



USAID
FROM THE AMERICAN PEOPLE

WASH & Nutrition

WATER AND DEVELOPMENT STRATEGY & Implementation Brief

October 2015

GOAL OF USAID WATER AND DEVELOPMENT STRATEGY 2013-2018:

To save lives and advance development through improvements in water, sanitation, and hygiene programs, and through the sound management and use of water for food security.

GOAL OF USAID MULTI-SECTORAL NUTRITION STRATEGY (2014-2025):

To improve nutrition to save lives, build resilience, increase economic productivity, and advance development.

I. Introduction

The U.S. Agency for International Development's (USAID's) [Water and Development Strategy](#) (2013–2018) was released in May 2013 with the goal of saving lives and advancing development through improvements in water, sanitation and hygiene (WASH) programs and through sound management and use of water for food security. The [Multi-Sectoral Nutrition Strategy](#) was released a year later in May 2014, with the goal of improving nutrition to save lives, build resilience, increase economic productivity and advance development. This implementation brief was initially released in complement to the existing [Water and Development Strategy Implementation Field Guide](#), to USAID staff in January 2015 to facilitate and support programming decisions on WASH and Nutrition, a key theme in the Water and Development Strategy. The brief is being re-released to support similar programming in the context of the Multi-Sectoral Nutrition Strategy. Other briefs in the Water and Development Strategy Implementation Briefs series currently available or in development will provide additional information to facilitate and support programming decisions on the following key themes related to the USAID Strategies: Agriculture Management, Sanitation, Water Quality, and Sustainability of WASH Services.

The Water and Development Strategy calls for increased integration of WASH and food security programs. USAID's water programs will be amplifying the goals of the U.S. Government's Feed the Future Initiative by ensuring improved agricultural water management and WASH components are integrated into food security programs whenever possible and appropriate for the local context.

Key Messages

1. Positive nutritional outcomes are dependent upon WASH interventions and nutrition actions.
2. Poor WASH conditions create an additional burden of undernutrition.
3. Many opportunities for co-programming WASH in nutrition programs exist and are described here.

At the nexus of WASH and food security programs lies nutrition. USAID's Multi-Sectoral Nutrition Strategy reflects a vision for 2025 of a world where countries, communities, and families have the capacity to achieve and sustain healthy, well-nourished populations. This vision includes reductions in rates of childhood stunting (low height for age) and wasting (low weight for height), and improved nutrition for women, in order to save millions of lives, increase resilience, and realize significant benefits to broad-based economic growth and development. Improvements in WASH and nutrition confer benefits on their own, but their complex interactions are inextricably linked. The objective of this Implementation Brief is to provide the evidence base for those linkages and offer programmatic approaches to better address these two sectors simultaneously.

Use of safe water, sanitation facilities, and good hygiene can improve nutritional outcomes by addressing both immediate and underlying causes of malnutrition. Lack of sanitation, in particular, is strongly correlated with acute malnutrition and stunting. Even in the absence of diarrhea, a fecal-contaminated environment is linked to chronic undernutrition, which reduces utilization of essential nutrients. Diarrheal disease reduces the absorption of nutrients by the gut. However, poor absorption of nutrients and undernutrition are not entirely attributed to diarrheal disease.

Undernutrition remains a significant public health threat that requires both WASH and nutrition interventions. Undernutrition is an underlying cause of 45 percent of child deaths globally, and the lives of nearly 7.4 percent of the world's children are at immediate risk due to severe wasting. Wasting is managed by specialized medical care combined with therapeutic feeding (Black et al., 2013). In less developed countries, 26 percent of children under 2 years old are stunted and will suffer permanent physical and cognitive effects. The 11 key nutritional interventions, taken up at levels over 90 percent, will only address 20 percent of this stunting (Black et al., 2013). WASH interventions are an important component of programs that target stunting. Simple actions can help prevent diarrhea and undernutrition, even in hygiene-challenged environments. WASH can improve nutritional status in three ways:

1. WASH reduces the incidence of diarrheal disease. A recent study using the latest burden of disease data estimates that almost 60 percent of diarrhea is caused by unsafe water, lack of sanitation, and poor hygiene behaviors, and is thus preventable (Prüss-Üstun et al., 2014). Extensive evidence supports the hypothesis that persistent diarrhea increases the risk of undernutrition. A vicious cycle exists between diarrhea and undernutrition, as children with diarrhea eat less and are less able to absorb the nutrients from their food. At the same time, they need additional calories to recover from the infection. Malnourished children have weakened immunity and are more susceptible to diarrhea when exposed to fecal matter from their environment. The World Health Organization (WHO) estimates 1.7 billion cases of diarrheal disease annually, which leads to 9 percent of child deaths (CHERG, 2013).
2. A second effect of poor WASH conditions is intestinal worm infection. Severe whipworm and roundworm infections are negatively associated with growth, and intestinal worms may result in poor absorption of nutrients, thus affecting nutritional status.
3. WASH interventions are able to reduce the pathogen load observed in environments with poor WASH conditions. Some causes of undernutrition are not directly associated with diarrhea, but instead are associated with high pathogen environments and poor WASH conditions (see Figure 1). Although this cause of undernutrition is not well understood, its association with high pathogen environments suggests that it may be caused by recurring infections in the gut that limit the proper absorption of calories and nutrients. This hypothesis is often referred to as environmental enteropathy or environmental enteric dysfunction.

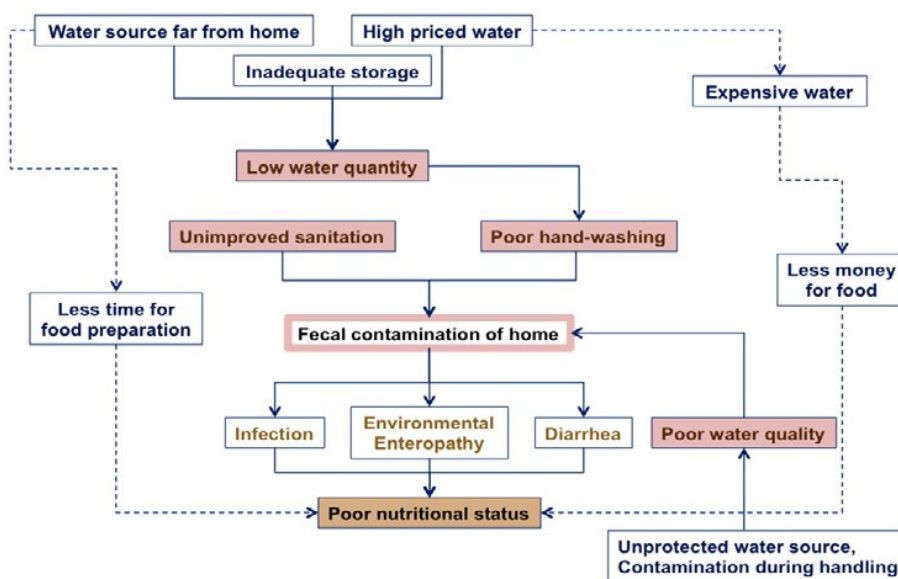


Figure 1. WASH and Nutrition Pathways

The health impacts of undernutrition are long-term growth and developmental deficits, at least partly due to gut dysfunction. This gut dysfunction that impairs nutrient absorption is not well understood, but is likely caused by damaged microvilli in the intestines (enteropathy), poor microbiota in the gut, and inflammation caused by recurring intestinal infections.

The goal of WASH interventions is to reduce the pathogen load in the environment and overcome the causes of gut dysfunction and infectious diseases, such as diarrhea and acute respiratory infection. In addition, adequate nutrition also requires access to the right quality (adequate macro- and micro-nutrients) and quantity of food (calories) as well as optimal maternal, infant, and young child feeding and care.

II. Background

A. Evidence Base for Integrating WASH and Nutrition to Address Gut Dysfunction

The evidence base for WASH contributions to improved nutrition, beyond just diarrheal disease, is significant; however, the specific pathway by which a pathogenic environment leads to undernutrition is less well known (Prendergast and Kelly, 2012). Key evidence for the impact of pathogenic environments on nutritional status includes:

1. A comparative study of markers for environmental enteropathy, parasite burden, and growth in 119 Bangladeshi children (<48 months of age) living in rural households with different levels of environmental cleanliness (defined by objective indicators of water quality and sanitary and handwashing infrastructure) was carried out by Lin et al. (2013). Both lower height-for-age and the presence of enteropathic biomarkers were observed for children in “dirty” household environments. These results are consistent with the hypothesis that environmental contamination causes growth faltering (lower height for age), perhaps mediated through environmental enteropathy.
2. Links between the environment and nutritional status were observed in Peace Corps Volunteers in Pakistan who experienced mild diarrhea and weight loss. The volunteers were observed to have both abnormal intestinal biopsies and complex carbohydrate absorption (indicative of gut dysfunction). Several years after returning to the United

States, they regained weight, normal carbohydrate absorptive function, and normal intestinal biopsies. These results suggest that the pathogenic environment temporarily affected their nutritional status and that a hygienic environment supported improved nutrition (Korpe and Petri, 2013).

