Ghana Micronutrient Survey 2017

Ghana Micronutrient Survey 2017 (GMS 2017)

FINAL REPORT

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Survey collaborators

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Abbreviations

AGP	α-1-acid glycoprotein
BMI	Body mass index
CRP	C-reactive protein
DHS	Demographic and Health Survey
EA	Enumeration area
ELISA	Enzyme linked immunosorbent assay
ERC	Ethical Review Committee, Ghana Health Service
GHS	Ghana Health Service
GMS 2017	Ghana Micronutrient Survey 2017
GSS	Ghana Statistical Service
HAZ	Height-for-age z-score
MICS	Multiple Indicator Cluster Survey
MoH	Ministry of Health
MRDR	Modified relative dose-response test
MUAC	Mid-upper arm circumference
NPW	Non-pregnant women (15-49 years)
ppm	Parts per million
PSC	Preschool-age children (6-59 months)
PW	Pregnant women
RBP	Retinol-binding protein
RDT	Rapid diagnostic test
TfR	Transferrin receptor
UNICEF	United Nations Children's Fund
WAZ	Weight-for-age z-score
WHO	World Health Organization
WHZ	Weight-for-height z-score

Foreword

In Ghana, micronutrient malnutrition continues to affect many children under five years of age and women. Although some reductions in micronutrient deficiencies have been achieved over the last decade, the prevalence of anaemia and deficiencies of vitamin A and iodine are still high and of public health concern. Notable causes of anaemia and micronutrient deficiencies include inadequate intakes of foods rich in the micronutrients, infections such as repeated bouts of malaria and diarrhoeal diseases, worm infestations and genetically-inherited conditions such as sickle-cell and -thalassemia diseases.

Over the past decades, several programmes have been implemented by the Ghana Health Service and other government agencies, with technical and funding support from partners, to help address micronutrient malnutrition in Ghana. These include routine vitamin A supplementation for children 6-59 months of age, iron and folic acid (IFA) supplementation for pregnant women attending antenatal clinics, IFA supplementation for adolescent girls aged 10-19 years in selected regions, routine deworming for school-age children, food fortification with vitamin A and iron, and salt iodization among others.

The Ghana Demographic and Health Survey provides some data on micronutrient malnutrition, however a comprehensive national data on the micronutrient situation in Ghana, especially for the vulnerable groups; such as children under five years of age and women of reproductive age have largely been unavailable. Recognizing the need for an updated, representative and reliable national data on the nutritional status of children under five years and women of reproductive age, the National Micronutrients Task team led by the Ghana Health Service held several consultative meetings with development partners, which ultimately led to the conduct of the Ghana National Micronutrient Survey in 2017. This survey was conducted by a consortium led by the University of Ghana and GroundWork, with technical and funding support from UNICEF and the Government of Canada.

The findings show there has been some modest reduction in anaemia prevalence in both women of reproductive age and children. This is indeed heartwarming and a possible indication of the success of on-going health interventions to prevent and control anaemia. We however hasten to indicate concern over the wide regional disparity that exists and also remain disturbed about the findings that indicate high rates of stunting levels and the wide variation in between regions This trend needs our special attention. The generation of program data including findings on the National Food Fortification Program is also of interest and will be a guide for policy makers to use in strengthening implementation.

We are grateful to all who supported the Ghana Micronutrient Survey 2017 in diverse ways and look forward to working with partners to drive policy and interventions aimed at improving the nutritional and micronutrient status of the Ghanaian populace.

Dr. Patrick Kuma Aboagye
The Director Family Health
Ghana Health Service

Executive Summary

Introduction

The African continent, in particular the sub-Saharan region, continues to be highly affected by malnutrition, which inhibits progress in human and economic development. In Ghana, despite two decades of sustained economic growth and reductions in some forms of malnutrition, progress on minimizing malnutrition, including micronutrient deficiencies, has been slow. Scarce data indicate that approximately 50% and 66% of non-pregnant and pregnant women and pre-school age children, respectively, suffer from anemia. Roughly 30% of pre-school children also suffer from iron and vitamin A deficiency. While 19% of children have been found to be stunted and 11% underweight in the 2014 Demographic and Health Survey (DHS), over 40% of women were found to be overweight or obese indicating the double burden of malnutrition is present in the Ghanaian population.

