA Programme Implementation and Experiences

Table 8.2.1: Content of School Health-Educator Training on IFA administration by directly observed therapy (DOT) in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Prior to the launch of the IFA Programme, in August 2017, school health-educators in the 4 phase-1 regions were trained. This teacher training included school health/nutrition education topic to be delivered to the students concerning anemia, the weekly IFA distribution cycle and dosing by IFA directly observed therapy (DOT).

At the follow-on survey, Table 8.2.1 shows some of the training content and messages teachers said they delivered to the girls when delivering IFA. Overall, teacher-respondents from the 60 schools mentioned they instructed their students to consume IFA on full stomach (91.7%), take IFA tablet with water (70.0%), and to take it straight away (48.3%). Some teachers (28.3%) reported IFA was 'not a family planning tablet'. Overall, the majority of teachers said they told girls the benefits including that IFA is good for health (80.0%) and strengthens blood (93.3%).

Table 8.2.1: Content of School Health-Educator Training on IFA administration by directly observed therapy (DOT)

Overall (JHS + SHS)	Northern		Volta		Overall (Northern + Volta)	
	Follow-on (n=30)		Follow-on (n=30)		Follow-on (n=60)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Information School Health Educators Gave to Girls in their School About How to Take IFA[1]						
Take on a full stomach	30	100.0	25	83.3 (69.6,97.1)	55	91.7 (84.5,98.9)
Take with water	23	76.7 (61.1,92.2)	19	63.3 (45.6,81.1)	42	70.0 (58.1,81.9)
Take it straight away	17	56.7 (38.4,74.9)	12	40.0 (22.0,58.0)	29	48.3 (35.3,61.4)
It is not family planning	15	50.0 (31.6,68.4)	2	6.7 (0.0,15.9)	17	28.3 (16.6,40.1)
[1]Other	2	6.7 (0.0,15.9)	4	13.3 (0.8,25.9)	6	10.0 (2.2,17.8)
Information School Health Educators Gave to Girls in their School About the Benefits of IFA[1]						
Good for Health	25	83.3 (69.6,97.1)	23	76.7 (61.1,92.2)	48	80.0 (69.6,90.4)
Strengthens Blood	26	86.7 (74.1,99.2)	30	100.0	56	93.3 (86.8,99.8)
Girls Need it More than Boys	9	30.0 (13.1,46.9)	6	20.0 (5.3,34.7)	15	25.0 (13.7,36.3)
[3]Other	7	23.3 (7.8,38.9)	3	10.0 (0.0,21.1)	10	16.7 (7.0,26.4)

[1]Multiple options apply for both questions. [2]More opportunities to take the IFA tablet if missed distribution, benefits of the tablets, helps improve appetite, normal for stool to change color, and should be taken weekly. [3]Help prevent anemia, helps replace lost menstrual blood, improves academic performance/IQ, improves health for child bearing, boosts immunity, and makes a person more active.

Table 8.2.2: Anemia Prevention Health Talks Given to Students in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

At follow-on, school health educators reported that overall the predominant anemia education information given to students were eating green leafy vegetables (81.7%), taking IFA or multi-vitamins (75.0%) and sleeping under mosquito bed net (53.3%).

Table 8.2.3: Content of Anemia Prevention Health Talks Given to Students

Overall (JHS + SHS)	Northern		Volta		Overall (Northern + Volta)	
	Follow-on (n=30)		Follow-on (n=30)		Follow-on (n=60)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Information given to students on the prevention of anemia (Multiple options apply)						
Eating meat/liver	18	60.0 (42,78.0)	12	40.0 (22.0,58.0)	30	50.0 (37.0.0,63.0)
Eating green leafy vegetables	24	80.0(65.3,94.7)	25	83.3 (69.6,97.1)	49	81.7 (71.6,91.7)
Preventing and treating malaria	10	33.3 (16.0,50.7)	11	36.7 (18.9,54.4)	21	35.0 (22.6,47.4)
Sleeping under a bed net	14	46.7 (28.3,65.0)	18	60.0 (42.0,78.0)	32	53.3 (40.3,66.3)
Preventing and treating worms/parasites	6	20.0 (5.3,34.7)	3	10.0 (0.0,21.1)	9	15.0 (5.7,24.3)
Taking iron & folic acid tablets or multi-vitamins	22	73.3 (57.0,89.6)	23	76.7 (61.1,92.2)	45	75.0 (63.7,86.3)

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Overall (JHS + SHS)	Northern		Volta		Overall (Northern + Volta)	
	Follow-on (n=30)		Follow-on (n=30)		Follow-on (n=60)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
Seeking health care	14	46.7 (28.3,65.0)	13	43.3 (25.1,61.6)	27	45.0 (32,58.0)
Taking blood tonics	9	30 (13.1,46.9)	0	-	9	15.0 (5.7,24.3)
Sleeping well/ resting	3	10.0 (0.0,21.1)	0	-	3	5.0 (0.0,10.7)
Avoiding eating soil or clay	2	6.7 (0.0,15.9)	1	3.3 (0.0,9.9)	3	5.0 (0.0,10.7)
[1]Other	8	26.7 (10.4,43.0)	1	3.3 (0.0,9.9)	9	15.0 (5.7,24.3)

[1]Avoid eating instant noodles, eat a balanced diet, eat beans and fish, eat fruits, eat local sources of protein and iron, avoid sleeping directly on the floor, and get enough rest.

Table 8.2.4: Teacher Perceptions of Students Response to IFA Programme in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Teacher perceptions of how the students responded to the GIFTS Programme at follow-on are shown in table 8.2.4. Approximately 72% reported the students liked/gave positive attributes to GIFTS while in a separate question teacher reported that 66.7% had concerns about it. Among those stating students had concerns, some of these included students thinking IFA was a family planning pill (67.5%), that consuming IFA altered menstruation (67.5%), as well as students having difficulties in getting water to take IFA(15.0%) and experiencing side-effects (52.5%).

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Table 8.2.4: Students Response to GIFTS Programme – Teacher Report

Overall (JHS + SHS)	Northern Follow-on (n=30)		Volta Follow-on (n=30)		Overall (Northern + Volta) Follow-on (n=60)	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
In general, how did girls respond to the GIFTS Programme (Multiple options apply)						
Most like it / Positive feelings	27	90 (78.9,100)	16	53.3 (35,71.7)	43	71.7 (59.9,83.4)
Some like it / Somewhat positive feelings	2	6.7 (0.0,15.9)	11	36.7 (18.9,54.4)	13	21.7 (10.9,32.4)
Most dislike it / Negative feelings	0	-	3	10.0 (0.0,21.1)	3	5.0 (0.0,10.7)
Other[1]	1	3.3 (0.0,9.9)	0	-	1	1.7 (0.0,5.0)
Have been concerns about the GIFTS Programme	15	50.0 (31.6,68.4)	25	83.3 (69.6,97.1)	40	66.7 (54.4,78.9)
What concerns have there been? (Multiple options apply)						
Family planning / contraception	12	80.0 (58.8,100)	15	60.0 (39.9,80.1)	27	67.5 (52.3,82.7)
Increased fertility	1	6.7 (0.0,19.9)	2	8.0 (0.0,19.1)	3	7.5 (0.0,0.16)
Altered menstruation	9	60.0 (34.1,85.9)	18	72.0 (53.6,90.4)	27	67.5 (52.3,82.7)
Side-effects	7	46.7 (20.3,73.1)	14	56 (35.7,76.3)	21	52.5 (36.3,68.7)
Difficulties getting water to take IFA	4	26.7 (3.3,50.1)	2	8.0 (0.0,19.1)	6	15.0 (3.4,26.6)
Difficulties taking on a full stomach	0	-	1	7.1 (0.0,21.2)	1	4.5 (0.0,13.6)
Girls being teased	2	13.3 (0.0,31.3)	1	4.0 (0.0,12)	3	7.5 (0.0,0.16)
Other[2]	4	26.7 (3.3,50.1)	3	12 (0.0,25.3)	7	17.5 (5.2,29.8)

[1]IFA tablets make them hungry. [2]Abdominal pain, decreased/increased menstrual flow, eating too much, dizziness, heart pains, and hunger.

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Figure 8.2.5: Teacher Experience – Student Refusal to Take IFA Tablets - During School Year in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Of the 60 school teachers interviewed, 68.3% experienced a student refusing an IFA table at some point during the school year. When this happened, teachers explained the importance of IFA (95.1%), 29.3% said they ordered student to take tablet. Some male teachers (4.9%) asked a female teacher colleague to assist/demonstrate by taking their IFA to convince the girl students to consume their IFA, as shown in figure 8.2.5.

Figure 8.2.5: Teacher Experiences Regarding IFA distribution to Students During School Year

School Teacher/Health Educator Encountered an IFA Refusal by a Student (n=60)

31.7% No · 68.3% Yes
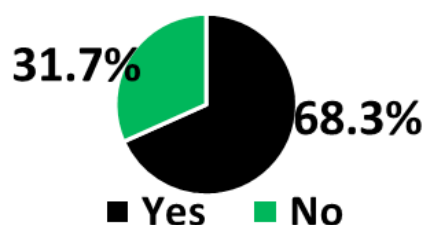
School Teacher/Health Educator Responses: Girls Refused to Take IFA, among teachers that experience a refusal (n=41)

Explained the importance of IFA	95.1%
Told her she had to take it	29.3%
Told her she would get sick without it	7.3%
Told her she did not have to take it	2.4%
Told her I would inform the school	4.9%
Told her I would inform her parents	12.2%
Other (female teacher acts as role model)	4.9%
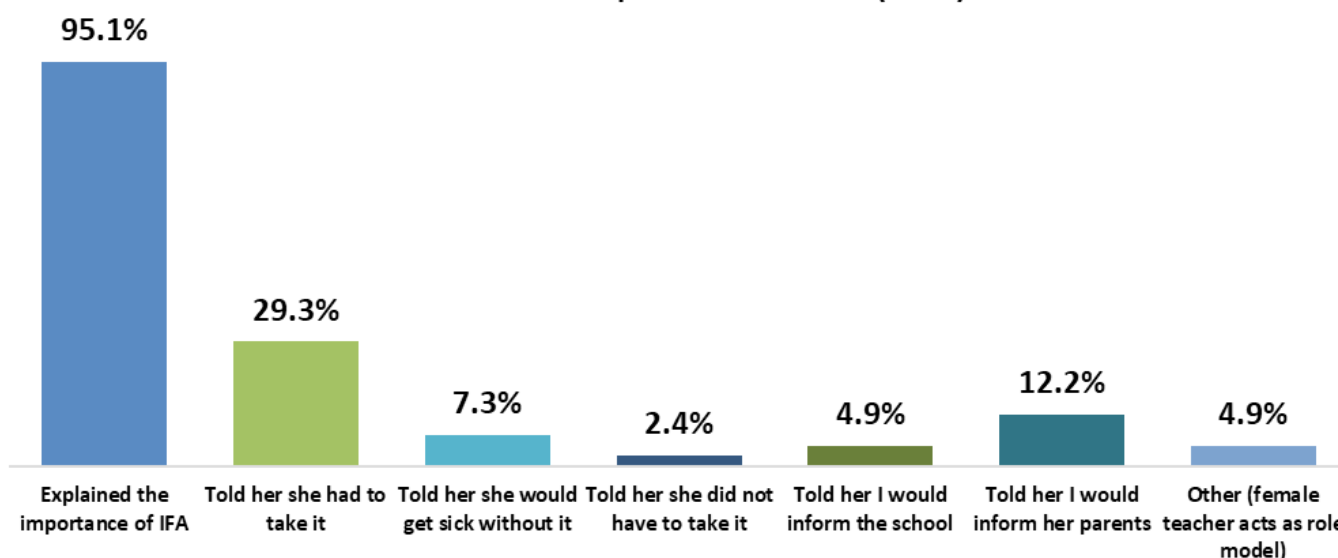
Table 8.2.5: Teacher Experience – Training Received Prior to IFA Programme Rollout in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

In all 60 schools, 60.0-83.3% of teachers attended a regional or district GIFTS Programme training prior to roll-out and/or during the academic year. Overall, in 68.3% of the schools only the SHEP teacher attended the training and >30% of the schools had one or more additional teachers attend a GIFTS training session. Training received was found adequate by 68.3% of the teacher-respondents.

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Teacher Experience – IFA Training Received

	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Overall (JHS + SHS)		**N=30**		**N=30**		**N=30**		**N=30**		**N=60**		**N=60**	
Attended Training	18	60.0 (42.2, 77.8)	20	66.7 (49.6, 83.8)	25	83.3 (69.8, 96.9)	21	70.0 (53.4, 86.6)	43	71.7 (60.1, 83.2)	41	68.3 (56.4, 80.3)	
				N=20				**N=21**				**N=41**	
0		-	9	45.0 (22.2, 67.8)		-	19	90.5 (77.4,100.0)		-	28	68.3 (53.4, 83.2)	
1		-	9	45.0 (22.2, 67.8)		-	2	9.5 (0.0, 22.6)		-	11	26.8 (12.7, 41)	
> 1		-	2	10.0 (0.0, 23.7)		-		-		-	2	4.9 (0.0, 11.8)	
Training was adequate		-	10	50.0 (27.1, 72.9)		-	18	85.7 (70.1,100.0)		-	28	68.3 (53.4, 83.2)	

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Figure 8.2.6: Teacher Experience – IFA Implementation Difficulties within School in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Over half of the teachers interviewed (51.7%) reported implementation difficulties at some point or during the school year. When asked about what these difficulties were, 62.1% of teachers said IFA distribution was time consuming 58.6% said lack of support from school and other teachers, and 51.7% said student refusals. Other difficulties included provision of water and cups (41.4%) or just cups (24.1%) for students, maintaining the IFA register (17.2%) and tracking and dosing students who had missed a distribution (31.0%).

Figure 8.2.6: Teachers IFA Implementation Experiences and Difficulties during School Year

School Techear/Health Educator Experienced Difficulties with Implementation

48.3%

51.7%

■ Yes   ■ No
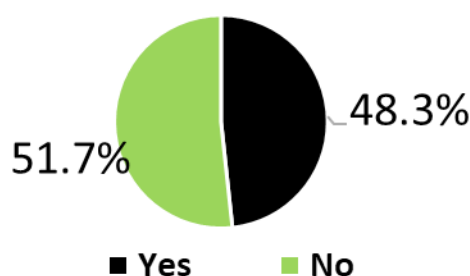
School Teacher/Health Educator-Response When Girls Refused to Take IFA, among schools with refusals (n=41)

62.1%	58.6%	51.7%	31.0%	41.4%	24.1%	17.2%	10.3%
Distribution is too time consuming	Lack of support from the school/ other teachers	Girls resist taking the IFA	Hard to track down girls absent on distribution	Hard to provide water/cups to take IFA	Hard to provide cups to take IFA	Hard to maintain register	Other
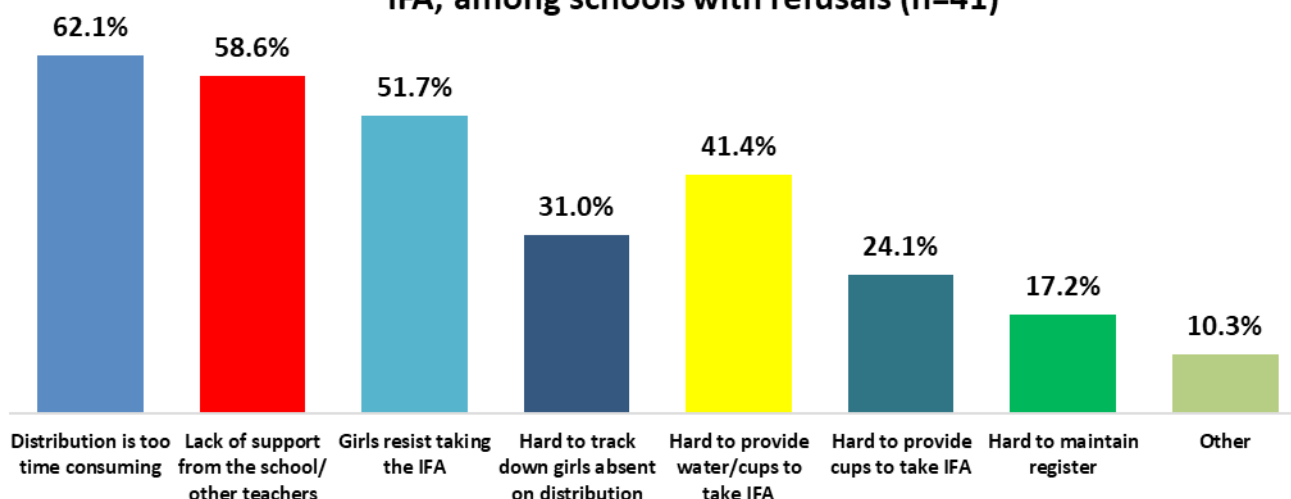
Figure 8.2.7: Teacher Experience – Sensitization and Difficulties within Communities in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.
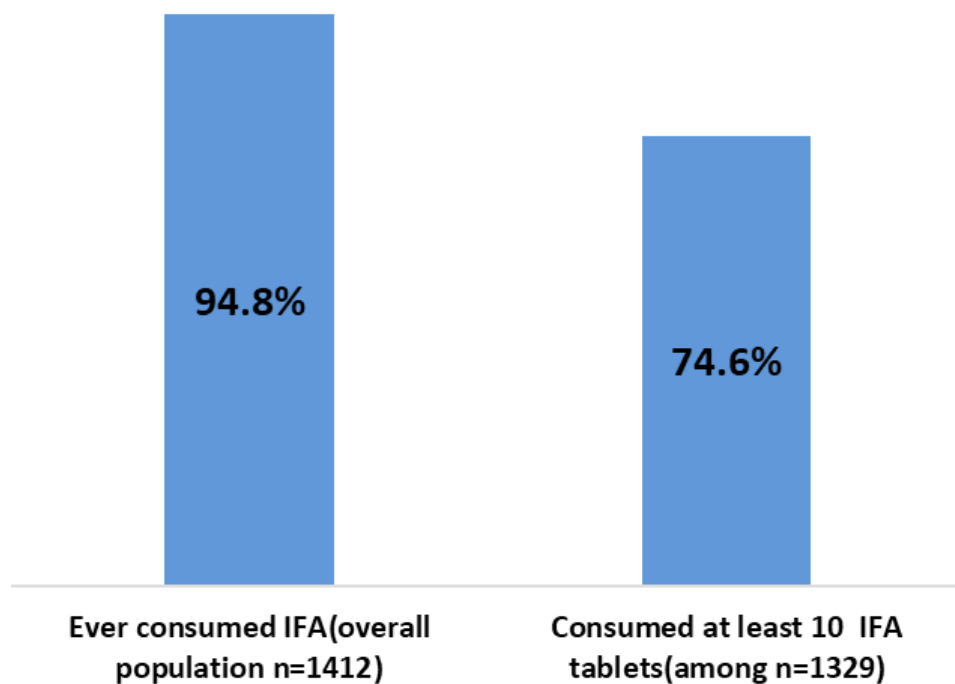
Teachers reported there was a parent-teacher IFA sensitization event in 37 schools (61.7%) and 13.3% reported they experienced IFA implementation difficulties from member of the community.

Sensitization and Difficulties within the Community (n=60)

- Experienced difficulties with the program in the community — 13.3%
- Had an IFA sensitization event with parents — 61.7%

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Figure 8.2.8: Teacher Experience – Additional Support Desired for IFA Implementation within Schools in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Teachers reported several issues and strategies to support the GIFTS Programme in schools. From the perspective of teacher needs, refresher training (75%), more supervision (55.0%), and incentives (61.7%) were identified as additional supports that would help the GIFTS Programme. For the students, teachers identified that supplying water for taking IFA (26.7%) and combining IFA with feeding Programmes or providing sanitary pads (30%) could help the Programme.

Additional Support Desired by Teacher-Respondents (n=60)

Category	Percentage
Other(feeding students/sanitary pads)	30.0%
Nothing	6.7%
Receive incentives	61.7%
Resources to supply water to students	26.7%
Share experiences with other schools	36.7%
More supervision	55.0%
Refresher training	75.0%

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Table 8.2.6: Teacher Experience – School Ever Received IFA Supply and IFA Intensive Monitoring Registers in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

At the baseline survey before IFA roll-out, 20% of the 60 schools had ever received IFA supply while at the time of the follow-on survey all 60 schools (100%) had IFA supply. Similarly, overall 25% of schools had received the IFA routine monitoring registers (only in some Volta schools) but at follow-on 96.7% of all schools had the registers.

Table 8.2.6: School Ever Received IFA Tablet Supply or GIFTS Programme Register

	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	P-value
Overall (JHS + SHS)		N=30		N=30		N=30		N=30		N=60		N=60	
Received IFA Tablets	0	-	30	100.0	12	9.0 (22.2, 57.8)	30	100.0	12	20.0 (9.7, 30.3)	60	100.0	-
Have a GIFTS Register	0	-	28	93.3 (84.3, 100)	15	50 (31.8, 68.2)	30	100.0	15	25.0 (13.9, 36.1)	58	96.7 (92.1, 100)	<.01

P-values test for differences between baseline and follow-on proportions chi-square test for the overall population.

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Table 8.2.7: Teacher Experience - School Receipt, Storage of IFA, and Registers in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

In 56.7% of the schools overall, the school IFA supply received from the nearest health facility was tracked using the BIN inventory card from the MOH/GHS', 18.3% of schools used a notebook and 11.7% did not record receipt of IFA supply from the health facility. The primary storage place for IFA was with the school head (48.3%) or the SHEP coordinator's office (18.3%). Overall in all 60 schools, only 6.7% (4 schools) ever reported a IFA stock-out over the academic year while 22.4% of the teacher-respondents had difficulty with the GIFTS register. Among those reporting difficulties, the most predominant complaint about the IFA register was that it was as time consuming (53.8%), there was no motivation/incentive to maintain and complete it (38.8%), and 30.8% said there were "too many sheets" to complete.

Among the 60 teachers surveyed, 78.8% and 13.3% found the Programme time-consuming and hard to implement respectively. Another 78.8% said it was important for the health of the girls and 25% reported that boys should also be included. When asked what could be done to improve the GIFTS Programme, over 71% of the teachers said communication materials like posters and flyers and another 71.7% more support for community sensitization could help improve the Programme.

Table 8.2.7: School Teacher Experience - School Receipt, Storage of IFA, and Registers

GIFTS Programme Logistics and Teacher-Implementer Experiences During School Year– Follow-on Only

		Northern		Volta		Overall (Northern + Volta)	
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	
Overall (JHS + SHS)		**N=30**		**N=30**		**N=60**	
Where IFA Tablets Received by the School are Tracked							
Notebook	3	10.0 (0.0,21.1)	8	26.7 (10.4,43)	11	18.3 (8.3,28.4)	
Bin Card	22	73.3 (57,89.6)	12	40.0 (22.0,58.0)	34	56.7 (43.8,69.6)	
Do not record	2	6.7 (0.0,15.9)	5	16.7 (2.9,30.4)	7	11.7 (3.3,20.0)	
Othera	3	10 (0.0,21.1)	5	16.7 (2.9,30.4)	8	13.3 (4.5,22.2)	
Storage of IFA Tablets							
SHEP coordinator's office	8	26.7 (10.4,43)	3	10 (0.0,21.1)	11	18.3 (8.3,28.4)	
Headmaster's/Headmistress' Office	16	53.3 (35,71.7)	13	43.3 (25.1,61.6)	29	48.3 (35.3,61.4)	
At home	2	6.7 (0.0,15.9)	2	6.7 (0.0,15.9)	4	6.7 (0.2,13.2)	
Nurses bring it on distribution day	1	3.3 (0.0,9.9)	6	20.0 (5.3,34.7)	7	11.7 (3.3,20.0)	
Otherb	3	10 (0.0,21.1)	6	20 (5.3,34.7)	9	15.0 (5.7,24.3)	
IFA Stock-out and GIFTS Register Availability							
Experienced 1 Stockout	2	6.7 (0.0,15.9)	2	6.7 (0.0,15.9)	4	6.7 (0.2,13.2)	
Had any difficulty with GIFTS register	8	28.6 (11.3,45.8)	5	16.7 (2.9,30.4)	13	22.4 (11.4,33.5)	
Overall Impressions of the GIFTS (Multiple options apply)							
Hard to Implement	0	-	1	20.0 (0.0,60.6)	1	7.7 (0.0,24.5)	

	Northern		Volta		Overall (Northern + Volta)	
	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)	n	Unweighted % (95% CI)
Too time consuming	1	12.5 (0.0,39.0)	0	-	1	7.7 (.0.0,24.5)
Boys should be included too	3	37.5 (0.0,76.3)	1	20.0 (0.0,60.6)	4	30.8 (1.7,59.8)
Important for the health of girls	0	-	1	20.0 (0.0,60.6)	1	7.7 (0.0,24.5)
Positive/good Programme	1	12.5 (0.0,39)	0	-	1	7.7 (0.0,24.5)
Poor sensitization	5	62.5 (23.7,100)	2	40.0 (0.0,89.7)	7	53.8 (22.5,85.2)
Should continue	5	62.5 (23.7,100)	0	-	5	38.5 (7.9,69.1)
[1]Other	3	37.5 (0.0,76.3)	2	40.0 (0.0,89.7)	5	38.5 (7.9,69.1)
What can be done to improve the GIFTS Programme (Multiple options apply)						
Have more training	22	73.3 (57.0,89.6)	12	40.0(22.0,58.0)	34	56.7(43.8,69.6)
Have more materials to support the Programme (poster, flyers etc,)	25	83.3(69.6,97.1)	18	60.0(42.0.0,78.0)	43	71.7(59.9,83.4)
More support for community sensitization	20	66.7 (49.3,84.0)	23	76.7 (61.1,92.2)	43	71.7(59.9,83.4)
Revise the registry	6	20.0 (5.3,34.7)	0	-	6	10.0 (2.2,17.8)
GIFTS Programme Logistics and Teacher-Implementer Experience During School Year - Follow-on Only						
Make distribution less frequent	1	3.3 (0.0,9.9)	1	3.3 (0.0,9.9)	2	3.3 (0.0,8.0)
Provide more supervision	17	56.7 (38.4,74.9)	12	40.0(22.0,58.0)	29	48.3 (35.3,61.4)
Train multiple teachers	17	56.7 (38.4,74.9)	11	36.7 (18.9,54.4)	28	46.7(33.7,59.7)
Have more teachers supporting distribution	16	53.3 (35,71.7)	8	26.7(10.4,43.0)	24	40.0(27.2,52.8)
Incentives / motivation for teachers	8	26.7 (10.4,43)	7	23.3 (7.8,38.9)	15	25.0(13.7,36.3)
[d]Other	3	10.0 (0.0,20.9)	5	16.7 (3.1,30.2)	8	13.3 (4.5,22.2)

[a]Assessment sheets given by Ghana Health Service, cannot find because SHEP coordinator is on maternity leave, GIFTS register, keep the empty bottles as records, on the summary sheet of previous report. [b]Other includes computer lab, first aid box, house mistress's home, in the girls' prefect cupboard, school store, SHEP coordinator house, senior house father's office, and sports department office. [c] Improves academic performance, difficulty with girls eating before coming to school, and no motivation. [d]Women delivering the Programme, more training by health workers, provision of bags for registers, school feeding, provision of water, provision of sanitary pads, the entire year's supply should be given, and nurses should do the distribution.

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8.3. Summary of Routine Intensive Monitoring and Student IFA Consumption Data

Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Overall across the 60 schools, a total of 29,519 tablets of IFA were distributed over the school year based on summaries of school records collected during the follow-on survey. Ghana's school calendar has 3 terms within an academic year. Each term has 12-14 weeks for a total of 40 instructional weeks per academic year. The distributions were even across the two regions, with the Northern region distributing 49.7% of the IFA tablets. Over the academic year, 74.6% of girls received more than 10 doses in the overall population. When disaggregating by terms, 11.6% and 20.4% had zero doses in terms 1 and 2 respectively. During the 6-8th week of term 3, 38.0% of students had zero doses (Northern 44.2%, Volta 34.0%). Some of the Northern region IFA distribution schedule was impacted by Ramadan, which affected term 3. Annex 6 shows the school level (JHS/SHS) stratified analyses.

