Policies and program implementation experience to improve maternal nutrition in Ethiopia

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Abstract

Background: *Maternal undernutrition persists as a serious problem in Ethiopia. Although there are maternal nutrition interventions that are efficacious and effective in improving maternal, neonatal, and child health (MNCH) outcomes, implementation has been limited.*

Objective*: This study explored needs, perceptions, priorities, facilitating factors and barriers to implementation of relevant policies and programs to find opportunities to improve maternal nutrition in Ethiopia*

Methods: *Background information was compiled and synthesized for a situation analysis. This informed focus group discussions and in-depth interviews with mothers, community leaders, health workers, and district health officials in four* woredas *(districts) in Tigray and Southern Nations, Nationalities and Peoples Region.*

Results: *Findings focused on three priority issues: maternal anemia, intrauterine growth retardation (IUGR), and maternal thinness and stunting. Community-level investigations found that women's low status, food insecurity and poverty, and workload were key factors perceived to contribute to women's undernutrition. Awareness of and demand for services to improve women's nutrition were low, except for high demand for supplementary food. On the supply side, barriers included low prioritization of maternal nutrition in health and nutrition service delivery and weak technical capacity to deliver context-sensitive maternal nutrition interventions at all levels.*

Conclusions: *Community-based health and nutrition services were promising platforms for expanding access to interventions such as micronutrient supplements and social and behavior change communication. Investments are needed to support these community-based programs, including training, supplies, supervision and monitoring. To address IUGR at scale, increased access to cash or food transfers could be explored.*

Key words: Ethiopia, nutrition programs, maternal nutrition, anemia, intrauterine growth retardation, birthweight,

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Summary

Background

Two regions in Ethiopia (Tigray and Southern Nations, Nationalities and Peoples Region) were selected as a case study to assess needs in maternal nutrition, identify key facilitators and bottlenecks in implementation of current programs with nutritional inputs, and identify opportunities for expanding access to interventions whose efficacy and effectiveness are established. Direct nutrition interventions were included (micronutrient supplements, fortification, food supplements, and dietary counseling), as well as selected health interventions that affect nutritional status, such as deworming and malaria prevention and control.

Methods

The study was conducted in two phases. In the first phase, background information was compiled and synthesized into a situation analysis. In the second phase, investigations focused on three key areas: potential and actual access to relevant interventions, barriers to access, and perceived needs and how these influenced demand and use of interventions. Focus group

discussions and in-depth interviews were conducted with mothers aged 18 to 45 years, community leaders and members of community associations, Voluntary Community Health Workers, Health Extension Workers, and district health officials. Investigations were conducted in local languages, recorded, transcribed verbatim, and translated into English. Deductive codes were based upon the study objectives, research questions, and previous studies, and additional inductive codes and subcodes were generated from the transcripts during the analytical process. Analysis focused on three priority issues in maternal nutrition: maternal anemia, intrauterine growth retardation (IUGR) and low birthweight (LBW), and maternal thinness and stunting.

Results

» **Anemia:** Iron-folic acid (IFA) supplements were not widely consumed (< 1% received the recommended 90 tablets in pregnancy); at the community level they were primarily perceived as anemia treatment rather than prevention. Community respondents were familiar with symptoms that correspond to severe anemia, but moderate anemia was not considered a priority problem. From the supply side, key barriers to IFA supplementation included poor awareness of government guidelines for universal IFA supplementation during pregnancy; weak supply chain; and poor use of antenatal care and lack of monitoring and supervision of IFA distribution, counseling, and follow-up.
» **IUGR and LBW:** Voluntary Community Health Workers were frequently used for identification and mobilization of pregnant women to increase utilization of antenatal care services but were not widely engaged in promoting maternal nutrition in pregnancy. Respondents at all levels reported that food insecurity was the greatest barrier to consuming the recommended diet in pregnancy but also reported several behaviors that could be targeted to improve weight gain in pregnancy, including "eating down," distribution of food within the household, religious fasting in pregnancy, and food taboos.
» **Maternal stunting and thinness:** Thinness in women is a serious problem in Ethiopia (26% with body mass index < 18.5), as is stunting (13% < 150 cm in height). In addition to food insecurity and several food-related cultural factors that contribute to maternal thinness, early age at first birth was identified as a priority issue. Nearly one-third of women aged 20 to 24 gave birth before age 18, contributing to poor maternal, neonatal, and child health outcomes. There is wide awareness of government legislation against early marriage, primarily through programs to address Harmful Traditional Practices. There are few services or platforms targeting adolescent girls for health or nutrition services.

Conclusions

Six priority areas were identified to promote maternal nutrition in Ethiopia: 1) Identify linkages to offer incentives to families to delay early marriage and to promote birth spacing. 2) Review and strengthen the role of Voluntary Community Health Workers in maternal nutrition, especially around anemia prevention and control. 3) In nutrition programs, investments in social and behavior change communication have been primarily focused on children under 2 years of age. Develop messages and facilitation materials for Health Extension Workers to promote maternal nutrition. 4) Food insecurity was continually identified as the greatest barrier to weight gain in pregnancy. The WFP/Ministry of Agriculture intervention for Targeted Supplementary Food offers the best targeted platform to provide fortified supplementary food to pregnant and lactating women, and could be strengthened by improving links to routine Focused Antenatal Care. The Productive Safety Net Program could better address maternal nutrition by ensuring that all communities follow the policy to exempt pregnant and lactating women from public work, considering adding conditionalities (e.g., Focused Antenatal Care visits) to cash or food support during pregnancy, and expanding the number of women who receive cash or food support during pregnancy. 5) Prioritize iodine capsules as an interim measure while iodized salt coverage scales up. 6) Improve monitoring and supervision of maternal nutrition components in both routine data and integrated supportive supervision.

Introduction

This study was part of a broader effort to compile and evaluate global experiences in implementation of efficacious and effective interventions to improve maternal, neonatal, and child health (MNCH) outcomes. Ethiopia, Nigeria, and India were selected as focal countries for case studies because of their high burdens of maternal mortality, morbidity, and undernutrition. The specific objectives of the study were to identify existing platforms for maternal nutrition, key facilitators and bottlenecks in implementation of current programs with maternal nutritional inputs, new and innovative platforms for nutrition interventions, and opportunities for expanding access to relevant interventions whose efficacy and effectiveness are established. Within Ethiopia, the northern region of Tigray and the Southern Nations, Nationalities and Peoples Region (SNNPR) were selected as focal points for this study. The range of relevant programs that

were examined included direct maternal nutrition interventions (micronutrient supplements, food fortification, supplementary food, and nutrition education and counseling). Cash transfers and safety nets were included because they are potential platforms for the above interventions and because of their potential to directly improve maternal nutrition [1]. Selected health measures that affect nutritional status, such as deworming and malaria prevention and control, were also included.

With 80 million people, Ethiopia is one of the most populous countries in Africa, as well as one of the least urbanized (85% rural) [2]. Ethiopia is one of 36 countries with the highest burdens of undernutrition in the world [3], with 29% of children underweight, 44% stunted, and 10% wasted [4]. These poor nutrition indicators are linked to several underlying factors, including poverty, food insecurity, poor hygiene and sanitation, and low literacy. Per capita annual gross domestic product is steadily rising but is still one of the lowest in the world at US$380. In drought years, the number of people needing humanitarian relief can rise to 14 million, more than 10% of the population [5]. Among the rural population, only 56% have access to safe drinking water, 5% use improved sanitation facilities, and female literacy is only 20% [6]. In recent years, Ethiopia has invested heavily in national programs, and both underweight and stunting show improving trends [2]. The government formulated a National Nutrition Strategy in 2005/06 that brought various uncoordinated nutrition programs into one comprehensive framework and started a transition from food-based emergency programming to a more development-oriented approach. This is now being implemented through the National Nutrition Program, 2008–13.

The nutrition interventions relevant to the health sector have been harmonized with the Federal Ministry of Health's flagship Health Extension Program, which has deployed 33,000 Health Extension Workers since 2005 to cover rural communities at a ratio of 1 Health Extension Worker to 2,500 people. From 2005 to 2008, per capita health expenditure rose from US$7.13 to US$16.10 [7]. The health system is organized into four tiers, with primary healthcare units at the lowest level serving an average of 25,000 people. Each primary healthcare unit includes a health center that acts as a referral center for five satellite health posts, which each serve an average of 5,000 people. Around 90% of the population lives within 2 hours walking distance of a health post, where all health services are provided free of charge [8]. Community outreach in nutrition is facilitated by Voluntary Community Health Workers as part of the Community-Based Nutrition Program (see **box 1** for more details). Voluntary Community Health Workers operate at a ratio of 1 to every 30 to 50 households.

BOX 1. Community-Based Nutrition

Community-Based Nutrition was designed to build upon the Health Extension Program to increase community outreach to address malnutrition. Health Extension Workers received 10 days of initial training from master trainings and regular refresher trainings, which were then cascaded down to Voluntary Community Health Workers. Working at a ratio of 1 Voluntary Community Health Worker to 50 households, Voluntary Community Health Workers provided mobilization, referral, follow-up, growth monitoring and promotion, and community meetings, with the Health Extension Workers providing supportive supervision

Methods

Study sites

Tigray and SNNPR were selected as focal regions. With 20% of the country's total population, SNNPR is one of the most populous regions in Ethiopia. SNNPR is also the most diverse region, with more than 80 ethnic groups, some of the most densely populated districts in Ethiopia in the agriculture-dependent highlands and midlands, as well as sparsely populated arid lands inhabited by pastoralist populations dependent upon livestock production. Tigray, in the northeast, has about 6% of the Ethiopian population and is relatively ethnically homogeneous. Tigray is characterized by rugged topography, which limits the accessibility of health services.

Regional consultations were held with key stakeholders to select the community-level study sites. Study sites were purposively selected for diversity of program implementation and physical accessibility, and included one high-performing and one low-performing *woreda* (district) in each region and one high-performing and one low-performing *kebele* (village) in each *woreda*. The criteria for high and low performance were based upon regional and *woreda* health and development indicators (details on selection criteria are included in the situation analyses, available online.*

Study design

The study was conducted in two phases. In phase 1 (April to October 2010), background information was compiled and synthesized for a situation analysis, including review of program reports and other unpublished materials, identification of relevant indicators, review of national health and nutrition policies, and

* http://tulane.edu/publichealth/internut/maternal-nutrition-project.cfm

identification of potential platforms for enhanced interventions. Data from the 2005 Demographic and Health Survey were updated wherever possible using the 2011 preliminary Demographic and Health Survey report, but not all indicators were available. Data on maternal height were calculated using the World Health Organization (WHO) 2007 Growth Reference Tables for Girls' Height-for-Age [9]. For women age 19, –2 SD of the median height is 150.1 cm; the percentage of women over 19 in Ethiopia with height ≤ 150.1 cm was calculated from the 2005 Demographic and Health Survey and reported as an estimate of maternal stunting.

