



**Testimony
Before the Committee on Foreign
Relations
United States Senate**

**CDC Efforts to Combat Child Hunger
and Malnutrition in Developing
Countries**

Statement of

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Good morning, Mr. Chairman and Members of the Committee. I am pleased to be here today to discuss the work of the Centers for Disease Control and Prevention (CDC) in combating child hunger and malnutrition in developing countries and our collaborations with other US agencies, multilateral and bilateral health organizations, and private partners.

Since its inception, CDC has been active in applying its technical skills to global health priorities of the United States, from the pivotal role the agency played in the campaign to eradicate smallpox, to CDC's current global portfolio, which includes science-based activities throughout the world. CDC has initiatives to directly address nutritional status of children through its micronutrient malnutrition program, safe water and humanitarian response activities, and infectious disease activities that impact nutritional status. CDC also plays a lead role in global disease detection and pandemic influenza preparedness efforts.

CDC has strengthened its commitment to global health by recently establishing Health Protection Goals specifically focused on helping people around the world live healthier, safer, and longer lives through global health promotion, health protection, and health diplomacy. In particular, through our health diplomacy activities: we work to engender trust, maintain high ethical standards, and engage the community; strengthen the public health workforce and leadership both within CDC and around the world; and meet country needs through our humanitarian responses to national disasters and efforts to address "core" public health issues—including improved availability and access to safe water and adequate food and nutrition, the focus of my testimony today.

Statistics on Nutritional Contributors to Child Deaths and Illness

The nutritional and infectious disease contributors to child deaths and illness are well-documented.

- Each year, undernutrition contributes to the deaths of about 5.6 million children younger than 5 in the developing world, according to UNICEF.

Another 146 million children younger than 5 are underweight and at increased risk of early death, illness, disability, and underachievement (UNICEF, 2006).

- UNICEF reports that in the least developed countries, 42 percent of children are stunted and 36 percent are underweight.
- A vitamin A deficient child faces a 23 percent greater risk of dying from ailments such as respiratory illnesses, diarrhea, and malaria.
- Lack of sufficient folic acid intake among women of childbearing age contributes to an estimated 200,000 babies born with crippling birth defects throughout the world.
- Iron deficiency, one of the top 10 causes of global disease burden (World Bank), contributes to about 60,000 deaths among women in pregnancy and childbirth, and robs 40 percent to 60 percent of the developing world's children of their intellectual development (UNICEF/MI).

Effective and inexpensive interventions such as food fortification, supplementation, and dietary improvements have eliminated most micronutrient malnutrition in developed countries and could result in similar public health improvements in developing countries. CDC, in partnership with other global public health leaders, is putting into practice these interventions.

CDC Interventions to Improve Nutritional Status

International Micronutrient Malnutrition Prevention and Control Program (IMMPaCt)

In 2000, CDC established the IMMPaCt Program to support the global effort to eliminate vitamin and mineral deficiencies, or hidden hunger. Through the IMMPaCt program, CDC provides funding and/or technical assistance directly to countries through cooperative and interagency agreements with UNICEF, the World Health Organization (WHO), the U.S. Agency of International Development

(USAID), the Global Alliance for Improved Nutrition (GAIN), and the Micronutrient Initiative (MI). With these partners, CDC has assisted countries in assessing the burden of hidden hunger through national surveys and surveillance systems that allow countries to monitor the coverage and impact of their food fortification and micronutrient supplementation programs. In addition, computer and web-based training tools and regional and national training workshops developed by CDC have strengthened the capacity of countries to assess the burden of malnutrition, track the effectiveness of interventions strategies through surveillance systems, and plan social marketing and health communication strategies to promote the consumption of vitamin- and mineral-fortified foods.

In 2002, in collaboration with the WHO Eastern Mediterranean Regional Office (EMRO), CDC provided funding support and consultation toward a national micronutrient survey to generate baseline data on iron status of adult women and preschool children in order to monitor the impact of the recently initiated national flour fortification program in Jordan.

