



MULTI-SECTORAL NUTRITION STRATEGY 2014–2025

Technical Guidance Brief

MATERNAL NUTRITION FOR GIRLS & WOMEN

INTRODUCTION

The risk of malnutrition in women spans a lifecycle, and preventing maternal malnutrition requires intervening at all stages of growth and development. The nutritional status of one generation of women affects the nutritional well-being of their children in childhood and adulthood and is often referred to as the “intergenerational effect of malnutrition” (Martorell and Zongrone, 2012). This brief presents information on why the nutrition of adolescent girls and mothers is important, the causes of malnutrition, and the scope of the problem. It also provides an overview of key, nutrition-specific interventions that address the immediate causes of malnutrition in adolescent girls and mothers. To mitigate the underlying and systemic causes of malnutrition, the brief suggests nutrition-sensitive interventions using a multi-sectoral approach. While this brief focuses on improving the nutrition of adolescent girls and pregnant and lactating women, interventions to protect the nutrition of girls in their first 1,000 days and all women also make important contributions to protecting health and economic outcomes in adult women and, in turn, the health and nutritional status of their own children (see the 1,000 Days Brief for more detail).

Key Messages

- It is critical to ensure women are well-nourished before, during, and after pregnancy
- Improving the nutritional well-being of adolescent girls helps keep them in school and improves their health before they become mothers
- Maternal malnutrition increases risk of women dying from pre-eclampsia and anemia
- The nutrition of mothers affects the stature of their children and their health at all ages

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This brief supports the U.S. Agency for International Development (USAID) Multi-Sectoral Nutrition Strategy 2014–2025 which “seeks to reduce malnutrition in women of reproductive age (ages 15-49) and children under five, **with a specific focus on the 1,000-day window from pregnancy to a child’s second birthday.**” In particular, USAID’s Strategy is to “decrease the prevalence of chronic and acute malnutrition and micronutrient deficiencies” and, relevant to this brief, promote “activities that target women’s nutrition for their own health.” “Investing in nutrition is fundamental to achieving our goals in improving global health, (and) ending preventable child and maternal deaths.” Good nutrition is an integral part of achieving the Agency’s goal toward ending preventable child and maternal deaths (EPCMD) (see the *Role of Nutrition in Ending Preventable Child & Maternal Deaths* brief for more information).

“Promoting gender equality and the empowerment of women and girls is a commitment across the Agency’s nutrition programs.” Gender plays a significant role in women’s and children’s nutritional status. Ensuring that girls and women can access an adequate diet within their households and the resources they need for a healthy and productive life at all stages of their lives are integral parts of the U.S. Government’s Feed the Future programs.

WHY NUTRITION FOR GIRLS AND WOMEN MATTERS

It is essential that women are well-nourished before, during, and after pregnancy. Maximizing the productivity and realizing the potential of all women, through good nutrition, makes an important contribution to national growth and development (World Bank, 2006). In developing countries, women spend much of their lives pregnant or nursing their children, and the cost of malnutrition to both mothers and their infants is high during this period, making this a critical stage in their lives to ensure optimal nutritional status. These also are times when women are most likely to have

contact with the health system for themselves and their children. Referred to as the critical 1,000 days for child development and growth (from pregnancy to a child’s second birthday), this period is an important “window of opportunity” to prevent and address malnutrition in women. Reaching girls and women with interventions before their first pregnancy and in between pregnancies also is an important strategy to improve their nutritional status and build micronutrient reserves before their first pregnancy or subsequent pregnancies. Delivering interventions to girls may be challenging in settings where girls do not attend school or participate in community-based activities. For example, in South Asia and sub-Saharan Africa, 30–40 percent of girls do not attend lower secondary school (UNESCO and UNICEF, 2015). If they are attending school, improving the nutrition of girls is a strategy to keep them in school. Keeping girls in school will delay marriage and their first pregnancy, improving the nutritional status of both mothers and their children later (Save the Children, 2015).