Overall (JHS + SHS)		Northern		Volta		Overall (Northern + Volta)
Cumulative IFA Doses-Academic year		14667		14852		29,519
% At least 10 tablets -academic year	625	91.3 (80.8,100.0)	573	51.1 (27.1, 75.1)	1198	74.6(58.8, 90.5)
IFA Consumption by School Terms						
Term 1		**N=687**		**N=735**		**N=1412**
0	25	5.5 (0.0,15.7)	66	20.1 (7.5,32.8)	91	11.6 (2.6,20.5)
1-3	20	1.7 (0.0,3.5)	36	14.4 (1.6,27.2)	56	7.0(0.3,13.6)
4-6	58	12.2 (2.8,21.7)	83	20.2 (4.4,36)	141	15.5 (6.9,24.1)
7-9	520	72.6 (60.2,85.1)	189	18.1 (7.3,28.8)	709	50.0 (35.7,64.4)
10-12	54	7.8 (0.0.0,15.9)	361	27.2 (10.4,44.1)	415	15.9 (7.5,24.3)
Term 2		**N=650**		**N=708**		**N=1358**
0	39	6.9 (0.0,17.6)	129	40.4(14.2,66.6)	168	20.4 (4.9,36.0)
1-3	26	5.8 (0.0,12.1)	31	7.9 (2.8,13.0)	57	6.7 (2.4,11.0)
4-6	88	32.2 (12.0,52.5)	89	17.7 (0.7,34.8)	177	26.4 (11.7,41.0)
7-9	96	20.6 (7.4,33.8)	146	18.9 (5.7,32.1)	242	19.9 (10.3,29.5)
10-15	401	34.5 (13.5,55.5)	313	15.0 (4.9,25)	714	26.6 (13.2,40.0)
Term 3		**N=648**		**N=710**		**N=1358**
0	123	34.0 (8.9,59.1)	154	44.2(18.8,69.6)	277	38.0 (19.5,56.5)
1-3	109	10.7 (2.2,19.1)	106	25.1 (4.7,45.5)	215	16.4 (6.3,26.6)
4-6	176	27.9 (5.7,50.1)	155	11.6 (3.5,19.7)	331	21.4 (6.8,36.0)
7-9	188	16.3 (1.9,30.7)	265	15.8 (2.6,29.1)	453	16.1 (6.0,26.2)
10-14	52	11.1 (0.0,25.1)	30	3.3 (0.0.0,7)	82	8.0 (0.0.0,16.7)
Total academic year		**N=621**		**N=708**		**N=1329**
0	23	5.8 (0.0,16.6)	46	17.1 (4.2,30.0)	69	10.4 (1.3,19.5)
1-5	15	1.3 (0.0,2.7)	51	18.5 (2.6,34.3)	66	8.3 (0.1,16.5)
6-10	21	2.9 (0.0,6.8)	52	12.4 (1.7,23.1)	73	6.8 (1.4,12.2)

Overall (JHS + SHS)		Northern		Volta		Overall (Northern + Volta)
11-15	74	27.9 (5.5,50.4)	44	10.8 (0.0,23.1)	118	20.9 (6.0,35.9)
16-20	83	23.8 (3.1,44.5)	75	7.9 (2.6,13.1)	158	17.3 (3.8,30.8)
21-25	124	10.1 (2.8,17.5)	142	16.4 (6,26.7)	266	12.7 (6.5,18.8)
26-30	221	19 (4,33.9)	167	12.4 (3.8,21.1)	388	16.3 (6.8,25.8)
31+	60	9.2 (0.0,19.6)	131	4.5 (0.5,8.6)	191	7.3 (0.8,13.8)

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CHAPTER 9: BIOLOGICAL INDICATORS

9.1 Anthropometry

Table 9.1.1 Anthropometric indicators in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

In all students surveyed, mean heights and weights differed significantly from baseline to follow-on (Table 9.1.1) but the prevalence of all malnutrition anthropometric indicators assessed were not statistically different (each $p > 0.05$). Overall, the percentage of students classified as short statured (<-2SD WHO Height-for-age Z-score) was 2.1% vs 2.7% at follow-on. Similarly, the prevalence of thinness was 0.9% vs. 0.8%, and overweight status was 18.9% vs. 19.8% and remained unchanged ($p=0.3155$) over the academic year. Anthropometric data quality was acceptable. Biologically implausible z-scores for height-for-age, and BMI-for-Age Z-scores were very minimal and less than 0.30% in the overall population (Annex 8.2) as was digit preference since there was minimal predominance of a single digit that exceeded 10% for both weight and height at baseline and the follow-on survey.

Teacher Experience – IFA Training Received

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Table 9.1.1: Anthropometric Indicators Baseline and Follow-on

Measure	Northern Baseline		Northern Follow-on		Volta Baseline		Volta Follow-on		Overall (Northern + Volta) Baseline		Overall Follow-on		P-value
Overall (JHS + SHS)	n	Mean (95% CI) N=764	n	Mean (95% CI) N=677	n	% (95% CI) N=785	n	% (95% CI) N=733	n	% (95% CI) N=1549	n	% (95% CI) N=1410	
Height (cm)		158.4 (157.7, 159.1)		159.0 (158.4, 159.6)		158.1 (157.7, 158.6)		158.9 (158.4, 159.5)		158.2 (157.8, 158.7)		159.0 (158.6, 159.4)	<.01
Weight (kg)		52.0 (51.1, 52.9)		53.0 (52.1, 53.8)		52.2 (51.2, 53.1)		53.7 (52.8, 54.5)		52.1 (51.4, 52.7)		53.3 (52.7, 53.9)	<.01
HAZ		-0.39 (-0.47, -0.32)		-0.37 (-0.44, -0.29)		-0.33 (-0.45, -0.20)		-0.33 (-0.44, -0.21)		-0.36 (-0.43, -0.29)		-0.35 (-0.41, -0.28)	0.23
BAZ		-0.03 (-0.11, 0.05)		0.02 (-0.07, 0.11)		0.04 (-0.06, 0.15)		0.11 (0.01, 0.20)		0.01 (-0.06, 0.07)		0.06 (0.0, 0.13)	<.01
Indicators	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Short Stature[1]	26	1.9 (0.6, 3.3)	21	1.7 (0.2, 3.3)	22	2.5 (0.9, 4)	25	4.0 (2.3, 5.7)	48	2.1 (1.1, 3.2)	46	2.7 (1.4, 4)	0.34
IOFT[2]		N=764		N=677		N=785		N=733		N=1549		N=1410	
Thin	10	0.6 (0.0, 1.1)	7	0.4 (0.0, 0.8)	13	1.5 (0.4, 2.5)	13	1.3 (0.3, 2.4)	23	0.9 (0.3, 1.5)	20	0.8 (0.2, 1.3)	0.49
Overweight	107	18.5 (13.7, 23.2)	101	19.5 (13.4, 25.6)	120	19.6 (14.1, 25.0)	114	20.2 (14.8, 25.6)	227	18.9 (15.3, 22.5)	215	19.8 (15.6, 24)	0.32
Obesity	11	1.9 (0.6, 3.1)	11	2.1 (0.7, 3.5)	21	4.5 (2.8, 6.2)	24	5.0 (3.1, 6.8)	32	2.9 (1.7, 4.2)	35	3.3 (1.9, 4.6)	0.38

Short Stature[1]: Height-for-age z-score, HAZ, < - 2SD WHO- Growth Reference (2007). [2]IOTF-International Obesity Task Force; BMI-for-age z-score-BAZ. Cut-offs: thinness(<-1SD), overweight (>+1), and obesity(>+2SD).[3]P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population for categorical, and survey design-based t-tests for continuous variables.

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9.2 Prevalence of Malaria

Table 9.2.1 Prevalence of Malaria in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Overall, malaria prevalence changed from baseline to follow-on, from 25.8% to 8.3%, p<.01 and in both junior high (36.6 to 17.8%; p<.01) and senior high schools (24.1 to 6.9%; p<.01).

Table 9.2.1 Prevalence of Malaria.

| Measure | Northern | | | | Volta | | | | Overall (Northern + Volta) | | | | P-value |
| | Baseline | | Follow-on | | Baseline | | Follow-on | | Baseline | | Follow-on | | |
	Mean (95% CI)		Mean (95% CI)		n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Overall	**N=764**		**N=677**			**N=787**		**N=735**		**N=1551**		**N=1412**	
Malaria	291	29.3 (24.6, 34.1)	96	8.3 (4.7, 11.8)	219	20.6 (12.3, 29)	115	8.5 (3.8, 13.1)	510	25.8 (21, 30.6)	211	8.3 (5.5, 11.2)	<.01
Junior High School (JHS)	**N=393**		**N=351**			**N=382**		**N=358**		**N=775**		**N=709**	
Malaria	187	45.2 (34.9, 55.5)	72	18.6 (9.2, 28.1)	109	24.1 (10.8, 37.4)	71	16.6 (5.4, 27.8)	296	36.6 (26.8, 46.3)	143	17.8 (10.5, 25)	
Senior High School (SHS)	**N=371**		**N=326**			**N=405**		**N=377**		**N=776**		**N=703**	
Malaria	104	26.9 (22.2, 31.6)	24	6.7 (3.1, 10.2)	110	20.1 (10.8, 29.4)	44	7.2 (2.5, 11.9)	214	24.1 (19, 29.3)	68	6.9 (4.1, 9.7)	**<.01**

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population.

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9.3 Anemia and Hemoglobin Concentration

Table 9.3.1 Prevalence of Anemia and Hemoglobin Concentration in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

The overall population anemia prevalence was significantly higher in baseline vs follow-on, reducing from 25.0% to 19.5%, p=0.04. Similarly measured hemoglobin concentrations were higher at follow-on relative to baseline 13.0 vs 12.8 g/dl, p=0.02. Overall changes were consistent when stratified by JHS vs SHS but only anemia reductions were statistically significant among the JHS population, as shown in Table 9.3.1. Annex table 8.6 also indicated that digit preference was also not in issue in Hemocue® machine readings.

Table 9.3.1 Prevalence of Anemia and Hemoglobin Concentration

Measure	Northern Baseline		Northern Follow-on		Volta Baseline		Volta Follow-on		Overall (Northern + Volta) Baseline		Overall (Northern + Volta) Follow-on		P-value
	n	%/mean (95% CI)	n	%/mean (95% CI)	n	%/mean (95% CI)	n	%/mean (95% CI)	n	%/mean (95% CI)	n	%/mean (95% CI)	
Overall (JHS+ SHS)	N=764		N=677		N=785		N=733		N=1549		N=1410		
Anemia (%)	179	24.3 (15.9, 32.7)	133	20.0 (16.5, 23.4)	190	26.0 (19.7, 32.3)	124	18.7 (13.6, 23.9)	369	25.0 (19.4, 30.6)	257	19.5 (16.5, 22.4)	0.04
Mean Hb (g/dL)	764	12.9 (12.6, 13.1)	677	12.9 (12.8, 13.1)	787	12.7 (12.6, 12.9)	735	13.0 (12.8, 13.2)	1551	12.8 (12.6, 12.9)	1412	13.0 (12.9, 13.1)	0.02
JHS	N=393		N=351		N=382		N=358		N=775		N=709		
Anemia (%)	90	23.3 (15.1, 31.5)	59	17.5 (11.4, 23.7)	82	18.1 (10.3, 25.8)	44	12.0 (6.1, 18.0)	172	21.1 (15.1, 27.2)	103	15.2 (10.7, 19.8)	0.02
Mean Hb (g/dL)	393	12.9 (12.5, 13.2)	351	13.0 (12.7, 13.4)	382	12.9 (12.7, 13.2)	358	13.1 (12.9, 13.3)	775	12.9 (12.7, 13.1)	709	13.1 (12.9, 13.3)	0.07
SHS	N=371		N=326		N=405		N=377		N=776		N=703		
Anemia (%)	89	24.4 (14.9, 34)	74	20.3 (16.4, 24.2)	108	27.2 (20.3, 34.2)	80	19.8 (13.9, 25.7)	197	25.6 (19.2, 32)	154	20.1 (16.8, 23.4)	0.08
Mean Hb (g/dL)	371	12.9 (12.5, 13.2)	326	12.8 (12.7, 13.0)	405	12.5 (12.3, 12.7)	377	12.9 (12.6, 13.1)	776	12.7 (12.5, 12.9)	703	12.9 (12.7, 13.0)	0.10

[3]P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population for categorical, and survey design-based t-tests for mean differences of continuous variables.

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CHAPTER 10: IMPACT EVALUATION

Table 10.1.1: Programme Impact Analyses for Key Indicators and Measures in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Programme impact associations with domains of the GIFTS Programme including a) anemia KAP; b) IFA knowledge; c) dietary intakes, d) anemia prevalence and hemoglobin concentration and e) anthropometric indicators are presented in Table 10.1.1. Impact evaluation statistical analyses were based on mixed linear model that accounted for students within a school as random effects.

In the age-adjusted regression (basic model), the integrated Programme was significantly (each p <.001) associated with positive mean changes in prevalences of +27.0% (95% CI: 23.2 - 30.7%) for anemia-KAP, and +63.5% (95% CI: 57.6 - 69.5%) for IFA knowledge from baseline to follow-on.

Similarly, overall dietary diversity score changed by +0.75 food groups (95%CI: 0.57, 0.92, p <0. 01) over the period as were the mean change in prevalences constituent food groups of the dietary score. For example, the Programme was associated with percent change in mean prevalence of reported consumption of good food sources of heme iron + 7.1% (95% CI: 3.0- 11.1%, p<0.01). No significant associations were observed for anthropometric indicators. Results were very similar in the fully adjusted models that additionally controlled for: socio-economic status (wealth tertile), and rurality as potential cofounders based on a conceptual framework.

Over the academic year, hemoglobin significantly increased, with + 0.19 g/dL (95%CI: 0.09 - 0.28, p<0.01) change in hemoglobin concentrations of a prospective cohort of 1412 adolescent school girls randomly selected from the 60 schools. For anemia, the prevalence reduced - 6.5% (95%CI -9.8 to -3.1%) during the year. This represented a 26% adjusted decrease in baseline anemia rate from 25.0% over the 8-month period. Similar to anemia-KAP, IFA-knowledge, and diet diversity, the anemia associations remained unchanged in the fully adjusted linear model that accounted for additional socio-demographic factors, and malaria infection status.

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Table 10.1.1: Programme Impact Analyses for Key Indicators and Measures

	Statistics	Baseline		Follow-on		Age-adjusted		Fully-adjusted
	Indicator / Measure	n	%(95% CI) N=1551	N	%(95% CI) N=1412	[1]PD or MD(95% CI) N=1412	p-value	PD or MD (95% CI) N=1412
KAP - Anemia	Ever Heard of Anemia (%)	940	63.8 (54.5, 73.2)	1253	90.9 (87.7, 94.1)	+27.0 (23.2, 30.7)	<.0001	+26.6 (22.8, 30.3)
IFA Knowledge	Ever Heard of IFA (%)	370	26.7 (17.7, 35.7)	1271	92.1 (89, 95.2)	+63.7 (57.8, 69.6)	<.001	+63.5 (57.6, 69.5)
Reported Dietary Intakes	[2]DDS (1-10)	-	3.3 (2.9, 3.6)	-	3.9 (3.6, 4.3)	+0.75 (0.57, 0.92)	<.001	+0.72 (0.55, 0.90)
	[3]Good Source of Heme Iron (%)	268	17.1 (13.0, 21.3)	377	24.1 (18.1, 30.2)	+7.1 (3.0, 11.1)	0.001	+6.9 (2.8, 11.0)
	[4]Fair Source of Heme Iron (%)	1162	71.5 (61.4, 81.6)	1164	78.7 (71.0, 86.4)	+8.1 (3.6, 12.7)	0.001	+7.6 (3.1, 12.2)
	[5]Source of Non-Heme Iron (%)	1051	66.6 (61.3, 71.9)	1131	71.9 (66.8, 77.1)	+5.8 (0.9, 10.8)	0.020	+5.6 (0.7, 10.6)
Anthropometric Indicators	Thin (IOTF) (%)	23	0.9 (0.3, 1.5)	20	0.8 (0.2, 1.3)	0	-	0
	Overweight (IOTF) (%)	227	18.9 (15.3, 22.5)	215	19.8 (15.6, 24)	+0.4 (-2.3, 3.0)	0.782	+0.2 (-2.4, 2.9)
	Obesity (IOTF) (%)	32	2.9 (1.7, 4.2)	35	3.3 (1.9, 4.6)	+0.6 (-0.2, 1.5)	0.145	+0.5 (-0.3, 1.4)
	BMI-for-Age Z-Score	-	0.01 (-0.06, 0.07)	-	0.06 (0.0, 0.13)	+0.02 (-0.02, 0.05)	0.389	+0.01 (-0.02, 0.05)
	Anemia (%)	369	25.0 (19.4, 30.6)	257	19.5 (16.5, 22.4)	-6.5 (-9.8, -3.1)	0.001	-6.4 (-9.7, -3.1)
Micronutrient Biomarker	Hemoglobin (g/dL)	1551	12.8 (12.6, 12.9)	1412	13.0 (12.9, 13.1)	0.19 (0.09, 0.28)	0.001	+0.18 (0.09, 0.28)

[1]PD: Prevalence Difference; MD: Mean Difference IOTF: International Obesity Task Force reference population. NSC: Non-significant change; P-values are derived from generalized linear models with robust SE corrected for the sampling design and covariance of the repeated measures within a child and school. Age-adjusted PD/MD are adjusted for age only. Fully adjusted PD/MD are adjusted for age, socio-economic status (wealth tertile), and rurality. [2]DDS – Dietary Diversity Score was derived from the sum of 10 food groups (see Chapter 7): red meats, white meats and poultry, fish, organ meats, eggs, dark green leafy vegetables, citrus fruits, legumes, bread, and fortified cereals and drinks. [3]Good sources of heme iron included red meats and organ meats. [4]Fair sources of heme iron included white meats and poultry, fish, and eggs. [5]Sources of non-heme iron included dark green leafy vegetables and legumes.

CHAPTER 11: STRENGHTS AND LIMITATIONS

1. Strengths of this Programme impact evaluation include the design: a population-based prospective cohort with longitudinal data from the same students at two time points. This design allowed examination of mean changes in prevalence of anemia and other Programme indicators in the same cohort of adolescents from the same school and facilitates ascertainment of temporal sequence of associations between Programme participation and anemia.

2. The use of mixed linear regression models ensured that results can be interpreted as an average student effect within each school level (cluster).

3. There was a high survey response rate. At both time points, response rates were >90% among students and teachers. This low attrition rates afforded higher statistical power for all observed associations.

4. A high proportion of students (>94.0%) had IFA consumption data, which were traceable and abstracted from IFA monitoring register for all weeks of the academic year.

5. The same field team personnel, data collection platform, and measuring equipment (Hemocue® machines, malaria rapid test kits, weighing scales and stadiometers) were used for both baseline and follow-on survey data collection.

6. There was generally low incidence of IFA stock-out reported over the academic year in all 60 schools.

7. One limitation is that data were collected in different months of the year, baseline (September, harvest season) and follow-on (July, non-harvest and rainy season in Ghana). Seasonality and other differences in the time of year could have impacted key measures of this evaluation. Further, conducting the follow-on survey a year later (September 2018) was not feasible as the students would have aged-out of their class.

8. Lack of an experimental 'control' group is a limitation. As all school adolescent girls in both regions were all supposed to be exposed to the IFA Programme (at some point), an unexposed or control group was not plausible for comparison of observed changes.

9. The evaluation was based on hemoglobin only. As additional functional biomarkers expected to be affected by the intervention including ferritin (stored iron), and RBC folate data were not collected, one cannot ascertain which of these micronutrient levels were the drivers of any observed changes in hemoglobin and anemia.

10. The time of the follow-on survey data collection occurred around the 6-8th week of the 3rd term, which was before the term ended. Hence the full complement IFA dosing for 14-week school term was not completed. Additionally, some schools suspended IFA distribution during the Muslim month of Ramadan and resumed after the fast was over. This might have impacted the number of weeks of IFA tablets received for the third term (particularly in the Northern region, which includes a large Muslim population).

11. Even though improvements in the hemoglobin levels can affect increased concentration and learning ability, physical fitness and work productivity[8-11], data on such functional outcomes like sick days, attendance, grades were not measured in this evaluation.

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Annex 1: Student Questionnaires in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Ghana GIFTS Baseline Questionnaire

Q #	Question	Response	Options	Comments
01	School code number	__ __ __	01-60(type)	Once school code number is entered the other cells should auto-populate and just be checked
02	Name of region	__ __	01 Volta 02 Northern (auto populated)	
03	Name of school		(auto populated)	
04	Level of school	__ __	01 Junior high school 02 Senior high school or equivalent 03 Technical (auto populated)	
05	Type of school	__ __	01 Public 02 Private (auto populated)	
06	District number	__ __	01-51 (auto populated)	
Basic information				
07	Date of interview	__ __/ __ __/ __ __	(drop down – date range day/month/year)	
08	Interviewer code	__ __		
	(drop down) 01-18			
09	Name of child (type)		Type here	
10	Do you have parental consent? [you must have access to the school tracking sheet to confirm whether consent has been provided for the selected child]		01 Yes – Caregiver consented 02 No – caregiver did not consent 03 no response from caregiver (drop down)	If no or no response, stop interview
11	Is the child at school today?	__ __	01 yes 02 No (drop down)	If no, do not continue with interview
12	Read: Hello, my name is _____, and I am working on behalf of Ghana Health Service. We are working on a project concerned with health and nutrition. I would like to talk to you about this subject. First we would like to take a drop of blood from the tip of your finger and test you for anemia and malaria. You will be given your results immediately and if you have malaria or anemia you will be referred to the nearest health facility. Then we will weigh and measure you and finally ask you some questions about the foods you eat. Your parents have already agreed for you to participate. Do you agree?			
13	Did the child provide assent for the specimen collection and interview?	__ __	01 yes 02 No (drop down)	If no, thank the child and stop the interview

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Q #	Question	Response	Options	Comments
Anthropometric and field test results panel				
A1	HemoCue® machine code	__ __	1-10	
A2	Stadiometer code	__ __	1-10	
A3	Scale code	__ __	1-10	
A4	Weight (kg)	__ __ __.__	Type in	These questions require double entry.
A5	Height (cm)	__ __ __.__ __	Type in	
A6	Hemoglobin	__ __.__	Type in	
A7	Malaria test	__ __	01 Negative (Control line only) 02 Positive P. Falciparum (Control and line 1) 03 Positive P. Vivax (Control and line 2) 04 Positive Mixed infection (All three lines) 05 Invalid (no lines after 20 minutes) (drop down)	
A8	Indicate if child was referred to nearest health facility for Hb <10g/dl and/ or positive malaria	__ __	01 yes – child referred 02 No - – child did not need referral (drop down)	
A9	[Please provide any additional comments on the specimen collection or anthropometry.]		(Blank text box)	
D1	What is your age? (in completed years)	__ __	10-20	
D2	What form are you in?	__ __	1-3	
D3	What class are you in?		Text box	
D4	Who is the head of your household?	__ __	01 Father 02 Mother 03 Grandmother 04 Grandfather 05 Brother 06 Sister 07 Aunt 08 Uncle 09 Step father 10 Step mother 11 Other relative 12 Self 98 Other (specify) (drop down)	

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Q #	Question	Response	Options	Comments
D5	What is the main occupation of the head of household?		01 Professional/technical/Managerial 02 Clerical 03 Sales and service 04 Skilled manual 05 Unskilled manual 06 Agricultural 98 Other (specify) (drop down)	
D6	How many people live and sleep in your household?	__ __	1-20 (Drop down)	
D7	Does your household or anyone in the household own the following items?		A. Radio B. CD/Cassette player C. Television D. Mobile telephone E. Land phone F. Refrigerator G. Electric or LPG Cooker H. Chair I. Sofa set J. Bed K. Air Conditioner L. Wall Clock M. Wrist Watch N. Bicycle O. Motorcycle or scooter P. Animal drawn cart Q. Car or truck R. Cable/Satellite TV S. Generator	01 yes 02 No 99 Don't Know (drop down)
D8	Does your household have electricity?	__ __	01 yes 02 No 99 Don't Know (drop down)	
D9	How long does it usually take you to get to your nearest community health facility/CHPS? [This should be by whatever means or transport they would typically use]	Number in minutes: __ __ __	1-120 999 Don't Know (drop down)	
Anemia causes, prevention, treatment, complications				
K1	Have you ever heard about anemia or [LOCAL TERM]?	__ __ __	01 yes 02 No 99 Don't Know (drop down)	02 skip to K9

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Q #	Question	Response	Options	Comments
K2	How can you tell if a person has anemia? [select all responses given]	__ __	01 Lack of concentration 02 Weakness/ unable to work 03 Shortness of breath 04 Repeated infections 05 Pale eyes, pale nails, pale tongue 06 Dizziness/ Easy to faint 07 Sleepy/ Fatigue/ Tired 08 Sleepy/ Fatigue/ Tired 09 Feel cold 98 other (specify) 99 don't know (check boxes)	
K3	What do you think causes anemia? [select all responses given]		01 Heavy loss of blood (menstrual cycle/ giving birth/ accident) 02 Poor diet 03 Diet lacks iron 04 Diet lacks vitamins 05 Malaria 06 Parasites 07 Lack of red meat in the diet 08 Eating soil/clay 98 Other (specify) 99 Don't know (check boxes)	
K4	What do you think can prevent anemia? [select all responses given]		01 Eating meat/liver 02 Eating green leafy vegetables 03 Preventing and treating malaria 04 Sleeping under a bed net 05 Preventing and treating worms/ parasites 06 Taking iron folic acid tablets or multi-vitamins 07 Seeking health care 08 Taking blood tonics 09 Sleeping well/ resting 98 other – specify 99 don't know (check boxes)	
K5	Which vitamin mineral deficiency in the body causes anemia? [select all responses given]	__ __	01 Iron 02 Zinc 03 Folate 04 B12 05 Vitamin A 06 Vitamin C 07 Vitamin D 98 Other (specify) 99 don't know (check boxes)	

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Q #	Question	Response	Options	Comments
K6	Have you ever had/experienced anemia or [LOCAL NAME]?	__ __	01 yes 02 No 99 Don't Know (drop down)	02 skip to QK9
K7	Did you seek help for treating anemia?	__ __	01 yes 02 No 99 Don't Know (drop down)	02 skip to QK9
K8	What were you given to treat the anemia?	__ __	01 iron tablets or syrup 02 Iron/folic acid supplements 03 A multiple micronutrient supplement 04 Blood transfusion 05 Dietary instructions / foods to consume that contain iron or help build blood 06 Nothing 98 other (specify) 99 don't know	
K9	Have you ever heard of Iron Folic Acid (IFA) tablets?	__ __	01 yes 02 No 99 Don't Know (drop down)	02 skip to QK11
K10	What do Iron Folic Acid (IFA) tablets do? [select all responses given]	__ __	01 More energy 02 More alert/learn better 03improves/strengthens/ increases your blood 04 Fights/avoids infection 05 prevents birth defects 06 avoids anemia (local term) 98 other (specify) 99 don't know (check boxes)	
K11	Did you take any supplements/ vitamins that contain iron in the last 7 days?	__ __	01 yes 02 No 99 Don't Know (drop down)	
K12	What are good sources of iron? [select all responses given]	__ __	01 Red meat 02 Liver 03 green leafy vegetables 04 Fish 05 Iron supplements 06 Iron folic acid supplements 98 Other (specify) 99 Don't know (check boxes)	
K13	Do you have think you have good access to malaria treatment if you need it?	__ __	01 yes 02 No 99 Don't Know (drop down)	