Key informant interviews were conducted with respondents in the health, nutrition, agriculture, humanitarian emergencies, women's affairs, and education sectors. These respondents were identified through the Federal Ministry of Health and the Regional Health Bureaus in SNNPR and Tigray, and included key informants from relevant government offices and international nongovernmental organizations (NGOs) and multilateral agencies. Key informant interviews were conducted by members of the study team from Tulane University, who took extensive notes that were later summarized and included in the final analysis. The findings from the situation analysis formed the basis for qualitative investigations at the community level in phase 2 (November and December 2010).

Phase 2 investigations focused on three key areas: potential and actual access to relevant interventions, barriers to access, and perceived needs and how these influenced demand for and use of interventions. Targets for in-depth interviews and focus group discussions were recruited with the use of gatekeepers (described in more detail in **table 1**). Focus group discussions and in-depth interviews were conducted in the local language and digitally recorded with permission of the participants. Focus group discussions and in-depth interviews lasted 1 to 2 hours and were facilitated by research associates who were trained in qualitative research techniques and on the study objectives and tools. All interviews were conducted by a pair of research associates who were fluent in the local language and in English.

The study protocol was approved by the Institutional Review Boards of Emory and Tulane Universities and the Regional Health Bureaus in Tigray and SNNPR. All research personnel were certified by the Collaborative International Training Initiative (CITI). All participants provided informed consent before participating in in-depth interviews and focus group discussions.

Data collection tools

Common study tools were developed by members of the study team from Tulane University and Emory University for use in Ethiopia, Nigeria, and India. These tools were then adapted in consultation with local partners (Hawassa University and Mekelle University. Priority research questions were selected with regional stakeholders in both SNNPR and Tigray. All tools were translated into local languages and pretested, then revised as necessary.

Data management and analysis

All focus group discussions and in-depth interviews were recorded, transcribed verbatim, and translated into English. Supervisors in each research team conducted spot checks on samples of the translations against the recordings to ensure quality of the transcription and translation. The data were coded and analyzed with the use of analytical software (MAXQDA).

TABLE 1. Study details, by region

Region	Study sites	Target populations and method of recruitment	FGDs and IDIs	Local research partners
Tigray	2 districts (*woredas*) selected purposively 2 villages (*kebeles*) selected per *woreda*	FGDs: Women 18–45 yr with a child > 5 yr (recruited for this study by gatekeepers, usually community leaders or health volunteers) Community leaders and women's associations (recruited by *woreda* officials) VCHWs[a] (recruited by HEWs) IDIs: HEWs (recruited by *woreda* health officials) Community leaders (recruited by HEWs) *Woreda* health officials (recruited by regional health officials)	25 FGDs 13 IDIs	Mekelle University (Tigray)
SNNPR	2 districts (*woredas*) selected purposively 3 *kebele*s in one woreda, 2 *kebele*s in the other *woreda*, all selected purposively		28 FGDs 10 IDIs	Hawassa University (SNNPR)

FGD, focus group discussion; HEW, Health Extension Worker; IDI, in-depth interview; SNNPR, Southern Nations, Nationalities and Peoples Region; VCHW, Voluntary Community Health Worker

a. VCHWs have varying degrees of training in community-based health programs including, but not limited to, nutrition.

Deductive codes were based upon the study objectives, research questions, and previous studies. In addition, inductive codes and subcodes were generated from the transcripts during the analytical process. All coding was done by one research associate. Themes were developed by comparing findings from each theme across study sites by *kebele* to look for similarities and differences in responses within and between communities. Initial conclusions were triangulated by comparing responses among the target populations: community, Voluntary Community Health Workers, Health Extension Workers, and *woreda* officials. These comparisons examined relationships between the community demand for health services and the experiences and perceptions of personnel in the health system. The findings presented here were consistent within subgroups and across study sites; any differences are noted in the text.

Data were analyzed and reported using three interrelated problems in maternal nutrition that affect maternal, neonatal, and child health (MNCH) and survival: maternal anemia, intrauterine growth retardation (IUGR), and maternal thinness (measured as low body mass index [BMI]) and stunting.

Results

Key findings on anemia in women

Background

Iron-deficiency anemia is prevalent in developing countries where women begin their pregnancies with low iron stores and are unable to consume sufficient dietary iron to meet the increased iron requirements of pregnancy [10]. An estimated 18% of global maternal mortality is attributable to iron deficiency [11], which may be an important consideration in Ethiopia, which has one of the highest maternal mortality rates in the world (673/100,000 births) [6]. Iron supplementation in pregnancy reduces the risk of maternal anemia and associated morbidity and mortality. Furthermore, iron supplementation in pregnancy significantly reduces the risk of low birthweight (LBW) [12].

Anemia prevalence among Ethiopian women decreased from 27% to 17% from 2005 to 2011, but these numbers obscure important regional differences.* Anemia prevalence in children 6 to 59 months of age also fell by about nine percentage points to 44% during the same period (**table 2**). Anemia was a severe public health problem in the pastoral regions of Afar and Somali, affecting 35% of women and 75% of children in Afar and 44% of women and 69% of children in Somali. The focal regions of Tigray and SNNPR had much lower prevalence rates of anemia in women (11% and 12%, respectively) [4].

At the time of publication, results from the 2011 Ethiopia Demographic and Health Survey were not yet available to update the indicators that may have contributed to this decrease in anemia, but as discussed in more detail below, coverage of iron supplementation has not widely improved. The reduction in anemia is more likely to be due to malaria prevention and control and improved hygiene and sanitation. In 2005 (the most recent year for which national data are available), coverage of iron supplements was very low: only 10% of mothers received any iron supplements during pregnancy, and less than 1% of mothers received the 180 tablets recommended by national policy. Consumption of dietary iron and vitamin A–rich foods was low, and iron-fortified foods were not widely available or consumed. Since 2005, the Federal Ministry of Health has prioritized scaling up key interventions in malaria prevention and control. About 75% of the population lives in potentially malarious areas characterized by unstable transmission and periodic widespread epidemics [13]. Areas with a history of malaria epidemics were targeted for indoor residual spraying, insecticide-treated bednets, and artemisinin-based combination therapy for first-line treatment. Between 2005 and 2007, distribution of insecticide-treated bednets increased significantly to cover two-thirds of households in malarious areas [13] (see **table 3** for more details).

Community-level beliefs, priorities, and practices

Causes and treatment of anemia in women

Respondents were familiar with the symptoms of anemia, although they usually did not use the clinical name. Anemia was understood to primarily affect women and was perceived as common during pregnancy. Dizziness or lightheadedness, spinning, vertigo, headache, and weakness or difficulty working were symptoms most commonly described as due to "low blood." Beyond these symptoms, the most consistently identified consequence of anemia was an increased vulnerability to illness or weakness. In a few groups, anemia was associated with danger, weakness, and "lack of blood" at the time of delivery and a corresponding risk of harm to the fetus, a difficult delivery, or death. Anemia was considered a consequence of many contributing factors, but respondents in both regions primarily related it to insufficient diets and women's heavy workloads. Repeated illness, intestinal parasites, malaria, and thinness were the next most frequently mentioned perceived causes of anemia.

> *We don't eat better things. We don't have rest. We have a lot of work. That is why our blood level is low… Even if she says "I feel tired and sick," still she is the one who does the work.*
>
> —Woman of reproductive age, SNNPR

* Data were reported for pregnant and nonpregnant women together; these indicators are adjusted for pregnancy status and altitude

TABLE 2. Selected demographic and health indicators[a]

Indicator	Source	Year	National (urban/rural) (%)[b]	SNNPR (%)[b]	Tigray (%)[b]
Nutrition in children 0–59 mo	DHS	2011			
HAZ <–2 SD (stunted)			44.4 (31.5/46.2)	44.1	51.4
WAZ <–2 SD (underweight)			29.0 (16.3/30.4)	28.3	35.1
WHZ <–2 SD (wasted)			9.7 (5.7/10.2)	7.6	10.3
Maternal thinness and stunting	DHS	2005			
Height < 145 cm			3.2 (1.9/3.4)	4.1	2.8
Mean height of women ≥ 19 yr			157.4 cm	156.6 cm	157.1 cm
BMI < 18.5 (thin)			26.5 (18.8/28.3)	26.7	37.5
BMI < 17.0 (moderately and severely thin)			8.8 (7.2/9.1)	8.2	15.6
Antenatal care	DHS	2005			
≥ 1 visit			28.5 (69.2/23.9)	30.7	35.7
≥ 4 visits			12.2	NA	NA
Visit in 1st trimester			6.4	NA	NA
Last birth protected against neonatal tetanus			32.2 (60.5/29.5)	39.8	36.9
Postnatal care					
Checkup within 41 days			5.9 (36.2/3.0)	3.4	8.6
Anemia prevention and control	DHS	2011			
Children 5–69 mo with any anemia			44.2 (35.2/45.4)	37.5	36.9
Women 15–49 yr with any anemia[c]			16.6 (10.9/18.3)	12.4	11.3
Mild anemia			13.1	9.7	8.8
Moderate anemia			2.9	2.3	2.1
Severe anemia			0.6	0.4	0.4
Use of supplements and drugs in last pregnancy, women 15–49 yr	DHS	2005			
Any iron supplements			10.4 (20.1/9.5)	12.2	12.0
≥ 90 iron supplements			0.1 (0.2/0.1)	0.2	0.0
Intestinal parasite drugs			4.0 (5.3/3.9)	1.8	5.0
Micronutrient intake by mothers	DHS	2005			
Foods rich in iron			14.2 (31.5/12.8)	24.6	7.9
Foods rich in vitamin A			41.1 (54.4/40.0)	32.5	61.2
Malaria prevention and control					
Households in malarious areas with ≥ 1 insecticide-treated bednet	MIS	2008	65.6	NA	NA
Fertility and early marriage	DHS	2005			
Median age at 1st birth, women 25–49 yr			19.0 (20.7/19.8) yr	19.0 yr	19.3 yr
Women 20–24 yr who gave birth by age 18			28.4	NA	NA
Median birth interval			33.8 (39.1/33.6) mo	34.5 mo	35.2 mo
Married women using family planning	DHS	2011	28.6 (52.5/28.4)	25.8	22.2
Met need for family planning: spacing			16.4 (51.5/15.1)	12.7	15.1
Unmet need for family planning: spacing			16.5 (8.1/18.1)	15.2	15.0
Households with adequately iodized salt	DHS	2005	19.9 (21.0/19.7)	28.0	18.5

BMI, body mass index; DHS, Demographic and Health Survey; HAZ, height-for-age z score; MIS, Malaria Indicator Survey; NA, not available; SNNPR, Southern Nations, Nationalities and Peoples Region; WAZ, weight-for-age z score; WHZ, weight-for-height z score

a. The data are the most recent available.

b All figures are percentages except mean height of women, median age at first birth, and median birth interval

c. DHS data adjusted anemia prevalence for altitude following Centers for Disease Control and Prevention guidelines. Among women 15–49 years of age, severe anemia is defined as hemoglobin < 7.0 g/dL, moderate anemia as hemoglobin 7.0–9.9 g/dL, and mild anemia as hemoglobin 10.0–10.9 g/dL for pregnant women and 10.0–11.9 g/dL for nonpregnant women.