Maternal malnutrition has serious consequences for both mothers and their children. For women, anemia is an underlying cause in approximately 20 percent of maternal deaths (Stoltzfus, et al., 2004) and women’s own short stature, which is a consequence of chronic malnutrition during early childhood (Black, et al., 2008). Giving pregnant women calcium supplements where dietary calcium intake is low, reduces their risk of dying from hypertensive disorders (WHO, 2011).

Newly created international fetal growth standards found fetal growth to be consistent across regions when mothers were healthy and well-nourished (Papageorghiou, et al., 2014).

The nutritional status of women before, during, and after pregnancy, including inadequate weight gain during pregnancy, affects birth and delivery outcomes. Fetal growth restriction, assessed by small for gestational age (weight below the 10th percentile of the international fetal growth standard for gestational age) leads to babies being born too small, which has consequences throughout life (Figure 1). Poor nutrition in girls may exacerbate their risk of poor birth and delivery outcomes because they are still growing (Bhutta, et al., 2013).

Figure 1: Consequences of Maternal Malnutrition

Underweight before/during pregnancy; short stature	<ul style="list-style-type: none"> Increases the risk of maternal death¹ Associated with 50 percent of low birth weight (LBW)²
Fetal growth restriction	<ul style="list-style-type: none"> Causes 20 percent of stunting in children³ An underlying cause in 12 percent of under-5 deaths⁴
Being born too small	<ul style="list-style-type: none"> Compromises mental/motor development⁵ Increases obesity, hypertension, cardiovascular disease, and diabetes in adults^{6,7}

Available evidence suggests that iron, folate, calcium, and zinc intakes in girls and women are inadequate in developing countries (Lee, et al., 2012; Caulfield and Elliot, 2015). Anemia in pregnant and non-pregnant women, 40–60 percent of which is estimated to be caused by iron deficiency (WHO, 2015), may increase risk of blood loss at delivery and increase postpartum hemorrhage (Kavle, et al., 2008), which is the major cause of maternal mortality in most low- and middle-income countries. From a secondary analysis of national studies in Africa, when pregnant women received iron-folic acid (IFA) supplements and presumptive treatment for malaria, which is also a cause of maternal anemia, the risk of neonatal mortality decreased by 34 percent (Titaley, et al., 2010). Similar findings have been found in other regions – for example, in Nepal, early and total neonatal mortality decreased by 45 percent and 42 percent, respectively, when

¹ Ozaltin, et al., 2010

² Kramer, 1987

³ Christian, 2014

⁴ Black, et al., 2013

⁵ Christian, et al., 2014

⁶ Barker, et al., 2002

⁷ Yang and Huffman, 2012

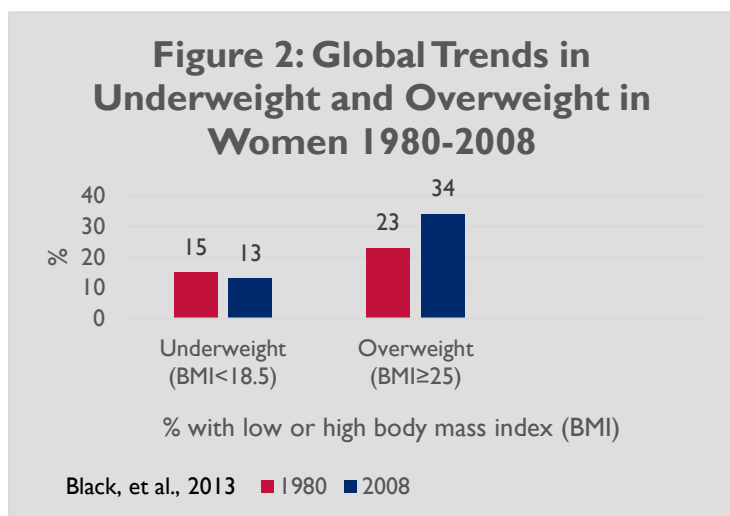
women took IFA supplements during pregnancy (Nisar, et al., 2015). The effect was highest when women started taking IFA supplements in their first trimester or when they took more than 150 IFA supplements. It was estimated that 15 percent of under-5 deaths were attributable to women’s not taking IFA supplements.