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Q #	Question	Response	Options	Comments
K14	Did you sleep under a bed net last night?	__ __	01 yes 02 No 99 Don't Know (drop down)	Skip to Q N1
K15	If no, why did you not sleep under a bed net?	__ __	01 I don't have one 02 uncomfortable 03 Its damaged 04 someone else uses it 98 other (specify) 99 Don't Know (drop down)	
Nutrition and health promotion				
N1	Do you know who the SHEP coordinator in your school is?		01 yes 02 No 99 Don't Know (drop down)	
N2	Has the SHEP coordinator or teachers at your school ever talked to you about the following?	A. Anemia B. Malaria C. Intestinal worms D. Clean Water E. Menstruation F. Eating iron rich foods G. Hand washing H. Iron tablets I. Folic acid tablets	01 yes 02 No 99 Don't Know (drop down)	
N3	How long does it take you to get to school? [In minutes]	__ __ __	1-120 (type) 999 Don't Know	
N4	Do you like going to school?	__ __ __	01 yes 02 No 99 Don't Know (drop down)	
N5	How many days per week do you usually eat meals prepared at school?	__	0 – 5 99 Don't Know (type)	
Dietary habits				
"Now we are going to talk about the different foods you might have consumed yesterday from the time you woke up, throughout the day, during the night until you finally went to sleep. I am going to read to you a list of foods and I would like you to tell me if or not you consumed those foods yesterday.				
F1	Any meats such as beef, pork, lamb, goat, wild game?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F2	Any chicken, duck, turkey, Guinea fowl or other birds, or meat products like sausage or kebabs?	__ __	01 yes 02 No 99 Don't Know (drop down)	

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Q #	Question	Response	Options	Comments
F3	Any fish?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F4	Any liver, kidney, heart or other organ meats?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F5	Any eggs?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F6	Any dark green leafy vegetables or dishes made with dark green leafy vegetables such as cocoyam leaves, cassava leaves, bean leaves, pumpkin leaves, or spinach?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F7	Any cow pea, soya beans, groundnuts, or melon seeds?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F8	Any oranges, pineapple, pawpaw, or mango?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F9	Any bread made from wheat flour?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F10	Any tea such as Lipton?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F11	Any Milo, Ovaltine, Cerelac, Yumvita, or Nido?	__ __	01 yes 02 No 99 Don't Know (drop down)	
F12	Do you sometimes eat soil or clay?	__ __	01 yes 02 No 99 Don't Know (drop down)	
Reproductive Health				
R1	Have you started menstruating?	__ __	01 yes 02 No 99 Don't Know (drop down)	
R2	[Please provide comments on anything unusual or note-worthy about this interview.]		(blank text box)	

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Ghana GIFTS Follow-On Questionnaire for GIRLS

Q #	Question	Response	Options	Comments
01	School code number	__ __ __	01-60(type)	Once school code number is entered the other cells should auto-populate and just be checked
02	Name of region	__ __	01 Volta 02 Northern (auto populated)	
03	Name of school		(auto populated)	
04	Level of school	__ __	01 Junior high school 02 Senior high school or equivalent 03 Vocational (auto populated)	
05	Type of school	__ __	01 Private 02 Government (auto populated)	
06	District name	____	Text (auto populated)	
Basic information				
07	Date of interview	__ __/ __ __/ _ _	(drop down – date range day/month/year)	
08	Interviewer name	__ __	(drop down – List of interviewers)	
09	Name of child from list NOTE: Girls should be listed. If not listed, first probe to see if she has a different name given at baseline.	__ __	(drop down – Prepopulate list of girls based on school code)	If "not listed," then type name in 9a.
09a	Name of child (type)	__ __	User entered text	
	Do you have parental consent? [you must have access to the school tracking sheet to confirm whether consent has been provided for the selected child]		01 Yes – Caregiver consented 02 No – caregiver did not consent 03 no response from caregiver 04 Child is 18 and above (drop down)	If no or no response, stop interview
11	Is the child at school today?	__ __	1 yes 0 no (drop down)	If no, do not continue with interview
	Read: Hello, my name is _____, and I am working on behalf of Ghana Health Service and Ghana education service. We are working on a project concerned with health and nutrition to improve the health of girls in Ghana. We talked to you at the beginning of this school year, and today I would like to talk to you again about this subject. We would like to take a drop of blood from the tip of your finger and test you for anemia and malaria. You will be given your results immediately and if you have malaria or anemia you will be referred to the nearest health facility. We will weigh and measure you and ask you some questions about the foods you eat. If you have any concerns or questions about the survey, please feel free to ask at the end of the interview. Any information you give us will be kept confidential and you can change your mind at any time. Your parents have already agreed for you to participate. Do you agree?			
13	Did the child provide assent for the specimen collection and interview?	__ __	1 yes 0 no (drop down)	If no, thank the child and stop the interview

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Q #	Question	Response	Options	Comments
Demographic info				
D1	What is your age? (in completed years)	__ __	10-30 (type)	
D2	What form are you in?	__ __	1-3	
D3	What class are you in?		(text box)	
Anemia causes, prevention, treatment, complications				
K1	Before today have you ever heard about anemia or [LOCAL TERM]?	__ __	1 yes 0 No 9 Don't Know (drop down)	0 skip to K9
K2	How can you tell if a person has anemia? [select all responses given]	__ __	01 Lack of concentration 02 Weakness/ unable to work 03 Shortness of breath 04 Repeated infections 05 Pale eyes, pale nails, pale tongue 06 Dizziness/ Easy to faint 07 Sleepy/ Fatigue/ Tired 08 Feel cold 09 Loss of appetite 10 Fever 98 other (specify) 99 don't know (check boxes)	
K3	What do you think causes anemia? [select all responses given]	__ __	01 Heavy loss of blood (menstrual cycle/ giving birth/ accident) 02 Poor diet 03 Malaria 04 Parasites 05 Lack of red meat in the diet 06 Diet lacks iron 07 Diet lacks folate 08 Diet lacks vitamin B12 09 diet lacks other vitamins/ minerals 10 Eating soil/clay 98 Other (specify) 99 Don't know (check boxes)	

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Q #	Question	Response	Options	Comments
K5	What do you think can prevent anemia? [select all responses given]	__ __	01 Eating meat/liver 02 Eating green leafy vegetables 03 Preventing and treating malaria 04 Sleeping under a bed net 05 Preventing and treating worms/parasites 06 Taking iron folic acid tablets or multi-vitamins 07 Seeking health care 08 Taking blood tonics 09 Sleeping well/ resting 10 Avoiding eating soil or clay 98 other – specify 99 don't know (check boxes)	
K5	Since a member of our team last interviewed you, have you had anemia or [LOCAL NAME]?	__ __	01 yes 02 No 99 Don't Know (drop down)	02 skip to QK9
K6	Did you report to the school that you had anemia or [LOCAL NAME]?	__ __	01 yes 02 No 99 Don't Know (drop down)	
K7	Since a member of our team last interviewed you, did you seek help for treating anemia?	__ __	01 yes 02 No 99 Don't Know (drop down)	
K8	What were you given to treat the anemia?	__ __	01 iron tablets or syrup 02 Iron/folic acid supplements 03 A multiple micronutrient supplement 04 Blood transfusion 05 Dietary instructions / foods to consume that contain iron or help build blood 06 Herbal or traditional medicine 07 Nothing 98 other (specify) 99 don't know	
K9	Have you ever heard of Iron & Folic Acid (IFA) tablets?	__ __	1 yes 0 No 9 Don't Know (drop down)	0 skip to QK11

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Q #	Question	Response	Options	Comments
K10	What do Iron & Folic Acid (IFA) tablets do? [select all responses given]		01 More energy 02 More alert/learn better 03 improves/strengthens/ increases your blood 04 Fights/avoids infection 05 prevents birth defects 06 avoids anemia (local term) 07 regulates menstruation 08 delays menstruation 98 other (specify) 99 don't know (check boxes)	
K11	What can you do to improve your blood? [select all responses given]	__ __	01 eat red meat 02 eat liver 03 eat green leafy vegetables 04 eat fish 05 Iron supplements 06 Iron folic acid supplements 07 Sleep under a bed net 08 Sanitation and hygiene 09 Deworming 10 Herbal or traditional medicine 98 Other (specify) 99 Don't know (check boxes)	
K12	If you have malaria, do you think you can get treatment?	__ __	1 yes 0 No 9 Don't Know (drop down)	
K13	Did you sleep under a bed net last night?	__ __	1 yes 0 No 9 Don't Know (drop down)	

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Q #	Question	Response	Options	Comments
K14	If no, why did you not sleep under a bed net?	__ __	01 I don't have one 02 uncomfortable 03 Its damaged 04 someone else uses it 05 I use a fan 06 Nowhere to tie/fix it 07 The weather is too hot 08 I use another method (coils, spray, repellant) 98 other (specify) 01 I don't have one 02 uncomfortable 03 Its damaged 04 someone else uses it 05 I use a fan 06 Nowhere to tie/fix it 07 The weather is too hot 08 I use another method (coils, spray, repellant) 98 other (specify) 99 Don't Know (drop down)	
K15	Since a member of our team last interviewed you, did a healthcare worker such as a nurse, community health nurse, or doctor tell you that you had malaria?	__ __	1 yes 0 No 9 Don't Know (drop down)	
Nutrition and health promotion				
N1	Since a member of our team last interviewed you, has the SHEP coordinator or teacher or health workers at your school ever talked to you about the following? (answer yes or no to each)	A. Anemia [if yes, answer N2] B. Malaria [if yes, answer N3] C. Deworming D. Clean Water E. Menstruation F. Eating iron rich foods G. Hand washing H. Avoiding eating clay or soil	1 yes 0 No 9 Don't Know (drop down)	

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Q #	Question	Response	Options	Comments
N2	What did the SHEP coordinator, teachers, or health workers say about anemia? (select all that are mentioned)	A. Eat local foods B. Improve your diet C. Menstruation can cause anemia D. Anemia can make you tired, weak, and/or sleepy E. Anemia can make you do poorly in school F. Anemia can make you have low blood during pregnancy G. Anemia can make your menstruation irregular H. Take deworming medication I. Other (specify)	1 yes 0 No 9 Don't Know (drop down)	
N3	What did the SHEP coordinator, teachers, or health workers say about malaria? (select all that are mentioned)	A. Use your bed net B. Keep areas around your quarters or compound tidy C. Eliminate standing water D. Use another method of mosquito control (coils, fan repellent, spray) E. Do not sleep outside F. Other	1 yes 0 No 9 Don't Know (drop down)	
N4	How many days per week do you usually eat meals sold or prepared at school?	__	(user entered integer)	
N5	Do you sometimes eat soil or clay? (agatawoe/ayilor/shire/ ferin kasa etc)	__	1 Yes 0 No	
N6	How often do you usually eat soil or clay?	__	01 every day 02 every week 03 once or twice a month 04 a few times per year 98 other (specify)	
N7	Why do you sometimes eat soil or clay?	__	01 Hungry 02 Nauseated 03 It tastes good, sweet, or appetizing 04 no cost 05 Makes me feel good. I crave it. 06 It smells good 98 Other (specify) 99 Don't know	

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Q #	Question	Response	Options	Comments
Dietary habits				
"Now we are going to talk about the different foods you might have consumed yesterday from the time you woke up, throughout the day, during the night until you finally went to sleep. I am going to read to you a list of foods and I would like you to tell me if or not you consumed those foods yesterday.				
F1	Any meats such as beef, pork, lamb, goat, wild game?	__	1 yes 0 No 9 Don't Know (drop down)	
F1a	How many days in the past 7 days did you eat it?	__	(integer)	
F2	Any chicken, duck, turkey, Guinea fowl or other birds, or meat products like sausage or kebabs?	__	1 yes 0 No 9 Don't Know (drop down)	
F2a	How many days in the past 7 days did you eat it?	__	(integer)	
F3	Any fish?	__	1 yes 0 No 9 Don't Know (drop down)	
F3a	How many days in the past 7 days did you eat it?	__	(integer)	
F4	Any liver, kidney, heart or other organ meats?	__	1 yes 0 No 9 Don't Know (drop down)	
F4a	How many days in the past 7 days did you eat it?	__	(integer)	
F5	Any eggs?	__	1 yes 0 No 9 Don't Know (drop down)	
F5a	How many days in the past 7 days did you eat it?	__	(integer)	
F6	Any dark green leafy vegetables or dishes made with dark green leafy vegetables such as cocoyam leaves, cassava leaves, bean leaves, pumpkin leaves, or spinach?	__	1 yes 0 No 9 Don't Know (drop down)	
F6a	How many days in the past 7 days did you eat it?	__	(integer)	
F7	Any oranges, lemons, sour sap (Aluguntugui), African star fruit (Alasa), pineapple, sweet apple (sweet sup), pawpaw, mango, or baobab pulp?		1 yes 0 No 9 Don't Know (drop down)	
F7a	How many days in the past 7 days did you eat it?		(integer)	

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Q #	Question	Response	Options	Comments
F8	Any cow pea, pigeon pea, soya beans, groundnuts, or melon seeds (agushie)?		1 yes 0 No 9 Don't Know (drop down)	
F8a	How many days in the past 7 days did you eat it?		(integer)	
F9	Any bread or flour products like brofrot, atsomor, polo, meat pie, cake, or tart?		1 yes 0 No 9 Don't Know (drop down)	
F9a	How many days in the past 7 days did you eat it?		(integer)	
F10	Any tea such as Lipton?		1 yes 0 No 9 Don't Know (drop down)	
F10a	How many days in the past 7 days did you have it?		(integer)	
F11	Any Milo, Ovaltine, Cerelac, Yumvita, or Nido?		1 yes 0 No 9 Don't Know (drop down)	
F11a	How many days in the past 7 days did you have it?		(integer)	
F12	Any local sugary drinks such as Hausa beer, sobolo, tamarind juice, asana or other sugary drinks?		1 yes 0 No 9 Don't Know (drop down)	
F12a	How many days in the past 7 days did you have it?		(integer)	
F13	Any foods that were fried such as plantain chips, yam chips, atsormor, polo, brofrot, kose, or meat pies?		1 yes 0 No 9 Don't Know (drop down)	
F13a	How many days in the past 7 days did you have it?		(integer)	
F14	How many days in the past 7 days did you eat a meal provided by the school?		(integer)	
F15	How many days in the past 7 days did you buy food on the school compound?		(integer)	
Reproductive Health				
R1	Have you started menstruating?	__ __	1 yes 0 No 9 Don't Know (drop down)	

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Q #	Question	Response	Options	Comments
Programme experiences with IFA				
P1	Since a member of our team last interviewed you, have you ever taken an IFA tablet at this school (show bottle/tablet)?		1 yes 0 No 9 Don't Know (drop down)	1, skip to P2
P1a	Why did you not receive am IFA tablet?		1 Teacher is not willing 2 I am not willing 8 Other	Skip to E1
P2	When did you last take an IFA tablet at this school?		01 this week 02 last week, 03 two weeks ago 04 more than a two weeks ago 99 Don't Know (drop down)	01 and 02, skip to QP4
P3	Why didn't you take an IFA last week?		01 was absent 02 there was no distribution 03 not enough IFA 04 lost the IFA 05 My school/ teacher was unwilling to provide IFA 98 Other (specify) 99 Don't Know (drop down)	
P4	On what day are IFA tablets usually distributed?		01 Monday 02 Tuesday 03 Wednesday 04 Thursday 05 Friday 06 different days 99 Don't know (drop down)	
P5	If you miss an IFA tablet, do you have another opportunity to get it?		1 yes 0 No 9 Don't Know (drop down)	
P5a	How do you get the IFA table you missed?		01 I look for the teacher/ coordinator to get the IFA 02 The Teacher looks for me with the IFA 03 Sometimes I look for the teacher , sometimes they look for me to take it 04 nothing – I wait for the next distribution 98 Other (specify) (drop down)	

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Q #	Question	Response	Options	Comments
P6	Do you usually eat before taking the IFA tablets?		01 yes 02 no 03 sometimes 99 Don't know (drop down)	
P7	Do you ever take the IFA on an empty stomach?		01 yes, most of the time 02 yes, sometimes 03 yes, once or twice 04 no, never 99 Don't know (drop down)	
P8	Why are you given IFA tablets? [select all responses given]		01 to improve my blood 02 to make me active 03 to help me concentrate 04 to improve my health 05 to improve/ regulate my menstruation 06 to make me feel fresh 07 to prevent pregnancy 08 improve school performance 98 Other (specify)	
P9	Have you noticed any differences/ changes since you started taking IFA tablets?		1 yes 0 no 9 Don't know (drop down)	
P10	What changes did you notice when you took IFA tablets? [select all responses given]		01 made me stronger 02 made me less sleepy 03 made me more active 04 gave me more appetite 05 helped me concentrate 06 improved my health 07 made my menstruation regular 08 made me feel fresh 09 made me feel dizzy 10 made me feel nauseous 11 gave me headaches 12 gave me stomach pains 13 prevented/ delayed/ shortened menstruation 14 made mensuration heavier and longer 15 made me too hungry 16 gave me diarrhea 17 made me constipated 18 gave me dark/ black stools 19 gave me smelly stools 98 other (specify)	

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Q #	Question	Response	Options	Comments
P11	Do you like the IFA tablets?	__ __	1 yes 2 no 0 yes and no 99 Don't know (drop down)	
P12	Why did you like the IFA? [select all responses given]		(check all that apply) 01 made me stronger 02 less sleepy 03 made me more active 04 gave me more appetite 05 helped me concentrate 06 improved my health 07 improved my menstruation 08 made me feel fresh 98 other (specify)	
P13	Why didn't you like the IFA? [select all responses given]		01 made me feel dizzy 02 made me feel nauseous 03 gave me headaches 04 gave me stomach pains 05 prevented menstruation made it irregular 06 made mensuration heavier and longer 07 made me too hungry 08 gave me diarrhea 09 made me constipated 10 gave me dark stools 11 gave me smelly stools 12 tastes bad 13 No water to take supplement 14 Hard to take on empty stomach 15 don't feel I need it 98 other (specify)	
P14	Did you ever refuse to take the IFA tablet?		1 yes 0 no 9 Don't know (drop down)	0, skip to P16

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Q #	Question	Response	Options	Comments
P15	Why did you refuse to take the IFA tablet? [select all responses given]		01 afraid it is a contraceptive 02 afraid it will make me sick 03 my parent/guardians don't want me to take it 04 my friends don't think I should take it. 05 don't know what is for? 06 don't like the taste 07 make me feel ill when I take it 08 teasing from boys or other students 09 I don't like to take medicine 98 other (specify)	
P16	Did you ever take the IFA but did not swallow it?		1 yes 0 no 9 Don't know (drop down)	0.0, skip to P18
P17	Why did you take the IFA but throw it away? [select all responses given]		01 afraid it is a contraceptive 02 afraid it will make me sick 03 my parent/guardians don't want me to take it 04 my friends don't think I should take it. 05 don't know what is for? 06 don't like the taste 07 make me feel ill when I take it 08 teasing from boys or other students 09 I don't like to take medicine 98 other (specify)	
P18	Do you have any suggestions about how to improve the IFA tablets? [select all responses given]		01 No suggestions 02 Change the color 03 make the tablet smaller 04 make the tablet larger 05 make the tablet taste better 98 Other (specify)	
P19	Have you shared your experiences on IFA with your friends or family?		1 yes 0 no 9 Don't know (drop down)	0.0, skip to E1

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Q #	Question	Response	Options	Comments
P20	What did you tell your friends or family about IFA? [select all responses given]		01 it improves blood 02 it makes people active 03 it helps people to concentrate 04 it improves health 05 it improves/ regulates menstruation 06 it helps prevent pregnancy 07 it improves school performance 08 it gives people headaches 09 it gives people stomach pain 10 it give people nausea 11 it gives people black and smelly stool 12 it tastes bad 98 Other (specify)	
Nutrition education sessions				
E1	Since a member of our team last interviewed you, did your SHEP coordinator/ teacher/health worker give any health or nutrition talks at School?		1 yes 0 no 9 Don't know (drop down)	
E2	What topics did they talk about?		01 How to take IFA 02 Importance of IFA 03 Anemia 04 Malaria prevention like bednets 05 Menstruation 06 Eating local foods rich in iron and folate 07 Hand washing 08 Personal hygiene 09 Family planning 10 Other health issues such as meningitis, TB, HIV, deworming 98 Other (specify)	
E3	How often do does your SHEP coordinator/ teacher talk about health nutrition or diet?		01 every day 02 every week 03 every two weeks 04 every month 05 every term 98 other (specify)	
E4	What is the name of the IFA distribution Programme?		01 Yes – GIFTS 02 Other name (type it) 99 Don't know	

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Q #	Question	Response	Options	Comments
General comments				
C1	[Please provide comments on anything unusual or note-worthy about this interview.]		(blank text box)	
Anthropometric and field test results panel				
A1	Stadiometer code	__ __	1-12 (drop down)	
A2	Scale code	__ __	1-12 (drop down)	
A3	Weight (kg)	__ __ __.__	Type in	These questions require double entry.
A4	Height (cm)	__ __ __.__	Type in	
A5	HemoCue® machine code	__ __	1-12 (drop down)	
A6	Hemoglobin	__ __.__	Type in	
A7	Malaria test	__ __	01 Negative (Control line only) 02 Positive P. Falciparum (Control and line 1) 03 Positive P. Vivax (Control and line 2) 04 Positive Mixed infection (All three lines) 05 Invalid (no lines after 20 minutes) (drop down)	
A8	Indicate if child was referred to nearest health facility for Hb <10g/dl and/ or positive malaria	__ __	1 yes – child referred 0 No – child did not need referral (drop down)	
A9	[Please provide any additional comments on the specimen collection or anthropometry.]		(Blank text box)	
A10	Enter the number of IFA tablets taken during:	Term 1: ___ Term 2: ___ Term 3: ___	(integers)	Information from the termly registers

ANNEXES

Annex 2: School-Teacher Questionnaires in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

GIFTS Programme BASELINE SCHOOL SURVEY - GHANA

A person who participated in the GIFTS training should be invited to participate in this interview

BASELINE QUESTIONNAIRE FOR SCHOOLS

Q#	Question	Responses	Comments
01	SCHOOL CODE NUMBER: _ _ _	01 – 60 (type number)	Once school code number is entered, the other cells should auto-populate. Check that they are correct.
02	NAME OF REGION: _ _	01 Volta 02 Northern (auto-populated)	
03	NAME OF SCHOOL	(auto-populated)	
04	LEVEL OF SCHOOL: _ _	01 Junior High School 02 Senior High School 03 Technical/vocational (auto-populated)	
05	TYPE OF SCHOOL: _ _	01 Public 02 Private (auto populated)	
06	DISTRICT NAME_ _	(auto-populated)	
Basic Information			
07	DATE OF INTERVIEW: _ _ / _ _ / _ _	(Drop down date range: DD/MM/YY)	
08	INTERVIEWER CODE: _ _	01 – 12 (drop down)	
	CONSENT: AS PART OF THE SCHOOL BASED SURVEY WE WILL BE INTERVIEWING SEVERAL GIRLS IN THE SCHOOL AND WE ALSO WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT ACTIVITIES IN THE SCHOOL. WE ALREADY HAVE PERMISSION FROM THE SCHOOL AND THE HEADMASTER/MISTRESS TO CONDUCT THIS INTERVIEW, MAY WE PROCEED?		
09	DO YOU HAVE CONSENT FOR INTERVIEW?	01 yes 02 no (drop down)	If no, stop the interview
10	WHAT IS YOUR FULL NAME?		
11	WHAT IS YOUR CONTACT NUMBER?		
12	WHAT IS YOUR ROLE AT THE SCHOOL?	01 SHEP Coordinator 02 Headmaster* 03 Teacher 04 Nurse/ Matron 05 Other (drop down)	For those answering "Other" (05), fill in the text box with their role.

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Q#	Question	Responses	Comments
School Information			
S1	WHAT IS THE ENROLLMENT OF GIRLS FROM EACH FORM OF THE SCHOOL? [You may need to consult the school headmaster/mistress or administrator.]	Form 1 __ __ __ __ Form 2 __ __ __ __ Form 3 __ __ __ __ (Enter number)	
S2	DO ANY STUDENTS LIVE/STAY AT THE SCHOOL? (e.g., a boarding school)	01 yes 02 no 99 Don't Know (drop down)	
S3	DOES THE SCHOOL ROUTINELY PROVIDE MEALS OR SNACKS TO ANY STUDENTS?	01 Yes, offered to all students 02 Yes, offered to some students 03 No 99 Don't Know (drop down)	If no (03) skip to S6.
S4	WHICH MEALS ARE PROVIDED TO STUDENTS? (SELECT ALL RESPONSES GIVEN)	01 Breakfast 02 Lunch 03 Dinner 04 Snack 05 All meals 99 Don't Know (check boxes)	
S5	YESTERDAY, DID ANY OF THE MEALS SERVED AT SCHOOL CONTAIN ANY OF THE FOLLOWING? (ANSWER EACH RESPONSE WITH YES, NO, OR DON'T KNOW)	01 Any meats such as beef, pork, lamb, goat, wild game 02 Any chicken, duck, turkey, guinea fowl, or other birds, or meat products like sausage or kebabs? 03 Any fish? 04 Any Liver, kidney, heart or other organ meats? 05 Any eggs? 06 Any dark green leafy vegetables or dishes made with dark green leafy vegetables such as cocoyam leaves, cassava leaves, bean leaves, pumpkin leaves, spinach and other dark green leafy vegetables 07 Cow pea, soya bean, groundnuts, melon seeds, 08 Any oranges, pineapple, pawpaw, or mango? 09 Bread made from wheat flour 10 Tea or cocoa 11 Micronutrient powders (check boxes with 01 yes, 02 no, or 99 don't know for 01-11)	"Yesterday" unless interview is conducted on a Monday. Last full day of school.