TABLE 3. Overview of direct and contributing interventions and platforms to address prioritized maternal nutrition areas

Area	Through Health Extension Program (Federal Ministry of Health)	Other key initiatives
Prevention and control of maternal anemia	Recommended 90 days daily IFA supplementation for pregnant and postpartum mothers through antenatal and postnatal visits Promotion of Essential Nutrition Actions, including diversified diet during pregnancy and lactation, at key contact points Prevention and control of infectious and parasitic diseases, including malaria and helminths, and diarrhea, HIV/AIDS, and tuberculosis (not covered) Family planning (covered in section on small maternal size) Promotion of hygiene and sanitation practices through Health Extension Program and WASH Program (not covered) Referral for diagnosis and treatment of anemia at health centers, using laboratory methods where available, or clinical diagnosis	Initial stages of development of national food fortification strategy and action plan (Federal Ministry of Health)
LBW and IUGR	Focused Antenatal Care, including IFA supplementation, weight gain monitoring, and nutrition education and communication Disease control for infectious and parasitic diseases, including malaria, helminths, diarrhea, HIV/AIDS, and tuberculosis Community Health Days: screening of pregnant women with MUAC < 21 cm and referral for Targeted Supplementary Food	Promotion of household use of iodized salt (Federal Ministry of Health) Development of national food fortification strategy and action plan (Federal Ministry of Health) Targeted Supplementary Food (Ministry of Agriculture/WFP) Productive Safety Net Program (Ministry of Agriculture)
Small maternal size	Family planning to delay first birth beyond maternal age of 18 years and promote birth intervals of 2 years or more Postnatal care to promote maternal nutrition during lactation Youth-friendly reproductive health initiatives	Prevention of underage marriage: Policy and legal frameworks (Ministry of Women's Affairs) Behavior change communication strategies (Ministry of Women's Affairs) Social protection initiatives: Productive Safety Net Program and National Social Protection Policy (in development)

IFA, iron–folic acid; LBW, low birthweight; IUGR, intrauterine growth retardation; MUAC, mid-upper-arm circumference; WASH, Water, Sanitation and Hygiene

When asked specifically about intestinal parasites in pregnant women, most respondents did not perceive this to be a priority problem. A small number of respondents said that "low blood" (anemia), "lost strength," "thinner baby due to loss of appetite," and "swollen legs" were specific challenges for pregnant women with intestinal parasites. However, children were seen as the group most affected by intestinal parasites, as adults were perceived to build up a tolerance. When asked about prevention of intestinal parasites, most respondents had received information from Health Extension Workers and Voluntary Community Health Workers on hygiene and sanitation during vaccination campaigns or at community conversations, although some respondents said that even though they received advice they did not follow it.

In SNNPR, when respondents were asked how they prevented or treated anemia, the most common response was improving or diversifying the diet. When prompted to describe important foods for anemia prevention, respondents listed a wide variety of foods, including dairy, meat, fruits, and vegetables, indicating that although communities are aware of the importance of diet, they received vague and inconsistent education and counseling on this issue. The pictorial guides in their Family Health Cards were meant to promote dietary diversification and included pictures of carrots, kale, pumpkin, meat, papaya, eggs, and mango. These items were mentioned often, but many other foods were mentioned as well.

Many respondents also highlighted the economic challenges of following the dietary counseling to consume diverse foods.

Just like urban families, the husband should slaughter animals at home so that we eat meat. He has to buy foods

in the market and provide to us. But in some families, the husband may not have enough money to afford all these things. As a result of this we will be anemic.

—Woman of reproductive age, Tigray

Iron–folic acid supplements

Both iron supplements and iron–folic acid (IFA) supplements were distributed through the health system, but respondents were unable to distinguish between the two because they looked very similar. For the purposes of this paper, only IFA supplements are referred to in the discussion, although in some cases they may have been iron supplements. Very few respondents in SNNPR spontaneously mentioned IFA supplements as options for prevention or treatment of anemia. Upon prompting, there was at least one person in each focus group discussion who had heard of IFA, but experiences were highly varied. Even respondents who lived in the same community and received services from the same health post had different perceptions of whether IFA was used by all pregnant women, anemic pregnant women, or all anemic women regardless of pregnancy status. In most sites, IFA was perceived as being available at the health centers, which were usually much less accessible to the community than health posts, but better equipped. In contrast to SNNPR, IFA supplements were frequently mentioned as the treatment for anemia in Tigray, and awareness of and experience with IFA were more common. Almost all respondents in Tigray had heard of "red tablets" or "iron tablets" and perceived them to be a treatment for pregnant women who reported "low blood" symptoms such as dizziness or fatigue. Treatment was provided after screening at the health post during routine antenatal care visits. In both Tigray and SNNPR, women perceived that pregnant women who were not identified as anemic by physical examination should receive dietary counseling only, and not IFA.

If she is healthy, why should she take them [iron supplements]?

—Woman of reproductive age, Tigray

In both Tigray and SNNPR, there was high variation in perception of the recommended duration of supplementation (2 weeks to 3 months) and of how many tablets should be taken (one to four per day). Respondents felt that women with worse anemia needed to take more IFA tablets, but they said that having to make return visits to the health post to check their anemia status was a barrier to accessing IFA for pregnant women who lived far away. In line with their perception that IFA was curative, respondents most frequently reported that IFA should be taken until the anemia symptoms were corrected. Respondents perceived that IFA was effective in relieving the symptoms of "low blood" (more details are provided on perceptions and practices in **box 2**).

BOX 2. Community-level perceptions and practices that may shape demand for iron supplements

Wide recognition of a condition most commonly called "low blood," with physical signs and symptoms that generally aligned with the biomedical concept of anemia, for which pregnant women were considered to be particularly at risk.

Iron supplements were often perceived as a curative medicine to be taken by women with physical signs and symptoms of anemia.

There was little awareness of the benefits of iron supplements for seemingly healthy pregnant women (i.e., for moderately anemic or nonanemic pregnant women) or the benefits for the fetus or infant.

Anemia was often linked to food, but not consistently to the absence of any specific nutrient in food, or even any group of foods (compared with the awareness that goiter is linked to absence of iodine). Many "good" foods were identified by the community, and their absence was perceived to be linked to anemia, but these were not necessarily iron-rich foods. This was particularly important in the context of the poor availability of micronutrient-rich foods and the economic constraints that many respondents identified as the major barrier to their consumption of better foods.

There was some community awareness of the link between anemia and intestinal parasites or malaria, but this was not consistent.

Health Extension Workers and Voluntary Community Health Workers did not provide counseling to improve adherence, beyond fairly vague messages (e.g., counseling the mother that IFA is important). Very little specific information was provided on side effects or remembering to take the tablets.

However, lactating and nonpregnant women were rarely mentioned as being at risk for anemia, and adolescent girls were never mentioned. The perception at all levels was that anemia is primarily an issue for pregnant women.

Side effects (burning sensation, change in appetite, gastric discomfort, vomiting) were mentioned as a problem in a small number of focus group discussions. There were no reports of counseling from the health workers on how to prevent side effects; respondents reported that women in their communities discontinued the supplements or reduced their dosage if they had negative experiences.

In Tigray, community respondents most frequently identified the Health Extension Worker as their source of information about IFA, because screening, counseling, and supplementation were usually integrated into routine antenatal care visits. Respondents in Tigray also reported that Health Extension Workers distributed supplements at house-to-house outreach visits in distant communities. In SNNPR, some respondents listed Voluntary Community Health Workers or Health Extension Workers as sources of information on IFA,

usually through mobilization for family planning or tetanus toxoid vaccination. However, community respondents in SNNPR most frequently reported that they heard about IFA from other community members.

Malaria and helminths

Malaria was well known, and pregnant women were prioritized for sleeping under insecticide-treated bednets. Voluntary Community Health Workers were actively involved in case detection and referral (children were prioritized). For intestinal parasites, the health post was perceived as a resource for deworming only for children (in some places, antihelminthics were only available for distribution during campaigns, but in some cases they were also available for outpatient visits). For adults, the major resource for treatment for intestinal parasites was the health center (which sometimes also provided stool tests if available); sometimes anthelminthics were also available from private providers in the nearest town or market. None of the respondents mentioned anthelminthics as a component of antenatal care or intestinal parasites as a cause of anemia.

Community-based interventions and platforms: Results and discussion

This section (and corresponding sections for IUGR and LBW and maternal stunting and thinness) incorporates key findings from focus group discussions with Voluntary Community Health Workers and in-depth interviews with Health Extension Workers and key informants from the *woreda*, regional, and federal levels. These are supplemented by gray and published literature, program reports, and routine data where appropriate. Responses from key informants generally conformed to each other and to findings at the community level; differences are highlighted in the text. This section describes findings specific to anemia prevention and control. The Health Extension Program is the primary platform for delivery of these components through antenatal care, but findings related to antenatal care, including identification and registration of pregnant women, are discussed in more detail further below.

Technical guidelines and training

Regional and federal key informants reported using the WHO Integrated Management of Pregnancy and Childbirth (IMPAC), which recommends universal supplementation of nonanemic pregnant women with 60 mg of iron per day for 3 months, or for 6 months in areas where anemia prevalence is greater than 40% (the prevalence of anemia in women ranged from 11% in SNNPR to 44% in Somali Region) [4]. However, the findings showed that key informants, from health post to federal levels, did not have a common understanding of the policy on iron supplementation.

At the health post level, Health Extension Workers did not consistently know the guidelines for universal targeting and supplementation through antenatal care visits. Several Health Extension Workers reported that they provided iron supplements only to pregnant women with physical symptoms of anemia. Pregnant women without physical symptoms of anemia often received only dietary counseling, which is contrary to the technical guidelines. Key informants at the *woreda*, regional, and federal levels were aware of the discrepancy in IFA practice at many health posts and attributed it to the scarcity of IFA tablets. However, the variations in practice were seen even among health posts with sufficient IFA in stock. Key informants at the *woreda*, regional, and federal levels also varied in their understanding of the duration of supplementation and targets for IFA (key findings are summarized in **table 4**). These inconsistencies indicate a need for training on the Federal Ministry of Health guidelines on anemia prevention and control.

Health Extension Workers prioritized physical examinations for anemia and reported little or no formal in-service training on universal supplementation with IFA. The main source of information on IFA for Health Extension Workers was preservice training or from cluster supervisors or *woreda* health officials. Among *woreda* health officials, the main source of information on IFA was from in-service training on Essential Nutrition Actions, Focused Antenatal Care, or IMPAC, but these training sessions were only implemented in some *woredas*.

Monitoring and supervision

There were no routine data available on availability or distribution of IFA at any level, so it was not possible to monitor Health Extension Worker practice. Some health posts had antenatal care registers from the Regional Health Bureau and/or family health cards, but they were not consistently available, and where the antenatal care register was available, the IFA column was often blank. This may have been because it was not a priority for supervision, since the data were not transmitted to higher levels. Some Health Extension Workers had handmade antenatal care registers to monitor pregnant women, including monitoring for IFA, but these were not seen at all health posts visited. Although regional informants reported that they included IFA in their integrated supervisory visits, there were no indicators included in routine Integrated Supportive Supervision checklists or monitoring processes through the health system. Iron supplementation was not prioritized among NGO-supported health system strengthening initiatives; only the US Agency for International Development (USAID)-funded Integrated Family Health Program monitored IFA in target *woredas* and transmitted the information to the federal level.