CDC also worked with the Ministry of Health (MOH) and UNICEF-Afghanistan on establishing salt iodization activities; including building several iodized salt-producing plants. In 2004, CDC subsequently helped the MOH and UNICEF-Afghanistan to plan and implement the first national nutrition survey which provided estimates of nutritional deficiency among children, women and men in Afghanistan, and showed that iodine status of the Kabul population is already substantially better since an iodized salt production factory started operating in 2003.

Through its International Micronutrient Reference Laboratory, CDC has collaborated with global partners to establish and support a global network of resource laboratories around the world to help improve and monitor the quality of national micronutrient testing.

IMMPaCt multi-sectoral partnerships to support improved nutrition

Fortification of Flour and Food with Vitamins and Minerals

To help improve nutrition worldwide, the CDC IMMPaCt Program helped launch the Flour Fortification Initiative (FFI) in 2002. The Initiative was formalized in 2005. The FFI Leaders Group, a network of government and international agencies, wheat and flour industries, academia, and consumer and civic organizations, was established to promote flour fortification. FFI supports fortification of flour with essential vitamins and minerals, especially folic acid and iron, as one important way to help improve the nutritional status of populations, especially women and children, around the world.

To more directly improve dietary vitamin and mineral intakes of infants and young children, CDC recently implemented a cooperative agreement with UNICEF-CEE/CIS to begin a multisectoral initiative to mobilize and engage the food industries, as well as the governments and public health sectors in countries of Eastern Europe and Central Asia, to strengthen breastfeeding promotion programs and to fortify all commercially produced complementary food (foods added to a child's diet during transition from breast milk) for infants older than six months of age. Experience in the U.S. and Canada suggests that the impact of such a partnership between the public sector and food industry in that region of the world is likely to be enormous.

In many Asian and African countries commercially produced infant foods are either not commonly used or readily accessible through markets in remote areas. Through the IMMPaCt program, CDC is actively planning pilot interventions in Kenya and Tajikistan to assess the feasibility of alternative approaches to sustainable distribution, through small local markets and house-to-house sales, of easy-to-use, "in-home" fortificants to enrich baby foods. These efforts will require public-private-civic sector partnerships to be nurtured and strengthened over time.

CDC Infectious Disease Interventions that Impact Nutritional Status

Global Immunization

Over recent decades, the experience of national immunization programs demonstrates that immunization is one of the “best buys” in public health. Rapid implementation and use of the traditional vaccines against childhood killer diseases has been the single most important contributor to the reduction of child mortality in developing countries.

Prevention of vaccine preventable diseases (VPDs) has the potential to positively impact malnutrition. Pertussis infection (whooping cough) is associated with coughing followed by vomiting that can last several months. This has been shown to result in poor growth and lower than normal weight for age, along with the potential to result in malnutrition.

Several studies suggest that children vaccinated against measles may have improved nutritional status compared with unvaccinated children. Fewer deaths due to diarrhea and malnutrition have also been reported in children vaccinated against measles. Infections, including those preventable by immunization, have been shown to lower the body’s immune defenses leading to more infections, lowered nutritional intake and eventual malnutrition. For example, measles infections are associated with lowered levels of Vitamin A, which increases susceptibility to diarrhea and pneumonia. These infections result in poor appetite, lowered food intake, and the potential for malnutrition. Studies from one African country demonstrated a decrease in the number of malnutrition cases that was temporally related to a mass measles vaccination campaign that improved control of measles.

In collaboration with WHO, UNICEF and other agencies, CDC’s Global Immunization Division has been involved in international activities to improve immunization coverage rates for all vaccine preventable diseases. Global routine measles coverage increased from 71 percent in 1999 to 76 percent in 2004.