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Q#	Question	Responses	Comments
S6	HOW ARE STUDENTS WITH HEALTH PROBLEMS IDENTIFIED IN YOUR SCHOOL? (SELECT ALL RESPONSES GIVEN)	01 medical check for admission to school 02 Anemia screening? 03 Self report - Student reports health concern to school nurse/teacher 04 Parent report health concern to school nurse/teacher 05 Teacher reports problems 98 Other – specify 99 Don't know (check boxes)	DID YOU ATTEND TRAINING ON THE GIRLS IRON FOLIC ACID TABLET SUPPLEMENTATION (GIFTS) Programme?
S7	DID YOU ATTEND TRAINING ON THE GIRLS IRON FOLIC ACID TABLET SUPPLEMENTATION (GIFTS) Programme?	01 yes 02 no 99 Don't Know (drop down)	
S8	HAS YOUR SCHOOL RECEIVED YOUR IRON-FOLIC ACID TABLETS?	01 yes 02 no 99 Don't Know (drop down)	
S9	DOES YOUR SCHOOL HAVE A REGISTRY FOR TRACKING THE IRON FOLIC ACID TABLETS EACH GIRL RECEIVES?	01 yes 02 no 99 Don't Know (drop down)	
S10	DOES YOUR SCHOOL HAVE STUDENT HEALTH CLUBS?	01 yes 02 no 99 Don't Know (drop down)	
S11	DOES THE SCHOOL HAVE FUNCTIONING TOILETS/LATRINES FOR STUDENTS?	01 Yes, offered to all students 02 No 99 Don't Know (drop down)	
S12	DOES THE SCHOOL HAVE FUNCTIONING HANDWASHING FACILITIES FOR STUDENTS?	01 Yes, offered to all students 02 No 99 Don't Know (drop down)	If no or don't know, skip to A1
S13	IF YES, WHICH HANDWASHING FACILITIES DO YOU HAVE? (SELECT ALL RESPONSES GIVEN)	01 Tippy Tap 02 Veronica bucket 03 Sink and tap with running water 04 Washing pot 05 Jerry can 98 Other	

ANNEXES

Q#	Question	Responses	Comments
Anemia Knowledge			
A1	HAVE YOU EVER HEARD ABOUT ANEMIA [LOCAL TERM]?	01 yes 02 no 99 Don't Know (drop down)	
A2	HOW CAN YOU TELL IF SOMEONE HAS ANEMIA? (SELECT ALL RESPONSES GIVEN)	01 Lack of concentration 02 Weakness/ unable to work 03 Shortness of breath 04 Repeated infections 05 Pale eyes, pale nails, pale tongue 06 Dizziness/ Easy to faint 07 Sleepy/ Fatigue/ Tired 08 Feel cold 98 Other (specify) 99 Don't know (check boxes)	
A3	WHAT DO YOU THINK CAUSES ANEMIA? (SELECT ALL RESPONSES GIVEN)	01 Heavy loss of blood (menstrual cycle/ giving birth/ accident) 02 Poor diet 03 Diet lacks iron 04 Diet lacks vitamins 05 Malaria 06 Parasites 07 Lack of red meat in the diet 08 Eating soil/clay 98 Other (specify) 99 Don't know (check boxes)	
A4	WHAT MIGHT PREVENT ANEMIA? (SELECT ALL RESPONSES GIVEN)	01 Eating meat/liver 02 Eating green leafy vegetables 03 Preventing and treating malaria 04 Sleeping under a bed net 05 Preventing and treating worms/ parasites 06 Taking iron folic acid tablets or multi-vitamins 07 Seeking health care 08 Taking blood tonics 09 Sleeping well/ resting 98 other – specify 99 don't know (check boxes)	

ANNEXES

Q#	Question	Responses	Comments
A5	WHICH VITAMIN MINERAL DEFICIENCY IN THE BODY CAUSES ANEMIA? (SELECT ALL RESPONSES GIVEN)	01 Iron 02 Zinc 03 folate 04 B12 05 Vitamin A 06 Vitamin C 07 Vitamin D 98 Other (specify) 99 Don't know (check boxes)	
School Programmes			
NOW I AM GOING TO ASK YOU SOME QUESTIONS ABOUT THE HEALTH AND NUTRITION RELATED ACTIVITIES THAT MAY HAVE TAKEN PLACE AT THE SCHOOL DURING THE LAST TERM.			
P1	DURING THE LAST ACADEMIC YEAR, APPROXIMATELY HOW OFTEN WERE THERE HEALTH TALKS OR HEALTH EDUCATION SESSIONS CONDUCTED IN YOUR SCHOOL?	01 every week 02 every two weeks 03 once per month 04 once a term 05 Never 98 other - specify	
P2	DURING THE LAST ACADEMIC YEAR, WERE ANY OF THESE ACTIVITIES RELATED TO ANEMIA IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Deworming 02 Nutritional counselling 03 Anemia screening 04 Iron supplementation 05 Malaria control counselling 06 Supplementation with other micronutrients 98 Other (specify) (check boxes with 01 yes, 02 no, or 99 don't know)	
P3	DURING THE LAST ACADEMIC YEAR, WERE ANY OF THESE ACTIVITIES RELATED TO MALARIA IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Bed net distribution 02 Counselling on use of bed nets 03 Counselling on malaria prevention (eg, use of coils, spraying of compounds) 04 Education on identifying symptoms of malaria 05 Counselling on removal of stagnant water in the compound 98 other –specify (check boxes with 01 yes, 02 no, or 99 don't know)	

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Q#	Question	Responses	Comments
P4	DURING THE LAST ACADEMIC YEAR, WERE ANY OF THESE ACTIVITIES RELATED TO SEXUAL AND REPRODUCTIVE HEALTH IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Group counselling 02 Peer to peer groups 03 One on one counselling 04 Provision of condoms 98 other specify (check boxes with 01 yes, 02 no, or 99 don't know)	
P5	DURING THE LAST ACADEMIC YEAR, WERE ANY OF THESE ACTIVITIES RELATED TO WATER AND SANITATION IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Counselling and education on clean and safe water (eg water treatment) 02 Provision of soap 03 Counselling on use of toilets/ latrines 98 Other- specify (check boxes with 01 yes, 02 no, or 99 don't know)	
Instructions for Interviewer			
I1	TAKE A PICTURE OF THE SELECTED GIRLS TRACKING SHEET NOW	01 Done	These are interviewer prompts for photographing paper forms following the interview.
I2	TAKE A PICTURE OF THE COMPLETED LAB AND ANTHROPOMETRY FORM	01 Done	
I3	TAKE A PICTURE OF THE COMPLETED REFERRALS TRACKING FORM	01 Done	

ANNEXES

GIFTS **FOLLOW**-ON SCHOOL SURVEY   - GHANA

Where possible the same person interviewed at baseline should be interviewed now

BASELINE QUESTIONNAIRE FOR SCHOOLS

Q#	Question	Responses	Comments
01	SCHOOL CODE NUMBER: _ _ _	01 – 60 (type number)	Once school code number is entered, the other cells should auto-populate. Check that they are correct.
02	NAME OF REGION: _ _	01 Volta 02 Northern (auto-populated)	
03	NAME OF SCHOOL	(auto-populated)	
04	LEVEL OF SCHOOL: _ _	01 Junior High School 02 Senior High School 03 Technical/vocational (auto-populated)	
05	TYPE OF SCHOOL: _ _	01 Public 02 Private (auto populated)	
06	DISTRICT NAME_ _	(auto-populated)	
Basic Information			
07	DATE OF INTERVIEW: _ _ / _ _ / _ _	(Drop down date range: DD/MM/YY)	
08	INTERVIEWER NAME	1. Xoese Ashigbi 2. Wisdom Kodzo Anumah 3. David Tekpor 4. Emmanuel Kobby Fumador 5. Godwin Tawiah-Dzasah 6. Ignatius Great Sakada 7. Benedict O. Appiah 8. Florence Akua Koblaji 9. Eliasu Yakubu 10. Osman Zuberu 11. Braimah Brian Mumuni 12. Ibrahim Abdul Rahman 13. James Boyele Dakurah 14. Elvis Amankona 15. Abigail Armah 16. Vitalis Naafu 17. Issah Shani 18. Sumani Musah	
	CONSENT: AS PART OF THE FOLLOW- UP SCHOOL BASED SURVEY WE WILL BE INTERVIEWING SEVERAL GIRLS IN THE SCHOOL AND WE ALSO WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT ACTIVITIES IN THE SCHOOL. WE ALREADY HAVE PERMISSION FROM THE SCHOOL AND THE HEADMASTER/MISTRESS TO CONDUCT THIS INTERVIEW, MAY WE PROCEED?		
09	NAME OF RESPONDENT ON BEHALF OF THE SCHOOL	19. (drop-down list from baseline respondents)	If the baseline respondent is unavailable, answer 9a.
9a	NAME OF RESPONDENT ON BEHALF OF THE SCHOOL	(text box)	
10	WHAT IS YOUR CONTACT NUMBER?	(text box)	

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Q#	Question	Responses	Comments
11	DO YOU HAVE CONSENT FOR INTERVIEW?	1 yes 0 no (drop down)	
12	WHAT IS YOUR FULL NAME?	(text box)	
13	WHAT IS YOUR ROLE AT THE SCHOOL?	01 SHEP Coordinator 02Headmaster/ Headmistress 03 Teacher 04 Nurse/ Matron 98 Other (drop down)	
Dietary Information			
S1	DOES THE SCHOOL ROUTINELY PROVIDE MEALS OR SNACKS TO ANY STUDENTS?	01 Yes, offered to all students 02 Yes, offered to some students 03 No 99 Don't Know (drop down)	If no (03) skip to A1.
S2	WHICH MEALS ARE PROVIDED TO STUDENTS? (SELECT ALL RESPONSES GIVEN)		
	A BREAKFAST	1 yes 0 No 9 Don't Know (drop down)	
	B LUNCH	1 yes 0 No 9 Don't Know (drop down)	
	C DINNER	1 yes 0 No 9 Don't Know (drop down)	
	D SNACK	1 yes 0 No 9 Don't Know (drop down)	
S3	YESTERDAY, DID ANY OF THE MEALS SERVED AT SCHOOL CONTAIN ANY OF THE FOLLOWING? (ANSWER EACH RESPONSE WITH YES, NO, OR DON'T KNOW)		"Yesterday" unless interview is conducted on a Monday. Last full day of school.
A	ANY MEATS SUCH AS BEEF, PORK, LAMB, GOAT, WILD GAME?	1 yes 0 No 9 Don't Know (drop down)	
B	ANY CHICKEN, DUCK, TURKEY, GUINEA FOWL OR OTHER BIRDS, OR MEAT PRODUCTS LIKE SAUSAGE OR KEBABS?	1 yes 0 No 9 Don't Know (drop down)	

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Q#	Question	Responses	Comments
C	ANY FISH?	1 yes 0 No 9 Don't Know (drop down)	
D	ANY LIVER, KIDNEY, HEART OR OTHER ORGAN MEATS?	1 yes 0 No 9 Don't Know (drop down)	
E	ANY EGGS?	1 yes 0 No 9 Don't Know (drop down)	
F	ANY DARK GREEN LEAFY VEGETABLES OR DISHES MADE WITH DARK GREEN LEAFY VEGETABLES SUCH AS COCOYAM LEAVES, CASSAVA LEAVES, BEAN LEAVES, PUMPKIN LEAVES, OR SPINACH?	1 yes 0 No 9 Don't Know (drop down)	
G	ANY ORANGES, SOUR SAP (ALUGUNTUGUI), AFRICAN STAR FRUIT (ALASA), PINEAPPLE, SWEET APPLE (SWEET SUP), PAWPAW, MANGO, OR BAOBAB PULP?	1 yes 0 No 9 Don't Know (drop down)	
H	ANY COW PEA, PIGEON PEA, SOYA BEANS, GROUNDNUTS, OR MELON SEEDS (AGUSHIE) OR DISHES MADE FROM THESE?	1 yes 0 No 9 Don't Know (drop down)	
I	ANY BREAD OR FOODS LIKE BROFROT, ATSOMOR, POLO, MEAT PIE, CAKE, OR TART?	1 yes 0 No 9 Don't Know (drop down)	
J	ANY TEA SUCH AS LIPTON?	1 yes 0 No 9 Don't Know (drop down)	
K	ANY LOCAL JUICES SUCH AS HAUSA BEER, SOBOLO, TAMARIND JUICE, RICE WATER,ICE KENKEY, ASANA OR OTHER SUGARY DRINKS/ JUICES?	1 yes 0 No 9 Don't Know (drop down)	
L	ANY FOODS THAT WERE FRIED SUCH AS PLANTAIN CHIPS, YAM CHIPS, ACHUMO, POLO, BROFROT, KOSE, OR MEAT PIES?	1 yes 0 No 9 Don't Know (drop down)	

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Q#	Question	Responses	Comments
Anemia Knowledge			
A1	HAVE YOU EVER HEARD ABOUT ANEMIA [LOCAL TERM]?	1 yes 0 No 9 Don't Know (drop down)	
A2	HOW CAN YOU TELL IF SOMEONE HAS ANEMIA? (SELECT ALL RESPONSES GIVEN)	01 Lack of concentration 02 Weakness/ unable to work 03 Shortness of breath 04 Repeated infections 05 Pale eyes, pale nails, pale tongue 06 Dizziness/ Easy to faint 07 Sleepy/ Fatigue/ Tired 08 Feel cold 09 Loss of appetite 10 Fever 98 other (specify) 99 don't know	
A3	WHAT DO YOU THINK CAUSES ANEMIA? (SELECT ALL RESPONSES GIVEN)	01 Heavy loss of blood (menstrual cycle/ giving birth/ accident) 02 Poor diet 03 Diet lacks iron 04 Diet lacks vitamins 05 Malaria 06 Parasites 07 Lack of red meat in the diet 08 Eating soil/clay 98 Other (specify) 99 Don't know (check boxes)	
A4	WHAT DO YOU THINK CAN PREVENT ANEMIA? (SELECT ALL RESPONSES GIVEN)	01 Eating meat/liver 02 Eating green leafy vegetables 03 Preventing and treating malaria 04 Sleeping under a bed net 05 Preventing and treating worms/ parasites 06 Taking iron folic acid tablets or multi-vitamins 07 Seeking health care 08 Taking blood tonics 09 Sleeping well/ resting 10 Avoiding eating soil or clay 98 other – specify 99 don't know	

ANNEXES

Q#	Question	Responses	Comments
ProgrammeMATIC EXPERIENCES			
P1	HOW ARE STUDENTS WITH HEALTH PROBLEMS IDENTIFIED IN YOUR SCHOOL? (SELECT ALL RESPONSES GIVEN)	01 medical check for admission to school 02 Anemia screening? 03 Self report - Student reports health concern to school nurse/teacher 04 Parent report health concern to school nurse/teacher 05 Teacher reports problems 98 Other – specify 99 Don't know (check boxes)	
P2	DID YOU ATTEND TRAINING ON THE GIRLS IRON-FOLATE TABLET SUPPLEMENTATION (GIFTS) Programme?	1 yes 0 No 9 Don't Know (drop down)	If no (0) skip to P5
P3	APART FROM YOU, HOW MANY OTHERS WERE TRAINED ON THE GIFTS Programme FROM THIS SCHOOL?		WRITE NUMBER
P4	DO YOU FEEL YOUR TRAINING WAS ADEQUATE IN PREPARING YOU TO IMPLEMENT THE GIFTS Programme?	1 yes 0 No 9 Don't Know (drop down)	
P5	WHAT ADDITIONAL SUPPORT/ TRAINING WOULD BE IMPORTANT FOR YOU? (SELECT ALL RESPONSES GIVEN)		
P5	WHAT ADDITIONAL SUPPORT/ TRAINING WOULD BE IMPORTANT FOR YOU? (SELECT ALL RESPONSES GIVEN)	01 Additional/refresher training 02 More supervisory visits 03 Review and share experiences with other schools 04 Resources to supply water to students 05 Receive incentives 06 No additional support or training required 98 Other (specify) 99 Don't know	
P6	HAS YOUR SCHOOL EVER RECEIVED YOUR IRON-FOLIC ACID TABLETS?	1 yes 0 No 9 Don't Know (drop down)	
P7	WHERE DO YOU RECORD IFA TABLETS YOUR SCHOOL RECEIVES?	1 Note book 2 Bin Card 3 Do not record 98 Other (specify)	ASK TO VERIFY
P8	WHERE DO YOU STORE YOUR IFA TABLETS	1 SHEP Coordinator's Office 2 Headmasters Office 3 At home 4 Nurses bring it on distribution day 5 Staff common room 98 Other (specify)	

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Q#	Question	Responses	Comments
P9	HAS YOUR SCHOOL EXPERIENCED ANY KIND OF STOCK OUT OF IFA TABLETS SINCE THE BEGINNING OF THIS ACADEMIC YEAR?	1 yes 0 No 9 Don't Know (drop down)	If no (0), skip to P14
P10	HOW MANY STOCK OUTS HAS YOUR SCHOOL HAD?	__ __ (type number)	
P11	WHAT WAS DONE TO RESOLVE THE STOCK OUT? (SELECT ALL RESPONSES GIVEN)	01 Head master/mistress informed 02 District health administration informed 03 Contacted health facility 04 Borrowed from other school 98 Other (specify) 99 Don't know	
P12	WERE ANY DISTRIBUTIONS MISSED DUE TO STOCK OUTS?	1 yes 0 No 9 Don't Know (drop down)	
P13	HOW MANY DISTRIBUTIONS WERE MISSED?	__ __ (type number)	
P14	DOES YOUR SCHOOL HAVE A REGISTER FOR TRACKING THE IRON FOLIC ACID TABLETS EACH GIRL RECEIVES?	1 yes 0 No 9 Don't Know (drop down)	
P14a	WHAT KIND OF REGISTER DO YOU HAVE?	1 GIFTS register 2 Improvised register 8 Other	
P15	HAVE YOU HAD ANY DIFFICULTY COMPLETING THE GIFTS REGISTER?	1 yes 0 No 9 Don't Know (drop down)	
P16	WHAT DIFFICULTIES HAVE YOU EXPERIENCED WITH THE REGISTER? (SELECT ALL RESPONSES GIVEN)	01 Confusing 02 Not enough space to write 03 Unclear how to complete 04 Not enough sheets 05 Too many sheets/Sheets not collated 06 Students transfer in/out of school 07 Students use different names 08 Not enough time 09 No motivation 98 Other (specify)	
P17	WHAT INFORMATION HAVE YOU GIVEN THE GIRLS IN YOUR SCHOOL ABOUT HOW TO TAKE IFA? (SELECT ALL RESPONSES GIVEN)	01 To take it on a full stomach 02 To take with water 03 To take straight away 04 That it is NOT for family planning 98 Other (specify)	
P17a	WHAT INFORMATION HAVE YOU GIVEN THE GIRLS IN YOUR SCHOOL ABOUT THE BENEFITS OF IFA? (SELECT ALL RESPONSES GIVEN)	01 That it is good for their health 02 That it will strengthen their blood 03 That girls need it more than boys 98 Other (specify)	

ANNEXES

Q#	Question	Responses	Comments
P18	WHAT INFORMATION HAVE YOU GIVIEN THE GIRLS IN YOUR SCHOOL ABOUT HOW TO PREVENT ANEMIA?	01 Eating meat/liver 02 Eating green leafy vegetables 03 Preventing and treating malaria 04 Sleeping under a bed net 05 Preventing and treating worms/ parasites 06 Taking Iron & Folic Acid tablets or multi-vitamins 07 Seeking health care 08 Taking blood tonics 09 Sleeping well/ resting 10 Avoiding eating soil or clay 98 other – specify 99 don't know (check boxes)	
P19	IN GENERAL, HOW DO GIRLS RESPOND TO TAKING IFA IN YOUR SCHOOL	01 Most like it / Positive feelings 02 Some like it / Somewhat positive feelings 03 Most neither like nor dislike it / Neutral feelings 04 Most dislike it / Negative feelings 98 Other	
P20	HAVE THERE BEEN ANY CONCERNS AMONG THE GIRLS ABOUT TAKING THE IFA?	1 yes 0 no 9 Don't Know (drop down)	If no, (0) skip to P24
P21	WHAT HAVE THESE MAIN CONCERNS BEEN ABOUT? (SELECT ALL RESPONSES GIVEN)	01 Family planning 02 Increased fertility 03 Altered menstruation 04 Side effects after taking the IFA 05 Difficulties getting water to take the IFA 06 Difficulties taking the IFA on a full stomach 07 Being teased 98 Other (specify)	
P22	HAS ANY GIRL REFUSED TO TAKE THE IFA?	1 yes 0 No 9 Don't Know (drop down)	If no, (0) skip to P24

ANNEXES

Q#	Question	Responses	Comments
P23	WHAT DID YOU DO IF A GIRL REFUSED TO TAKE THE IFA? (SELECT ALL RESPONSES GIVEN)	01 I talked to her and explained its importance 02 I talked to her and said she had to take it 03 I talked to her and told her she would get sick without it 04 I told her not to take it if she didn't want to 05 I told her I would inform the school 06 I told her I would inform her parents 98 Other (specify)	
P24	HAVE YOU EXPERIENCED ANY DIFFICULTIES IMPLEMENTING THE IFA DISTRIBUTION IN THE SCHOOL?	1 yes 0 No 9 Don't Know (drop down)	If no (0), skip to P26
P25	WHAT DIFFICULTIES HAVE YOU EXPERIENCED? (SELECT ALL RESPONSES GIVEN)	01 Distribution is too time consuming 02 Lack of support from the school / other teachers 03 Girls resist taking the IFA 04 Hard to track down girls absent on distribution 05 Hard to provide water/cups to take IFA 06 Hard to provide cups to take IFA 07 Hard to maintain registry 98 Other (specify)	
P26	SINCE THIS ACADEMIC YEAR BEGAN HAVE YOU OR THE SCHOOL HAD ANY EVENT WITH PARENTS TO TALK TO THEM ABOUT THE PURPOSE OF THE IFA SUPPLEMENT?	1 yes 0 No 9 Don't Know (drop down)	
P27	HAVE YOU EXPERIENCED ANY DIFFICULTIES WITH THE IFA AND GIFTS Programme IN THE COMMUNITY?	1 yes 0 No 9 Don't Know (drop down)	If no (0), skip to P29
P28	WHAT DIFFICULTIES HAVE YOU EXPERIENCED? (SELECT ALL RESPONSES GIVEN	01 Community are suspicious about IFA 02 Community want to know why IFA is only given to girls 03 Concerns about family planning 04 Concerns about the safety of IFA 98 Other (specify)	
P29	OVERALL, WHAT DO YOU THINK ABOUT THE GIFTS Programme? (SELECT ALL RESPONSES GIVEN)	01 Hard to implement 02 Too time consuming 03 Boys should be included too 04 Important for the health of girls 98 Other (specify)	

ANNEXES

Q#	Question	Responses	Comments
P30	IN YOUR OPINION, WHAT CAN BE DONE TO IMPROVE THE GIFTS Programme? [PROBE IMPROVEMENTS WITH DISTRIBUTION, RESOURCES AVAILABLE, TRAINING, RECORDING DATA]	01 Have more training 02 have more materials to support the Programme (poster, flyers etc,) 03 more support for community sensitization 04 revise the registry 05 make distribution less frequent 06 provide more supervision 07 Train multiple teachers 08 have more teachers supporting distribution 98 Other (specify)	
School facilities			
F1	DOES YOUR SCHOOL HAVE STUDENT HEALTH CLUBS (SUCH AS CLUBS THAT DISCUSS ADOLESCENT HEALTH, HYGIENE, ETC)?	1 yes 0 No 9 Don't Know (drop down)	
F2	ARE THESE HEALTH CLUBS ACTIVE?	1 yes 0 No 9 Don't Know (drop down)	
F3	DOES THE SCHOOL HAVE FUNCTIONING TOILETS/LATRINES FOR STUDENTS?	1 yes 0 No 9 Don't Know (drop down)	
F4	DOES THE SCHOOL HAVE FUNCTIONING HANDWASHING FACILITIES FOR STUDENTS?	1 yes 0 No 9 Don't Know (drop down)	If no or don't know, skip to N1
F5	IF YES, WHICH HANDWASHING FACILITIES DO YOU HAVE? (SELECT ALL RESPONSES GIVEN)	01 Tippy Tap 02 Veronica bucket 03 Sink and tap with running water 04 Washing bowl 05 Jerry can 98 Other	
School Programmes			
NOW I AM GOING TO ASK YOU SOME QUESTIONS ABOUT THE HEALTH AND NUTRITION RELATED ACTIVITIES THAT MAY HAVE TAKEN PLACE AT THE SCHOOL SINCE THE START OF THIS SCHOOL YEAR IN SEPTEMBER 2017.			
N1	DURING THIS ACADEMIC YEAR, APPROXIMATELY HOW OFTEN HAVE HEALTH TALKS OR HEALTH EDUCATION SESSIONS CONDUCTED IN YOUR SCHOOL?	01 every week 02 every two weeks 03 once per month 04 once a term 05 once or twice per term 06 Never 98 other – specify	

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Q#	Question	Responses	Comments
N2	DURING THIS ACADEMIC YEAR, HAVE ANY OF THESE ACTIVITIES RELATED TO ANEMIA BEEN IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Deworming 02 Nutritional counselling 03 Anemia screening 04 Iron supplementation 05 Iron and folic acid supplementation (IFA) 06 Malaria control counselling 07 Supplementation with other micronutrients 08 Counselling on anemia 09 Counselling on IFA 98 Other (specify)	
N3	DURING THIS ACADEMIC YEAR, HAVE ANY OF THESE ACTIVITIES RELATED TO MALARIA BEEN IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Bed net distribution 02 Counselling on use of bed nets 03 Counselling on malaria prevention (eg, use of coils, spraying of compounds) 04 Education on identifying symptoms of malaria 05 Counselling on removal of stagnant water in the compound 98 other –specify (check boxes with 01 yes, 02 no, or 99 don't know)	
N4	DURING THIS ACADEMIC YEAR, HAVE ANY OF THESE ACTIVITIES RELATED TO SEXUAL AND REPRODUCTIVE HEALTH BEEN IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Group counselling 02 Peer to peer groups 03 One on one counselling 04 Provision of condoms 98 other specify (check boxes with 01 yes, 02 no, or 99 don't know)	
N5	DURING THIS THIS ACADEMIC YEAR, HAVE ANY OF THESE ACTIVITIES RELATED TO WATER AND SANITATION BEEN IMPLEMENTED? (SELECT ALL RESPONSES GIVEN)	01 Counselling and education on clean and safe water (eg water treatment) 02 Handwashing with soap 03 Counselling on use of toilets/latrines 98 Other- specify (check boxes with 01 yes, 02 no, or 99 don't know)	
N6	HOW DO YOU DECIDE WHICH TOPICS TO DISCUSS AND HOW OFTEN?	01 I decide what is important to discuss and prepare talks 02 The headmaster/mistress decides 03 Other teachers at the school decide what should be discussed 98 Other (specify)	
N7	WOULD YOU FIND IT HELPFUL TO HAVE A CURRICULUM WITH TOPICS TO DISCUSS AND A SCHEDULE?	1 yes 0 No 9 Don't Know (drop down)	

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Q#	Question	Responses	Comments
N8	WHAT TIME OF DAY DO YOU USUALLY GIVE YOUR HEALTH AND NUTRITION TALKS? (SELECT ALL RESPONSES GIVEN)	01 morning assembly 02 afternoon assembly 03 during your classes 04 at special events or assemblies 05 When IFA is distributed 06 During worship 98 Other (specify) 99 Don't know	
N9	APPROXIMATELY HOW LONG DO YOUR HEALTH TALKS USUALLY TAKE, IN MINUTES?	__ __ (type time in minutes)	
Instructions for Interviewer			
I1	HOW MANY WEEKS WERE IN:	Term 1: ___ Term 2: ___ Term 3: ___	This information should come from the termly registers and be recorded on the intensive monitoring form as well.
I2	TAKE A PICTURE OF THE COMPLETED LAB AND ANTHROPOMETRY FORM	01 Done	These are interviewer prompts for photographing paper forms following the interview.
I3	TAKE A PICTURE OF THE INTENSIVE MONITORING FORM	01 Done	

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Annex 3: School Environment

Annex 3.1: Student Health Problems and School Facilities in Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Teacher Experience – IFA Training Received

| | | Overall (Northern + Volta) | | | |
| | | Baseline | | Follow-on | |
	n	Unweighted% (95% CI)	n	Unweighted% (95% CI)	P-value
JHS		**N=30**		**N=30**	
How students with health problems are identified in the school					
Medical check for admission	0	-	3	10.0 (0.0.0,20.9)	-
Anemia screening	0	-	4	13.3 (1.0.0,25.7)	-
Students Self-report health concerns	25	83.3(69.8,96.9)	28	93.3 (84.3,100.0)	0.22
Parent report	8	26.7(10.6,42.7)	14	46.7 (28.6,64.8)	0.11
Teacher reports	14	46.7(28.6,64.8)	22	73.3 (57.3,89.4)	0.03
Other	10	33.3(16.2,50.4)	8	26.7 (10.6,42.7)	0.57
School has health clubs	10	33.3(16.2,50.4)	19	63.3 (45.8,80.8)	0.02
School has functioning toilets or latrines	22	73.3(57.3,89.4)	23	76.7 (61.3,92.0)	0.77
School has handwashing facilities	22	73.3(57.3,89.4)	23	76.7 (61.3,92.0)	0.77
Type of handwashing facilities, among those schools which have them(N=22/23)					
Tippy tap		xx	19	xx	-
Veronica bucket		xx	14	xx	-
Sink and tap with running water		xx	1	xx	-
Washing bowl		xx	5	xx	-
SHS		**N=30**		**N=30**	
How students with health problems are identified in the school					
Medical check for admission	5	16.7 (3.1,30.2)	9	30.0 (13.4,46.6)	0.227
Anemia screening	0	-	1	3.3 (0.0.0,9.8)	-
Students Self-report health concerns	29	96.7 (90.2,100.0)	27	90.0 (79.1,100.0)	0.30
Parent report	7	23.3 (8.0.0,38.7)	9	30.0 (13.4,46.6)	0.56
Teacher reports	14	46.7(28.6,64.8)	19	63.3 (45.8,80.8)	0.19
Other	5	16.7 (3.1,30.2)	8	26.7 (10.6,42.7)	0.35
School has health clubs	13	43.3(25.3,61.3)	14	46.7 (28.6,64.8)	0.795
School has functioning toilets or la-trines	26	86.7 (74.3,99.0)	27	90.0 (79.1,100.0)	0.67
School has handwashing facilities	14	46.7(28.6,64.8)	18	60.0 (42.2,77.8)	0.30

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| | | Overall (Northern + Volta) | | | |
| | | Baseline | | Follow-on | |
	n	Unweighted% (95% CI)	n	Unweighted% (95% CI)	P-value
Type of handwashing facilities, among those schools which have them (N=14, 18)					
Tippy tap		xx	7	xx	-
Veronica bucket		xx	12	xx	-
Sink and tap with running water		xx	1	xx	-
Washing bowl		xx	3	xx	-
Other		xx	2	xx	-
xx. Percentage estimates not shown due to low denominators n < 25.					