TABLE 4. Range of responses on technical guidelines for anemia prevention and control

Source	Key informants	Range of responses in interviews[a]
Reports of technical guidelines and Federal Ministry of Health policy	Health post (HEWs)	Targets for iron supplementation: **anemic pregnant women only (identified by physical screening);** anemic pregnant and lactating women only; both anemic and nonanemic pregnant women; both anemic and nonanemic pregnant and lactating women Physical screening for anemia: **pallor of fingernails, eyelids, or palms;** low blood pressure; headache; low MUAC; weight loss Number of tablets given at each visit: **up to 30;** as many as 60 Instructions on number of tablets: no information given; **1 daily**; 2 daily Month of pregnancy to start supplementation: 3rd to **6th month** Length of supplementation: **1** to 6 months
	Woreda, regional, federal	Targets for iron supplementation: **universal supplementation for pregnant women;** universal supplementation for pregnant and lactating women Length of supplementation: **3 months,** 6 months
Training on technical guidelines and Federal Ministry of Health policy	Health post (HEWs)	**Preservice training for HEWs (developed in 2005, incorporated Essential Nutrition Action modules)** Informal communication from cluster supervisors or *woreda* supervisors
	Woreda, regional, federal	**In-service training on Focused Antenatal Care (WHO IMPAC)** In-service training on Essential Nutrition Actions (2007 or earlier) Preservice training for health officers (incorporated Essential Nutrition Actions)

HEW, Health Extension Worker; MUAC, mid-upper-arm circumference; WHO IMPAC, World Health Organization Integrated Management of Pregnancy and Childbirth

a. The most frequent responses are in bold.

Supply of IFA supplements

The supply chain for IFA from region to health post was varied and ad hoc, including the type of supplement and the dosage of iron (as discussed above, some health posts had iron while others had iron folate). Some Health Extension Workers reported that they traveled to the health centers to pick up their supplies; others received deliveries from UNICEF or NGOs directly; others got their supplies from the supervisor during site visits; and others traveled to the *woreda* health office to get them. None of the health posts had supply checklists or logbooks to monitor IFA, although some had written records for other commodities (e.g., ready-to-use supplementary food, family planning supplies). There was no system in place for *woredas* to "pull" IFA from a central regional supplier according to need. Key informants reported that most of their supplies were "pushed" from UNICEF health post kits, meaning that distribution was based more on availability than on need. Within *woredas*, some health posts had too much IFA and others did not have any. Expired stocks of IFA were common at the health post. In some cases this was because IFA was not distributed to the community, but in other cases key informants reported that IFA supplies reached the health post near or past their expiry date**.** Health posts were directed not to use expired IFA.

Leadership in IFA supplementation

Logistics and supply were a challenge for all drugs and commodities at the health post level, but IFA was felt to be particularly vulnerable, as key informants perceived that anemia did not clearly fall under any case team's mandate. At the regional level, neither the Disease Prevention nor the Pharmaceutical case teams felt that they were responsible for ensuring supply of IFA to *woredas*.

> *In a recent regional workshop we realized that there is a lack of communication between the prevention department and the pharmaceutical department for requesting IFA supply. This leads to stock outs at woreda levels.*
>
> —Member of Disease Prevention case team, Tigray

> *All woredas turn in monthly request forms for medicines, but iron supplements are not on the list. This is the responsibility of the Disease Prevention/Maternal and Child Health department in the Regional Health Bureau*
>
> —Member of Pharmaceutical case team, Tigray

The challenge of leadership in IFA in the health system was a recurring theme at the regional and federal levels. Key informants said although case teams were nominally in charge of integrated programs and monitoring and supervision were integrated, many of the training programs were vertical (e.g., maternal health/safe motherhood). In practice, maternal anemia fell into a gap. At the regional and *woreda* levels, the focal persons for nutrition said that they considered IFA to be part of their responsibilities, but they did not prioritize it, as most of their work addressed moderate and acute child undernutrition.

Role of Voluntary Community Health Workers in anemia prevention and control

Voluntary Community Health Workers mentioned dietary counseling more frequently than they mentioned IFA when asked about anemia prevention. Those who were trained in Community-Based Nutrition reported that they received some information on mobilizing pregnant women for antenatal care and follow-up on IFA but that it was only a small part of training, and no written or visual teaching aids were provided. Although most Voluntary Community Health Workers did perceive that their roles included promoting the health of pregnant women, Voluntary Community Health Workers usually did not mention universal IFA as a component of antenatal care, and few Voluntary Community Health Workers were used to promote IFA. In a few communities, Health Extension Workers oriented and supported Voluntary Community Health Workers in identifying and mobilizing pregnant women for IFA, particularly to ensure follow-up visits to the health posts. In those communities, respondents more frequently knew about IFA in pregnancy, and Voluntary Community Health Workers were reported as mobilizers and sources of information on IFA.

Malaria and helminths

Malaria was highlighted as a priority issue in all *woredas*. Key informants had strong knowledge about malaria treatment and prevention, including prioritization of pregnant women and children for sleeping under insecticide-treated bednets. However, none of the key informants at any level prioritized the diagnosis or treatment of malaria in pregnancy. Helminths were rarely linked to anemia in pregnant women or other community members by any Health Extension Worker or Voluntary Community Health Worker respondents. Anthelmintics were not routinely provided to pregnant women. Health Extension Workers were trained to provide albendazole only to children under 5 years of age, and all other cases were referred to the health center. Regional- and *woreda*-level respondents were aware of the Federal Ministry of Health policy to provide anthelmintics to pregnant women after their first trimester but confirmed that the policy was to distribute anthelmintics to adults at health centers only for curative purposes. Key informants both in maternal health and in nutrition at the federal level felt that this issue was not a priority for pregnant women or anemia prevention.

Food fortification

Fortification of flour with IFA and fortification of oil with vitamin A were identified as the two most feasible options for fortification of staple foods, but neither flour nor oil is widely consumed. A voluntary standard for flour fortification was developed by the Agricultural and Food Technology Standards Committee, but it does not specify the levels of iron or folic acid. There are no standards established for premixed fortification, and premixes are currently not being used at scale. Flour is presently impractical for large-scale fortification: a wide range of staple cereals are consumed, and these are primarily processed in small-scale local mills. These barriers are unlikely to change in the short term. Standards for domestically produced edible oils have been developed but are not in place, and centrally produced edible oils are not widely consumed.

Key findings on IUGR and LBW

Background

Less than 5% of infants in Ethiopia are weighed at birth. On the basis of maternal recall of infant size at birth, the incidence of LBW (≤ 2.5 kg) in Ethiopia was estimated as 15% [14]. Analysis of birthweight data from developing countries indicates that where the incidence of LBW is greater than 10%, IUGR accounts for the majority of LBW [15]. Ten percent of infants under six months of age in Ethiopia are stunted, which is another indication of the extent of IUGR [4].

Low caloric intake during pregnancy is one of the leading causes of IUGR and, together with prepregnancy nutritional status (i.e., weight), is estimated to account for more than one-third of LBW in developing countries [16]. Utilization of antenatal care in pregnancy was low, reducing women's access to prevention and treatment of other potentially modifiable factors to reduce IUGR and LBW, such as control of maternal infection and behavior change communication to address gestational weight gain. In 2005, less than a third of women had at least one antenatal care visit, and only 12% of women had four visits. Iodine requirements increase by more than 50% in pregnancy [17], which is an important consideration in Ethiopia, where less than 20% of households consume adequately iodized salt [6].

Community-level perceptions and practices

Care during pregnancy

Compared with Tigray, more female respondents in SNNPR reported that they made no changes in the way that they cared for themselves during pregnancy.

> *We do nothing. We just continue as before.*
> —Woman of reproductive age, SNNPR

> *There is no preparation or care, expect for when the time of delivery comes nearer.*
> —Woman of reproductive age, SNNPR

Services for pregnant women were primarily delivered as part of the Health Extension Program through Focused Antenatal Care and quarterly or 6-monthly Community Health Days (screening of pregnant and lactating women for mid-upper-arm circumference

[MUAC] < 21 cm at community outreach). Respondents in both regions indicated that they used antenatal care less frequently than other health post services, such as immunization and family planning, implying that it was perceived as less useful. In SNNPR, the most frequently mentioned health services during pregnancy were tetanus toxoid vaccination and quarterly MUAC screening for pregnant and lactating women (discussed in more detail below). Several respondents in SNNPR reported that except for tetanus toxoid immunization, they usually only visited the health post during pregnancy if they felt sick. Tetanus toxoid vaccination was prioritized by the community and perceived as good for the fetus and for a healthy delivery. Because there was no functioning refrigerator at the health post to store the vaccine, usually tetanus toxoid vaccination was given to all pregnant women on a single day and was not integrated with other components of antenatal care.

In all sites in Tigray and in one site in SNNPR, respondents reported that they went to antenatal care for physical examination to "find out about the position of the fetus" to avoid complications of delivery and to get information from the Health Extension Worker. Respondents reported that first visits to antenatal care were often later in pregnancy because pregnant women did not publicly discuss their pregnancies until they were sure. For example, they waited to see if menstruation resumed, until their pregnancy became visible, or they could feel the fetus moving. Through household visits, Voluntary Community Health Workers were instrumental in identifying pregnant women and referring them for antenatal care, but Voluntary Community Health Workers typically did not register a pregnancy until it was visible.

Use of antenatal care was linked to active Voluntary Community Health Worker mobilization, as respondents reported that Voluntary Community Health Workers made appointments, reminded them of appointments, and sometimes escorted them to the health post.

> *The VCHWs educate and counsel us during their house-to-house visits. As a result of their education, we visit the health post for antenatal care and other health services.*
>
> —Woman of reproductive age, Tigray

> *The VCHWs supervise us so that we are not absent from antenatal care.*
>
> —Community leader, Tigray

Physical access was the most consistently reported barrier to antenatal care, particularly late in pregnancy when it was hard for pregnant women to walk long distances. People who lived near the health post reported no problems attending follow-up visits, but people who lived farther away often went to antenatal care only if they were ill. Many respondents noted that people in the community did not know the benefits of antenatal care and perceived that it was unnecessary.

> *There are also women who don't believe in the benefits of antenatal care. They don't think that the health workers know the position of the child in the womb. They also insist that our elder mothers did not attend this care but did not have any problem in their pregnancy or labor. It is all up to St. Mary.*
>
> —Voluntary Community Health Worker, Tigray

Rest and reduced workload during pregnancy

Workload was mainly perceived to be linked to the risk of miscarriage. Several respondents also linked women's workload to "low blood" and weakness (as described above in "Causes and treatment of anemia in women"). Respondents reported that they were counseled by the Voluntary Community Health Worker or Health Extension Worker to rest more during pregnancy but said that they could not follow that advice because of their enormous work burdens, including household chores, collecting water, and agricultural duties. In some places, women were also responsible for community work programs and cash or food for work programs.