Gestational hypertensive disorders, including pre-eclampsia and eclampsia, are the second cause of maternal mortality in developing countries (Black, et al., 2013). These conditions also increase the risk of prematurity and fetal growth restriction. Giving pregnant women calcium supplements where calcium intake is low reduces pre-eclampsia by 52 percent and prematurity by 24 percent (WHO, 2011).

Consuming a micronutrient-rich diet during adolescence and before pregnancy promotes optimal mental and physical development and also provides essential vitamins and minerals that women need when they decide to have children. Iron deficiency is associated with compromised learning in not only young children, but also older girls, even in developed countries (Grantham-McGregor and Ani, 2001; Halterman, et al., 2001). When women take folic acid supplements prior to conception, there is a 72 percent decrease in the risk of neural tube defects in newborns (e.g., spina bifida) (De-Regil, et al., 2010). Iodine deficiency before and early in pregnancy increases the risk of poor birth outcomes including severe mental retardation (cretinism) (Black, et al., 2013), and newborn death. Iodine deficiency affects brain function in girls and women of all ages, reducing intelligence quotient by 13.5 points even where iodine deficiency is mild but chronic (Bleichrodt and Born, 1994).

Overweight and obesity in girls and women are growing problems in developing countries and also contribute to poor health and delivery outcomes, such as premature delivery and maternal complications. Obese women are at increased risk of gestational diabetes and pre-eclampsia compared to women with normal weights, as measured by body mass index (BMI) (Black, et al., 2013).

SCOPE OF THE PROBLEM



Globally from 1980 to 2008, underweight decreased slightly in women 20–49 years of age from about 15 percent to 13 percent while overweight increased from about 23 percent to 34 percent (Figure 2). However, underweight is 5–10 percentage points higher in poor countries. For example, in 5 countries (Bangladesh, Cambodia, Ethiopia, Nepal, and Senegal), 20–25 percent of women are underweight – an estimated 12 million pregnant and lactating women who are too thin. There are few nationally-representative nutrition surveys on the nutritional status of girls 10–19 years of age except for information about girls 15–19 years of age who have already given birth. There also is little information on the proportion of pregnant women who do not gain adequate weight, based on their pre-pregnancy nutritional status, which is a risk factor for fetal growth

restriction. One analysis using modeling of national datasets found 42 percent of Indian and 17 percent of African women were underweight at the beginning of their pregnancy (Coffey, 2015). Weight gain during pregnancy was the same in both regions at about 7 kg, which is about one-half of the minimum weight gain recommended during pregnancy for women in the United States. These findings indicate that higher rates of low birth weight (LBW) in Asian than in African newborns is due to higher prevalence of underweight in Asian women before they conceive.

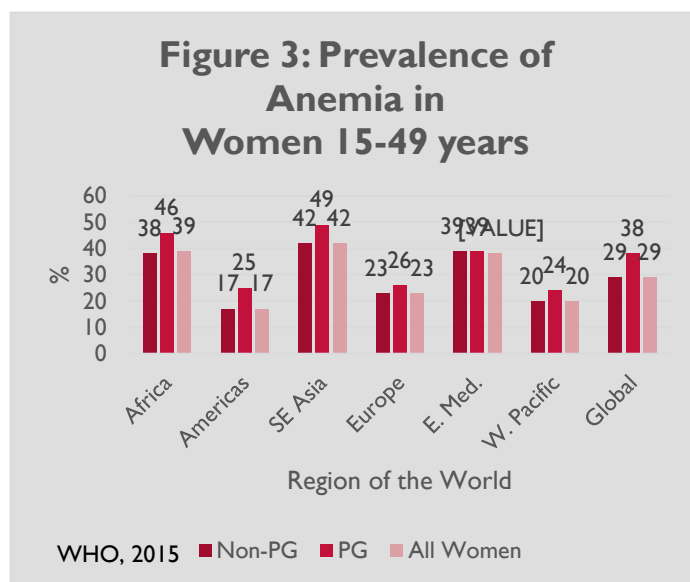
The double burden of malnutrition with stunting or wasting and overweight or obesity in the same household is a growing trend in many countries. In 13 out of 19 USAID Feed the Future priority countries, overweight exceeds

underweight by 2- to 4-fold in women of reproductive age while in most of these countries stunting in children remains high.⁸

The prevalence of micronutrient deficiencies based on nationally-representative surveys is unknown, although dietary intakes of micronutrients in women are inadequate from available studies (Lee, et al., 2012). Figure 3 shows the prevalence of anemia by region and reproductive status. With iron deficiency as one of its major causes, anemia in pregnant women, for example, ranges from 24 percent to 49 percent by region (WHO, 2015).