3. A clear association between sanitation and child height was observed by using country-level regressions across 65 developing countries, with a particular focus on India. The results suggest that much of the stunting in India is associated with poor sanitation, perhaps a proxy for a pathogenic environment (Spears, 2013).

New research is underway to further document the evidence for the link between WASH and undernutrition. Upcoming results from the WASH Benefits Trial, MAL-ED Project, and the SHINE study in Zimbabwe (partially funded by USAID) will inform future programs that integrate WASH and nutrition interventions.

B. Alignment with USAID Strategies

Optimal nutrition is fundamental to, and a strong indicator of, achieving USAID's wider mission to reduce poverty and raise the quality of life in the developing world, and ending preventable child deaths, which is the focus of the Global Call to Action for Child Survival. To achieve this goal, USAID'S Water and Development Strategy and Multi-Sectoral Nutrition Strategy reaffirm USAID's commitment to partner in the global movement to address malnutrition.

The USAID Water and Development Strategy, released in 2013, emphasizes links among WASH, nutrition, and food security. Further, where diarrheal disease and undernutrition are prevalent, Missions should add sanitation as a key element of their water, health, and nutrition activities. USAID's Water and Development Strategy places a special emphasis on scaling up sanitation.

The USAID Multi-Sectoral Nutrition Strategy also emphasizes the relevance of WASH to nutrition. The Nutrition Strategy calls on USAID to increase access to high quality nutrition-sensitive services, including access to water, sanitation facilities, and hygiene. USAID is further committing to making its nutrition initiatives more effective by integrating key hygiene actions (safe drinking water, handwashing with soap, safe disposal of excreta, and food hygiene) as essential components in all its nutrition programs. The Nutrition Strategy also lays out a research and learning agenda, including research to strengthen the evidence base for the nutrition linkages to WASH.

III. Best Practices

The rationale for integrating WASH and nutrition programs is both to enhance the outcomes of nutrition programs and to build more comprehensive programs to improve health. The key interventions for WASH, food hygiene, and nutrition are described below as a starting point for programming.

USAID operates on the development hypothesis that WASH improvements have the greatest and most sustainable impact on health when a balance of the following three elements is achieved: 1) expanded access to hardware (e.g., water and sanitation infrastructure and hygiene commodities); 2) required behavior changes for sustained improvements in water and sanitation access/service and hygiene practices (e.g., social marketing, community participation, counseling, school programs); and 3) an improved enabling policy and institutional environment (e.g., supportive policies, capacity building, partnerships, financing, community mobilization). These interconnected components are all necessary to implement effective programs that achieve public health impact.

WASH practices have been proven to reduce diarrheal rates by 30–40 percent (Cairncross et al., 2010). This level of reduction can be achieved through a comprehensive approach – promoting improvements in key WASH practices (e.g., handwashing, treatment and safe storage of drinking water, safe disposal of feces, and food hygiene); improving access to safe water and sanitation technologies and products; and facilitating or supporting an enabling environment (e.g., improved policies, community organization,

institutional strengthening, and public- private partnerships). Furthermore, a clean environment for children is also important to reduce exposure to the pathogenic surroundings.

A. Optimal Handwashing

Handwashing prevents diarrhea effectively when done properly and at critical times (before preparing food, eating, or feeding; after defecating, cleaning a baby, or changing a diaper). Proper technique includes using soap, or an effective substitute such as ash, rubbing hands together at least three times, rinsing hands in flowing water, and drying them on a clean cloth or by air. A meta-analysis of handwashing studies conducted in developing countries concluded that handwashing can reduce the risk of diarrhea in the general population by 42 percent. A recent observational study in Bangladesh found that diarrhea occurred less often in households where residents washed at least one hand after defecation and before preparing food. The study suggested that washing hands before preparing food is particularly important to prevent diarrhea in children (Luby et al., 2011). More information is available at <http://www.globalhandwashing.org>.