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Annex 3.2: School Nutrition and Health Promotion Talks– Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Annex Table 3.2: Health and Nutrition Promotion Talks in During Academic Year

Topic	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
JHS	N=30		N=30		N=30		N=30		N=60		N=60		
At least 1 talk	382	97.6 (95.8, 99.4)	322	87.8 (83.5, 92.1)	381	99.8 (99.4, 100.0)	351	92.7 (89.6, 95.8)	763	98.5 (97.4, 99.6)	673	89.9 (86.9, 92.8)	<.01
At least 3 talks	247	67.9 (56.1, 79.7)	209	58.8 (49.2, 68.4)	329	87.7 (82.9, 92.5)	304	79.4 (71.9, 86.8)	576	76.0 (67.9, 84.1)	513	67.5 (60.1, 74.8)	0.02
Anemia	107	29.0 (23.5, 34.4)	132	41.5 (30.3, 52.8)	203	54.8 (46, 63.6)	271	74.6 (66.1, 83.0)	310	39.6 (32.5, 46.7)	403	55.4 (45.8, 64.9)	<.01
Malaria	272	72.4 (62.5, 82.4)	198	58.6 (51.5, 65.7)	325	86.5 (78.3, 94.7)	261	70.2 (64.4, 76.0)	597	78.2 (70.9, 85.6)	459	63.4 (58.4, 68.5)	0.02
Deworming	118	34.9 (23.5, 46.3)	113	35 (24.7, 45.3)	219	59.9 (47.9, 71.9)	136	40.9 (30.5, 51.3)	337	45.1 (35.4, 54.9)	249	37.5 (29.9, 45.1)	0.04
Clean Water	307	78.8 (74.9, 82.7)	240	67.8 (63.3, 72.3)	339	89.6 (85.9, 93.4)	302	83.8 (79.9, 87.6)	646	83.2 (79.5, 86.9)	542	74.5 (69.9, 79.1)	<.01
Menstruation	270	70.1 (61.2, 79.1)	267	77.0 (71.4, 82.6)	339	90.1 (85.6, 94.5)	332	93.5 (90.1, 96.9)	609	78.3 (71.3, 85.3)	599	83.9 (78.9, 88.9)	<0.05
Eat iron rich foods	131	34.8 (23.3, 46.3)	197	59.6 (50.4, 68.8)	194	50.9 (43.9, 57.9)	230	59.8 (49.2, 70.5)	325	41.4 (33.3, 49.5)	427	59.7 (52.7, 66.6)	<0. 01
Hand washing	332	85.5 (79.1, 91.8)	290	85.3 (78.5, 92.1)	370	97.5 (95.4, 99.7)	317	89.0 (85.2, 92.8)	702	90.4 (85.9, 94.9)	607	86.9 (82.6, 91.1)	0.17
Avoid eating clay or soil	-	-	162	49.0 (41.2, 56.9)	-	-	163	40.2 (29.0, 51.3)	-	-	325	45.3 (38.1, 52.5)	-
SHS	N=371		N=326		N=405		N=377		N=776		N=703		
At least 1 talk	337	91.0 (86.5, 95.5)	283	81 (76.7, 85.3)	359	88.2 (81.5, 94.9)	342	82.2 (79, 85.3)	696	89.9 (86, 93.7)	625	81.5 (78.7, 84.3)	<0.01

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Topic	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall (Northern + Volta) Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
At least 3 talks	217	58.8 (52.4, 65.3)	171	48.8 (40.9, 56.8)	219	53.6 (41.4, 65.8)	236	54.7 (50.8, 58.5)	436	56.7 (50.5, 62.9)	407	51.2 (46.1, 56.3)	0.23
Anemia	90	26.0 (14, 38)	103	32.6 (25.6, 39.6)	104	25.0 (17.5, 32.5)	211	49.9 (45.2, 54.6)	194	25.6 (17.8, 33.4)	314	39.8 (34.4, 45.1)	0.01
Malaria	227	62.0 (52.6, 71.3)	163	50.2 (41.9, 58.5)	232	55.9 (46.7, 65.1)	214	50.3 (42.2, 58.4)	459	59.5 (52.7, 66.3)	377	50.2 (44.3, 56.1)	0.05
Deworming	110	29.3 (21.3, 37.3)	60	19.8 (12.2, 27.4)	145	36.8 (28.8, 44.7)	108	23.9 (19.0, 28.7)	255	32.3 (26.2, 38.5)	168	21.5 (16.6, 26.4)	0.01
Clean Water	252	68.9 (62.5, 75.4)	206	63.9 (53.6, 74.3)	247	58.7 (45.1, 72.2)	233	58.6 (53.2, 64)	499	64.8 (57.8, 71.7)	439	61.7 (55, 68.4)	0.47
Menstruation	297	79.7 (75.4, 84.1)	228	71.5 (65.7, 77.2)	301	75.7 (65.7, 85.6)	299	74.2 (69.0, 79.4)	598	78.1 (73.4, 82.8)	527	72.6 (68.6, 76.6)	0.11
Eat iron rich foods	137	32.4 (24, 40.8)	133	39.7 (33.0, 46.4)	133	32.2 (23.5, 40.9)	216	55.7 (49.9, 61.6)	270	32.3 (26.2, 38.4)	349	46.3 (40.5, 52.1)	<0.01
Hand washing	273	74.0 (67.2, 80.7)	236	72.2 (64, 80.4)	301	74.2 (62.5, 85.8)	271	66.9 (62.5, 71.3)	574	74.1 (67.9, 80.2)	507	70.0 (64.6, 75.4)	0.24
Avoid eating clay or soil	-	-	95	28.0 (20.4, 35.6)	-	-	138	29.2 (18.4, 40.1)	-	-	233	28.5 (22.2, 34.8)	-

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Annex 3.3: Meals Purchased or Provided on School Compound– Stratified Region and School level Results in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Teacher Experience – IFA Training Received

		Northern		Volta		Overall (Northern + Volta)	
		Baseline		Follow-on			
	n	Unweighted% (95% CI)	n	Unweighted% (95% CI)	n	Unweighted% (95% CI)	
JHS		**N=351**		**N=358**		**N=709**	
Meals provided by the school							
0 days/week	350	99.6 (98.9,100.0)	344	95.1 (89.9,100.0)	694	97.7 (95.2,100.0)	
Meals purchased1 on the school compound							
0 days/week	95	23.3 (9.5,37.2)	26	8.0 (4.9,11.2)	121	16.9 (8.4,25.4)	
1-3 days/week	113	32.9 (26.1,39.7)	85	23.5 (14.9,32.1)	198	29.0 (23.2,34.7)	
4-6 days/week	141	43.2 (30.3,56.0)	243	67.7 (57.3,78.1)	384	53.5 (43.7,63.2)	
7 days/week	2	0.6 (0.0.0,1.4)	4	0.8 (0.0,1.7)	6	0.7 (0.1,1.3)	
SHS		**N=326**		**N=377**	**N=703**		
Meals provided by the school							
0 days/week	132	33.9 (18.2,49.6)	194	45.4 (36.6,54.2)	326	38.7 (28.2,49.1)	
1-3 days/week	31	10.8 (6.3,15.3)	22	8.7 (3.8,13.6)	53	9.9 (6.6,13.3)	
4-6 days/week	49	18.7 (10.9,26.5)	19	8.1 (4.4,11.8)	68	14.3 (8.8,19.8)	
7 days/week	114	36.6 (25.0,48.2)	142	37.8 (28.5,47.1)	256	37.1 (29.3,44.9)	
Meals purchased1 on the school compound							
0 days/week	46	10.8 (5.3,16.3)	59	11 (6.1,15.9)	105	10.9 (7.1,14.7)	
1-3 days/week	110	34.9 (30.0,39.8)	142	37.8 (31.8,43.7)	252	36.1 (32.3,39.8)	
4-6 days/week	112	35.5 (24.7,46.4)	138	36 (23.9,48.1)	250	35.7 (27.6,43.8)	
7 days/week	58	18.8 (12.8,24.7)	38	15.2 (0.9,29.5)	96	17.3 (10.5,24.1)	

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Annex 4: Student Anemia KAP

Annex 4.1: Student Knowledge: Signs of Anemia – Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Topic	Northern Baseline		Northern Follow-on		Volta Baseline		Volta Follow-on		Overall (Northern + Volta) Baseline		Overall Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
JHS		N=116		N=253		N=300		N=355		N=416		N=608	
Lack concentration	0	-	2	0.7 (0.0, 1.8)	4	0.9 (0.0, 2)	9	3.3 (1.4, 5.3)	4	0.6 (0.0, 1.3)	11	2.0 (0.7, 3.3)	0.09
Weakness	22	15.3 (6.7, 23.9)	61	24 (15.7, 32.3)	58	20.9 (14.3, 27.4)	83	22.6 (16.8, 28.3)	80	18.9 (13.5, 24.3)	144	23.3 (18.2, 28.4)	0.23
Shortness of breath	2	2.4 (0.0, 5.2)	2	1.0 (0.0, 2.3)	5	1.9 (0.3, 3.6)	6	1.2 (0.2, 2.2)	7	2.1 (0.6, 3.6)	8	1.1 (0.3, 1.9)	0.11
Repeated infections	2	2.2 (0.0, 5.1)	14	5.1 (2.5, 7.8)	9	2.3 (0.3, 4.4)	23	5.9 (3.4, 8.4)	11	2.3 (0.6, 4.0)	37	5.5 (3.7, 7.3)	0.02
Pale eyes, nails, or tongue	34	26.3 (11.9, 40.7)	137	52.1 (38.4, 65.7)	172	52.6 (42.9, 62.2)	187	45.4 (34, 56.8)	206	43 (34.2, 51.9)	324	48.8 (39.5, 58.2)	0.23
Dizziness/ faint	2	1.7 (0.0, 4.3)	25	10.5 (6.2, 14.8)	44	13.9 (9.5, 18.3)	64	18.1 (12.6, 23.6)	46	9.5 (5.7, 13.3)	89	14.2 (10.4, 18)	0.03
Feel cold	0	-	6	2.8 (0.0, 5.7)	4	2.8 (0.2, 5.4)	12	4.6 (1.4, 7.7)	4	1.8 (0.0, 3.7)	18	3.7 (1.4, 5.9)	0.07
Loss of appetite	-	-	22	8.1 (3.7, 12.5)	-	-	22	6.9 (3.7, 10.1)	-	-	44	7.5 (4.8, 10.3)	-
Fever	-	-	10	4.2 (1.6, 6.8)	-	-	24	8.4 (2.5, 14.4)	-	-	34	6.3 (2.8, 9.7)	-
Other	17	14.1 (8.8, 19.5)	72	30.4 (23.4, 37.4)	46	19.8 (10.1, 29.5)	52	19.2 (11.5, 26.9)	63	17.7 (10.9, 24.6)	124	25 (19.6, 30.3)	
SHS		N=185		N=274		N=339		N=371		N=524		N=645	
Lack concen-tration	2	0.7 (0.0, 1.9)	11	4.7 (1.3, 8.1)	10	2.9 (0.4, 5.5)	4	1.4 (0.1, 2.8)	12	1.9 (0.3, 3.5)	15	3.3 (1.1, 5.4)	0.30

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Topic	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
Weakness	24	13.7 (7.7, 19.8)	52	20.1 (13.5, 26.7)	82	32.4 (20.9, 43.9)	88	24.7 (21, 28.4)	106	23.7 (14.8, 32.7)	140	22.1 (18, 26.3)	0.69
Shortness of breath	0	-	0	-	3	0.8 (0.0, 1.7)	1	0.1 (0.0, 0.3)	3	0.4 (0.0, 0.9)	1	0.0 (0.0, 0.1)	0.02
Repeated infections	3	1.7 (0.0, 5)	17	6.3 (2.4, 10.1)	6	1.6 (0.2, 3.1)	14	3.7 (1.0, 6.3)	9	1.7 (0.0, 3.4)	31	5.1 (2.6, 7.6)	0.02
Pale eyes, nails, or tongue	54	33.9 (20.4, 47.5)	123	50.1 (35.2, 65.1)	154	43.5 (32.6, 54.4)	190	54.8 (45.1, 64.6)	208	39.1 (30.7, 47.4)	313	52.2 (42.9, 61.6)	<0.01
Dizziness/ faint	8	5.1 (1.5, 8.8)	39	15.3 (8.4, 22.3)	76	27.9 (19.8, 36)	107	33.3 (24.6, 42.1)	84	17.3 (9.6, 25.1)	146	23.4 (16.3, 30.5)	0.06
Sleepy/ Fatigue/ Tired	13	9.4 (4.4, 14.3)	29	9.2 (5.1, 13.3)	40	17.4 (8.1, 26.7)	47	18.8 (8.4, 29.3)	53	13.7 (7.5, 19.8)	76	13.5 (7.4, 19.6)	0.93
Feel cold	6	2.6 (0.0, 5.9)	18	8.3 (3.5, 13.2)	12	3.6 (0.3, 6.8)	19	3.4 (1.6, 5.3)	18	3.1 (0.8, 5.4)	37	6.1 (2.9, 9.4)	0.17
Loss of appetite	-		40	16.1 (8.7, 23.5)	-		35	10.1 (5.6, 14.7)	-		75	13.4 (8.4, 18.4)	-
Sign of anemia	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**n**	**% (95% CI)**	**P-value**
Fever	-	-	13	5.4 (2.8, 8.1)	-	-	41	9.3 (4.6, 13.9)	-	-	54	7.2 (4.6, 9.7)	-
Other	27	15.5 (9.7, 21.3)	83	28.1 (19.6, 36.6)	77	22.3 (17.0, 27.7)	57	16.2 (12.3, 20.1)	104	19.2 (15.0, 23.4)	140	22.8 (17.5, 28.1)	0.26

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population.. Other includes monthly blood loss, anorexia, blood pressure, blood/lab tests, cannot tell, chest pains, cold palms and feet, headache, cough, defecating, weight loss, weight gain, does not lose blood when he or she gets cuts, don't know, dry skin, vomiting, easily getting sick, edema, yellowish eyes, feels sick of malaria, irregular menstruation, lack of blood, reddish hair, big belly, body pains, rashes, diarxrhea, rapid heartbeat, the person will be worried, stunted growth, sunken eyes, "you don't talk plenty when you anemia."

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Annex 4.2: Student Knowledge: Causes of Anemia – Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Cause of anemia	Northern Baseline		Northern Follow-on		Volta Baseline		Volta Follow-on		Overall (Northern + Volta) Baseline		Overall (Northern + Volta) Follow-on		P-value
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
JHS	**N=116**		**N=253**		**N=300**		**N=355**		**N=416**		**N=608**		
Heavy loss of blood	8	7.3 (0.0, 15.9)	40	16.5 (8.7, 24.3)	70	21.4 (13.4, 29.3)	75	20.0 (14.3, 25.8)	78	16.3 (10.0, 22.5)	115	18.2 (13.4, 23.1)	0.50
Poor diet	35	29.7 (14.9, 44.5)	161	64.0 (54.5, 73.4)	135	47.0 (36.7, 57.4)	189	50.0 (42, 58.1)	170	40.7 (31.3, 50.2)	350	57.2 (49.8, 64.6)	0.01
Malaria	14	11.0 (5.4, 16.5)	38	12.9 (7.5, 18.3)	78	22.9 (14.4, 31.3)	75	18.8 (13.9, 23.7)	92	18.6 (12.4, 24.7)	113	15.8 (12, 19.6)	0.25
Parasites	0	-	12	4.1 (0.5, 7.8)	9	2.5 (0.4, 4.5)	5	2 (0.0, 4.3)	9	1.6 (0.2, 3)	17	3.1 (0.9, 5.3)	0.26
Lack of red meat in the diet	2	1.5 (0.0, 3.6)	13	5.5 (0.7, 10.2)	8	3.2 (0.2, 6.2)	7	1.8 (0.3, 3.2)	10	2.6 (0.5, 4.7)	20	3.7 (1.0, 6.3)	0.50
Diet lacks iron	0	-	0	-	8	2 (0.0, 4.2)	16	5.0 (2.0, 8.1)	8	1.3 (0.0, 2.7)	16	2.4 (0.5, 4.4)	0.32
Diet lacks folate	0	-	1	0.2 (0.0, 0.5)	0	-	1	0.2 (0.0, 0.6)	0	-	2	0.2 (0.0, 0.4)	-
Diet lacks vitamin B12	0	-	2	0.9 (0.0, 2.6)	0	-	4	0.7 (0.0, 1.4)	0	-	6	0.8 (0.0, 1.8)	-
Diet lacks other vitamins/ minerals	0	-	17	6.8 (0.0, 13.9)	1	0.3 (0.0, 0.8)	3	1.0 (0.0, 2.2)	1	0.2 (0.0, 0.5)	20	4.0 (0.2, 7.8)	<.001
Eating soil/clay	0	-	2	1.1 (0.0, 2.5)	5	1.7 (0.2, 3.2)	3	1.0 (0.0, 2.3)	5	1.1 (0.0, 2.2)	5	1.1 (0.2, 2)	1.00
Other	14	14.4 (6.6, 22.2)	53	20.6 (14.7, 26.5)	20	7.1 (2.7, 11.6)	37	13.4 (6.8, 20)	34	9.8 (5.5, 14.1)	90	17.1 (12.8, 21.4)	-

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Cause of anemia	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall (Northern + Volta) Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
JHS		N=116		N=253		N=300		N=355		N=416		N=608	
Heavy loss of blood	13	5.0 (1.4, 8.6)	51	22.4 (14.1, 30.6)	94	32.6 (25.2, 40.0)	86	26.8 (22.8, 30.8)	107	19.8 (11.6, 27.9)	137	24.4 (19.4, 29.3)	0.30
Poor diet	53	34.5 (19, 50.1)	178	67.7 (60.2, 75.3)	147	49.3 (41, 57.6)	188	58.1 (50.9, 65.3)	200	42.4 (33.4, 51.4)	366	63.4 (57.8, 69.1)	<.01
Malaria	17	9 (5.6, 12.5)	36	13.2 (8.4, 18)	42	11.4 (5, 17.8)	62	11.9 (7.1, 16.7)	59	10.3 (6.5, 14.1)	98	12.6 (9.1, 16.1)	0.31
Parasites	1	0.5 (0.0, 1.4)	10	4.4 (1.9, 6.9)	9	1.8 (0.5, 3.2)	7	1.9 (0.2, 3.5)	10	1.2 (0.3, 2.1)	17	3.3 (1.5, 5.0)	0.03
Lack of red meat in the diet	1	0.8 (0.0, 2.3)	18	6.0 (1.6, 10.4)	10	4.4 (0.6, 8.2)	12	2.5 (0.8, 4.3)	11	2.7 (0.2, 5.2)	30	4.4 (1.8, 7.1)	0.37
Diet lacks iron	4	2.5 (0.0, 5.2)	11	4.9 (0.9, 8.9)	26	10.1 (2.4, 17.7)	36	10.6 (7.4, 13.7)	30	6.6 (1.7, 11.4)	47	7.4 (4.4, 10.4)	0.74
Diet lacks folate	0	-	8	3.1 (0.0, 6.8)	1	0.3 (0.0, 0.8)	1	0.2 (0.0, 0.5)	1	0.1 (0.0, 0.4)	9	1.8 (0.0, 3.9)	<.01
Diet lacks vitamin B12	0	-	7	3.2 (0.0, 7)	0	-	3	0.6 (0.0, 1.4)	0	-	10	2.1 (0.0, 4.3)	-
Diet lacks other vitamins/ minerals	2	1.2 (0.0, 3.6)	22	8.6 (4, 13.1)	11	4.7 (0.0, 10.1)	14	4.7 (0.5, 8.8)	13	3.1 (0.0, 6.4)	36	6.8 (3.5, 10.1)	0.22
Eating soil/clay	0	-	0	-	4	1.5 (0.2, 2.7)	4	1.5 (0.0, 3.7)	4	0.8 (0.0, 1.5)	4	0.7 (0.0, 1.7)	0.81
Other	18	9.9 (6.3, 13.5)	76	27.9 (19.4, 36.4)	47	10.5 (4.9, 16.1)	50	11.4 (5.7, 17.1)	65	10.2 (6.8, 13.6)	126	20.5 (13.6, 27.4)	-

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test. Other includes alcohol, smoking, drugs, bed bugs, being under sun always, bushy/ dirty environment, cholera, cold, coughing and sleeping together, diet lacks green leafy vegetables, drinking contaminated water, stress, drinking less/more water, eating fruits, eating cold foods, eating late, eating of fatty foods, lack of exercise, exercising, eating sugary foods, eating too much salt, Ebola, HIV, have it from birth, hard work, don't know, not eating regularly, talking too much, inadequate intake of blood tonic, inadequate intake of carbohydrates, inadequate palm oil in diet, inadequate sleep, injury, bacteria, lack of eggs or milk,

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Annex 4.3: Student Knowledge: Ways to Prevent Anemia– Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Ways to prevent anemia	Northern				Volta				Overall (Northern + Volta)				P-value
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
JHS		N=116		N=253		N=300		N=355		N=416		N=608	
Eat meat/liver	18	14.4 (4.6, 24.2)	82	33.6 (23.8, 43.3)	44	15.2 (6.9, 23.5)	64	16.0 (8.8, 23.2)	62	14.9 (8.5, 21.3)	146	25.0 (17.4, 32.7)	0.01
Eat DGLV	19	14.4 (6.3, 22.4)	152	60.5 (51.6, 69.3)	128	37.8 (24.4, 51.1)	170	45.9 (38, 53.7)	147	29.3 (19.8, 38.7)	322	53.3 (46.1, 60.6)	<.01
Prevent/treat malaria	0	-	14	4.7 (1.6, 7.9)	14	4 (1, 7)	23	5.4 (1.9, 8.8)	14	2.6 (0.5, 4.6)	37	5.1 (2.7, 7.4)	0.12
Sleep under a bed net	8	6.2 (1.1, 11.3)	34	11.8 (6.7, 17)	31	11.8 (6, 17.6)	49	12.8 (6.5, 19.1)	39	9.8 (5.4, 14.2)	83	12.3 (8.2, 16.3)	0.35
Prevent/treat parasites	0	-	2	0.7 (0.0, 1.8)	2	1.0 (0.0, 2.6)	3	0.8 (0.0, 1.6)	2	0.6 (0.0, 1.7)	5	0.8 (0.1, 1.5)	0.87
Take IFA/multi-vitamins	0	-	33	12.2 (5.5, 18.9)	24	8.0 (4.7, 11.4)	71	22.1 (15.2, 29)	24	5.1 (2.4, 7.9)	104	17.0 (11.5, 22.6)	<.01
Seek health care	12	9.2 (0.0, 19.5)	38	15.6 (6.2, 25)	66	21.9 (12.5, 31.3)	50	13.9 (7.4, 20.4)	78	17.3 (10.0, 24.6)	88	14.8 (9, 20.6)	0.44
Take blood tonics	2	1.9 (0.0, 4.4)	15	5.6 (1.3, 9.9)	43	15 (7.5, 22.6)	39	11.6 (9.1, 14.2)	45	10.3 (4.4, 16.1)	54	8.5 (5.5, 11.5)	0.50
Sleep well/rest	0	-	0	-	3	1.3 (0.0, 2.7)	2	0.9 (0.0, 2.1)	3	0.9 (0.0, 1.8)	2	0.4 (0.0, 1.1)	0.49
Avoid eating soil or clay	-	-	1	0.6 (0.0, 1.6)	-	-	1	0.2 (0.0, 0.6)	-	-	2	0.4 (0.0, 1.0)	-
Other	51	44.3 (32.1, 56.5)	117	46.7 (37.4, 56.1)	72	26.9 (16.4, 37.4)	78	24.8 (17.4, 32.3)	123	33.2 (25, 41.4)	195	36 (28.9, 43.2)	-

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Ways to prevent anemia	Northern				Volta				Overall (Northern + Volta)				P-value
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
SHS		N=185		N=274		N=339		N=371		N=524		N=645	
Eat meat/liver	19	13.2 (3.7, 22.8)	86	32.9 (27.4, 38.5)	53	22.1 (12.6, 31.6)	54	18.3 (11, 25.6)	72	18 (10.8, 25.2)	140	26.4 (21.2, 31.6)	0.08
Eat DGLV	44	24.9 (13.4, 36.3)	160	57.9 (50.0, 65.9)	135	43.3 (37.6, 49)	189	53.2 (43.6, 62.7)	179	34.7 (27.2, 42.3)	349	55.8 (49.7, 61.9)	<.01
Prevent/treat malaria	5	2.3 (0.0, 4.8)	14	5.6 (1.7, 9.6)	6	1.8 (0.0, 3.9)	14	2.5 (0.9, 4.1)	11	2 (0.4, 3.6)	28	4.2 (1.7, 6.8)	0.09
Sleep under a bed net	12	6.3 (2.3, 10.2)	31	11.1 (7.8, 14.4)	22	5.6 (2.3, 8.9)	43	8.1 (3.8, 12.4)	34	5.9 (3.3, 8.5)	74	9.7 (6.9, 12.6)	0.01
Prevent/treat parasites	0	-	6	2.7 (0.4, 5.0)	7	1.4 (0.0, 3.3)	4	0.6 (0.0, 1.4)	7	0.8 (0.0, 1.8)	10	1.8 (0.3, 3.2)	0.28
Take IFA/multi-vitamins	3	2.2 (0.0, 4.7)	42	16.4 (11.5, 21.4)	23	8.8 (3.1, 14.5)	83	23.3 (18.7, 27.9)	26	5.8 (1.9, 9.6)	125	19.5 (15.9, 23.1)	<.081
Seek health care	12	7 (0.0, 14.1)	24	8.3 (4.2, 12.3)	64	23.0 (16.6, 29.4)	62	21.8 (12.6, 31.0)	76	15.6 (9.1, 22.1)	86	14.3 (8.2, 20.4)	0.66
Take blood tonics	3	1.5 (0.0, 3.3)	10	3.9 (2, 5.8)	61	26.9 (16.8, 36.9)	55	16.2 (11.8, 20.5)	64	15.1 (5.8, 24.3)	65	9.4 (5.9, 12.8)	0.04
Sleep well/rest	2	1.4 (0.0, 3.2)	3	1.9 (0.0, 4.9)	6	3.4 (0.0, 7.5)	4	1.9 (0.5, 3.3)	8	2.5 (0.0, 5.0)	7	1.9 (0.1, 3.7)	0.67
Avoid eating soil or clay	-		1	0.3 (0.0, 1)	-		1	0.2 (0.0, 0.7)	-		2	0.3 (0.0, 0.7)	-
Other	58	34.9 (25.5, 44.4)	136	49.8 (40.6, 59)	121	29.7 (17.1, 42.3)	98	24.3 (18.4, 30.2)	179	32.1 (23.7, 40.6)	234	38.4 (30.0, 46.9)	-

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test in overall population. Abbreviation: DGLV= Dark Green Leafy Vegetables

Other includes adhere to medication, after menstruation you need to take malt or egg, always eat on time, eat fruits, sleep, anti-malaria drugs, avoid been under the sun, avoid alcohol/smoking/drugs, avoid cold foods, avoid contaminated foods, avoid eating fatty or sugary foods, regular exercise, avoid injury, avoid physical hard work, avoid talking too much, avoid sprayed foods, avoid wearing dirty clothing, balanced diet, banana, groundnut, palm oil, orange, Yaa Asantewaa leaves, milk, beans, eggs, tomatoes, fish, malt drink, vegetables, mango, watermelon, carrot, cabbage, apples, rice, soup, Banku, okro stew, snails, lemon, Fufu, garden egg, Kenkey, Dawadawa, cheese, grapes, turkey berry, tea, Cerelac, blood check often, blood transfusion, boiling water before drinking, hygiene, avoid sharing spoons and bowls with others, cover food well, reduce stress, eat variety instead of single meal plan, sleeping, stop thinking, take local medicines, not skipping meals, avoid stagnant water, sleep on a mattress, stop swimming in rivers, not taking tramadol, educate the public on anemia, energy drinks, Coca-Cola with thin tomatoes, Don Simon, take paracetamol and penicillin, wash hands before eating, use of mosquito coil/insecticide, cook food well, and stop shouting.