CAUSES AND BEST PRACTICE INTERVENTIONS

Interventions should address the immediate and underlying causes of malnutrition in girls and women. Immediate causes include lack of knowledge about adequate nutrition, inadequate or excessive consumption of nutrients, and chronic and frequent infections that increase energy and micronutrient requirements and decrease nutrient absorption. Underlying causes of malnutrition include lack of access to nutritious foods, quality health services and a clean environment; early, frequent, too many, and short spacing of pregnancies; limited infrastructure; food insecurity; the absence of markets to purchase food; gender and other inequalities; heavy workloads in women; and poverty. For girls, lack of access to services, education, and foods due to inequality in household food distribution are particularly important underlying causes of malnutrition. Mitigating the underlying causes of malnutrition can improve the nutrition situation of girls and women, even when the availability of food at the household level does not change.



NUTRITION-SPECIFIC INTERVENTIONS

The table on the following page shows nutrition-specific interventions to improve the nutritional status of girls and women, particularly during pregnancy and lactation (Bhutta, et al., 2013; Mason, et al., 2014). Many of these interventions are integrated into the health platform in health facilities or at the community level and should be tailored to the needs of women with special needs, including pregnant girls. Indicators for the interventions are provided. Those indicators that are collected by or can be calculated with data from Demographic and Health Surveys are designated with an asterisk.

⁸ Demographic and Health Surveys. Stat Compilier for 19 USAID priority countries using the most recent surveys.

Nutrition-Specific Interventions to Improve the Nutritional Status of Girls and Women, particularly during Pregnancy and Lactation⁹

Group	Description of Interventions	Description of Indicator (s)*
Pregnancy (Antenatal Care—ANC)	<ul style="list-style-type: none"> - Daily IFA supplements (60 mg of iron-400 mcg folic acid^{10 11}) or Multiple Micronutrients (MMN) (60 mg of iron and 400 mcg folic acid and other vitamins and minerals)¹²; counseling on why and how to take IFA/MMN and how to manage side effects, if they occur - Hemoglobin test at least once in pregnancy - Anemia assessment using clinical signs (i.e., pallor)¹³ if hemoglobin test is not available - 2 IFA supplements (60 mg of iron-400 mcg of folic acid each) or one IFA supplements (120 mg of iron-400 mcg of folic acid, if available) daily to treat women with anemia - Daily calcium supplements where dietary intake of calcium is low (1–4 500 mg of calcium carbonate); counseling on why and how to take calcium and how to manage side effects, if they occur - Counseling & social and behavior change communications (SBCC) about adequate diet – why and what foods to consume to provide optimal energy, protein, essential fatty acids, and micronutrients including available fortified staples and condiments (i.e., iodized salt); taboos that limit food intake; adequate weight gain in pregnancy - Appropriate psychosocial and nutrition care of pregnant girls, ensuring they receive special services tailored to meet their needs, which need to be determined at the country level 	<ul style="list-style-type: none"> - % of women who received 180 IFA/MMN supplements in their last pregnancy* - % of women who took 180 IFA/MMN supplements in their last pregnancy* - % of women who received a hemoglobin test in their last pregnancy* - % of women who were checked for clinical signs of anemia in their last pregnancy - % of pregnant women with anemia treated for anemia - % of women taking the recommended number of calcium supplements in their last pregnancy - % of women consuming 3 meals per day in their last pregnancy - % of women consuming at least 5 out of 10 food groups in their last pregnancy* (in some surveys) - % of women consuming fortified staples or other foods in their last pregnancy - % of women living in households with adequately iodized salt in their last pregnancy* - % of girls receiving antenatal care (ANC) and nutrition services and counseling specific their needs

⁹ Interventions to improve the nutrition of girls are still limited.