Overall, global measles-related deaths decreased 48 percent from 1999 to 2004, i.e., from 871,000 people to 454,000. CDC is also a founding member of the Measles Partnership, which from 2001 to 2005 supported 40 African countries in conducting mass measles vaccination campaigns. An estimated 213 million African children were vaccinated, averting 1.2 million measles-related deaths. The Partnership is also supporting measles vaccination in WHO's Eastern Mediterranean and South East Asia Region, where 60 million children are to be vaccinated in 2006. These activities have the potential to impact on malnutrition by greatly reducing the risk of developing measles infection.

In addition to providing measles vaccine during Partnership-supported campaigns, Vitamin A, antihelminthic (deworming) medication and bed nets (to prevent malaria infection) were also distributed together in a number of countries. These integrated or "bundled" interventions are more efficient and effective. From 2001 to 2005, more than 43 million children received doses of Vitamin A, more than 13 million received deworming medication, and 1.5 million received insecticide-treated bed nets to prevent malaria. Plans in WHO's AFRO region for 2006 include vaccinating 64 million children and providing 10 million children with deworming medication, 20 million with Vitamin A, and five million with anti-malarial bed nets. Integrated delivery of child survival interventions are also planned in countries in other regions as well, including Indonesia.

Intestinal helminthes (worms)

More than two billion children globally are infected by intestinal helminthes, with 155,000 deaths reported annually. The burden of diseases caused by intestinal helminthes infection (39 million disability associated life years (DALYs) is higher than that caused by measles (34 million DALYs) or malaria (36 million DALYs). Intestinal helminthes infection affects the nutritional status of children through intestinal bleeding, malabsorption, competition for nutrients, loss of appetite and diarrhea. All of these effects are reversible after treatment. Another benefit of treatment is better digestion of the sometimes limited food available.

Drugs for deworming treatment are highly effective, widely available, inexpensive, easy to administer during school or general population drug campaigns and without serious side effects. One caveat is that treatment must be repeated every 6-12 months because of re-infection. CDC has provided technical support to programs addressing neglected tropical diseases (NTD), such as intestinal helminthes, in more than 10 countries. NTD programs provide significant public health value at low cost, less than \$1 per person per year and represent excellent examples of public-private partnerships through the generous donations of drugs by Merck, Glaxo-Smith-Kline, Pfizer, and Johnson & Johnson.

Safe Water

In settings with poor access to safe water and hygiene, children can become trapped in a vicious cycle of diarrheal illness and malnutrition. Diarrheal infections kill nearly two million children less than five years of age annually and can cause substantial short- and long-term morbidity among survivors. Children with diarrhea frequently lose their appetites and can't absorb food, which can lead to nutritional deficiencies. Similarly, malnourished children are also at higher risk for diarrheal diseases. Poor weight and height gains have been reported among children with heavy diarrheal burdens early in life.

Where drinking water and hygiene practices are unsafe, improving child nutrition may not be as simple as providing food aid. Additionally, foods prepared with unsafe water or contaminated hands may expose children to diarrheal pathogens, causing additional illness and further compromising child nutrition⁸.

This problem was highlighted during an early 2006 diarrhea outbreak in Botswana -- investigated by CDC and partners, including the Ministry of Health, U.S. Office of Foreign Disaster Assistance (OFDA), Peace Corps, UNICEF, and Doctors Without Borders -- that killed more than 530 children. HIV-infected mothers in Botswana are provided free infant formula during their children's first

year of life in an effort to prevent mother-to-child transmission of HIV, but water used to prepare the formula is not always safe to drink. In this outbreak, diarrhea and acute malnutrition were more common among children who were not breastfed. The lesson learned is that food aid is likely to be most effective when combined with additional interventions, such as safe water.

The Safe Water System (SWS) consists of water treatment with dilute, locally produced sodium hypochlorite solution, safe water storage, and behavior change techniques. The solution is typically marketed through commercial channels at an affordable price and is promoted locally by project partners. Through partnerships with dozens of public, private, and nongovernmental organization (NGO) partners, the SWS has been implemented in 23 countries. Approximately three million persons per month benefit from the program.