> *Women in our locality whether pregnant or not have a great burden in their households. Carrying heavy wood to the local market…in other localities similar tasks are carried out by donkey. What people call "special care" for pregnant women is unthinkable in our locality. In practice, the burden of a pregnant woman is almost the same as that of a nonpregnant woman.*
>
> —Woman of reproductive age, focus group discussion, SNNPR

The role of husbands and older children was highlighted as the most important factor in determining whether women could rest or reduce their responsibilities during pregnancy. Neighbors were occasionally mentioned, but more in the context of help immediately during and after labor. In Tigray, responses were inconsistent on participation in community work programs during pregnancy: in some sites women were exempt, but in other sites women reported that they still worked during their pregnancies.

Dietary practices during pregnancy

When asked how women stayed healthy during pregnancy, the importance of food and diet was frequently mentioned in Tigray. The most frequently mentioned food for pregnant women was a special gruel made from red teff, flaxseed, or a variety of grains, which was thought to be nutritious. Eggs and milk were also frequently mentioned. Vegetables, fruits, and meat were mentioned as healthy foods, but respondents noted that this was very dependent upon the financial capacity of the household. In Tigray, respondents reported that they were counseled to improve their diet from

whatever was at home, even though that was often just two grains, such as teff and sorghum or flaxseed.

Diet was rarely mentioned spontaneously in SNNPR, but when specifically prompted about women's diets during pregnancy, respondents identified a wide range of healthy foods that they tried to eat to diversify their diets. Barley, sorghum, teff, maize, milk, eggs, lentils and peas, oil and butter, fruits (orange, banana, papaya, avocado, and pineapple), and vegetables (cabbage, kale, beetroot, tomatoes, potato, and sweet potato) were all identified as part of a balanced or varied diet. Meat was rarely mentioned. The communities knew that they should eat a better diet, but they needed more guidance on what local foods to prioritize and how to increase consumption of inaccessible foods.

In both SNNPR and Tigray, respondents reported that special diets in pregnancy were not part of their traditional practice, and they learned about them from Health Extension Workers or Voluntary Community Health Workers. In contrast, there is a tradition of postpartum nutritious foods, including butter and special porridge made from sorghum or barley in SNNPR and from flaxseed and/or teff in Tigray. This was prepared by the woman before she delivered, sometimes with assistance from her neighbors, and the community was aware of the health repercussions of malnutrition of breastfeeding women.

> *Malnutrition of the children starts in the mothers. If mothers do not take meals to replace the blood lost during delivery, they will not have enough milk to produce for the babies. Thus the babies will become malnourished.*
>
> —Woman of reproductive age, focus group discussion, SNNPR

Economic barriers to improved diets

The most frequently mentioned reason for eating less or eating a poor diet in pregnancy was insufficient food in the household. Respondents emphasized that changing their practice was dependent upon the economic capacity of the household. Despite awareness that they should consume a diversified diet during pregnancy, many respondents said that they did not do anything special or different in pregnancy, and they typically ate only the foods that were commonly available in their homes.

> *There is no special diet or consideration for pregnant women. She has to eat whatever the rest of her family eats. There are even situations where she doesn't get anything to eat because she has to provide for her husband and children first.*
>
> —Woman of reproductive age, focus group discussion, SNNPR

Distribution of food within households

Female respondents reported that they shared all foods with the rest of the household, including supplementary food. The traditional practice was for husbands to eat first (sometimes with elder children), but in some households the family ate together. At all sites, respondents agreed that the husband and children were prioritized for food, especially when food was scarce.

> *In better-off households, there is a change in feeding habits during pregnancy. If a mother used to consume injera made from sorghum when she was not pregnant, she will start to take additional foods like gruel, honey, and flaxseed during her pregnancy. She will change to bread, porridge, and vegetables. But due to resource limitations, most of us do not change our feeding habits in pregnancy. Our food is always the same. We sometimes try to find additional foods like vegetables and wot (sauce), but we will share all available food with the rest of the family members. Did you think I would prepare gruel and eat it all by myself, leaving my children?*
>
> —Woman of reproductive age, focus group discussion, Tigray

In both SNNPR and Tigray, respondents associated a diverse diet with an easier delivery and/or improved health of both mother and fetus. The absence of a diverse diet was associated with a thin or sick child, insufficient milk in the mother, and "low blood" (as described above in "Causes and treatment of anemia in women").

Eating down and food taboos

The practice of reducing food intake during pregnancy is often referred to as "eating down" and is often thought to be associated with fears of a difficult labor [18]. In SNNPR, there was variation in responses on "eating down" during pregnancy. In three of five sites in SNNPR, respondents frequently mentioned that women worried about distress in labor caused by an "overweight" or "fat" baby starting as early as the sixth month of pregnancy.

> *If a person eats too much food regularly, the size of the baby is going to be big and it results in difficulty in delivery. So they may be referred to the hospital and may be exposed to different problems, so eating medium food is good. Too little food is also not good for a pregnant mother.*
>
> —Woman of reproductive age, focus group discussion, SNNPR

In contrast, in the other two sites in SNNPR and Tigray, respondents did not report eating down because of fear of a large baby or difficult delivery, but rather reported "eating down" because there was less space in their stomachs because of the growing fetus, or because they felt discomfort if they ate too much, especially late in pregnancy. This appeared to be linked to counseling by the health workers and Voluntary Community Health Workers; in some sites, respondents reported that health workers counseled them that eating less would make them weak during labor and would cause

their baby to be underweight. In these sites, women were counseled to eat smaller amounts more frequently to avoid discomfort and indigestion. However, women reported that this was difficult advice to follow because of cultural taboos against women eating alone (as described above).

Food taboos during pregnancy were frequently mentioned in SNNPR. Several respondents reported that women prioritized keeping their digestive tracts clean in the last month before they delivered. Many women ate less in the ninth month and also took laxatives (either locally developed herbal medicines [*kosso*] or commercial laxatives). In SNNPR, respondents frequently mentioned the belief that eating dairy products late in pregnancy would make the baby dirty and cause the delivery to be dirty. This taboo was also mentioned infrequently in Tigray.

Respondents reported that some pregnant and lactating women continued to fast during fasting periods. In SNNPR, the research sites were in both Orthodox Christian and Muslim communities, but fasting was most often associated with Muslims during Ramadan. In Tigray, where all research sites were primarily Orthodox Christian, fasting was much more frequently reported. In some cases, pregnant women were told by the priests that they could eat animal products during the fasting season and then compensate by fasting after delivery, but many women reported that they still fasted by avoiding all animal products.

> *My last pregnancy was during the fasting time for Easter. The Health Extension Workers told me to eat eggs, meat, and dairy products. But I denied the advice because my priest did not allow anyone to take these foods at any time during fasting. And I did not have any interest to eat those foods during fasting. How could I?*
>
> —Woman of reproductive age, focus group discussion, Tigray

In line with the finding described above that there are more food traditions supporting lactating women than pregnant women, respondents reported that it was more common to make exceptions for breastfeeding mothers than for pregnant women during fasting periods.

Targeted Supplementary Food

MUAC screening for pregnant and lactating women was the best-known service for pregnant women at the health post. At all sites, respondents knew that women identified as malnourished (MUAC < 21cm) received a 6-month supply of supplementary food (25 kg of fortified corn–soy blended food and 3 L of vegetable oil). In some places, MUAC screening was a source of tension because respondents felt that food distribution was not fair and malnourished families did not all receive supplementary foods. In other places, respondents said the process was fair and that no one missed the screening because everyone wanted the opportunity to get the supplementary food. At some sites, respondents said that the target mother consumed the supplementary food herself, but most respondents said that they would always share their supplementary food, either among their children or with the whole family. A typical response was "*It is impossible for a mother to eat alone where there are children. She is used to sharing with her children all that she has and then eating for herself.*"

Iodized salt

In SNNPR, iodized salt was not widely available in the community and was generally considered to be used only by people who had goiter. In Tigray, iodized salt was reported to be available at shops and in the market. Respondents reported that they were taught about iodized salt in *kebele* meetings and by Voluntary Community Health Workers and Health Extension Workers and that it was beneficial because it prevented goiter. There were still some respondents who reported that iodized salt was a treatment for goiter and did not need to be used by everyone. The price difference between iodized and noniodized salt was reported to be a barrier in many communities, but data were not collected on this issue during the field studies.

Community-based interventions and platforms

The Health Extension Program is the primary platform to address the modifiable factors that affect MNCH outcomes. The following section summarizes key findings on relevant components delivered through antenatal care or promoted by the Health Extension Workers as part of 16 focal Health Extension Program packages (with outreach support from Voluntary Community Health Workers), and the linked platform Targeted Supplementary Food. Cash or food transfers through the Productive Safety Net are also included here as a platform with potential for expansion (see **table 2** for a summary of direct and contributing interventions and platforms to address IUGR and LBW).

Antenatal care

Federal guidelines for antenatal care followed WHO's IMPAC, which recommended four Focused Antenatal Care visits starting from the fourth month of pregnancy (relevant interventions in IMPAC are summarized in **box 2**). Key informants at the *woreda*, regional, and federal levels reported that community demand for antenatal care was low. Distance was identified as the primary barrier to utilization of antenatal care. Health Extension Workers reported that it was difficult to ensure follow-up visits for pregnant women at the health post, especially later in pregnancy. Some Health Extension Workers reported using household visits and outreach to reduce the barrier of distance, but Health Extension Workers reported that their workloads prevented them from covering all pregnant women.

Health Extension Workers and key informants at the *woreda* and regional levels reported that mothers resisted using antenatal care because pregnancy was not traditionally a time requiring care ("*They think that the health of the baby is determined by God*"—regional Maternal and Child Health case team member, Tigray). This was primarily attributed to "illiteracy" or to poor awareness of the importance of antenatal care. However, these same key informants also showed an overall lack of clarity on the benefits of Focused Antenatal Care, and there was overall agreement that antenatal care services are generally poor, except for the provision of tetanus toxoid vaccination. The weakness in antenatal care was attributed to weak Health Extension Worker capacity, but we found that key informants at the *woreda* level also perceived antenatal care primarily as an opportunity to increase tetanus toxoid vaccination and as a route to increase institutional delivery, which have clear associated outcomes and are both federal and regional priorities in health.

> *Why don't women go for antenatal care? There is not much actually done at the visits.*
>
> —Regional health officer, Tigray

> *About antenatal care, there is no training given now. The services they are delivering at the health post depend on the knowledge that they acquired at school [preservice training]. The Health Extension Workers have learned only certain things at school. So if they can't fully provide the service at the health post, the customers will not come to them. The problem is knowledge, as the Health Extension Workers can't diagnose and identify problems.*
>
> —Woreda health officer, Tigray

Part of this weakness stems from a lack of training in maternal nutrition in antenatal care (or other platforms). In-service training on Community-Based Nutrition and preservice training on Essential Nutrition Actions were the most frequently mentioned sources of technical knowledge on nutrition. Regional and *woreda* respondents noted that maternal nutrition (including anemia) was not prioritized in any of the nutrition trainings. At the federal level, this was attributed to vertical programming, since none of the technical advisors to the Federal Ministry of Health was explicitly focused on maternal nutrition.