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Annex 4.5: Student Knowledge: Ways to Improve Blood – Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Charateristics	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
JHS	N=393		N=351		N=382		N=358		N=775		N=709		
Eat red meat	58	14.1 (8.2, 19.9)	141	40.3 (31.3, 49.4)	62	14.3 (7.6, 21.1)	73	17.5 (7.7, 27.4)	120	14.2 (9.8, 18.6)	214	30.8 (22, 39.5)	<.01
Eat liver	2	0.4 (0.0, 0.9)	7	1.7 (0.1, 3.3)	3	0.5 (0.0, 1.2)	2	0.4 (0.0, 1.0)	5	0.4 (0.0, 0.8)	9	1.1 (0.1, 2.1)	0.13
Eat green leafy vegetables	111	27.9 (21, 34.8)	245	68.6 (60.2, 76.9)	185	44.4 (34.1, 54.6)	197	49.8 (37.6, 62)	296	34.7 (28.4, 41)	442	60.7 (52, 69.4)	<.01
Eat fish	41	9.7 (4, 15.5)	113	34 (22.1, 45.9)	51	11.9 (4.4, 19.4)	36	8.6 (3.8, 13.4)	92	10.6 (6.1, 15.2)	149	23.4 (13.9, 32.8)	0.01
Iron supplements	14	3.7 (0.7, 6.7)	20	5.2 (1.5, 8.9)	42	12.7 (6.9, 18.4)	27	7.6 (4.7, 10.4)	56	7.4 (3.6, 11.1)	47	6.2 (3.7, 8.7)	0.59
Iron folic acid supplements	1	0.2 (0.0, 0.6)	84	23.2 (14.2, 32.3)	57	16.5 (8.8, 24.2)	180	52.8 (44.3, 61.4)	58	6.9 (2.1, 11.7)	264	35.6 (26.2, 45.1)	<.01
Sleep under a bed net	4	0.5 (0.0, 1.2)	9	2.6 (0.2, 5)	13	3.5 (0.2, 6.8)	18	6.4 (3.1, 9.6)	17	1.7 (0.1, 3.3)	27	4.2 (2, 6.4)	0.02
Sanitation and hygiene	7	1.8 (0.3, 3.3)	3	1.1 (0.0, 2.1)	11	2.6 (1.0, 4.1)	7	2.7 (1.5, 3.9)	18	2.1 (1, 3.2)	10	1.7 (0.8, 2.7)	0.63
Deworming	-	-	1	0.1 (0.0, 0.4)	-	-	0	-	-	-	1	0.1 (0.0, 0.2)	-
Herbal or traditional medicine	-	-	6	1.8 (0.0, 3.9)	-	-	15	4.4 (1.4, 7.4)	-	-	21	2.8 (1.0, 4.7)	-
Other	232	59.8 (53.4, 66.2)	168	49.7 (40.8, 58.6)	137	40.7 (29.3, 52.1)	76	22.3 (15.1, 29.4)	369	52 (45.5, 58.5)	244	38.2 (30.2, 46.3)	

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Charateristics	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
SHS	N=371		N=326		N=405		N=377		N=776		N=703		
Eat red meat	49	15.3 (8.7, 22)	122	40.8 (31.2, 50.4)	43	15.7 (7.5, 23.9)	49	17.8 (9.7, 25.8)	92	15.5 (10.3, 20.6)	171	31.3 (23, 39.6)	<.01
Eat liver	7	3.0 (0.0, 6.3)	29	12.2 (2.7, 21.7)	3	0.9 (0.0, 2)	4	1.1 (0.0, 2.2)	10	2.1 (0.0, 4.3)	33	7.6 (1.2, 13.9)	0.03
Eat green leafy vegetables	134	37.3 (30.0, 44.6)	217	66.7 (57.9, 75.4)	186	49.1 (42.1, 56.1)	215	56.1 (51.5, 60.7)	320	42.1 (36.1, 48.1)	432	62.3 (56.2, 68.4)	<.03
Eat fish	32	11.7 (4.2, 19.2)	99	34.1 (20.2, 48.1)	35	14.4 (5.8, 23)	34	11.8 (6.3, 17.2)	67	12.8 (7.1, 18.5)	133	24.9 (14.8, 35)	0.01
Iron supplements	15	4.1 (2.4, 5.7)	27	8.2 (2.0, 14.3)	45	14.0 (7.8, 20.1)	52	10.9 (5.3, 16.6)	60	8.1 (4.3, 11.8)	79	9.3 (5.0, 13.6)	0.68
Iron folic acid supplements	8	3 (0.4, 5.6)	104	36 (27.5, 44.4)	57	22.6 (12.5, 32.7)	196	54.1 (46.8, 61.3)	65	10.9 (4.3, 17.6)	300	43.5 (36.7, 50.2)	<.01
Sleep under a bed net	8	2.5 (0.0, 5.1)	12	3.2 (0.2, 6.1)	8	2.5 (0.0, 5.3)	19	4.6 (2.3, 7.0)	16	2.5 (0.6, 4.4)	31	3.8 (1.7, 5.8)	0.22
Sanitation and hygiene	4	1.1 (0.1, 2.1)	3	0.8 (0.0, 1.8)	16	6.3 (1.2, 11.5)	3	0.5 (0.0, 1.2)	20	3.2 (0.5, 5.9)	6	0.7 (0.1, 1.3)	0.01
Deworming	-	-	1	0.4 (0.0, 1.2)	-	-	1	0.2 (0.0, 0.7)	-	-	2	0.4 (0.0, 0.9)	-
Herbal or traditional medicine	-	-	13	5.1 (0.0, 11.4)	-	-	40	7.5 (3.9, 11.0)	-	-	53	6.1 (2.2, 10.0)	-
Other	241	63.5 (56.9, 70.2)	171	45.9 (33.1, 58.8)	203	41.7 (28.8, 54.5)	102	24.9 (19.2, 30.5)	444	54.7 (46.3, 63.1)	273	37.2 (28.7, 45.7)	

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test in the overall population. Other included eating foods that contain all the essential nutrients/balanced diet, taking a blood tonic, taking a blood medication, eating fruits, taking medication, Vitamin C, avoid eating fatty foods, exercise, eating beans, eggs, palm oil, fish, yam, tomatoes, milk, or other local food, blood infusion, medical check-up, drinking water, multi vitamins, limit intake of salt, sleeping/resting, herbal medicine, Coca-Cola, malt, visiting a nutritionist, and not menstruating.

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Annex 4.6: Student Malaria Knowledge on Treatment and Prevention – Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Annex Table 4.6: Students Reported Malaria Knowledge on Treatment and Prevention

| Charateristics | Northern | | | | Volta | | | | Overall (Northern + Volta) | | | | |
| | Baseline | | Follow-on | | Baseline | | Follow-on | | Baseline | | Follow-on | | |
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	P-value
JHS		N=393		N=351		N=382		N=358		N=775		N=709	
Think they could get malaria treatment	357	93.3 (89.7, 97)	330	95.3 (92.3, 98.3)	368	97.8 (95.5, 100.0)	346	97.7 (96.0, 99.4)	725	95.2 (92.6, 97.7)	676	96.3 (94.3, 98.2)	0.40
Reported they had malaria since baseline	-	-	55	16.9 (9.6, 24.1)	-	-	85	22.8 (18.1, 27.6)	-	-	140	19.4 (14.7, 24.0)	-
Slept under a bed net the previous night	143	30.5 (20.4, 40.6)	142	37.0 (25.0, 49.1)	189	38.2 (20.7, 55.7)	181	40.4 (22.9, 58)	332	33.7 (24.4, 42.9)	323	38.5 (28.4, 48.5)	0.07
Reason for not sleeping under a bed net the previous night													<0.01
I don't have one	99	44.6 (37.2, 51.9)	69	34.0 (24.4, 43.6)	30	17.3 (13.0, 21.7)	15	7.1 (3.6, 10.7)	129	33.7 (25.9, 41.4)	84	23.3 (14.0, 32.6)	
Uncomfortable	46	20.1 (13.8, 26.4)	40	17.6 (10.0, 25.2)	41	21.9 (15.8, 27.9)	45	30.8 (19.3, 42.2)	87	20.8 (16.3, 25.3)	85	22.8 (14.9, 30.8)	
It's damaged	6	2.4 (0.0, 4.8)	5	1.7 (0.0, 3.8)	6	2.2 (0.0, 4.9)	2	0.9 (0.0, 2.2)	12	2.3 (0.5, 4.1)	7	1.3 (0.0, 2.7)	
Someone else uses it	10	4.6 (1.2, 8)	5	2.5 (0.0, 5.1)	9	4.1 (1.2, 6.9)	1	0.4 (0.0, 1.2)	19	4.4 (2.1, 6.7)	6	1.6 (0.0, 3.3)	
I use a fan	1	0.3 (0.0, 0.8)	2	1.3 (0.0, 2.7)	3	1.9 (0.1, 3.7)	3	2.9 (1.2, 4.5)	4	0.9 (0.0, 1.9)	5	1.9 (0.7, 3.1)	

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Charateristics	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
Nowhere to tie/fix it	9	3.8 (2.3, 5.4)	16	7.9 (3.2, 12.6)	11	5.4 (1.8, 9.0)	19	11.2 (7.7, 14.7)	20	4.5 (2.7, 6.2)	35	9.2 (5.9, 12.5)	
The weather is too hot	3	1.2 (0.0, 2.6)	3	1.5 (0.0, 3.1)	9	5.4 (0.4, 10.5)	10	4.0 (0.2, 7.7)	12	2.9 (0.4, 5.4)	13	2.5 (0.8, 4.2)	
I use another method (coils/spray/repellant)	7	3.5 (0.0, 7.6)	21	11.1 (5.3, 16.9)	9	5.1 (0.0, 10.2)	27	15.5 (10.6, 20.4)	16	4.1 (0.9, 7.3)	48	12.8 (8.8, 16.8)	
Other	41	19.5 (9.9, 29.2)	46	22.5 (14.4, 30.6)	66	36.7 (26.9, 46.4)	45	27.3 (17.5, 37.2)	107	26.4 (18.2, 34.6)	91	24.4 (18.1, 30.7)	
SHS	N=371		N=326		N=405		N=377		N=776		N=703		
Think they could get malaria treatment	344	93.8 (90.0, 97.6)	317	97 (94.8, 99.1)	399	99 (98, 100.0)	371	98.2 (96.9, 99.5)	743	95.9 (93.4, 98.4)	688	97.5 (96.1, 98.9)	0.110
Reported they had malaria since baseline	-	-	66	21.2 (16.6, 25.7)	-	-	99	23.6 (17.6, 29.6)	-	-	165	22.2 (18.6, 25.7)	-
Slept under a bed net the previous night	159	39 (30.5, 47.5)	166	48.6 (33.7, 63.5)	222	45.3 (29.3, 61.3)	229	53.7 (39.2, 68.2)	381	41.6 (33.4, 49.8)	395	50.7 (40.2, 61.3)	0.02
Reason for not sleeping under a bed net the previous night													-
I don't have one	88	41.7 (34.1, 49.2)	67	39.8 (27.1, 52.4)	38	22.9 (17.4, 28.4)	17	15 (9.5, 20.6)	126	34.5 (27.5, 41.4)	84	30.3 (20.4, 40.2)	
Uncomfortable	23	9.7 (3.6, 15.7)	25	12.3 (4.8, 19.7)	57	32.1 (26.9, 37.2)	51	29.6 (17.3, 41.9)	80	18.2 (10.4, 26.0)	76	18.9 (11.2, 26.6)	
It's damaged	2	0.4 (0.0, 1.0)	1	0.8 (0.0, 2.6)	5	1.7 (0.0, 4.5)	2	0.7 (0.0, 1.8)	7	0.9 (0.0, 2)	3	0.8 (0.0, 1.9)	
Someone else uses it	6	3.2 (0.5, 5.9)	0	-	0	-	0	-	6	2.0 (0.1, 3.9)	0	-	

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Charateristics	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall (Northern + Volta) Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-value
I use a fan	1	0.2 (0.0, 0.6)	2	1.9 (0.0, 4.5)	1	0.4 (0.0, 1.2)	1	0.4 (0.0, 1.3)	2	0.3 (0.0, 0.7)	3	1.3 (0.0.0, 3.0)	
Nowhere to tie/fix it	42	26.6 (13.2, 40.0)	32	28.8 (10.5, 47.1)	20	18.8 (7.3, 30.3)	27	19.3 (12.2, 26.4)	62	23.6 (14.3, 33.0)	59	25.1 (12.9, 37.4)	
The weather is too hot	1	0.4 (0.0, 1.2)	0	-	7	2.6 (0.1, 5.1)	12	7.0 (2.4, 11.6)	8	1.2 (0.0, 2.5)	12	2.7 (0.5, 4.9)	
I use another method (coils, spray, repellant)	6	1.9 (0.0, 3.9)	13	6.0 (2.2, 9.8)	7	3.3 (0.0, 7.4)	9	6.7 (3.9, 9.5)	13	2.4 (0.5, 4.4)	22	6.3 (3.7, 8.9)	
Other	36	15.9 (8.1, 23.8)	19	10.4 (5.6, 15.2)	44	18.2 (8.8, 27.7)	27	21.2 (7.3, 35.1)	80	16.8 (10.9, 22.7)	46	14.6 (7.1, 22.1)	

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population.. Other includes "I don't like it", laziness, no mosquitoes, someone told me I could not, bed bugs, it is dirty/being washed, new and have yet to fix it, allergic reaction, did not sleep at home/in own room, "It looks local to sleep in it", "Mosquitoes don't bite me", and bed net is hanged at the entrance of the room.

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Annex 5.1: Student Experiences with IFA Tablet Consumption– Pooled Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Annex Table 5.1: Student Experiences with Iron-Folic Acid Tablet Consumption– Pooled Results

Overall (JHS + SHS)	Northern N=677		Volta N=735		Overall (Northern + Volta) N=1412	
Ever took IFA	674	99.2 (98.2,100.0)	709	88.7 (72.4,100.0)	1383	94.8 (87.3,100.0)
Last taken IFA tablet, among those who ever took IFA						
This week	223	24.9 (6.9,42.8)	200	34.7 (17,52.4)	423	28.7 (15.2,42.1)
Last week	222	27.1 (8.4,45.8)	354	29.9 (19.0,40.8)	576	28.2 (16.1,40.3)
Two weeks ago	64	8.0 (1.1,15.0)	38	6.9 (2.5,11.3)	102	7.6 (3.0.0,12.2)
More than two weeks ago	146	34.6 (12.1,57.0)	105	26.4(12.1,40.6)	251	31.4 (16.4,46.3)
Reason missed IFA tablet, among those who did not take tablet in previous week						
Was absent	21	10.0 (1.8,18.2)	36	18.4 (9.5,27.3)	57	12.7 (5.9,19.4)
There was no distribution	113	56.7 (40.0,73.4)	38	40.7(22.8,58.5)	151	51.6 (37.8,65.3)
Not enough IFA	4	0.1 (0.0,0.4)	0	-	4	0.1 (0.0.0,0.3)
School/teacher was unwilling	4	3.9 (0.0,10.9)	3	1.7 (0.0.0,4.4)	7	3.2 (0.0.0,8.1)
Other[b]	80	23.8 (8.2,39.4)	72	37.5(27.3,47.6)	152	28.1 (16.2,40)
Day of distribution, among those who ever took IFA						
Monday	5	1.0 (0.0,2.9)	4	1.3 (0.0,2.8)	9	1.1 (0.0.0,2.4)
Tuesday	8	0.8 (0.0,1.7)	4	0.6 (0.0,1.4)	12	0.7 (0.0.0,1.3)
Wednesday	632	91.8 (83.5,100.0)	658	83.5(74.2,92.8)	1290	88.6(81.9,95.2)
Thursday	12	2.0 (0.4,3.6)	15	3.8 (1.4,6.2)	27	2.7 (1.3,4.1)
Friday	7	1.5 (0.0,4.3)	2	1.6 (0.0,4.5)	9	1.5 (0.0,3.6)
Different days	7	1.5 (0.0,3.3)	19	7.4 (1.7,13.1)	26	3.8 (0.9,6.7)
Another opportunity if missed	562	74.3 (64.7,83.9)	571	74.9(67.1,82.8)	1133	74.5 (67.9,81.2)
How to get IFA missed, among those who have another opportunity						
Student looks for teacher	261	45.8 (40.2,51.4)	435	73.3(62.8,83.8)	696	56.6(48.8,64.3)
Teacher looks for student	151	15.9 (8.6,23.1)	53	6.4 (2.2,10.6)	204	12.2 (7.4,16.9)
Both	70	14.8 (9.1,20.5)	52	6.7 (1.4,12)	122	11.6 (7.0,16.3)

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Overall (JHS + SHS)	Northern	N=677	Volta	N=735	Overall (Northern + Volta)	N=1412
Nothing – wait for the next distribution	63	14.9 (5.3,24.6)	17	3.8 (0.0,7.8)	80	10.6 (4.1,17.1)
Other^c	24	8.6 (1.4,15.8)	39	9.8 (2.5,17.1)	63	9.1 (3.9,14.3)
Usually eat before taking IFA, among those who ever took IFA						
Yes	630	91.7 (88.1,95.3)	649	90.9(85.7,96.1)	1279	91.4 (88.4,94.4)
Ever take the IFA on an empty stomach, among those who ever took IFA						
Most of the time	19	1.6 (0.2,3.0)	3	0.6 (0.0,1.3)	22	1.2 (0.3,2.1)
Sometimes	78	12.2 (5.7,18.7)	76	12.1 (6.9,17.3)	154	12.2 (7.7,16.6)
Once or twice	121	18.5 (14.3,22.6)	70	9.4 (5.9,12.8)	191	14.9 (11.5,18.4)
Never	454	66.6 (58.1,75.1)	560	77.9 (72,83.8)	1014	71.0 (64.7,77.2)
Why are you given IFA tablets? (among those who ever took IFA)						
To improve my blood	529	78.8 (70.9,86.6)	578	81.3(76.2,86.3)	1107	79.7 (74.6,84.9)
To make me active	59	9 (2.9,15.1)	37	4 (1.4,6.6)	96	7.1 (3.0.0,11.1)
To help me concentrate	19	2.8 (0.0,6.4)	16	2.2 (0.4,3.9)	35	2.6 (0.3,4.9)
To improve my health	254	33.8 (24.3,43.2)	112	13.7 (9.0,18.3)	366	26.0 (18.7,33.2)
To improve/ regulate my menstruation	191	33.3 (22.8,43.8)	163	24.2(18.7,29.6)	354	29.7 (22.5,36.9)
To make me feel fresh	25	4.4 (1.2,7.6)	11	1.2 (0.0,2.4)	36	3.2 (1.0,5.4)
To prevent pregnancy	12	1.5 (0.0,3.0)	1	0.1 (0.0,0.2)	13	0.9 (0.0,0,1.9)
Improve school performance	13	1.1 (0.2,2.0)	12	0.8 (0.0,1.6)	25	1.0 (0.3,1.6)
Other^d	102	17.3 (10.9,23.7)	82	12.7 (8.0,17.4)	184	15.5 (11.2,19.9)
Noticed any differences or changes						
since taking IFA tablets	486	73.1 (67.4,78.8)	494	64.2(58.6,69.8)	980	69.7 (65.1,74.3)
Changes noticed when taking IFA tablets, among those who noticed changes						
Made me stronger	82	18.4 (7.2,29.6)	24	2.6 (0.8,4.4)	106	12.8 (4.5,21.0)
Made me less sleepy	45	7.7 (3.2,12.3)	7	1.0 (0.0,2.0)	52	5.3 (2.0,8.6)
Made me more active	46	9.4 (4.3,14.5)	26	5.3 (1.9,8.6)	72	7.9 (4.3,11.6)
Gave me more appetite	150	28.6 (13.7,43.5)	58	10.4 (4.7,16.1)	208	22.1 (11.4,32.9)
Helped me concentrate	14	3.4 (0.0,8.2)	15	2.1 (0.4,3.8)	29	2.9 (0.0,6.1)

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Overall (JHS + SHS)	Northern N=677		Volta N=735		Overall (Northern + Volta) N=1412	
Improved my health	165	27.6 (18.2,37.1)	85	11.0 (6.6,15.4)	250	21.7 (14.5,28.9)
Made my menstruation regular	128	33.7 (23.8,43.6)	154	30.9(23.7,38.1)	282	32.7 (25.7,39.7)
Made me feel fresh	4	0.9 (0.0,2.0)	13	1.5 (0.3,2.7)	17	1.1 (0.2,1.9)
Made me feel dizzy	18	3.6 (1.2,6.1)	17	6.1 (3.2,8.9)	35	4.5 (2.5,6.5)
Made me feel nauseous	3	1.5 (0.0,3.1)	3	0.5 (0.0,1.0)	6	1.1 (0.0,2.2)
Gave me headaches	5	1.5 (0.0,3.1)	3	0.4 (0.0,0.9)	8	1.1 (0.0,2.2)
Gave me stomach pains	7	1.0 (0.0,2.0)	15	2.0 (0.6,3.4)	22	1.3 (0.5,2.2)
Prevented/delayed/shortened menstruation	31	10.1 (7.9,12.2)	27	6.4 (3.9,8.9)	58	8.8 (6.9,10.7)
Made mensuration heavier/longer	96	26.6 (19.3,33.8)	118	29.3 (18.6,40.0)	214	27.5 (21.5,33.5)
Made me too hungry	17	2.8 (1.0,4.5)	18	2.8 (0.5,5.2)	35	2.8 (1.4,4.2)
Made me constipated	2	0.7 (0.0,1.7)	0	-	2	0.4 (0.0,1.1)
Gave me dark/ black stools	3	0.7 (0.0,1.7)	0	-	3	0.5 (0.0,1.1)
Gave me smelly stools	1	0.5 (0.0,1.5)	0	-	1	0.3 (0.0,1.0)
Other[e]	121	31.6 (23.1,40.1)	159	32.9 (16.0,49.9)	280	32.1 (24.0,40.2)
Did you like the IFA tablets? (among those who ever took it)						
Yes	629	87.3 (81.4,93.2)	649	87.8 (83.7,91.9)	1278	87.5 (83.6,91.5)
Reason liked IFA tablets, among those who liked it						
Made me stronger	104	17.4 (7.2,27.6)	47	4.8 (1.9,7.8)	151	12.5 (5.5,19.5)
Less sleepy	14	2.6 (0.1,5.0)	6	0.9 (0.0,1.9)	20	1.9 (0.3,3.5)
Made me more active	68	13.8 (4.5,23.1)	47	5.3 (1.9,8.7)	115	10.5 (4.2,16.7)
Gave me more appetite	172	24.1 (11.1,37.2)	58	8.1 (5.2,10.9)	230	17.8 (9.1,26.6)
Helped me concentrate	20	3.2 (0.0,7.2)	18	1.8 (0.0,3.6)	38	2.7 (0.1,5.2)
Improved my health	310	41.5 (31.2,51.8)	201	30.3(21.9,38.7)	511	37.1 (29.8,44.5)
Improved my menstruation	200	42.7 (30.9,54.4)	221	35.9(29.7,42.1)	421	40 (32.2,47.8)
Made me feel fresh	14	2.2 (0.7,3.8)	19	2.3 (0.9,3.8)	33	2.3 (1.2,3.4)
Other	192	32.8 (20.1,45.5)	251	35.9(28.6,43.1)	443	34 (25.7,42.3)

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Overall (JHS + SHS)	Northern N=677		Volta N=735		Overall (Northern + Volta) N=1412	
Reason disliked IFA tablets, among those who did not like it						
Made me feel dizzy	8	29.4 (14.6,44.1)	10	19.7 (3.1,36.3)	18	25.7 (13.3,38.1)
Made me feel nauseous	3	6.6 (0.0,15.2)	6	5.9 (0.0,12.2)	9	6.4 (0.6,12.1)
Gave me headaches	3	5.1 (0.0,12.2)	4	5.3 (0.0,13.6)	7	5.2 (0.0,10.6)
Gave me stomach pains	6	12.2 (3.7,20.7)	4	3.1 (0.0,6.8)	10	8.8 (2.8,14.7)
Prevented menstruation/made it ir-regular	4	8.6 (0.0,18.4)	4	8.9 (0.0,18.6)	8	8.7 (1.6,15.9)
Made mensuration heavier and longer	1	3.0 (0.0,9.0)	11	28.6 (0.0,59.7)	12	12.7 (0.0,27.7)
Made me too hungry	2	0.5 (0.0,1.5)	8	7.5 (0.0,16.9)	10	3.2 (0.0,7.1)
Gave me dark stools	1	0.9 (0.0,2.8)	0	-	1	0.6 (0.0,1.7)
Tastes bad	2	9.0 (2.2,15.8)	0	-	2	5.6 (0.0,11.3)
Don't feel I need it	1	0.4 (0.0,1.3)	2	7.2 (0.0,18.3)	3	3.0 (0.0,7.9)
Other[g]	23	51.7 (42.2,61.1)	21	31.9 (14.5,49.2)	44	44.2 (34.2,54.1)
Ever refused to take IFA tablet	66	15.3 (11.0,19.7)	172	29.3 (23.2,35.5)	238	20.8 (16.8,24.8)
Reason refused IFA tablet, among those who ever refused						
Afraid it is a contraceptive	6	14.5 (0.0,30.2)	22	14.7 (4.8,24.6)	28	14.6 (5.7,23.5)
Afraid it will make me sick	4	10.1 (3.2,17.0)	8	4.3 (0.0,8.8)	12	6.9 (2.4,11.5)
Parent/guardian refused	0	-	8	3.0 (0.0,5.9)	8	1.6 (0.0,3.3)
Friends don't think I should take it	0	-	2	4.2 (0.0,9.1)	2	2.3 (0.0,5.3)
Don't know what is for	1	1.1 (0.0,3.2)	0	-	1	0.5 (0.0,1.5)
Don't like the taste	4	12.2 (3,21.5)	1	0.1 (0.0,0.4)	5	5.6 (0.0,11.1)
Make me feel ill when I take it	5	12.1 (5.5,18.8)	9	9.6 (0.2,19.1)	14	10.8 (4.7,16.8)
Teasing from boys or other students	0	-	1	1.8 (0.0,5.4)	1	1.0 (0.0,3.0)
I don't like to take medicine	5	7.1 (0.1,14.1)	7	10.3 (1.4,19.3)	12	8.9 (2.8,14.9)
Other[h]	47	57.9 (37.6,78.3)	121	59.4 (41.8,77.0)	168	58.7 (45.4,72.1)
Ever took IFA but did not swallow	57	14.6 (7.1,22.1)	82	10.5 (5.7,15.3)	139	13.0 (7.8,18.2)

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Overall (JHS + SHS)	Northern N=677		Volta N=735		Overall (Northern + Volta) N=1412	
Reason did not swallow IFA tablet, among those who ever took it but did not swallow it						
Afraid it is a contraceptive	9	14.5 (2.0,27.0)	6	6.8 (0.0,15.3)	15	12.1 (2.4,21.8)
Afraid it will make me sick	5	7.7 (0.9,14.4)	5	4.5 (0.0,9.3)	10	6.7 (1.8,11.5)
Parent/guardian refused	0	-	2	0.7 (0.0,1.8)	2	0.2 (0.0,0.6)
Friends don't think I should take it	1	2.1 (0.0,6.5)	2	4.6 (0.0,13.1)	3	2.9 (0.0,7.0)
Don't know what is for	2	3.5 (0.0,8.2)	3	1.8 (0.0,4.4)	5	3.0 (0.0,6.5)
Don't like the taste	2	7.0 (0.0,16.0)	0	-	2	4.8 (0.0,11.1)
Make me feel ill when I take it	1	0.4 (0.0,1.1)	2	14.8 (0.0,41.6)	3	4.9 (0.0,14.3)
Teasing from boys or other students	0	-	1	1.6 (0.0,4.7)	1	0.5 (0.0,1.5)
I don't like to take medicine	2	2.6 (0.0,7.3)	4	12.3 (0.0,25.1)	6	5.7 (0.0,11.6)
Other[i]	41	67.9 (53.9,81.9)	59	60.9 (36.2,85.7)	100	65.7 (53.6,77.8)
Suggestions for improving the IFA tablets						
Change the color	5	0.9 (0.0,2.1)	2	0.8 (0.0,1.8)	7	0.9 (0.1,1.7)
Make the tablet smaller	7	1.3 (0.1,2.5)	2	0.5 (0.0,1.3)	9	1.0 (0.2,1.8)
Make the tablet larger	2	0.1 (0.0,0.2)	1	0.0 (0.0,0.1)	3	0.1 (0.0,0.1)
Make the tablet taste better	33	5.0 (2.2,7.9)	4	0.8 (0.0,1.9)	37	3.4 (1.4,5.4)
Other[i]	144	26.0 (15.6,36.4)	58	11.4 (7.8,15.0)	202	20.4 (13.0,27.7)
Ever shared experiences with friends or family	351	53.3 (43.4,63.2)	380	52 (42.8,61.1)	731	52.8 (45.8,59.8)
Information shared about IFA, among those who shared experience						
It improves blood	196	50.5 (42.7,58.2)	236	58.5 (47.7,69.4)	432	53.5 (46.9,60.1)
It makes people active	34	8.3 (2.1,14.4)	26	5.4 (2.2,8.5)	60	7.2 (3.1,11.2)
It helps people to concentrate	16	4.6 (0.0,10.9)	8	0.6 (0.0,1.5)	24	3.1 (0.0,7.2)
It improves health	117	28.7 (18.2,39.2)	84	17 (8.8,25.2)	201	24.3 (16.7,31.8)
It improves/ regulates menstruation	105	36.0 (28.9,43.1)	133	34.9 (27.7,42.0)	238	35.6 (30.4,40.8)
It helps prevent pregnancy	1	0.2 (0.0,0.6)	1	0.7 (0.0,1.9)	2	0.4 (0.0,0.9)
It improves school performance	3	0.9 (0.0,2.2)	5	1.2 (0.0,2.6)	8	1.0 (0.1,2)
It gives people headaches	2	1.1 (0.0,2.5)	0	-	2	0.7 (0.0,1.6)

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Overall (JHS + SHS)	Northern N=677		Volta N=735		Overall (Northern + Volta) N=1412	
It gives people stomach pain	6	2.0 (0.4,3.6)	3	0.4 (0.0,1.0)	9	1.4 (0.3,2.5)
It gives people nausea	2	0.8 (0.0,2)	2	0.4 (0.0,1.0)	4	0.7 (0.0,1.4)
It gives people black/smelly stool	4	0.7 (0.0,1.4)	0	-	4	0.4 (0.0,0.9)
It tastes bad	3	1.1 (0.0,2.4)	0	-	3	0.7 (0.0,1.5)
Other[k]	96	32.6 (24.3,40.9)	76	20.6 (12.4,28.7)	172	28.0 (21.4,34.6)

[b]Absent from school, side effect (dizziness, heavy flow, lack of menses, hunger, overeating, weak, drowsy, stomachache), menstruating, did not eat, had sports, forgot, did not have porridge to take it with, pregnant.