Currently, food fortification standards for iron, zinc, B-vitamins and vitamin A in wheat flour and vitamin A in vegetable oil exist in Ghana. Analyses conducted in 2011, however, showed that while 95% of oil samples in Ghana were adequately fortified (≥10 mg/kg for vitamin A), only 13% of wheat flour samples were adequately fortified (≥58.5 mg/kg for iron; [1]. Such low iron fortification levels in wheat flour and stability issues of retinyl palmitate added to vegetable oil, coupled with diets low in iron and provitamin A carotenoids, may be the reason for the high prevalence of anemia and vitamin A deficiencies in Ghana.

Objectives

The objective of this survey was to obtain updated and reliable information on the nutrition and micronutrient status of children 6-59 months of age, non-pregnant women 15-49 years of age, and pregnant women in Ghana, to formulate evidence-based recommendations improving the nutritional status of vulnerable groups.

Key nutrition indicators assessed included prevalence of anemia and malaria parasitemia in pre-school children, non-pregnant women, and pregnant women; deficiencies of iron and vitamin A in pre-school children and non-pregnant women; deficiencies of folate and vitamin B12 in non-pregnant women; prevalence of hemoglobinopathies in pre-school children and non-pregnant women; childhood wasting and stunting; child and adult overweight and obesity; and undernutrition in pregnant women.

Other variables that may potentially influence or cause various types of micronutrient deficiencies, such as socio-economic status, household food security, individual food consumption patterns, infant feeding and breastfeeding practices, intake of micronutrient supplements and information on the consumption of fortified vegetable oil and wheat flour were also assessed. At the cluster level, up to 6 flour samples were selected from bakeries and retail points to assess the coverage of adequately fortified (i.e., ≥58.5 ppm iron) wheat flour. For households, the coverage of adequately (i.e., ≥10 ppm vitamin A) fortified vegetable oil by quantitative measurement of vitamin A content was the primary indicator assessed.

Design

The GMS 2017 is a cross-sectional stratified survey based on a probability sample to produce estimates that have acceptable precision for priority indicators of nutritional status in children 6-59 months of age and non-pregnant women using three different strata across Ghana (Coastal belt, Middle belt, Northern belt) to represent areas with different agricultural and climatic conditions. Administrative regions included in each stratum are as follows: Coastal Belt (Greater Accra, Central, Volta, Western), Middle Belt (Brong-Ahafo, Ashanti, Eastern), and Northern Belt (Northern, Upper East, Upper West).

A two-stage sampling procedure was conducted to randomly select households. As a first stage, census enumeration areas (EAs) or clusters within each stratum were randomly selected with probability proportional to population size. For the second stage of sampling, a random selection of households in each EA or cluster was completed by using simple random sampling. The GMS 2017 survey was nationwide in scope, and collected data at the cluster level and from four target groups: 1) households, 2) children aged 6-59 months, 3) non-pregnant women of child-bearing age (15-49 years of age), and 4) pregnant women.

Results

In this executive summary, only national estimates are presented, but Table 1 refers readers to the corresponding table in the report containing more detailed results.

Table 1. Summary results of the Ghana Micronutrient Survey 2017

Target group	Indicator[a]	Result	Table[b]
Clusters			
	Flour iron ≥ 58.5 ppm	1.5 %	Table 15
Households			
	Oil vitamin A ≥ 10 ppm	55.6 %	Table 13
Children 6-59 months			
	Anemia	35.6 %	Table 27
	Mild anemia	17.8 %	Table A14-9
	Moderate anemia	17.0 %	Table A14-9
	Severe anemia	0.7 %	Table A14-9
	Iron deficiency	21.5 %	Table 27
	Iron deficiency anemia	12.2 %	Table 27
	Vitamin A deficiency (RBP)	20.8 %	Table 30
	Positive malaria RDT	20.3 %	Table 19
	Hemoglobinopathies, sickle cell disorder	13.1 %	Table 25
	Hemoglobinopathies, α-thalassemia	30.7 %	Table 25
	Stunting (i.e. HAZ < -2)	21.4 %	Table 22
	Wasting (i.e. WHZ (< -2)	7.0 %	Table 23
Non-pregnant women (15-49 years)			
	Anemia	21.7 %	Table 39
	Mild anemia	14.3 %	Table A15-1
	Moderate anemia	7.0 %	Table A15-1
	Severe anemia	0.4 %	Table A15-1
	Iron deficiency	13.7 %	Table 39
	Iron deficiency anemia	8.9 %	Table 39
	Vitamin A deficiency (RBP)	1.5 %	Table 41
	Folate deficiency	53.8 %	Table 42
	B12 deficiency	6.9 %	Table 43
	Positive malaria RDT	8.4 %	Table 38
	Hemoglobinopathies, sickle cell disorder	13.5 %	Table 37
	Hemoglobinopathies, α-thalassemia	34.6 %	Table 37
	Overweight (BMI>25)	24.7 %	Table 35
	Obesity (BMI>30)	14.3 %	Table 35
Pregnant women			
	Anemia	45.1 %	Table 48
	Malaria	9.5 %	Table 47
	Underweight (MUAC)	3.6 %	Table 46