Health Extension Workers reported that they prioritized the provision of nutrition education and counseling in antenatal care, which was consistent with community reports. The most frequently mentioned topics were good foods to eat in pregnancy (based upon illustrations in the Family Health Card), increasing dietary diversity using local foods, and eating more during pregnancy. Health Extension Workers reported that the greatest barriers were low socioeconomic status and food insecurity, which prevented pregnant women from following most of their advice. Some Health Extension Workers demonstrated strong technical knowledge in recommending locally available nutritious foods. Only some Health Extension Workers mentioned that they adapted their counseling to address local taboos and cultural barriers. Health Extension Workers occasionally mentioned involving community groups to address some of the barriers that affect the target behaviors—for example, involving men, families, or religious leaders to address gender norms (e.g., women eating after their families) or religious practices such as fasting (see **box 3**).

Despite the low attendance at antenatal care, the community findings showed that Health Extension Workers and Voluntary Community Health Workers were the most important sources of information on nutrition in pregnancy. However, respondents often differentiated between what they were told to do and

BOX 3. Community-level perceptions and practices to prioritize in social and behavioral change to address LBW and IUGR

Continue to promote the materials that were already developed and disseminated through Essential Nutrition Actions and Community-Based Nutrition, focusing on eating an additional daily meal during pregnancy and promoting priority foods as part of a diverse diet.

Additional areas to prioritize for social and behavior change communication:

- Support the perception that pregnancy is a period requiring maternal care, with important consequences for both maternal and infant health; although economic barriers are undoubtedly a serious issue, the findings showed that many families did find ways to prioritize foods for lactating women because it was traditionally considered important.
- Timing of public acknowledgment of pregnancy, and associated timing of pregnancy care.
- Involvement of husband, families, and communities to reduce maternal workload in pregnancy.
- Key informants at all levels perceived lack of food to be the major barrier to women's weight gain in pregnancy. Include opportunities to improve dietary intake that may not be dependent upon household food security:
  - Dietary taboos in pregnancy (especially in last month)
  - Continued fasting during pregnancy
  - Women (including pregnant women) delaying eating until after the husband or elder children
  - Pregnant women reducing intake because of discomfort, especially in late pregnancy, but not eating smaller meals or snacks because they will not eat alone
  - Broad and vague perceptions of what "good" foods should be eaten in pregnancy, especially in relation to what is locally available.
  - "Eating down" continues in some communities

what they actually did. This was also seen in the reports by Voluntary Community Health Workers that mothers "accepted" their messages. Despite some training on community mobilization in nutrition, Voluntary Community Health Workers and Health Extension Workers still struggle with two-way communication with the community members and facilitation of actual behavior change. This may be linked to deeply embedded cultural practices, such as eating down, and dietary taboos, which were not explicitly addressed in training on nutrition. Voluntary Community Health Workers and Health Extension Workers also need more support on how to promote better nutrition in times of high food insecurity.

> *Continuous counseling by the Health Extension Worker is there. They accept what we say, there is no problem. But practice by the mothers is not to the expected level.*
>
> —Voluntary Community Health Worker, SNNPR

> *They teach us, they tell us. But we do not practically do what they tell us.*
>
> —Woman of reproductive age, SNNPR

Monitoring weight gain in pregnancy

All sites visited had working ground scales, and all Health Extension Workers said they measured weight during antenatal care visits. But this was primarily to identify high-risk pregnancies, as most of the Health Extension Workers did not know how much weight women should gain during pregnancy, or they had a vague or inaccurate understanding of weight gain in pregnancy.

> *We advise them to make their weight normal. For example, a mother's weight has to increase to some percentage starting from conception. It means she has to gain weight since she carries her baby.*
>
> —Health Extension Worker, SNNPR

Furthermore, as discussed above, Health Extension Workers and Voluntary Community Health Workers were not able to effectively counsel women to increase weight gain during pregnancy, since it was perceived to be almost exclusively due to economic factors. None of the Health Extension Workers recorded weight in a way that allowed them to track change in weight over time in pregnant women. The important issue of prepregnancy weight is discussed below.

Role of Voluntary Community Health Workers

Some key informants suggested that the role of Voluntary Community Health Workers in mobilization and nutrition education and communication should be expanded. This was in line with community findings that the Voluntary Community Health Workers were highly active in mobilizing women to attend antenatal care and were generally seen as an important source of information. However, key informants raised concerns about the high turnover of Voluntary Community Health Workers and the importance of incentives to maintain their participation. Training and refresher training were typically used as incentives, since Voluntary Community Health Workers were paid a per diem for attending. But refresher trainings were not always delivered as scheduled (i.e., in some cases they were cancelled or delayed), which was demotivating for Voluntary Community health workers. The increasing workload of Voluntary Community Health Workers was identified as an important issue, since they are only volunteers and have other responsibilities. Supervision and refresher training were identified as key issues in Voluntary Community Health Worker capacity.

Enhanced Outreach Strategy/Community Health Days and Targeted Supplementary Food

Donor-supported outreach campaigns (Enhanced Outreach Strategy) were transitioning into routine health services (covered through *woreda* Health Office budgets) through Community Health Days, organized by Health Extension Workers and monitored by the *woreda* Health Office, in all Community-Based Nutrition *woredas*. The child survival components of Enhanced Outreach Strategy/Community Health Days were provided in all *woredas*, but screening for malnutrition and referral for supplementary food was only done in the 167 *woredas* currently covered by Targeted Supplementary Food (as of 2010, according to World Food Programme and Emergency Nutrition Coordinating Unit (ENCU) Targeted Supplementary Food program records). These were selected on the basis of levels of food insecurity as determined through annual multiagency assessments coordinated by the Ministry of Agriculture. Because of changes in funding, coverage by Targeted Supplementary Food has sharply dropped from the peak of more than 300 *woredas* covered in 2008. Typically, only women with visible pregnancies (in the second trimester or later) attended the MUAC screening, as it was the only way that the program screening staff could ensure that they qualified. Pregnant and lactating women with MUAC < 21 cm referred to Targeted Supplementary Food received a 3-month ration of 25 kg of corn–soy blend and 3 L of oil (1,690 kcal, 55 g of protein, and 15 g of fat per day).

Most Health Extension Workers reported that the Enhanced Outreach Strategy/Community Health Days screening had very high coverage of pregnant and lactating women and was one of the most-used health services. Estimates of coverage were varied, but national program records from 2009 showed that nearly 90% of the target population of pregnant and lactating women was screened through Enhanced Outreach Strategy, with around 18% (150,000 women) referred for Targeted Supplementary Food. In 2010, program

reports showed that 16% and 22% of screened pregnant and lactating women were referred for Targeted Supplementary Food in SNNPR and Tigray, respectively. *Woreda* Health Office respondents reported that Community Health Day was one of their priority programs and a good way to reach people who might not otherwise visit the health post. Targeted Supplementary Food was perceived to be an effective program that improved nutrition and reduced morbidity and mortality in children. Respondents were less clear about program objectives regarding pregnant and lactating women, although all acknowledged the importance of the ration for the health of pregnant and lactating women.

Some Health Extension Workers described negative experiences with the screening and inclusion or exclusion of pregnant and lactating women for supplementary food, saying that women complained when they didn't get supplementary food or refused to attend services at the health post. Women who were previously measured but didn't qualify for food sometimes refused to return for screening. Voluntary Community Health Workers and Health Extension Workers reported that the ration usually took 1 or 2 months to arrive (sometimes more and sometimes less). The distribution sites were 30 minutes to 3 hours from the communities. The ration was distributed by "food distribution agents," trained women from the community, who also provided basic nutrition education on the utilization of the food. The education was primarily targeted to improving nutrition among children under 2 years of age and to discouraging ration sharing. However, the ration is often distributed from sites that cover more than one *kebele* (i.e., five *kebeles*), so pregnant and lactating women do not always receive the education from the food distribution agents. Voluntary Community Health Workers and Health Extension Workers reported that ration sharing is normal within households, since no one in the community ever eats alone.

Respondents at all levels highlighted ongoing problems with data quality and correct screening of beneficiaries. In 2010, a pilot project in SNNPR found that only 51% of beneficiaries were actually malnourished when remeasured by an independent team using MUAC [19]. Support from the *woreda* Health Office and cluster supervisors was essential to accurate screening. The Federal Ministry of Health is conducting pilot projects and operational research to try to improve the accuracy of screening, but the evaluation studies have focused on the effectiveness of Targeted Supplementary Food on outcomes in under-five children and have not looked at the impact of the supplement in pregnant and lactating women.

Productive Safety Net Program

The Productive Safety Net Program is the largest social safety net in sub-Saharan Africa, covering about 7.6 million people in selected food-insecure *woredas* [5]. The Productive Safety Net Program was operational in three of the selected *woredas*. Local development committees identified eligible households, who then received cash or food transfers conditional on participation in public works. When women in beneficiary households became pregnant, they were eligible to shift to lighter work or exemption from 6 months of pregnancy until 10 months of lactation. During that time, they received cash or food (up to 50 birr [~US$4] or up to 15 kg of unfortified grain per month). Respondents reported that they used the Productive Safety Net Program Implementation Manual as their guide but reported varying understanding of when women were eligible for exemption in pregnancy (at 3 months or at 6 months) and when they were supposed to return to work; this policy was not being implemented consistently in the visited *woredas*. No data were available on the numbers of pregnant and lactating women registered for public works in the Productive Safety Net Program.

In many communities, pregnant women had to produce a certificate from the Health Extension Worker to officially prove their pregnancies, which was an unofficial conditionality with potential health benefits, as it required at least one antenatal care visit. But women did not always know when they were pregnant or when they were eligible for exemption. In other communities, pregnant women worked until their pregnancy was visible, and no certificate was required. Pregnant women in the Productive Safety Net Program usually covered both their own household and agricultural labor as well as their Productive Safety Net Program workloads until their exemption period started. In addition, in Tigray respondents reported that women also engaged in mandatory soil and water conservation activities, which did not involve exemption for pregnant women.

Role of the kebele *administration*

The support of the *kebele* administration was identified as an important factor in the success of health and nutrition programs. For example, the *kebele* administration often ensured that Voluntary Community Health Workers fulfilled their responsibilities in identifying and referring pregnant women and others to the health post. The administration fulfills political duties but also includes multisectoral committees (e.g., agricultural extension workers, women's affairs, farmers' association, teachers, Health Extension Worker, and others) that mobilize community actions.