B. Treatment of Safe Drinking Water in Households

Treatment and safe storage of drinking water in households has been shown to reduce the risk of diarrheal disease by 30–40 percent. Simple, low-cost strategies can greatly reduce the microbial content of water and result in diarrheal disease morbidity reductions comparable to those achieved by handwashing and sanitation. However, compliance is a major obstacle to getting the correct and consistent use that is required to have a public health impact. Treating water in the home can be done in several ways: chlorination; boiling; solar disinfection (SODIS) via heat and UV radiation; filtration with different types of filters; and combined chemical coagulation, flocculation, and disinfection. All treated water must be stored in a clean and appropriate vessel with a narrow neck and a tap and/or lid. Access to water treatment supplies and willingness to pay for water quality (when households are often paying very high rates for any water at all) also affect compliance with correct use. More information is available at http://www.who.int/household_water/en/.

C. Sanitation

Improved sanitation is a proven intervention to reduce diarrheal disease rates by as much as one-third. However, sanitation remains a low priority for governments and donors due to the lack of political will and the high cost of improvement. As one of the great challenges in development and as Clean Water and Sanitation is one of the Sustainable Development Goals, sanitation requires new focus and emphasis. More information is available at <http://www.susana.org/en/>.

Strategic sanitation investments should encourage at-scale national or sub-national sanitation interventions and should be context-specific. They might include community-based approaches such as Community-led Total Sanitation (CLTS) and Sanitation Marketing (SanMark), which can facilitate communities to adopt improved sanitation. Investments should consider how to reach underserved populations and facilitate a comprehensive and functional sanitation supply chain with improved governance and engagement of the private sector. An at-scale approach includes a focus on strengthening national institutions, fostering strong private sector participation, and enabling behavior change, rather than merely building toilets. There are many resources online including: <http://www.wsp.org/topics>, <http://www.worldbank.org/en/topic/sanitation> and <http://www.susana.org/lang-en/sustainable-sanitation>.

D. Key Food Safety Actions

The World Health Organization (WHO) published a document called 5 Keys to Safer Food that describes actions families should take in the kitchen to maintain safe food. These actions are especially important during child weaning. Furthermore, high quality food hygiene may contribute to a healthier intestinal microbiome and positively affect gut function. Detailed information can be found at <http://www.who.int/foodsafety/consumer/5keys/en/>.

1. Keep food preparation areas clean, including hands, surfaces, and utensils
2. Separate raw and cooked food
3. Cook food thoroughly
4. Keep foods at safe temperatures
5. Use safe water and raw materials

E. Essential Nutrition Actions

The key “Essential Nutrition Actions” within the framework of WASH and nutrition integration include the following:

1. Promotion of optimal breastfeeding during the first six months
2. Promotion of optimal complementary feeding starting at six months with continued breastfeeding to 2 years old and beyond
3. Promotion of optimal nutrition for women
4. Promotion of optimal nutritional care of sick and severely malnourished children

Other “Essential Nutrition Actions” include:

5. Promotion of adequate intake of iron and folic acid and prevention and control of anemia for women and children
6. Promotion of adequate intake of iodine by all members of the household
7. Prevention of vitamin A deficiency in women and children

IV. Programmatic Implications for Integrated Programming

Some key areas for integration of WASH into nutrition programs could include:

1. Identify overlapping geographic work areas. Both WASH and nutrition programs typically focus on the most vulnerable populations including geographies with high poverty rates, households without sanitation facilities, regions with high percentages of stunting, etc.
2. Recognize interventions that affect both WASH and nutrition. Both WASH and nutrition programs require social and behavior change to achieve impact. For example, behavior change programs such as “healthy kitchens” target hygiene and nutrition simultaneously. Also, WASH interventions have been included in nutrition programs from Feed the Future and USAID’s Office of Disaster Assistance and Food for Peace.

To inform program design, all programs should conduct gender analyses that identify gender dynamics and roles, and how they impact WASH and nutrition behaviors for men, women, and children. Programs that target the community, households, or health facilities should prioritize recruitment and participation from both men and women.

Finally, one of the challenges for integrated programming is that adequate hardware is required for comprehensive successful WASH interventions, although hygiene can be improved even in the absence of expensive infrastructure investments.

A. Integration Practices Relevant to Health Programs

Health programs typically focus on the communities and households as well as government policy. An illustrative list of programmatic ideas to address WASH in nutrition programs includes:

- **Engaging government.** Different levels of government (national, provincial, and district) should be included to strengthen their capacity and ownership of the WASH sector. Working with the relevant units within the ministries (including health, agriculture public works, education), partners can work together with the ministries to develop multifaceted behavior change strategies and standardized messaging and materials, so organizations working in WASH and nutrition are conveying consistent hygiene and nutrition messages approved by the government. Behavior change strategies may include a variety of approaches including counseling, training, mass communication, community organization, and others.