In Kenya, a partnership including CDC, USAID, WHO, Rotary International, Population Services International, CARE, Emory University, the Millennium Water Alliance, the Ministry of Health, the Ministry of Education, and several private companies, is promoting and distributing SWS products through the private sector, women's groups, primary schools, clinics, hospitals, and religious organizations. In Kenya, Uganda, and Nigeria, SWS products and handwashing supplies are distributed to HIV-infected people to help prevent opportunistic infections, improve their nutritional status, and protect the health of other vulnerable family members. In Afghanistan, hygiene kits including SWS products and soap are provided free to pregnant mothers as an incentive to attend antenatal clinics and to help them develop good hygienic habits before the birth of their children.

CDC has also collaborated with Procter & Gamble (P&G) Company to develop and field test PuR, a water treatment product that clarifies and disinfects water. PuR has been used in internally displaced populations in Ethiopia to prevent illness and improve nutritional status. CDC is also currently conducting a clinical

trial of a new water treatment product produced by Occidental Chemicals in collaboration with Medentech, Inc. CDC has collaborated with P&G on handwashing research, including a recent study in China that documented a decrease in primary school absenteeism in children in a handwashing promotion program. CDC is also part of the Public Private Partnership for Handwashing that is coordinated by the World Bank.

Safe water also contributes to preventing Guinea worm disease (GWD), a parasitic disease that affects resource-poor communities in remote parts of Africa that lack safe drinking water. Infection is painful and debilitating, with serious negative economic and social consequences, such as loss of agricultural production and reduced school attendance. GWD is targeted for eradication, and since the mid-1980s the incidence of the disease has declined from more than 3 million cases per year to less than 12,000 in 2005. Transmission has been stopped in 11 of 20 countries. CDC collaborates with many partners in the global GWD eradication efforts, including the Global 2000 program of the Carter Center, UNICEF, and WHO. Eradication efforts include simple interventions and CDC has been instrumental in demonstrating that cloth filters and pipe filters can protect users from GW-contaminated drinking water, identifying barriers to early case identification and containment, and assessing the effectiveness of health education and messages to inform villagers about GWD. CDC plans to continue to assist Ministries of Health and other partners with monitoring and evaluation activities, provide technical assistance concerning surveillance, case detection and containment, and to work with WHO and The Carter Center to reduce cases in the two remaining most highly endemic countries of Ghana and Sudan to fully eradicate this disease.

Impact of Malaria Intervention on Child Nutrition

CDC also contributes to improved child nutrition through its malaria prevention and control program. It is generally accepted that poor nutrition may lead to increased susceptibility to infectious diseases such as malaria along with

immune and metabolic system dysfunction that can then further impair nutritional status. Study findings include these: 1) over time, infections such as malaria may impair growth in young children; 2) anemia is a common result of both nutritional deficiency and malaria and in areas of intense malaria transmission, where children experience repeated and chronic malaria infection, this nutritional/malarial anemia is likely to resemble iron deficiency anemia and may require iron therapy along with antimalarial treatment; 3) persistent malaria may induce iron deficiency through one or more mechanisms, including decreased iron absorption, enhanced iron loss during an acute malarial episode, or making iron unavailable in the body for red blood cell production; 4) malaria-associated low birth weight is a risk factor for increased neonatal and infant mortality; and 5) prevention of malaria and associated anemia through control strategies such as insecticide-treated nets (ITNs) may help to improve infant growth and weight gain.

CDC is actively involved in malaria research that may impact on overall nutritional status of children. For example, CDC has measured the impact of specific treatments and assessed the optimal frequency of iron supplementation to address the anemia associated with malaria. In other work, CDC has documented the beneficial positive impact of insecticide-treated nets (ITNs) on anemia and growth in infants; assessed the impact of ITNs on growth, nutritional status, and body composition of primary school children; and is conducting an ongoing study of IPT with different antimalarial regimens plus iron supplementation in infancy to assess impact on malaria, anemia, and growth. In addition, the synergy and heightened health benefit of deworming and malaria interventions such as bed nets helps address the combined anemia caused by malaria and intestinal worms (especially hookworm).