Key findings on maternal thinness and stunting

Background

Poor prepregnancy nutritional status is linked to intergenerational growth failure through high incidence of LBW (discussed above) and growth failure in infancy

and childhood (44% of children 0 to 59 months of age were stunted, and 29% were underweight) [4], leading to thin and stunted adolescent girls and women who then go on to have LBW infants [20]. Short stature and low prepregnancy BMI are risk factors for IUGR and LBW [16]. The mean height of Ethiopian women is 157.1 cm, 3% are less than 145 cm tall, and 13% are less than 150 cm tall [6]. More than a quarter (26%) of Ethiopian women of reproductive age are thin (BMI < 18.5), which is one of the highest rates in Africa [6]. Thinness is not restricted to the poorest women; the prevalence of thin women is about 30% in all three of the lowest wealth quintiles. Maternal prepregnancy BMI can also be used as a proxy for the adequacy of maternal nutritional stores available during pregnancy, as maternal access to resources and maternal workloads are unlikely to change during the pregnancy and lactation periods, despite their increased nutritional burdens.

Many of the perceptions and practices related to pregnancy nutritional status also apply to prepregnant nutrition status, particularly perceptions about the lower priority of women for household distribution of food, food insecurity and poverty causing malnutrition and weakness in women, and heavy workloads. The following section deals primarily with nonfood factors affecting the stunting and thinness of adolescent girls and prepregnant women, particularly age at marriage and first birth and fertility behaviors. Childbearing during adolescence is an important modifiable risk factor for poor MNCH outcomes, as girls may enter their pregnancies with low nutrient reserves because of recent or ongoing growth. Ethiopia has traditionally had one of the highest rates of early marriage in sub-Saharan Africa, with 28% of women aged 20 to 24 having given birth before age 18, and a median age at first birth of 19 years [6]. The rates of early marriage and early first birth are slowly declining but still remain high, as seen in a comparison of age bands: among women 45 to 49 years of age, 10% had their first birth by age 15, compared with 5% among women 20 to 24 years of age [6]. The median birth interval in Ethiopia was 33.8 months in 2005 and has probably improved, as use of family planning increased from 14% in 2005 to 29% in 2011 [4, 6]. However, health services are still not meeting demand: 16% of women reported unmet needs for family planning for spacing purposes. Adolescents had even higher demand: 30% of 15- to 19-year-olds expressed an unmet need for family planning [4].

Community-level beliefs, priorities, and practices

Early marriage

Respondents had high awareness of the issue of early marriage, most often about the increased risks in delivery and the harmful effects on maternal health. When discussing early marriage, many respondents also mentioned the issue of girls staying in school. Some respondents felt that girls in school were more connected to the community, had more exposure to messages from teachers and health workers, and could seek help from community leaders if their families insisted on unwanted marriages. However, others pointed out that many girls chose to leave school to get married (*"They just throw their schoolbooks away and go"*—woman of reproductive age, SNNPR), and not all community respondents thought there were benefits to keeping girls in school.

> *Those girls who completed their school did not show any positive change compared with those who did not learn.*
> —Community elder, SNNPR

Most respondents reported that early marriage was decreasing in their communities, but several focus group discussions indicated that community perceptions of early marriage did not always correspond to the legal definition. Most respondents were aware that the government mandated a minimum age for marriage, but many did not know that the legal age was 18. This was further complicated by the absence of birth certificates, as communities rarely knew the exact age of adolescents; many communities continued to use traditional practices linked to menarche and physical development to determine when a girl was ready for marriage. Even when respondents were aware of the legal age of marriage, many respondents reported that very early marriage (below age 15) decreased, but marriages below age 18 still took place.

> *Before we used to practice [early marriage] due to lack of knowledge. But today we are all aware of the consequences and thus we refuse such a practice. We do not know the age limit for the girl to engage in marriage. We know by looking at her face and body to see if she is matured… However, we know that she is not matured a year after circumcision. She should have to wait some years. She is circumcised at about age 14. Currently the girls are growing faster, thus we circumcise them from the age of 11, 12, and 13. But 3 or 4 years after circumcision she is ready to engage in marriage.*
> —Woman of reproductive age, SNNPR

> *The legal age is above 18, but 16 or 17 years of age is mostly accepted by the community. If a girl is married below these ages then it is considered as early marriage. Early marriage occurs as low as 12 or 13 in this community.*
> —Woman of reproductive age, Tigray

Barriers to change included the deeply ingrained economic ties and agricultural practices associated with marriage and weak enforcement of the law. Many respondents also worried that delaying marriage would result in their daughters being sexually active outside of marriage. Teenage pregnancy was raised as an issue that contributed to early marriage, as respondents noted that young women who married early were often already pregnant. Health services for adolescents were

almost nonexistent, and these results highlighted the need for youth-focused reproductive health and family planning services.

Birth spacing and delay of first birth

The use of family planning before the first birth was virtually unheard of, even though many respondents talked about the maternal health problems associated with early marriage. Women wanted children soon after they got married, especially to avoid rumors of infertility. Respondents reported that women rarely used family planning even after their first child. Family planning was perceived to be most frequently used by women who already had many children, and women usually started using spacing methods after giving birth to two or three children ("*She thinks, 'What will happen to her if that single child should die?'*"—community elder, SNNPR). Survey results showed higher unmet needs for family planning (especially for spacing) among women 15 to 19 years of age, which might not be captured in these findings, since we did not target adolescent girls for interviews.

Family planning for birth spacing was consistently reported as one of the most used services at the health post. Relative to other services for maternal health, women had much more information and awareness about family planning, although many respondents still reported misconceptions. Health Extension Workers and Community Health Workers were the most frequently mentioned sources of information on family planning. Postnatal care was the most frequently mentioned period to receive counseling on family planning.

The community respondents reported that the use of family planning increased as people overcame their fear that family planning could cause infertility.

> *Previously we didn't understand that someone could take the injection or tablet and later give birth. But then we saw people who gave birth even after they took the tablets [and stopped]. And then we did understand and that was the difference.*
>
> —Woman of reproductive age, SNNPR

Respondents also reported that they had increased awareness of the adverse health effects of many pregnancies.

> *If she uses family planning she can eat foods that are good. She can look after the child until he grows older. She could be hurt if she has narrow spaced and repeated pregnancies. If she uses injection and if she doesn't get pregnant repeatedly, she will not be hurt*
>
> —Woman of reproductive age, SNNPR

Distance was highlighted as one of the main barriers to family planning, because it was hard for women to return to the health post for follow-up visits. Respondents also frequently identified religious leaders and husbands as barriers to family planning. In several sites, respondents reported some husbands were supportive, but that women who were not allowed to go to family planning would go without informing their husbands. Some Health Extension Workers reported that they visited mosques or churches and talked to religious leaders as part of their efforts to promote family planning.

There was high awareness of the benefits of birth spacing. Although most respondents thought that 2 years between births was enough, many others described waiting 3 to 5 (or even 6) years between births. The most frequently mentioned reasons for birth spacing were to improve maternal and child health and for socioeconomic reasons.

> *It is useful. The mother regains her blood and her flesh. Both the mother and the baby won't be emaciated. They will be in a good state of health… she breastfeeds him well. She feeds him well. She dresses him well.*
>
> —Woman of reproductive age, Tigray

Community-based interventions and platforms

This section summarizes relevant findings from the Health Extension Program platform as well as interventions to address early marriage (categorized as a Harmful Traditional Practice) that are delivered through multiple platforms, including the Health Extension Program. Finally, a description of a draft social protection policy is included here as a platform that could be expanded to address small maternal size before and between pregnancies.

Prevention of Harmful Traditional Practices

Preventing early marriage is particularly important, since these findings showed negative perceptions about using family planning before delivering a first child. Health Extension Workers and the Women's Affairs committees delivered key messages on the negative health effects of early marriage through public meetings, religious and social meetings, and other community gathering opportunities. Campaigns also promoted the benefits of girls staying in school. These same committees addressed female genital mutilation, which is linked to menarche and traditions about when girls are ready for marriage. Education sessions were also held at schools to directly target adolescent girls. Voluntary Community Health Workers were actively engaged in identifying potential early marriages. The Ministry of Women's Affairs had several relevant programs at regional levels and lower. Implementing bodies in Tigray included women's affairs associations, income-generating groups, and girls clubs. In SNNPR, similar community mobilization programs focused on women's rights and promoting secondary school. Many of these programs prioritized reduction of maternal mortality and promotion of institutional delivery but included messages on delaying age of marriage.

However, respondents reported that the most

important factor was enforcement of the law prohibiting early marriage, which required commitment from the administrative sector: the *kebele* and sometimes the *woreda*. Women's associations were also involved at multiple levels from regional trainings down to the *kebele*. Some communities also engaged religious leaders. In communities where early marriage had greatly decreased, families were required to register their marriages with a village committee and provide witnesses to prove that both parties were over 18. The committees had the power to fine the parents or report them to local police for jail or fines. Similar legislation was in place to address female genital mutilation, but respondents reported many of the same barriers to trying to change practice.

Promoting birth spacing and delay of first pregnancy

Adolescents were sometimes targeted for counseling on reproductive health (reported more frequently in Tigray through girls' clubs and school outreach education sessions), but they rarely accessed family planning services at the health post (as highlighted in the findings cited above that the subgroup of girls 15 to 19 years of age have double the unmet need for family planning compared with women 15 to 49). Education and access to contraceptives for adolescents were highlighted as priorities, but respondents also noted that there are many cultural barriers. Youth-friendly health services have been piloted on a very small scale, primarily in urban areas.

Voluntary Community Health Workers were instrumental in increasing the use of family planning in the community and were trained and supported by the Health Extension Workers to understand the guidelines for family planning counseling. Voluntary Community Health Workers minimized the barrier of distance by targeting women for family planning and referring them to the Health Extension Workers. For example, the Voluntary Community Health Workers usually monitored women who had recently delivered at home and mobilized them to attend the health post for family planning counseling and for their children's vaccinations. However, postnatal care was still reported to be extremely underutilized (around 6%) and was probably an important missed opportunity to promote birth spacing.

Social Protection Policy

A draft National Social Protection Policy was produced by a task force chaired by the Ministry of Labour and Social Affairs and the Ministry of Agriculture. Relevant to this discussion, the draft policy addresses transfers to vulnerable families. As part of the fledgling movement toward formal social protection, the Tigray regional government has formalized previously existing (often ad hoc) community-care "coalitions" of *kebele* officials, parasocial workers, Health Extension Workers, teachers, and members of the *kebele* development team. Eligibility is focused on households that have poor pensioners, disabled persons, and/or vulnerable children. The eligible households receive around $10 per month, which will eventually come from both a regional budget and a collection taken from the community but is currently provided by development partners (UNICEF, the International Labor Organization, the World Food Programme, the UK Department for International Development, and the World Bank). Enrolled households receive follow-up visits from community agents to link to priority services. Other regions are planning to follow with similar pilots. There is currently no provision for vulnerable pregnant women in this draft policy.

Implications of findings and priorities for next steps

Although the findings of this study were organized around anemia, IUGR and LBW, and maternal stunting and thinness, the implications overlap in six priority themes.