[a] See text of method section for case definitions;
[b] Refer to the table indicated for more detailed analysis of the outcome, including group-specific results by age, region, wealth quintiles and other analyses.

Discussion

At the household level, most households had access to safe drinking water, but only 1 out of 10 households have adequate sanitary facilities. As such, access to adequate sanitation facilities should be increased, since access to safe drinking water alone is insufficient to reduce diarrhea in children.

Among household that had refined vegetable oil available, 56% were adequately fortified with vitamin A (i.e., having ≥ 10 µg RE/mL oil). This means that at the time of the survey, only 4 out of 10 households consumed adequately fortified oil nationally. That said, there are marked differences in proportions of adequately fortified oil by region and by agro-ecological zones, driven by the fact that the different oil brands reach different market segments and have varying vitamin A concentrations. For wheat flour, the GMS found that less than 2% of flour samples were adequately fortified, which is slightly lower that previous assessments. While wheat flour fortification is mandatory in Ghana [2], wheat flour milling companies have been reluctant to comply with national standards citing organoleptic changes following fortification.

Among preschool-aged children, infant and young child feeding practices are mostly adequate with regard to early initiation and continued breastfeeding, but clearly need improving with regard to minimum acceptable diet, both with regard to dietary diversity and food frequency. Also, vitamin A supplementation and deworming in the six months preceding the survey is quite low with only about one-third of the children receiving either of those interventions.

Child stunting affects close to 20% of the children under 5 years of age, a prevalence that is slightly lower but comparable to the 2014 DHS. Also similar to the DHS, the prevalence of overweight among pre-school children was quite low, affecting less than 1% of children. For stunting, the stunting prevalence was higher in rural children, and stunting prevalence decreased with increasing household wealth. A quarter of children 6-59 months of age reportedly had diarrhea during the two weeks preceding the interview, and a third or more reportedly had fever or cough during the same period. This high occurrence of illness is reflected by the high prevalence of elevated markers inflammation (AGP, CRP, or both) among the children.

Vitamin A deficiency affects about 20% of children in Ghana, with a higher prevalence in Ghana's northern belt (31%), and lower among children residing in wealthier households (9%). Despite the relatively high vitamin A deficiency prevalence in Ghanaian children based on retinol-binding protein, results from the modified relative dose response test are indicative of recent improvements of the vitamin A situation. Nonetheless, efforts to reduce vitamin A deficiency should be strengthened.

Anemia was markedly higher in the Northern belt (53.2%) compared to the Middle (28.2%) and Southern (32.3%) belts. A similar disparity was observed with ID and IDA as the prevalence in the Northern belt was substantially higher than in the other strata. To illustrate, IDA was nearly 30% in the Northern belt, but less than 8% in the Middle and Southern Belts. About 35% of anemic children had concurrent iron deficiency, which is slightly higher than the 28% estimate in a recent meta-analysis for countries in sub-Saharan Africa and indicates that iron deficiency continues to play an important role

in the etiology of anemia in Ghanaian children. The current analysis clearly suggests that there are multiple factors contributing to anemia in addition to ID. The GMS also illustrates that improving iron status may not always result in improved anemia prevalence. For example, children receiving deworming tablets had a significantly lower prevalence of ID and IDA, but no difference in the anemia prevalence was found. While children that consumed iron-fortified foods the day prior to the survey had very low levels of anemia (<2%), this finding may be a proxy for household wealth. About 10% and 30% of children in the fourth and wealthiest wealth quintile consumed iron-fortified foods, whereas these foods were consumed by 5% or less children in other wealth quintiles. As such, interventions focusing solely on reducing iron deficiency, although important, will not eradicate anemia.