President's Malaria Initiative activities

CDC is working to control malaria and its deleterious effects on child survival, morbidity, and nutritional status through participation in the President's Malaria Initiative (PMI), an intergovernmental initiative led by USAID, as well as HHS/CDC, HHS/National Institutes of Health (NIH), the U.S. Department of State, the U.S. Department of Defense and the White House. When PMI was launched in the summer of 2005, President Bush pledged to increase funding of malaria prevention and treatment in sub-Saharan Africa by more than \$1.2 billion over five years.

The goal of the President's Malaria Initiative is to reduce malaria deaths by half in each target country after three years of full implementation. The initiative helps national governments deliver proven, effective interventions – insecticide-treated bednets (ITNs), indoor residual spraying, prompt and effective treatment with artemisinin-based combination therapies (ACTs), and intermittent preventive treatment for pregnant women -- to a majority (85 percent of people at greatest risk—pregnant women and children less than five years old.

Work is ongoing in Angola, Tanzania, and Uganda. In 2007, PMI will target four additional African countries: Malawi, Mozambique, Rwanda, and Senegal. In 2008, eight more countries will be added. The initiative will eventually be implemented in 15 African countries most affected by malaria.

HIV/AIDS

HIV/AIDS and malnutrition are both highly prevalent in many parts of the world, especially in sub-Saharan Africa. There are well-established links between HIV/AIDS and poor nutrition and food insecurity. HIV, which causes weight loss and wasting, specifically affects nutritional status by increasing energy requirements, reducing food intake, and adversely affecting nutrient absorption and metabolism.

PEPFAR recognizes that nutrition is important for people living with HIV/AIDS (including pregnant women) and HIV-exposed children. Within PEPFAR, CDC is helping to support efforts to provide appropriate nutritional support and to create links with broader nutrition programs.

Infants born to HIV-positive mothers (“HIV-exposed children” including both infected and uninfected children) are at a substantially higher risk of low birth weight, early malnutrition, and mortality in the first two years of life than children born to mothers without HIV. The risks are greatest for infants of mothers with more advanced disease (Kuhn et al., 2005). These HIV-exposed infants are the major focus of the prevention of mother-to-child HIV transmission (PMTCT) and orphans and other vulnerable children (OVC) programs. Successful outcomes for these children depend on early detection, strong counseling, antiretroviral (ARV) provision, safe infant feeding and follow-up and support system for the infant/mother pairs. Growth, nutritional status and survival of HIV-infected children are also improved by prophylactic cotrimoxazole, ARV therapy and prevention and treatment of opportunistic infections, while improved dietary intake improves weight gain, growth, and recovery from opportunistic infections and decreases risk of mortality. PMTCT programs target both the HIV-positive pregnant women (and mothers) and their infants and young children with these interventions.

The prevention of mother-to-child HIV transmission programs encourage and support safe infant feeding. In settings where breastfeeding is common and prolonged, transmission through breast milk may account for up to half of the HIV infections in infants and young children. The overall risk of mother-to-child HIV transmission (MTCT) in non-breastfeeding populations is 15-25 percent (without interventions to reduce transmission) and in breastfeeding populations 20-45 percent. To reduce the risk of HIV transmission, HIV-positive mothers are advised to avoid breastfeeding and use replacement feeding when it is acceptable, feasible, affordable, sustainable, and safe to do so. Otherwise,

exclusive breastfeeding for the first months of life is recommended, followed by early breastfeeding cessation when conditions for safe replacement feeding can be met. Available ARV prophylaxis interventions can substantially reduce MTCT during pregnancy, labor and delivery but, so far, significant reduction of postnatal mother-to-child HIV transmission has been less successful.