¹⁰ Note that folic acid must be given around the time of conception to prevent NTDs. For this reason, only folic acid taken before pregnancy will reduce NTDs. The U.S. Government recommends that women who have had a child with a NTD take folic acid daily (4,000 mcg) one month before they intend to get pregnant through the first three months of pregnancy and 400 mcg at all other times when they are not pregnant (CDC, 1991). In countries where food staples are fortified with folic acid, supplementation before conception may not be necessary.

¹¹ The dose of folic acid should never be 5 mg (5,000 mcg) or higher because this dose interferes with intermittent preventive treatment for malaria in pregnancy (IPTp).

¹² Composition may vary by need and country. For the UNICEF MMN formulation for pregnant women see: [https://supply.unicef.org/unicef_b2c/app/displayApp/\(cpgsize=5&layout=7.0-12_1_66_69_115_2&uiarea=2&care=4F091DAA39BB068AE10000009E711453&cpgnum=1&cit=4F091DAA39BB068AE1000009E7114534EBA6580BBC20F68E10000009E71143E\)/do?rf=y](https://supply.unicef.org/unicef_b2c/app/displayApp/(cpgsize=5&layout=7.0-12_1_66_69_115_2&uiarea=2&care=4F091DAA39BB068AE10000009E711453&cpgnum=1&cit=4F091DAA39BB068AE1000009E7114534EBA6580BBC20F68E10000009E71143E)/do?rf=y)

¹³ Note clinical signs are relatively good at identifying severe anemia.

	<ul style="list-style-type: none"> - Adequate weight gain monitored (IOM, 2009): <ul style="list-style-type: none"> • BMI<18.5: 12.7-18.2 kg • BMI 18.5-24.9: 11.4 kg-15.9 kg • BMI 25.0-29.9: 6.8 kg-11.4 kg • BMI≥30: 5.0kg-9.1 kg - Weighed in first and third trimesters and height measured once in pregnancy with appropriate action taken - Balanced energy-protein supplements for underweight or food insecure women (25% of the total energy supplement as protein) (Bhutta, et al., 2013) - Breastfeeding counseling¹⁴ on initiation within 1 hour after birth, breast care, breastfeeding in first 3 days, exclusive breastfeeding, lactational amenorrhea method (LAM) - Malaria prevention in endemic countries – three combined tablets of SP (500 mg sulfadoxine; 25 mg pyrimethamine each) at each ANC visit starting as early as possible in the second trimester until the time of delivery with each dose given at least 1 month apart); long-lasting insecticide-treated nets (LLINs) 	<ul style="list-style-type: none"> - % of women gaining adequate weight in their last pregnancy - % of women who were weighed at least once in their last pregnancy* - % of pregnant who were measured for height at least once during pregnancy* - % of pregnant women with short stature who are referred to health facilities with emergency obstetric care, in the event prolonged labor occurs - % of underweight pregnant or lactating women receiving balanced energy-protein supplements - % of pregnant or lactating women receiving balanced energy-protein or other supplements during seasonal shortages - % of women who received counseling in ANC about breastfeeding and LAM in their last pregnancy - % of pregnant women who received the full course of anti-malarial prevention in pregnancy using SP* - % of pregnant women sleeping under LLINs*
<p>Delivery</p>	<ul style="list-style-type: none"> - Delayed cord clamping (DCC) from 1–3 minutes except in the case of emergencies such as asphyxia in newborns - Early breastfeeding (i.e., initiation within 1 hour after delivery; provision of colostrum; not giving pre-lacteal feeds; positioning; managing BF problems) 	<ul style="list-style-type: none"> - % of mothers with DCC at delivery (except those mothers with emergencies such as asphyxia in newborns) - % of women who received counseling about/help with breastfeeding and LAM at delivery - % of mothers initiating breastfeeding within 1 hour after delivery* - % of mothers giving colostrum* (in some surveys) - % of mothers giving pre-lacteal feeds*

¹⁴ While breastfeeding counseling during ANC may not seem like a maternal nutrition intervention, breastfeeding does improve iron stores in women and increases birth spacing, which improves the nutritional status of women. Preparing women to breastfeed in pregnancy improves breastfeeding practices.