Linkages to incentivize delaying age at first birth and promote birth spacing

There are multiple programs working through several platforms to address age at first birth and spacing between births. The common theme among the multiple programs is their focus on social and behavior change communication, often through committees that cascade from region to zone to *woreda* to community. However, early marriage practices are deeply ingrained, with complex cultural and economic roots. In addition to building awareness (and in the case of early marriage, enforcing punishments), there are platforms that could be modified to incentivize behavior change. For example, both the Productive Safety Net Program and the draft Social Protection Policy offer opportunities to provide cash incentives conditional on desirable behaviors for improved maternal, neonatal, and child health (MCHN) outcomes, such as delaying birth until the mother is at least 18 years of age and spacing births at least 2 (or even 3) years apart. The Health Extension Workers are typically already involved in relevant community-level (*kebele*) committees, although there may be no formal linkages. These programs target the most vulnerable households and involve education and follow-up of specific health actions through existing health infrastructure.

Review and strengthen the role of Voluntary Community Health Workers in maternal nutrition

The findings of this study clearly highlighted the

importance of Voluntary Community Health Workers as sources of information (and sometimes misinformation) and as mobilizers, and showed that the Voluntary Community Health Workers are well placed to support maternal nutrition as part of their work supporting overall maternal health. Given the considerable workloads of Voluntary Community Health Workers, this expanded role in maternal nutrition should be focused on anemia prevention and control: for example, household visits to pregnant women to support adherence to iron supplementation, addressing perceptions of anemia and iron supplementation in the community, facilitating follow-up visits for iron supplements to the health post, and even direct distribution of iron supplements in cases where distance is a barrier. This would entail explicitly expanding the guidelines and associated in-service training materials for the Health Extension Workers, who would then cascade their training down to the Voluntary Community Health Workers with support from the *woreda* health office and the health center supervisors. This is especially timely as the Federal Ministry of Health prepares to scale up a new cadre of community-based volunteers, to be called the Health Development Army, who will provide multipurpose health support to the Health Extension Workers.

The finding that Voluntary Community Health Workers often wait until pregnancy is visible is an important issue that needs to be addressed. Efforts to improve first-trimester antenatal care (and associated distribution of IFA) will be dependent upon this issue, and this finding should be explored in more depth through further research.

Strengthen behavior change and communications materials for maternal nutrition

Extensive resources have been used to develop effective messages to improve child nutrition (e.g., on complementary feeding, exclusive breastfeeding, and others) through Community-Based Nutrition, Essential Nutrition Actions, Alive and Thrive, and other initiatives in Ethiopia.

However, there have been no corresponding efforts in two key areas in maternal nutrition. The first is the need to develop messages and facilitation materials for Health Extension Workers and health supervisors to ensure that social and behavior change communication in pregnancy is locally adapted and useful. The community results most frequently highlighted economic barriers to improving nutrition in pregnancy, but several persistent practices were identified that also affect women's diets during pregnancy. Key findings in this area are summarized in **box 3**. The findings underscored the importance of religious leaders, women's affairs committees, and *kebele* committees as important groups to engage in social and behavior change communication strategies.

Given the recent investment in IFA supplements to be distributed at scale, a second priority is the development of a social and behavior change communication strategy to build capacity to address perceptions and practices in the community related to maternal anemia. This should include building awareness of universal supplementation guidelines for pregnant women, promoting adherence to iron supplementation, addressing perceptions of moderate anemia, and building understanding of the contributions of malaria and helminths to maternal anemia. As the findings showed inconsistent understanding of anemia prevention and control guidelines at all levels, a strategy will be needed to cascade information from regional health officers down to Health Extension Workers through in-service training.

Food and cash transfers to pregnant and lactating women

Given that so many households in Ethiopia could benefit from supplementary food, there are overwhelming logistic and financial barriers to targeting supplementary food to pregnant women. However, there are currently two platforms that provide cash or food support to pregnant women, and both could be strengthened to better address the needs of pregnant women.

First, the Enhanced Outreach Strategy/Community Health Days and linkages to Targeted Supplementary Food were identified as the primary platform to address food insecurity during pregnancy, but it is currently focused primarily on child survival, and it is not clear what outcomes are expected from the supplementation of pregnant women. For example, an under-five child receives Targeted Supplementary Food until his or her MUAC improves beyond the cutoff point or his or her health situation deteriorates and further action is required. Corresponding linkages between supplementary food inputs and expected outcomes for pregnant women were not laid out. Although we expect that the supplementary food would improve birthweight, this was not articulated in any program objectives or evaluations that we found.

There are several factors that would facilitate expanding the supplementary food platform to address birthweight: high and generally positive visibility in the community, high coverage of MUAC screening of pregnant and lactating women within the covered *woredas*, and supplementary food fortified with micronutrients (other opportunities for pregnant and lactating women to get cash or food do not have any linkages to fortified foods). However, the cost of expansion is probably prohibitive, and coverage is already dropping as funding decreases and fewer *woredas* are covered through geographic targeting of high-priority food-insecure areas. Furthermore, the community findings also highlighted

additional barriers: the quarterly screening days reportedly focus only on visibly pregnant women (i.e., from 6 months onwards), and there is a lag time of at least 1 month (and often more) between MUAC screening and food delivery.

This platform was developed before the scaling up of the Health Extension Program, which now offers much improved access to health services for pregnant and lactating women; the campaign approach may no longer be necessary. To address the priority issue of birthweight, operational research should be conducted to assess the feasibility of providing regular MUAC screening of pregnant and lactating women through Focused Antenatal Care and postnatal care. This would improve the timeliness of screening by moving away from quarterly Community Health Days and also link target women to associated iron supplementation and social and behavior change communication as part of Focused Antenatal Care. If birthweight is the priority, operational research should reconsider the current practice of targeting pregnant women using the cutoff point of MUAC < 21 cm as the criterion for entry into supplementary feeding programs. First, international standards for selective feeding programs in emergencies have set the threshold for pregnant and lactating women at MUAC < 22 cm based on risk of mortality, and trials in Asia and Latin America suggest that the threshold for improved birth outcomes is probably closer to 23 cm [21]. Second, MUAC was reported to have a high degree of error during screening. Furthermore, MUAC is a weaker predictor of LBW than is attained prepregnancy weight or attained weight at 7 or 9 months of pregnancy [22] (which are not feasible to measure in these populations). Eliminating MUAC screening and focusing on better geographic targeting of the poorest districts or villages may be a more effective way to reach the most vulnerable women.

The second platform that could be strengthened is the Productive Safety Net Program for chronically food insecure households and nonchronic households affected by shocks. Cash or food* transfers are provided to households whose adults participate in labor-intensive public works projects. Direct support grants are provided to households that are labor-poor. Beneficiaries include pregnant and lactating women. Eligibility is established by community committees using locally determined criteria for entry and exit. The Productive Safety Net Program platform offers wide coverage to increase caloric intake among vulnerable households but does not address the issue of the quality of the diet. Nonetheless, the Productive Safety Net Program offers several opportunities, with increasing financial ramifications: one relatively easy opportunity is to clarify and disseminate the technical guidelines for exemption of pregnant and lactating women from public works after 6 months of pregnancy [5]. The Productive Safety Net Program has a policy of exempting pregnant and lactating women, but there were no data on this beneficiary group, which implies that it is not a priority, and made it impossible to assess how well the policy has been implemented. The policy could be further strengthened by linking the exemption from public works in pregnancy to additional conditionalities at the health post (e.g., requiring the recommended four antenatal care visits, including IFA supplementation as a conditionality of cash or food support). Unlike the food supplied through the Ministry of Agriculture/Targeted Supplementary Food, the food supplied by the Productive Safety Net Program is not fortified. This underscores the need for links to IFA supplementation at the health post, and possibly exploring home-based multimicronutrient fortificants (e.g., Sprinkles). To address IUGR on a larger scale, the direct support (i.e., cash or food without labor conditionalities) component of the Productive Safety Net Program could be expanded to provide (ideally, fortified) food or cash transfers to cover more eligible pregnant women. This option could still require antenatal care or other health conditionalities.

* Where markets are functioning, cash is the preferred mode of tranfer.

Iodized salt and iodine capsules

Coverage of iodized salt remains low, and although the situation is improving with the recent passage of legislation mandating universal fortification of salt with iodine, it is unlikely to change quickly. In iodine-deficient populations, iodine supplementation in pregnancy is efficacious in reducing the risk of LBW and perinatal and infant mortality and in increasing cognitive function among infants [17]. In 2008/09, iodized oil capsules were distributed to pregnant women and young children through Community Health Days, but this practice has been discontinued. Prioritizing iodized oil capsule distribution as an interim measure while iodized salt coverage improves could have an important impact on birthweight, as well as on child development. At the same time, systems could be strengthened to regularly report on the availability of iodized salt in sentinel or randomly selected markets, to provide more frequent feedback on when iodized oil capsules could be phased out.

Monitoring and supervision

Without data on distribution of IFA to pregnant women, it was impossible to monitor progress in this priority area. The gap in monitoring started with the absence of a register at the health post to allow Health Extension Workers to monitor their own distribution of IFA. Ideally, this indicator should be in the Health Management and Information System and flow to the

Federal Ministry of Health with the rest of the Health Management and Information System indicators, and achievement of targets should be monitored in supportive supervision visits. As the Federal Ministry of Health is planning to scale up iron supplementation, more rigorous monitoring of the supply and distribution will be needed. As a priority, the Health Management Information System should include an indicator to monitor the number of pregnant women who receive the minimum 90 iron supplements. As a secondary priority, consider adding an indicator to monitor the number of women who attend four antenatal care visits, which would provide some information on the delivery of Focused Antenatal Care over multiple visits instead of monitoring only one antenatal care visit. In addition, an indicator to monitor the availability of IFA through checklists for Integrated Supportive Supervision would be useful to monitor this issue at all levels moving forward.

Areas for operational research and follow-up in maternal nutrition

For follow-up, the following areas are not immediate priorities but should remain "on the radar" in the coming 2 years:

» Given the many challenges that still need to be addressed to increase IFA supplementation among pregnant women, that group remains the priority. Weekly IFA supplementation to adolescent girls and nonpregnant women will be a priority for the next phase of implementation; operational research is needed to identify specific social and behavioral change messages and implementation on a pilot basis to find the best platforms to reach them. For example, growth monitoring and promotion sessions are a good opportunity to reach nonpregnant women for intermittent IFA supplementation.

» Given the severe prevalence of anemia in the pastoral regions (i.e., Somali and Afar), the Voluntary Community Health Workers and the health development army will require a context-appropriate strategy for weekly intermittent supplementation to adolescent girls and nonpregnant women, following WHO guidelines [23].

» Multiple micronutrient supplementation in pregnancy is more effective at increasing birthweight than iron alone [24]. However, multiple micronutrient supplements are not included in any federal technical guidelines or addressed in any micronutrient policies. There remain several operational considerations, including the increased cost compared with supplements with iron alone. Policy makers must also consider the recent review finding that multiple micronutrient supplementation starting in the second or third trimester may increase the risk of early neonatal death [24]. However, with the high rate of LBW in Ethiopia, policy makers should watch for WHO guidance on this issue.

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