[c]Class/health prefect administers it and tracks down those who miss, having never missed, waiting until the next distribution, and the teacher has stopped altogether.

[d]Rduce during menstruation, replace (menstrual) blood loss, don't know, give energy, give more nutrients, give more blood, improve appetite, give iron, gain weight, kill germs, sleep well, prevent hepatitis B, prevent iron deficiency, prevents malaria, protect us, to help give birth safely, make safe from bad odor, make you strong,

[e]Other includes menstrual blood has become bright red, grown fat, reduces abdominal pains, feeling sleepy, sleep more, growing faster, gaining

[f]Gives enough blood, reduces symptoms (dizziness, pain, hunger, cramps), prevents anemia, unspecified positive changes, replaces lost blood, no side-effects, has no taste (not bitter or sweet), positive comments from teachers/nurse/colleagues, improves appetite, improved sleep, no longer needs blood transfusion, helps during childbirth, father said to take it, and helps your future.

[g]An abortion drug and one cannot get pregnant, it increases blood, it is being given every week while I prefer a two weeks interval instead, heard it's a family planning tablet, don't like the way it smells, don't see any effect on me, get heavy flow, made me hungry, made me feel weak and go to toilet more frequently, made me sleep a lot.

[h]Rumors from friends/family that it was a family planning drug, tired of taking medicine, had not eaten, experiencing menses, fasting, taking another medication (iron syrup, iron tablet, malaria treatment, ulcer medication), no water, forgot, feeling lazy, saved it until she went home to eat and forgot, prefers injection, absent on distribution day, feeling ill,

[i]Did not throw it away but took it later, no water, no money for food, forgot it and washed it with her clothes.

[j]Boys should be included, change the smell, continue the Programme, "distribution should continue unabated", "educate the general public about it so that parents will support their daughters to take it", more education for girls

[k]Reduces menstrual pains, increases appetite, reduces hunger, side-effects (heavy flow/irregular menses, dizziness, sleepiness), makes me sleep well, gaining weight, encourage friends to take it, improved memories, prevents anemia, told my mother to give me egg in place of IFA when I'm in sports prevents malaria, helps my heartburn, IFA is not helping me, and the supplement is good but it should be given once in a month

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Annex 6: Student IFA Consumption – Stratified Region and School level Results in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Number of tablets	Northern		Volta		Overall (Northern + Volta)	
	Count		Count		Total Count	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
JHS						
Cumulative IFA Doses- Academic year		8952		9056		18008
% At least 10 tablets -academic year	351	100.0	336	93.2 (89.5,96.9)	687	97.2 (94.9,99.4)
Term 1	**N=351**		**N=358**		**N=709**	
0	1	0.2 (0.0,0.5)	11	3.8 (0.4,7.3)	12	1.7 (0.0,3.4)
1-3	6	2.1 (0.0,6.0)	4	0.8 (0.0,1.5)	10	1.5 (0.0,3.9)
4-6	13	4.2 (0.0,10.8)	15	4.6 (0.9,8.3)	28	4.4 (0.2,8.5)
7-9	298	80.5 (59.1,100)	90	25.9 (9.8,41.9)	388	57.6 (40.1,75.1)
10-12	33	13 (0.0,33.6)	238	65 (49.5,80.5)	271	34.8 (18.2,51.4)
Term 2	**N=351**		**N=358**		**N=709**	
0	2	0.3 (0.0,0.8)	28	10.8 (1.2,20.4)	30	4.7 (0.0,9.7)
1-3	0	-	7	1.9 (0.5,3.2)	7	0.8 (0.1,1.5)
4-6	2	0.3 (0.0,0.7)	32	10.2 (0.3,20.2)	34	4.5 (0.0,9.3)
7-9	41	14.1 (0.0,32.2)	40	12.1 (3.8,20.4)	81	13.3 (2.2,24.4)
10-15	306	85.3 (67.3,100)	251	65 (48.5,81.5)	557	76.8 (63.4,90.2)
Term 3	**N=322**		**N=358**		**N=680**	
0	7	1.9 (0.0,3.9)	36	10.5 (6.2,14.8)	43	5.8 (2.7,8.8)
1-3	85	32.8 (7,58.6)	18	6.5 (2.5,10.4)	103	20.9 (5.4,36.4)
4-6	82	21.6 (5.9,37.3)	108	41.6 (20.7,62.4)	190	30.6 (16,45.2)
7-9	135	42 (14.5,69.5)	196	41.5 (16.5,66.4)	331	41.8 (22.9,60.6)
10-14	13	1.7 (0.0,5.3)	0	-	13	0.9 (0.0,2.9)
Total academic year	**N=322**		**N=358**		**N=680**	
0	0	-	8	2.7 (0.4,5.1)	8	1.2 (0.0,2.5)
1-5	0	-	4	0.7 (0.0,1.5)	4	0.3 (0.0,0.7)

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Number of tablets	Northern		Volta		Overall (Northern + Volta)	
	Count		**Count**		**Total Count**	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
6-10	2	0.3 (0.0,1.0)	12	3.7 (1.5,5.9)	14	1.8 (0.5,3.2)
11-15	2	0.3 (0.0,0.8)	15	6.3 (1.1,11.5)	17	3.0 (0.1,6.0)
16-20	23	7.6 (0.0,16.1)	39	11.8 (4.3,19.3)	62	9.5 (3.6,15.4)
21-25	90	30.8 (13.7,47.8)	53	20 (3.9,36.1)	143	25.9 (14,37.8)
26-30	171	49.9 (28.7,71.1)	119	34.5 (15.7,53.3)	290	43 (28.3,57.6)
31+	34	11.1 (0.0,28.7)	108	20.2 (3.8,36.7)	142	15.3 (3.3,27.2)
SHS						
Cumulative IFA Doses- Academic year	5715		5796		11511	
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)
% At least 10 tablets -academic year	274	89.9 (77.7,100)	237	44.5 (18.7,70.4)	511	71.2 (53,89.4)
Term 1	**N=326**		**N=377**		**N=703**	
0	24	6.4 (0.0,18.1)	55	22.7 (8.7,36.7)	79	13.1 (2.8,23.4)
1-3	14	1.7 (0.0,3.6)	32	16.5 (2.3,30.7)	46	7.8 (0.2,15.4)
4-6	45	13.5 (2.8,24.1)	68	22.6 (4.5,40.7)	113	17.2 (7.4,27.1)
7-9	222	71.4 (57.4,85.4)	99	16.9 (5,28.7)	321	48.9 (32.5,65.2)
10-12	21	7.1 (0.0,15.7)	123	21.3 (3.7,39)	144	13 (4,21.9)
Term 2	**N=299**		**N=350**		**N=649**	
0	37	7.9 (0.0,20.4)	101	45.5 (16.3,74.8)	138	23.0 (5,41.1)
1-3	26	6.8 (0.0,14.1)	24	9 (3.1,14.8)	50	7.6 (2.6,12.7)
4-6	86	37.3 (14.9,59.8)	57	19 (0.0,38.9)	143	30 (13.3,46.6)
7-9	55	21.6 (6.7,36.6)	106	20.1 (4.4,35.8)	161	21 (10.0,32.1)
10-15	95	26.3 (4.1,48.6)	62	6.4 (0.1,12.6)	157	18.3 (4.3,32.3)
Term 3	**N=326**		**N=352**		**N=678**	
0	116	38.3 (10.1,66.4)	118	49.9 (21.9,78)	234	42.8 (22,63.6)
1-3	24	7.7 (0.0,16.3)	88	28.3 (4.5,52.1)	112	15.8 (4.4,27.2)
4-6	94	28.7 (3.7,53.8)	47	6.4 (1,11.8)	141	20 (3.4,36.6)
7-9	53	12.9 (0.0,28.2)	69	11.5 (0.0,25.3)	122	12.3 (1.6,23.1)

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Number of tablets	Northern		Volta		Overall (Northern + Volta)	
		Count		Count		Total Count
10-14	39	12.4 (0.0,28.2)	30	3.9 (0.0,8.3)	69	9.1 (0.0,19.1)
Total academic year		N=299		N=350		N=649
0	23	6.6 (0.0,19)	38	19.6 (5.1,34)	61	11.8 (1.3,22.3)
1-5	15	1.5 (0.0,3.1)	47	21.5 (3.8,39.3)	62	9.5 (0.1,18.9)
6-10	72	31.8 (6.7,56.9)	29	11.6 (0.0,26)	101	23.7 (6.7,40.7)
11-15	19	3.3 (0.0,7.7)	40	13.9 (1.4,26.4)	59	7.5 (1.3,13.8)
16-20	60	26.1 (2.8,49.3)	36	7.2 (1.4,13)	96	18.5 (3.1,33.9)
21-25	34	7.2 (0.0,14.5)	89	15.7 (4.1,27.4)	123	10.6 (4.2,17.1)
26-30	50	14.6 (0.0,30.6)	48	8.6 (0.5,16.7)	98	12.2 (2.1,22.3)
31+	26	9 (0.0,20.6)	23	1.8 (0.0,4.8)	49	6.1 (0.0,13.3)

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Annex 7.1: Dietary Intake over Previous 24-hours – Stratified Region and School level Results in the baseline and follow-on Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Annex: Table 7.1.1: Dietary Intake over Previous 24-hours

Foods Consumed	Northern Baseline		Northern Follow-on		Volta Baseline		Volta Follow-on		Overall (Northern + Volta) Baseline		Overall Follow-on		P-Value
Number of tablets	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
JHS	N=393		N=351		N=382		N=358		N=775		N=709		
[1]Red meats	81	22.3 (16.1, 28.5)	114	35.6 (26.4, 44.9)	60	16.6 (11.5, 21.7)	83	24.1 (18.6, 29.6)	141	20.0 (15.5, 24.4)	197	30.8 (24.3, 37.3)	<.01
[2]Poultry/white meat	47	11.0 (6.5, 15.5)	77	21.9 (17.2, 26.6)	137	40.6 (30.7, 50.6)	144	40.9 (34.1, 47.6)	184	23.2 (14.5, 32)	221	29.9 (24.1, 35.6)	0.08
Fish	168	43.4 (32.1, 54.6)	203	60.5 (50.7, 70.3)	316	81.5 (78.3, 84.7)	288	78.7 (75.1, 82.4)	484	59.0 (48.9, 69.1)	491	68.1 (61.5, 74.7)	<0.01
[3]Organ meats	9	2.2 (0.7, 3.6)	29	7.7 (4.2, 11.2)	6	1.7 (0.4, 2.9)	22	5.2 (3.1, 7.3)	15	2.0 (1.0.0, 2.9)	51	6.7 (4.4, 9.0)	<.01
Eggs	49	12.0 (9.1, 15.0)	105	29.9 (22.3, 37.4)	79	25.1 (15.2, 35)	124	32.6 (25.3, 39.9)	128	17.4 (11.6, 23.2)	229	31.0 (25.7, 36.4)	<.01
[4]Dark green leafy vegetables	172	42.4 (35.8, 49)	297	83.9 (76.6, 91.1)	169	45.0 (40.1, 49.8)	225	60.4 (52.7, 68)	341	43.5 (39, 47.9)	522	74.0 (66.4, 81.7)	<.01
[5]Fruits	130	32.9 (23.9, 41.9)	196	55.4 (51.1, 59.6)	190	47.5 (38.5, 56.5)	172	45.9 (41.3, 50.5)	320	38.9 (31.9, 45.9)	368	51.4 (47.6, 55.2)	<.01
[6]Pulses	191	46.1 (39, 53.1)	213	60.8 (52.6, 68.9)	197	41.8 (25.6, 58.1)	229	59.6 (51.7, 67.5)	388	44.3 (36.2, 52.4)	442	60.3 (54.4, 66.1)	<.01
[7]Bread or flour products	169	46.2 (37.6, 54.8)	198	62.2 (49.9, 74.6)	231	61.3 (52.9, 69.7)	251	70.4 (64.1, 76.8)	400	52.4 (45.6, 59.2)	449	65.7 (58, 73.4)	<.01
Tea	72	20.4 (12.7, 28.2)	159	51.7 (40.9, 62.5)	21	8.9 (2.3, 15.5)	31	10 (6, 14.1)	93	15.7 (10.1, 21.3)	190	34.2 (22.9, 45.6)	<.01

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Number of tablets / Foods Consumed	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall (Northern + Volta) Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-Value
[8]Fortified drinks or cereals	62	16.6 (10.0, 23.3)	131	41.5 (32.4, 50.6)	76	20.4 (16.5, 24.4)	134	38.1 (30.6, 45.5)	138	18.2 (13.9, 22.5)	265	40.1 (33.8, 46.3)	<.01
SHS		N=371		N=326		N=405		N=377		N=776		N=703	
[1]Red meats	75	18.8 (12.5, 25.2)	88	26.4 (17.1, 35.6)	35	9.5 (4.7, 14.3)	50	12 (6.3, 17.7)	110	15.0 (10.6, 19.4)	138	20.5 (13.8, 27.2)	0.08
[2]Poultry/white meat	48	13.8 (3.6, 24)	111	30.6 (18.9, 42.3)	101	31.6 (19.2, 44)	134	41.9 (32.9, 50.8)	149	21 (11.8, 30.2)	245	35.3 (26.6, 43.9)	<.01
Fish	131	33.1 (18.7, 47.5)	137	41.8 (32.1, 51.6)	333	77.5 (69.9, 85.2)	297	77.3 (67.9, 86.7)	464	51.1 (38, 64.2)	434	56.5 (46.6, 66.3)	0.31
[3]Organ meats	8	1.6 (0.1, 3.2)	22	5.8 (2.9, 8.7)	9	2.7 (0.4, 4.9)	10	2.4 (0.0, 5.5)	17	2.1 (0.7, 3.4)	32	4.4 (2.2, 6.6)	0.05
Eggs	86	24.2 (10.3, 38.1)	87	26.3 (16.3, 36.2)	74	20.7 (11.1, 30.2)	63	15 (9.3, 20.7)	160	22.7 (13.6, 31.9)	150	21.6 (14.8, 28.5)	0.86
[4]Dark green leafy vegetables	81	23.4 (18.1, 28.8)	128	35 (24.7, 45.4)	151	39.3 (30.3, 48.2)	171	44.6 (37.1, 52)	232	29.9 (23.9, 35.8)	299	39.0 (31.7, 46.3)	0.03
[5]Fruits	67	17.0 (10.6, 23.5)	130	40.5 (32.3, 48.8)	102	27 (20.1, 33.9)	90	20.3 (11.2, 29.3)	169	21.1 (15.8, 26.4)	220	32.2 (24.2, 40.2)	0.04
[6]Pulses	199	55.6 (46.7, 64.4)	179	53.7 (45, 62.3)	229	57.5 (51.7, 63.3)	229	57.5 (41.9, 73)	428	56.4 (50.6, 62.1)	408	55.3 (47.1, 63.4)	0.82
[7]Bread or flour products	193	53.3 (43.1, 63.5)	200	62.4 (50.3, 74.4)	263	75.6 (66, 85.3)	231	68.6 (58.8, 78.5)	456	62.4 (53.4, 71.3)	431	65 (56.6, 73.4)	0.67
Tea	101	22.1 (12, 32.1)	118	34.3 (27.4, 41.1)	18	8.2 (0.0.0, 17.5)	16	2.5 (0.5, 4.5)	119	16.5 (9.6, 23.3)	134	21.1 (13.5, 28.8)	0.31

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Number of tablets	Northern				Volta				Overall (Northern + Volta)				
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		P-Value
Foods Consumed	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
[8]Fortified drinks or cereals	152	38.6 (24, 53.3)	170	53.5 (40.7, 66.3)	164	53.6 (42.3, 64.8)	178	59 (47.3, 70.7)	316	44.7 (33.6, 55.8)	348	55.8 (46.6, 65)	<.01

[1]Red meats such as beef, pork, lamb, goat, wild game. [2]Poultry/white meat such as chicken, duck, turkey, Guinea fowl or other birds, or meat products like sausage or kebabs.[3]Organ meats such as liver, kidney, or heart.[4]Dark green leafy vegetables such as nkontomire, cassava leaves, bean leaves, ademe, gboma, pumpkin leaves, or spinach,[5]Fruits: Oranges, lemons, sour sap (Aluguntugui), African star fruit (Alasa), pineapple, sweet apple (sweet sup), pawpaw, mango, or baobab pulp.[6]Cow pea, pigeon pea, soya beans, groundnuts, or melon seeds (agushie).[7]Bread or flour products like brofrot, atsormor, polo, meat pie, cake, or tart.[8]Fortified drinks or cereals such as Milo, Ovaltine, Cerelac, Yumvita, or Nido

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Annex 7.2: Dietary Intake over Past 7-days – Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

	Northern		Volta		Overall (Northern + Volta)	
Number of tablets	**Count**		**Count**		**Total Count**	
	n	**%(95% CI)**	**n**	**%(95% CI)**	**n**	**%(95% CI)**
JHS	**N=351**		**N=358**		**N=709**	
0 days/week	127	34.2 (27,41.4)	194	52.3 (44.9,59.7)	321	41.8 (35.3,48.3)
1-3 days/week	182	52.2(44.7,59.6)	141	41.4 (34.9,47.8)	323	47.7 (42.2,53.1)
4-6 days/week	26	7.6 (5.3,9.9)	17	4.6 (2.4,6.9)	43	6.3 (4.6,8.1)
7 days/week	16	6.0 (1.1,11)	6	1.7 (0.0,3.6)	22	4.2 (1,7.4)
Poultry/white meat[2]						
0 days/week	206	59.7(51.9,67.5)	109	28.7 (19.2,38.2)	315	46.7 (37.4,56)
1-3 days/week	132	36.3 (27.7,45)	212	58.5 (48.5,68.6)	344	45.6 (37.6,53.7)
4-6 days/week	8	1.9 (0.8,3.1)	28	9.7 (3,16.4)	36	5.2 (1.6,8.8)
7 days/week	5	2.1 (0.4,3.7)	9	3.1 (0.0,6.6)	14	2.5 (0.7,4.2)
Fish						
0 days/week	123	33.6 (27,40.3)	26	7.7 (4.6,10.7)	149	22.7 (16.1,29.4)
1-3 days/week	147	41.1(33.6,48.5)	142	42.7 (35.7,49.8)	289	41.8 (36.4,47.1)
4-6 days/week	43	13 (9.1,16.8)	75	21.7 (17.8,25.6)	118	16.6 (13.3,19.9)
7 days/week	38	12.4 (7.3,17.4)	115	27.9 (19.7,36.2)	153	18.9 (14,23.7)
Organ meats[3]						
0 days/week	298	84.2(79.7,88.7)	326	90.4 (86,94.9)	624	86.8 (83.4,90.2)
1-3 days/week	45	14.1(10.2,18.1)	32	9.6 (5.1,14)	77	12.2 (9.1,15.3)
4-6 days/week	5	1.0 (0.1,2)	0	-	5	0.6 (0.0,1.1)
7 days/week	3	0.7 (0.0,1.6)	0	-	3	0.4 (0.0,0.9)
Eggs						
0 days/week	190	52.7(47.2,58.2)	151	43 (33.6,52.5)	341	48.7 (43.3,54)
1-3 days/week	147	43.4(38.3,48.4)	186	51.2 (42.9,59.5)	333	46.7 (41.9,51.4)
4-6 days/week	10	2.6 (0.8,4.3)	19	5.4 (1.7,9.1)	29	3.8 (1.8,5.7)
7 days/week	4	1.3 (0.2,2.5)	2	0.4 (0.0,0.9)	6	0.9 (0.2,1.7)
Dark green leafy vegetables[4]						
0 days/week	26	8.6 (5,12.3)	48	12.9 (8.1,17.8)	74	10.4 (7.4,13.5)
1-3 days/week	199	58.1(49.5,66.7)	231	65.8 (60.2,71.3)	430	61.3 (55.4,67.2)
4-6 days/week	68	17.7(13.8,21.5)	50	13.8 (11.1,16.6)	118	16.1 (13.5,18.6)
7 days/week	58	15.6 (5.7,25.5)	29	7.5 (3.3,11.7)	87	12.2 (5.8,18.6)
Fruits[5]						

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		Northern		Volta		Overall (Northern + Volta)	
Number of tablets		**Count**		**Count**		**Total Count**	
	n	**%(95% CI)**	**n**	**%(95% CI)**	**n**	**%(95% CI)**	
0 days/week	102	29.6(22.6,36.7)	96	25 (16.8,33.3)	198	27.7 (22.1,33.3)	
1-3 days/week	189	55.9 (49,62.8)	216	61.2 (52.9,69.4)	405	58.1 (52.7,63.5)	
4-6 days/week	42	9.8 (6,13.7)	29	8.8 (4.4,13.2)	71	9.4 (6.6,12.3)	
7 days/week	18	4.6 (2.3,6.9)	17	4.9 (2,7.9)	35	4.8 (2.9,6.6)	
Pulses[6]							
0 days/week	93	26.9(18.4,35.4)	52	16.3 (11.7,20.9)	145	22.5 (16.9,28.1)	
1-3 days/week	207	59.5(53.6,65.4)	221	63.1 (59.5,66.7)	428	61 (57.2,64.8)	
4-6 days/week	36	9.8 (5.7,13.9)	49	12.8 (6.3,19.2)	85	11 (7.4,14.7)	
7 days/week	15	3.8 (1.5,6.1)	36	7.9 (3.1,12.7)	51	5.5 (3.1,7.9)	
Bread or flour products[7]							
0 days/week	109	27.4(16.5,38.2)	49	11.3 (6.4,16.2)	158	20.6 (13.1,28.2)	
1-3 days/week	163	46.8(41.9,51.7)	218	60.3 (54.2,66.3)	381	52.5 (47.8,57.2)	
4-6 days/week	35	10.5 (6.2,14.8)	56	16.7 (12.5,21)	91	13.1 (9.6,16.6)	
7 days/week	44	15.4 (9.7,21.1)	35	11.6 (7,16.3)	79	13.8 (9.9,17.7)	
Tea							
0 days/week	155	37.5(27.2,47.9)	287	79.4 (74.9,83.9)	442	55.1 (43.7,66.5)	
1-3 days/week	103	31.4(25.4,37.4)	51	14.4 (11.1,17.6)	154	24.2 (19,29.5)	
4-6 days/week	39	11.8 (4.8,18.8)	12	4.6 (2.1,7.2)	51	8.8 (4.4,13.2)	
7 days/week	54	19.3(11.8,26.7)	8	1.6 (0.1,3.1)	62	11.9 (5.5,18.2)	
Fortified drinks or cereals[8]							
0 days/week	195	50.7(41.4,60.1)	154	43.6 (34.7,52.5)	349	47.7 (41.1,54.4)	
1-3 days/week	103	31.7(25.3,38.1)	163	44.2 (36.8,51.5)	266	36.9 (31.6,42.2)	
4-6 days/week	21	6.7 (4,9.4)	23	7.5 (3.8,11.3)	44	7.1 (4.8,9.3)	
7 days/week	32	10.8 (5.5,16.1)	18	4.7 (2.9,6.6)	50	8.3 (4.7,11.9)	
SHS	**N=326**		**N=377**		**N=703**		
Red meats[1]							
0 days/week	141	37.1(25.6,48.6)	267	73.3 (63.5,83.1)	408	52.1 (40.0,64.2)	
1-3 days/week	159	55.2 (45,65.3)	97	22.7 (15,30.4)	256	41.8 (30.9,52.6)	
4-6 days/week	14	4.3 (1.3,7.2)	6	2 (0.0,4.1)	20	3.3 (1.3,5.3)	
7 days/week	12	3.5 (1.4,5.6)	7	2 (0.0,4)	19	2.9 (1.3,4.4)	
Poultry/white meat[2]							
0 days/week	154	48.7 (34,63.5)	150	30.3 (21.8,38.8)	304	41.1 (30.4,51.9)	
1-3 days/week	147	43.7(30.1,57.3)	184	53.4 (48.6,58.1)	331	47.7 (39,56.4)	
4-6 days/week	17	5.4 (2.5,8.3)	27	9.5 (6.2,12.9)	44	7.1 (4.7,9.5)	
7 days/week	8	2.2 (0.5,3.8)	16	6.8 (3.5,10.1)	24	4.1 (1.9,6.3)	
Fish							