<p>Postnatal Care (PNC)</p>	<ul style="list-style-type: none"> - Weekly IFA supplements (60 mg of iron-2,800 mcg folic acid)¹⁵; counseling on why and how to take IFA/MMN and how to manage side effects, if they occur - Support to exclusive breastfeeding (i.e., on-demand and day and night feeding; frequency and duration of feeding, managing breastfeeding problems) - Counseling to prepare women for transition from Lactational Amenorrhea Method (LAM) to another modern family planning method at 5 months or less - Counseling & SBCC about adequate diet – why and what foods to consume to provide optimal energy, protein, essential fatty acids, and micronutrients including available fortified staples and condiments (i.e., iodized salt); taboos that limit food intake; adequate weight gain in pregnancy 	<ul style="list-style-type: none"> - % of postpartum women who take IFA supplements weekly for three months - % of mothers who received PNC who are checked for and helped with breastfeeding practices and problems - % of mothers who exclusively breastfed in the first 6 months* - % of women who practice LAM before six months* - % of women who practice LAM and start another modern family method at 5 months. - % of postpartum women consuming three meals per day - % of postpartum women consuming at least 5 out of 10 food groups* (in some surveys) - % of postpartum women consuming fortified staple or other foods - % of postpartum women living in households with adequately iodized salt*
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*Demographic and Health Surveys either report on the indicator or the indicator may be available by using raw data to calculate the indicator.

NUTRITION-SENSITIVE INTERVENTIONS

When interventions are integrated into a package of services and through different sectors, they address the multiple, underlying causes of maternal malnutrition, either before (e.g., adolescence, engaged, and newly married women), during, or after pregnancy and lactation. These interventions are referred to as “nutrition-sensitive” interventions. Examples of the role different sectors play in improving the nutrition of girls and women:

- **Family planning** programs provide counseling and commodities to delay pregnancy, increase birth spacing, and reduce the number of children women have, which improves the nutritional status of women, extends breastfeeding, and prevents stunting in children.
- The **education** sector can provide take-home food rations to families in return for keeping girls in school. Longer schooling and greater education can delay marriage, protects girls’ nutritional status, and improve their status in society.
- The **education** sector can provide health, water, sanitation and hygiene (WASH), and nutrition interventions to benefit girls including providing toilet facilities for girls, micronutrient supplements, deworming, and treatment for malaria.
- The **agriculture** sector increases the availability of nutrient-rich foods through horticulture and livestock programs for girls and women.
- The **WASH** sector improves water and sanitation infrastructure and promotes hand washing and the hygienic preparation of food to reduce diarrhea in girls and women.

¹⁵ WHO. Guideline: Intermittent iron and folic acid supplementation in menstruating women. World Health Organization, 2011. This recommendation has been used for postpartum women since WHO does not have a recommendation for postpartum women. The period of 3 months was chosen based on a previous WHO recommendation. Daily IFA supplements may be needed where anemia prevalence is high or women do not consume 180 IFA supplements during pregnancy.

- The **private food industry**, supported by appropriate public policies and government regulation and monitoring, can produce healthy, affordable fortified foods to address micronutrient deficiencies in all women of reproductive age.
- The **social protection** sector provides social safety nets such as conditional cash transfers to women to increase their use of health, nutrition, and education services or direct food support for mothers and children, particularly targeting undernourished girls and women before, during, and after pregnancy.
- **Civil society and religious organizations** can play the role of nutrition champion through consumer groups, religious organizations, and contact points (e.g., marriage registration programs), and monitoring nutrition at the community level.

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ADDITIONAL RESOURCES

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This Technical Brief will be periodically updated. Comments from readers are welcome, especially comments to help clarify the information provided or where additional information may be useful. (Last updated December 22, 2015.)