Among non-pregnant women, about 50% consumed 5 or more food groups the day preceding the survey interview. Vitamin or mineral supplement intake when not pregnant was relatively rare, although a fifth of women stated having taken iron tablets in the previous six months. Almost seven out of ten women reported having consumed iron supplements during their last pregnancy; this coverage estimate is slightly higher compared to the 2014 DHS, where the corresponding coverage was 59%.

Nearly 40% of the Ghanaian women were overweight (25%) or obese (14%). Furthermore, prevalence of overweight/obesity is almost double in urban areas compared to rural areas, and is strongly positively associated with socio-economic status. While overweight and obesity increases with age, age likely serves as a proxy for parity. The overweight and obesity prevalence significantly increases from 12.2% in women with no births, to 28.6% in those with one birth, to 51.5% in those with two or more births. The well-documented link between overweight/obesity and type 2 diabetes, blood pressure, cardiovascular diseases and all-cause mortality highlights the importance of tackling the problem. Over and above, there is growing evidence of an intergenerational effect in that children born to overweight/obese mothers are more likely to be stunted or to also become overweight later in life.

One in five women was anemic, and about 14% and 9% had ID and IDA, respectively. Among anemic women, 40% had concurrent ID. ID is more prevalent in urban areas; there are differences by stratum for anemia and IDA, and a marginal difference for ID, with the Middle belt having higher prevalences. Sickle cell trait (HbAS) is also associated with slightly higher anemia prevalence, but it has to be noted that the numbers are small. ID and elevated inflammatory markers are highly and positively associated with anemia. Interestingly, many known risk factors for anemia were not significantly associated in the GMS 2017, such as current or recent malaria parasitemia, folate deficiency, recent iron supplement intake, folic acid supplement intake or multivitamin intake.

Vitamin A deficiency was hardly present in Ghanaian women, both when assessed using RBP and MRDR. We can conclude that the vitamin A status in Ghana appears to have improved over time and is likely due to diligent public health interventions. It is worth noting that in the Northern Belt, considerably more women are affected by VAD although the prevalence remains relatively low with 5%. Folate deficiency affects a bit over half of the women and although no prevalence thresholds for determining the

public health severity exist, can be considered highly prevalent. In contrast, vitamin B12 deficiency affects only 7% of women.

For pregnant women, because their number is limited, the GMS 2017 could only provide sub-group analyses for residence and stratum. Dietary diversity is comparable to non-pregnant women, yet supplement consumption is considerably higher.

Recommendations

Various programs and research projects are required to address the deficiency documented in the GMS. To address vitamin A deficiency in children, multiple approaches are needed. Ghana's vitamin A supplementation program should be strengthened as a measure to reduce the risk of mortality due to measles, diarrhea, and other illnesses. In addition, the vegetable oil fortification program should be strengthened to increase the coverage of adequately fortified vegetable oil, which would likely increase quantity of retinol consumed by children on a daily basis. In areas where vegetable oil is not widely consumed (e.g. Upper East and Upper West regions), policy makers should pursue social behavior change programs that increase the consumption of vitamin A-rich foods (i.e. foods other than fortified vegetable oil) and biofortification programs, if feasible in these areas.

To reduce anemia in children and women, programs should prioritize activities in regions in the Northern belt, as the anemia prevalence here is markedly higher than in the Middle and Southern strata. Interventions should include the promotion of age-appropriate infant and young child feeding practices, including the promotion of foods (fortified or unfortified) rich in iron and vitamin A. The GMS also recommends that malaria prevention programs be strengthened and targeted to rural and low-income households. Programs that reduce the prevalence of malaria in children will both help to reduce mortality and morbidity associated with malaria directly, and will also help to reduce anemia in children.

The prevalence of overweight and obesity has increased in Ghana in the past decade, and it programs, particularly for women in urban areas, are needed to prevent the prevalence of overweight and obesity from rising further. Due to the association between increased parity and increased overweight and obesity prevalence, it is recommended that antenatal and postnatal care provided by doctors and nurses be expanded to include behavior change messages and counseling for mothers

The GMS documented a very high prevalence of folate deficiency in women. To address this deficiency, it is recommended that Ghana's health system promote and expand the distribution of folic acid supplements. In addition, the implementation of Ghana's wheat flour fortification program should be improved. The GMS results suggest that wheat flour fortification is poorly implemented in Ghana, and challenges have been cited in previous reports about Ghana's fortification program. To improve the performance of Ghana's wheat flour fortification program, it is recommended that monitoring and compliance activities be strengthened.