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Number of tablets	Northern		Volta		Overall (Northern + Volta)	
	Count		Count		Total Count	
	n	%(95% CI)	n	%(95% CI)	n	%(95% CI)
0 days/week	88	25.9 (18,33.8)	30	12.5 (3.6,21.4)	118	20.3 (14.3,26.4)
1-3 days/week	197	62.8(54.9,70.7)	129	35.5 (28.7,42.2)	326	51.5 (43.3,59.7)
4-6 days/week	16	5.5 (3.2,7.7)	61	15.3 (9,21.7)	77	9.5 (6.2,12.9)
7 days/week	25	5.9 (3.4,8.4)	157	36.7 (26.7,46.8)	182	18.6 (11.1,26.2)
Organ meats[3]						
0 days/week	285	88.7(85.2,92.2)	356	96.1 (92.7,99.5)	641	91.8 (88.8,94.8)
1-3 days/week	39	10.6 (7.7,13.6)	20	3.8 (0.4,7.1)	59	7.8 (5.1,10.5)
4-6 days/week	1	0.4 (0.0,1.2)	1	0.1 (0.0,0.3)	2	0.3 (0.0,0.8)
7 days/week	1	0.2 (0.0,0.7)	0	-	1	0.1 (0.0,0.4)
Eggs						
0 days/week	122	32.4 (21,43.8)	149	40.9 (32.2,49.5)	271	35.9 (27.8,44)
1-3 days/week	184	62.6 (51.2,74)	218	56 (47.4,64.5)	402	59.9 (51.9,67.8)
4-6 days/week	15	3.3 (1.2,5.3)	6	2.3 (0.9,3.6)	21	2.8 (1.6,4.1)
7 days/week	5	1.7 (0.0,4.2)	4	0.9 (0.0,2)	9	1.4 (0.0,2.9)
Dark green leafy vegetables[4]						
0 days/week	113	36.3(26.9,45.7)	116	29.4 (21.8,36.9)	229	33.4 (26.8,40.1)
1-3 days/week	188	57.4 (50.0,64.8)	213	57.6 (50.0,65.2)	401	57.5 (52.1,62.8)
4-6 days/week	13	3.3 (0.4,6.2)	27	6.9 (4.9,8.9)	40	4.8 (2.7,6.9)
7 days/week	12	3 (1.2,4.7)	21	6.2 (4,8.4)	33	4.3 (2.7,5.9)
Fruits[5]						
0 days/week	131	42.8(35.1,50.5)	201	56.2 (48.6,63.9)	332	48.3 (41.9,54.8)
1-3 days/week	157	47.1(38.9,55.3)	160	39.4 (33.2,45.7)	317	43.9 (38.1,49.8)
4-6 days/week	26	7 (3.8,10.2)	10	2.7 (0.4,5)	36	5.2 (2.9,7.5)
7 days/week	12	3.1 (1.3,5)	6	1.7 (0.0,3.5)	18	2.5 (1.1,3.9)
Pulses[6]						
0 days/week	66	21.4(15.4,27.4)	51	14.9 (7.7,22.2)	117	18.7 (14,23.4)
1-3 days/week	223	68.2 (65,71.5)	241	64.5 (61.8,67.2)	464	66.7 (64.3,69.1)
4-6 days/week	21	6.4 (3.9,9)	67	16.7 (11.5,21.9)	88	10.7 (7.4,13.9)
7 days/week	16	4 (1.8,6.2)	18	3.9 (0.8,6.9)	34	3.9 (2.1,5.7)
Bread or flour products[7]						
0 days/week	66	19 (8.2,29.7)	57	12.1 (7.1,17.1)	123	16.1 (9.3,23)
1-3 days/week	182	56.3 (48.5,64)	224	62 (53.2,70.8)	406	58.7 (52.5,64.8)
4-6 days/week	36	12.9 (5.1,20.7)	40	10.8 (8.3,13.3)	76	12 (7.3,16.8)
7 days/week	42	11.9 (5,18.7)	56	15.1 (7.8,22.3)	98	13.2 (8.2,18.2)
Tea						
0 days/week	150	47.5(41.1,53.9)	344	93.5 (90.1,96.8)	494	66.5 (55.8,77.2)

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		Northern		Volta		Overall (Northern + Volta)	
Number of tablets		Count		Count		Total Count	
	n	%(95% CI)	n	%(95% CI)	n	%(95% CI)	
1-3 days/week	124	37.3 (30.7,44)	26	5.4 (2.6,8.2)	150	24.1 (16.3,32)
4-6 days/week	17	5.1 (3.3,6.8)	2	0.2 (0.0,0.5)	19	3 (1.6,4.5)
7 days/week	35	10.1 (6.5,13.8)	5	0.9 (0.0,1.9)	40	6.3 (3.3,9.4)
Fortified drinks or cereals[8]							
0 days/week	117	35.2 (22,48.4)	118	23.5 (14.5,32.5)	235	30.4 (21,39.7)
1-3 days/week	141	44.6 (36.2,53)	174	49.6 (40.7,58.4)	315	46.6 (40.3,53)
4-6 days/week	24	7.7 (5.3,10)	29	9.7 (6.3,13)	53	8.5 (6.5,10.5)
7 days/week	44	12.6 (6.9,18.2)	56	17.3 (10.6,24)	100	14.5 (9.9,19.1)

[1]Red meats such as beef, pork, lamb, goat, wild game. [2]Poultry/white meat such as chicken, duck, turkey, Guinea fowl or other birds, or meat products like sausage or kebabs.[3]Organ meats such as liver, kidney, or heart.[4]Dark green leafy vegetables such as nkontomire, cassava leaves, bean leaves, ademe, gboma, pumpkin leaves, or spinach,[5]Fruits: Oranges, lemons, sour sap (Aluguntugui), African star fruit (Alasa), pineapple, sweet apple (sweet sup), pawpaw, mango, or baobab pulp.[6]Cow pea, pigeon pea, soya beans, groundnuts, or melon seeds (agushie).[7]Bread or flour products like brofrot, atsormor, polo, meat pie, cake, or tart.[8]Fortified drinks or cereals such as Milo, Ovaltine, Cerelac, Yumvita, or Nido

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Annex 7.3: Consumption of Sugary Beverages and Fried Foods – Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Consumption of Sugary Beverages and Fried Foods

	Northern		Volta		Overall (Northern + Volta)	
Number of tablets	**Count**		**Count**		**Total Count**	
	n	**%(95% CI)**	**n**	**%(95% CI)**	**n**	**%(95% CI)**
JHS	**N=351**		**N=358**		**N=709**	
[1]**Local sugary drinks**						
24-hours	195	58.2 (50.7,65.6)	144	37.6 (30.5,44.8)	339	49.6 (42.1,57)
0 days/week	124	33.2 (26.3,40.2)	125	31.7 (24.6,38.7)	249	32.6 (27.5,37.6)
1-3 days/week	179	51.8 (44.8,58.8)	188	52.3 (45.7,58.8)	367	52.0 (47.1,56.9)
4-6 days/week	33	10.2 (7.8,12.6)	30	10.7 (5.7,15.8)	63	10.4 (7.9,13)
7 days/week	15	4.8 (3.1,6.5)	15	5.4 (3.3,7.5)	30	5.0 (3.7,6.4)
Fried Foods[2]						
24-hours	137	40.7 (32.7,48.6)	153	40.3 (33.4,47.2)	290	40.5 (35.1,46)
0 days/week	174	48.1 (39.3,57)	136	34.1 (22.6,45.7)	310	42.2 (34.2,50.3)
1-3 days/week	143	43.2 (34,52.3)	179	51.9 (45.2,58.6)	322	46.8 (40.5,53.2)
4-6 days/week	22	5.6 (2.8,8.4)	34	11 (6.9,15.1)	56	7.9 (5,10.7)
7 days/week	12	3.1 (0.8,5.4)	9	3 (0.7,5.3)	21	3.1 (1.4,4.7)
SHS	**N=326**		**N=377**		**N=703**	
[1]**Local sugary drinks**						
24-hours	112	37.4 (29,45.8)	106	29.0 (14.5,43.4)	218	33.9 (25.7,42.1)
0 days/week	157	46.1 (38.9,53.2)	180	46.9 (37.1,56.6)	337	46.4 (40.5,52.2)
1-3 days/week	145	44.9 (37.4,52.5)	164	43.5 (36.8,50.2)	309	44.3 (39.1,49.6)
4-6 days/week	14	4.9 (3.2,6.6)	22	6.0 (2.5,9.5)	36	5.4 (3.6,7.1)
7 days/week	10	4.1 (2,6.1)	11	3.6 (1.2,6.1)	21	3.9 (2.3,5.5)
Fried Foods[2]						
24-hours	116	34.6 (22.3,46.9)	105	29.3 (17.2,41.3)	221	32.4 (23.6,41.2)
0 days/week	165	52.7 (41.3,64.2)	176	45.6 (36.1,55.1)	341	49.8 (41.7,57.8)
1-3 days/week	145	42.8 (32.6,53)	177	47.8 (38.4,57.2)	322	44.9 (37.5,52.2)
4-6 days/week	14	4.3 (0.1,8.5)	14	4.6 (3.0,6.3)	28	4.4 (1.9,7.0)
7 days/week	2	0.2 (0.0,0.5)	10	2.0 (0.4,3.6)	12	0.9 (0.2,1.7)

[1]Hausa beer, Sobolo, Tamarind juice, Asaana or other sugary drinks. [2]Fried plantain chips, yam chips, Flour products (atsormor, polo, brofrot), Kose(fried blackeyed peas pastry), or meat pies

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Annex 7.4: Geophagy Practice, Frequency and Reasons – Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Annex Table 7.4 Practice of Geophagy, Frequency and Reasons

	Northern				Volta				Overall (Northern + Volta)				P-Value
	Baseline		Follow-on		Baseline		Follow-on		Baseline		Follow-on		
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
JHS	**N=393**		**N=351**		**N=382**		**N=358**		**N=775**		**N=709**		
Geophagy	93	24 (14.3, 33.6)	59	18.3 (5.8, 30.8)	137	32.3 (23.5, 41.1)	85	22.2 (15.2, 29.3)	230	27.4 (20.7, 34)	144	20 (12.2, 27.7)	0.14
Frequency, among those who engage in geophagy													
Every day	-	-	3	5.8 (0.0, 15.1)	-	-	14	14.4 (5.9, 23)	-	-	17	9.8 (2.6, 17)	-
Every week	-	-	18	27.3 (15.1, 39.4)	-	-	27	31.6 (21.3, 42)	-	-	45	29.3 (20.6, 37.9)	-
Once or twice a month	-	-	12	18.9 (9.6, 28.1)	-	-	20	26.8 (15, 38.6)	-	-	32	22.6 (14.1, 31.1)	-
A few times per year	-	-	23	41 (23.6, 58.3)	-	-	21	23.3 (9.7, 36.8)	-	-	44	32.7 (18.8, 46.6)	-
Other	-	-	3	7.1 (0.0, 15.9)	-	-	3	3.9 (0.0, 11.3)	-	-	6	5.6 (0.0, 11.9)	-
Reasons, among those who engage in geophagy													
Hungry	-	-	2	2.8 (0.0.0, 7.4)	-	-	1	1.3 (0.0.0, 3.8)	-	-	3	2.1 (0.0, 4.7)	-
Nauseated	-	-	2	4.4 (1.1, 7.7)	-	-	6	8.6 (0.9, 16.4)	-	-	8	6.4 (2.5, 10.3)	-
It tastes good, sweet, or appetizing. I crave it.	-	-	41	6.4 (1.5, 11.2)	-	-	46	5.2 (3.1, 7.3)	-	-	87	5.9 (2.8, 8.9)	-
It smells good	-	-	22	32 (23, 41.1)	-	-	27	31.8 (22, 41.6)	-	-	49	31.9 (25.3, 38.6)	-

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	Northern Baseline n	Northern Baseline % (95% CI)	Northern Follow-on n	Northern Follow-on % (95% CI)	Volta Baseline n	Volta Baseline % (95% CI)	Volta Follow-on n	Volta Follow-on % (95% CI)	Overall Baseline n	Overall Baseline % (95% CI)	Overall Follow-on n	Overall Follow-on % (95% CI)	P-Value
¹Other	-	-	4	0.7 (0.0, 1.5)	-	-	14	2.6 (0.4, 4.7)	-	-	18	1.5 (0.4, 2.6)	-
SHS		N=371		N=326		N=405		N=377		N=776		N=703	
Geophagy	94	24.8 (17.1, 32.6)	66	22.7 (15.5, 29.9)	131	28.8 (21, 36.6)	94	24.8 (20.7, 28.9)	225	26.4 (20.9, 32)	160	23.6 (19, 28.1)	0.47
Frequency, among those who engage in geophagy													
Every day	-	-	4	5.2 (0.2, 10.2)	-	-	5	2.8 (0.0, 6.6)	-	-	9	4.2 (0.7, 7.6)	-
Every week	-	-	9	15.2 (8.8, 21.6)	-	-	25	25.5 (15.6, 35.4)	-	-	34	19.7 (14.1, 25.2)	-
Once or twice a month	-	-	20	28.6 (18.4, 38.9)	-	-	27	28.9 (19.9, 37.9)	-	-	47	28.7 (21.7, 35.7)	-
A few times per year	-	-	29	46.5 (29.8, 63.1)	-	-	19	30.6 (15.8, 45.4)	-	-	48	39.6 (28.5, 50.6)	-
Other	-	-	4	4.5 (0.0, 9.3)	-	-	18	12.2 (3, 21.3)	-	-	22	7.8 (2.9, 12.8)	-
Reasons, among those who engage in geophagy													
Hungry	-	-	0	-	-	-	2	1.5 (0.0, 3.7)	-	-	2	0.6 (0.0, 1.6)	-
Nauseated	-	-	5	8.9 (4.2, 13.6)	-	-	11	10.1 (0.9, 19.3)	-	-	16	9.4 (4.7, 14.2)	-
It tastes good, sweet, or appetizing.													
I crave it.	-	-	49	7.9 (5.7, 10.1)	-	-	40	5.6 (4.1, 7)	-	-	89	7 (5.4, 8.5)	-
It smells good	-	-	20	36.7 (24.8, 48.6)	-	-	36	45.5 (29.9, 61.2)	-	-	56	40.6 (30.7, 50.6)	-
²Other	-	-	12	1.8 (1, 2.6)	-	-	17	1.7 (1, 2.5)	-	-	29	1.8 (1.2, 2.3)	-

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| | Northern | | | | Volta | | | | Overall (Northern + Volta) | | | | |
| | Baseline | | Follow-on | | Baseline | | Follow-on | | Baseline | | Follow-on | | P-Value |
	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	n	% (95% CI)	
Reasons, among those who engage in geophagy													
Hungry	-	-	0	-	-	-	2	1.5 (0.0, 3.7)	-	-	2	0.6 (0.0, 1.6)	-
Nauseated	-	-	5	8.9 (4.2, 13.6)	-	-	11	10.1 (0.9, 19.3)	-	-	16	9.4 (4.7, 14.2)	-
It tastes good, sweet, or appetizing.													
I crave it.	-	-	49	7.9 (5.7, 10.1)	-	-	40	5.6 (4.1, 7)	-	-	89	7 (5.4, 8.5)	
It smells good	-	-	20	36.7 (24.8, 48.6)	-	-	36	45.5 (29.9, 61.2)	-	-	56	40.6 (30.7, 50.6)	-
[2]Other	-	-	12	1.8 (1, 2.6)	-	-	17	1.7 (1, 2.5)	-	-	29	1.8 (1.2, 2.3)	-

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test for the overall population.. [1]Two years ago, anytime I feel like eating it, anytime it is available, anytime a friend is eating it, occasionally, and when the ground is wet. [2]Aids in digestion, any time I have a cough, to reduce blood flow in menstruation, dizziness, diarrhea, vomiting, to clean teeth, thicken blood, to be healthy/strong, friends also consume it, "I just feel like it", prevent indigestion, and no cost.

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Annex 8.1 Anthropometric Measures– Stratified Region and School level Results in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Table: Anthropometric Indicators Baseline and Follow-on

	Northern		Volta		Overall (Northern + Volta)		
JHS	Baseline	Follow-on	Baseline	Follow-on	Baseline	Follow-on	P-Value
	N=393	N=351	N=380	N=356	N=773	N=707	
Height (cm)	156.6 (155.3, 157.8)	157.8 (156.8, 158.9)	160.2 (159.6, 160.8)	160.2 (159.6, 160.8)	156.3 (155.6, 157.0)	157.7 (157.0.0, 158.3)	<.01
Weight (kg)	47.9 (46.2, 49.6)	49.6 (48.1, 51.1)	48.1 (47.2, 49.1)	50.2 (49.5, 50.9)	48.0 (47.1, 49.0)	49.9 (49.0.0, 50.7)	<.01
HAZ	-0.41 (-0.54, -0.28)	-0.34 (-0.45, -0.22)	-0.31 (-0.54, -0.08)	-0.30 (-0.51, -0.09)	-0.36 (-0.49, -0.23)	-0.32 (-0.44, -0.20)	0.02
BAZ	-0.24 (-0.38, -0.10)	-0.14 (-0.26, -0.01)	-0.12 (-0.24, -0.01)	-0.03 (-0.14, 0.07)	-0.18 (-0.27, -0.09)	-0.08 (-0.17, 0.0)	<.01
Indicators	N=371	N=326	N=405	N=377	N=776	N=703	
	n / % (95% CI)	n / % (95% CI)	n / % (95% CI)	n / % (95% CI)	n / % (95% CI)	n / % (95% CI)	
IOFT[2]	N=393	N=351	N=380	N=356	N=773	N=703	
Short Stature[1]	21 / 5.1 (2.7, 7.4)	16 / 4.3 (2.3, 6.3)	9 / 2.3 (0.0, 5.1)	10 / 2.8 (0.8, 4.9)	30 / 3.9 (2, 5.8)	26 / 3.7 (2.2, 5.2)	0.64
Thin	8 / 2.0 (0.5, 3.4)	5 / 1.7 (0.0.0, 4.0)	8 / 1.8 (0.6, 3.0)	8 / 1.9 (0.5, 3.2)	16 / 1.9 (0.9, 2.9)	13 / 1.8 (0.3, 3.2)	0.75
Overweight	31 / 9.1 (6.2, 12.1)	32 / 10.0 (6.1, 13.9)	52 / 15.5 (10.7, 20.3)	47 / 14.3 (10.3, 18.4)	83 / 11.7 (8.7, 14.8)	79 / 11.8 (8.8, 14.8)	0.94
Obese	2 / 0.7 (0.0, 1.7)	3 / 1.2 (0.0, 2.7)	5 / 2.0 (0.9, 3.1)	7 / 2.7 (1.3, 4.1)	7 / 1.2 (0.5, 2)	10 / 1.8 (0.6, 3)	0.23
SHS	N=371	N=326	N=405	N=377	N=776	N=707	
Height (cm)	156.1 (155.4, 156.8)	157.5 (156.7, 158.4)	160.1 (159.6, 160.7)	160.4 (159.8, 161.0)	160.2 (159.7, 160.6)	160.3 (159.8, 160.7)	0.18
Weight (kg)	56.1 (55.4, 56.9)	56.3 (55.4, 57.3)	56.2 (54.6, 57.8)	57.1 (55.6, 58.6)	56.2 (55.3, 57.1)	56.7 (55.8, 57.6)	0.01
HAZ	-0.38 (-0.46, -0.29)	-0.40 (-0.49, -0.31)	-0.35 (-0.44, -0.26)	-0.35 (-0.44, -0.27)	-0.36 (-0.42, -0.30)	-0.38 (-0.44, -0.31)	0.27

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Indicators	Northern Baseline		Northern Follow-on		Volta Baseline		Volta Follow-on		Overall (Northern + Volta) Baseline		Overall (Northern + Volta) Follow-on		P-Value
BAZ		0.18 (0.10.0, 0.27)		0.18 (0.06, 0.30)		0.21 (0.03, 0.39)		0.25 (0.08, 0.41)		0.20 (0.09, 0.30)		0.21 (0.11, 0.32)	0.49
Indicators		**N=371**		**N=326**		**N=405**		**N=377**		**N=776**		**N=703**	
Short Stature[1]	5	1.4 (0.0.0, 2.9)	5	1.4 (0.0.0, 3.0)	13	2.5 (0.7, 4.2)	15	4.2 (2.3, 6.1)	18	1.9 (0.7, 3.0)	20	2.5 (1.0.0, 4.0)	0.31
IOFT[2]		**N=371**		**N=326**		**N=405**		**N=377**		**N=776**		**N=703**	
Thin	2	0.3 (0.0.0, 0.9)	2	0.2 (0.0, 0.4)	5	1.4 (0.2, 2.6)	5	1.2 (0.0, 2.5)	7	0.8 (0.1, 1.4)	7	0.6 (0.0, 1.2)	0.52
Overweight	76	19.9	69	21.0	68	20.2	67	21.1	144	20.0	136	21.0	0.31
Obese	9	2 (0.5, 3.5)	8	2.2 (0.6, 3.8)	16	4.9 (3, 6.8)	17	5.3 (3.2, 7.4)	25	3.2 (1.8, 4.6)	25	3.5 (2.0.0, 5)	0.48

P-values test for differences between baseline and follow-on proportions by Rao-Scott chi-square test. Short Stature1: Height-for-age z-score, HAZ, < - 2SD WHO- Growth Reference (2007). 2IOTF-International Obesity Task Force BMI-for-age z-score, BAZ cut-offs: thinness(<-1SD), overweight (>+1), and obesity(>+2SD).

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Annex 8.2: Percent of Biologically Implausible value (BIV) of Height-for-age z-score (HAZ), and Body Mass Index (BMI)-for-age z-score (BMIZ) in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Population Group	Characteristics	N	Biologically Implausible value (BIV)	
			HAZ, %	BMIZ, %
Junior High School	Baseline	773	-	-
	Follow-on	708	0.14	0.28
	Total	**1481**	**0.07**	**0.14**
Senior High School	Baseline	776	-	-
	Follow-on	703	-	-
	Total	**1479**	**-**	**-**
Note: unweighted estimates				

There was only one BIV of HAZ and two BIV of BMIZ among the JHS girls and none among the SHS girls.

Annex 8.3: Percent of Digit Preference in Height in in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Population Group	Charac-teristics	Digit preference for Height values									
		n	0.0, %	1, %	2, %	3, %	4, %	5, %	6, %	7, %	8, %	9, %
Junior High School	Baseline	775	14.83	10.59	11.30	9.60	9.32	10.17	10.59	7.2	7.63	8.76
	Follow-on	709	11.90	9.57	10.48	12.68	8.41	10.35	9.70	8.93	6.73	11.25
	Total	**1481**	13.30	10.06	10.87	11.21	8.85	10.26	10.13	8.10	7.16	10.06
Senior High School	Baseline	776	11.98	10.95	9.41	10.95	11.47	10.82	9.28	8.12	6.83	10.18
	Follow-on	703	11.95	11.95	10.95	8.82	12.09	9.25	9.82	8.25	7.97	8.96
	Total	**1479**	11.97	11.43	10.14	9.94	11.76	10.07	9.53	8.18	7.37	9.60
Note: unweighted estimates											

It is preferred that each of the numeric digits from 0 to 9 be evenly distributed for all measurements and should be around 10%. The results (Annex 8.3) show that 11-12% of height measurements had a 0 or 1 or 4 relative to the other digit.

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Annex 8.4: Percent of Digit Preference in Weight in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Population Group	Charac-teristics	Digit preference for Height values										
		n	0.0, %	1, %	2, %	3, %	4, %	5, %	6, %	7, %	8, %	9, %
Junior High School	Baseline	775	11.23	11.61	10.58	9.42	8.65	9.29	7.87	9.81	10.32	11.1
	Follow-on	709	10.86	9.87	10.72	10.01	11.42	9.87	8.60	7.76	10.30	10.58
	Total	**1484**	11.05	10.78	10.65	9.70	9.97	9.57	8.22	8.83	10.31	10.85
Senior High School	Baseline	776	10.82	10.44	10.82	7.86	11.08	9.02	8.25	10.95	9.92	10.82
	Follow-on	703	9.53	8.96	10.10	8.53	11.52	9.96	11.52	10.10	10.67	9.10
	Total	**1479**	10.21	9.74	10.48	8.18	11.29	9.47	9.80	10.55	10.28	10.01
Note: unweighted estimates												

These data show that rounding was not an issue during the measurement of weight as there were minimal predominance of single digit that exceeded 10%.

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Annex 8.5: Standard deviation (SD), minimum (Min) and maximum (Max) of Hemoglobin Concentration (Hb), Height-for-age z-score (HAZ), and Body Mass Index (BMI)-for-age z-score (BMIZ) in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Population Group	Characteristics	Standard Deviation and Distribution Ranges for Hemoglobin and Anthropometric Z-scores						
		n	Hb		HAZ		BMIZ	
			SD	(Min, Max)	SD	(Min, Max)	SD	(Min, Max)
Junior High School	Baseline	775	1.25	(7.6, 16.5)	0.95	(-3.43,4.11)	0.94	(-3.81,3.23)
	Follow-on	709	1.29	(7.4,17.9)	0.92	(-3.04,3.87)	0.94	(-3.88,3.40)
	Total	**1484**	1.28	(7.4,17.9)	0.94	(-3.43,4.11)	0.95	(-3.88, 3.40)
Senior High School	Baseline	776	1.36	(6.1,16.1)	0.87	(-3.49,2.74)	0.87	(-2.53,3.57)
	Follow-on	703	1.35	(7.4,16.8)	0.87	(-3.13,2.52)	0.90	(-2.67,3.92)
	Total	**1479**	1.36	(6.1,16.8)	0.87	(-3.49,2.74)	0.88	(-2.67,3.92)
Note: unweighted estimates. Biologically Implausible value (BIV) are excluded.								

Annex 8.6: Percent of Digit Preference in Hemoglobin in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

Population Group	Charac-teristics	Annex 8.6 - Digit preference for Hemoglobin values									
		n	0.0, %	1, %	2, %	3, %	4, %	5, %	6, %	7, %	8, %	9, %
Junior High School	Baseline	775	8.52	8.26	10.06	9.16	10.19	10.45	11.48	10.58	11.23	10.06
	Follow-on	709	9.73	9.59	9.03	11.71	10.01	11.71	10.01	10.3	7.48	10.44
	Total	**1480**	9.1	8.89	9.57	10.38	10.11	11.05	10.78	10.44	9.43	10.24
Senior High School	Baseline	776	9.28	9.66	10.57	10.82	10.31	10.7	10.44	9.28	10.05	8.89
	Follow-on	703	9.25	10.95	10.1	11.24	7.97	9.25	8.68	10.67	10.95	10.95
	Total	**1479**	9.26	10.28	10.34	11.02	9.2	10.01	9.6	9.94	10.48	9.87
Note: unweighted estimates											

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Annex 9: Ethics Review Committee Approval Letter in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

Research & Development Division
Ghana Health Service
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Email: ghserc@gmail.com

MyRef. GHS/RDD/ERC/Admin/App |683
Your Ref. No.

Esi Foriwa Amoaful
Ghana Health Service
PMB, Accra

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

GHS-ERC Number	GHS-ERC: 07/05/17
Project Title	Iron Folic Acid Supplementation and Anaemia Reduction in Adolescent Girls in Ghana: An Impact Evaluation
Approval Date	18th July, 2017
Expiry Date	17th July, 2018
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of 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 study cannot be implemented or is discontinued and reasons why

- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

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. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

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Annex 10: Field Staff Introduction Letter in the baseline and follow-on in the Impact Evaluation of a School-based Integrated Nutrition and Health Education Programme with Iron and Folic-Acid supplementation Intervention among Adolescent Girls in Volta and Northern regions of Ghana, 2017-2018.

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

My Ref. No
GHS/NUT/JUN/18/010

Your Ref. No. ....

GHANA HEALTH SERVICE
PRIVATE MAIL BOX
ACCRA, GHANA.

nutrition @ghsmail.org

18TH JUNE 2018

TO WHOM IT MAY CONCERN:
LETTER OF INTRODUCTION OF FIELD STAFF FOR GIFTS FOLLOW-ON SURVEY

The Ghana Health Service, in collaboration with Ghana Education Service and other stakeholders and with support from UNICEF, is implementing Weekly Iron and Folic acid Supplementation for adolescent girls in and out of school and adult women in line with WHO recommendations with the aim of reducing the persistently high anaemia rates in Ghana.

A follow-up survey to enable assessment of programme effectiveness has been planned to take place in the same baseline regions with same baseline respondents. A team of data collectors recruited will be visiting initially selected baseline schools to re-interview respondents and take sample blood for test in the laboratory.

This is to introduce the four member team that will undertake survey scheduled to take place in 24th June – July 31st 2018.

The team comprise of the under listed members and we will be grateful if you accord them the needed cooperation and your kind assistance to facilitate their work:

No.	Name	Designation
1.		Supervisor
2.		Interviewer
3.		Interviewer
4		Interviewer

You may call Ms. Esi Amoaful (0244770800) or Ms. Josephine Asante (0201897531) with any queries regarding this survey.

We thank you and count on your usual cooperation.

DR PATRICK KUMA ABOAGYE
DIRECTOR, FAMILY HEALTH DIVISION

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