Safe infant feeding is still a major challenge. In resource-limited settings, where large numbers of HIV-infected women and their infants benefit from PMTCT programs, safe feeding of infants without breast milk is difficult. Many women have inadequate access to clean water, infant formula, and other safe, nutritionally complete for infants. Many mothers and health providers are unaware of the food requirements of infants who do not receive breast milk, because children in these countries have historically been breastfed for up to two years. Because of these issues, some infants born to HIV-infected mothers receive inadequate nutrition as a result of efforts to prevent HIV. Several research projects are currently underway to assess the impact of HIV prevention programs on child survival overall and to determine the best way to feed infants of HIV-positive women in resource-limited settings.

CDC Responds to Complex Humanitarian Emergencies

Through its International Emergency and Refugee Health program, CDC works to document the nutritional status and needs of children in complex humanitarian emergencies, food crises and famines and uses the results to target the most vulnerable populations and improve relief efforts.

Recent surveys have been conducted in Darfur, Sudan, Niger, Chad and tsunami affected areas of Indonesia. In addition, CDC provides technical assistance to UN agencies and OFDA in response to nutritional crises, such as the food crisis in Ethiopia in 2003, to assess the magnitude of the problem and prioritize intervention strategies and the Southern Africa crisis in 2003 where CDC assisted UNICEF in reviewing all survey data from the region.

CDC supports innovative research to enhance field practice with the goal of reducing morbidity and mortality. Examples include investigating feasible interventions and programs to reduce micronutrient malnutrition in food aid dependent populations and the evaluation of new approaches to the treatment of severe malnutrition. In addition, CDC has helped develop guidelines, manuals, and tools for measuring nutritional status for both WFP and UNICEF. CDC has conducted many trainings on improved practices for field level and country level staff to strengthen overall capacity and enhance the competency of international agencies.

CDC activities in Darfur are illustrative. Beginning in 2004, CDC and partners conducted a series of nutrition surveys to determine the extent of acute malnutrition among children living in conflict-affected areas of Darfur. The most recent survey, completed on September 21, 2006, covered the entire 3.8 million persons currently affected by the crisis. These surveys have assisted the United Nations in monitoring the coverage and impact of their interventions over time as well as providing valuable data for planning humanitarian assistance for 2004 through 2007.

Another example is CDC's response to the food crisis in the West African country of Niger. In 2005, an estimated 2.5 million people were potentially at risk due to food insecurity. CDC conducted a series of eight regional nutrition surveys in collaboration with UNICEF during the crisis to document the extent and severity of the problem. The results of the survey were used to improve the general food distributions in the areas with the highest levels of malnutrition and leverage funding from donor agencies.

CDC's involvement in fighting malnutrition in complex humanitarian emergencies has a broad impact on the health of vulnerable children. The surveys and assessments conducted by CDC have raised awareness to the magnitude and

severity of nutritional emergencies in crisis affected populations around the world and helped focus limited resources on the most vulnerable.

CDC is committed to continuing to work with UN agencies and NGOs to implement best nutritional practices in emergency settings and to document the burden of malnutrition in emergency settings. CDC supports international collaboration to improve training for UN, international and local aid staff. With our partners, we are working to strengthen the capacity of agencies and staff in order to effectively and efficiently implement nutrition programs.

Conclusion

CDC's unique contributions to addressing child hunger and malnutrition around the world are through the scientific and technical expertise we bring to partnerships for vitamin supplementation, food fortification, and data collection activities of the IMMPaCT and related programs, and the proven and effective interventions that prevent and control the infectious diseases that lead to malnutrition and are the major causes of deaths and illness in children in developing countries. CDC also responds to the nutrition and health needs of vulnerable populations who are affected by conflict, natural disasters and famine.

Collaboration with other federal agencies is key to developing strong multilateral, bilateral, and private partnerships around the world.

CDC is committed to continuing to address these "core" public health issues—including improved availability and access to safe water and adequate food and nutrition.

Thank you for the opportunity to testify. I would be happy to answer any questions you may have.