- **Developing standardized messages and effective materials.** Counseling materials should be based on consumer and field research or use existing messaging that is confirmed as appropriate for the audience. These materials should be grounded on formative research that recognizes current practices and beliefs, as well as facilitating and constraining factors. Final materials and messages are pre-tested with the target audience to ascertain understanding. Examples of messages that would benefit from standardization include length of time to boil water, methods to protect water quality from source to consumption, length of time to wash hands, and materials to wash hands (soap and water, ash and water, etc.). Radio, video, and mobile phone messaging have also become popular and effective behavior change communication methods. Commercial marketing expertise to finely tune messaging has also been shown to be effective in changing social norms around these deeply engrained behaviors.
- **Encouraging coordinated field visits and cross training.** WASH and nutrition behaviors are unique in that the behavioral standard is high – these are activities that must be practiced by every person, every day, or multiple times per day in order to maximize the health impact. Consequently, the delivery of the social and behavior change activities should come from multiple, reinforcing channels that target the entire household. Health workers, nutrition and agricultural extension agents, teachers, and other community leaders should be encouraged to deliver a range of WASH, nutrition, and agriculture messages. Also, coordinated field visits minimize disruption to the existing daily activities of the target population.
- **Joint promotion of essential WASH and nutrition actions.** One example of joint promotion is handwashing with soap and water before food preparation along with complementary feeding. Handwashing with soap should be incorporated into all counseling and promotional materials as “step zero” before preparing any food, feeding oneself, or feeding or breastfeeding a child. This task involves promotion of a designated place for handwashing with soap and water located near areas where food is prepared and children are fed. Complementary feeding and encouraging a proper diet (including diverse foods in the right quantity and at the right frequency) can be promoted together with handwashing, including demonstrations to reinforce these behavioral practices and emphasize safe drinking water along with dietary diversity.
- **Negotiating improved practices.** Both health workers and nutrition and agricultural extension agents can be taught to work with mothers and others to assess the current WASH practices in the family, reinforce existing positive actions, and help identify a few actions to be improved. These new “small doable actions” are simple, feasible steps toward reaching ideal WASH and complementary feeding practices. The counselor then “negotiates” one or two small doable actions with the mother, which are then followed up on and reinforced in subsequent visits.
- **Food preparation demonstrations.** Demonstrations of food preparation for improved nutrition provide a tangible opportunity to link nutrition and improved WASH. Project staff should ensure that demonstration sites for food preparation have safe drinking water that is stored in clean containers with a narrow mouth and a lid (e.g., jerry cans or other containers that reduce the potential for contamination through contact with the water), as well as handwashing stations complete with water and soap. Demonstrations should always begin with the staff washing hands in front of the participants. Messages during a food preparation demonstration might include: keep foods hot, maintain good hygiene during preparation, wash knives and cutting boards after contact with raw meat, and store dishes off the ground.
- **Promoting enabling technologies with a focus on behavior change.** Handwashing stations that have water and soap provide a visible cue to wash hands when leaving the latrine and before preparing food or eating. Similarly, many combinations of pit, slab, and

superstructure provide hygienic sanitation, as does offering households choices that meet their needs and budgets rather than a single pre-determined design for latrines/toilets. Water storage containers also vary, but the key message is to prevent any contamination to the stored water by using a small neck on the container, a tap, and/or lid, or a clean ladle to extract water from the container.

B. Integration with WASH and Nutrition Assessments

The following list of questions is provided as an aid for USAID staff developing nutrition assessments. The questions are illustrative, but it is important to include some questions for each category listed below, as each is associated with a fecal-oral transmission route. **The questions in bold** are the highest priority to include if time or survey length is limited. Validated survey instruments for the WASH questions can be found online at <http://www.measuredhs.com/publications/publication-DHSQ6-DHS-Questionnaires-and-Manuals.cfm> (questions 102-109 for water and sanitation; questions 138-139 for handwashing).

WASH & Nutrition Assessments

Household drinking water

1. Where do you get your drinking water?
2. **Do you treat your drinking water? If so, how?**
3. **Where do you store treated drinking water? How do you maintain your container? (Visually inspect whether it's clean and closed. Do people put dirty hands or cups into the container?)**
4. How do you serve/give people water to drink (pour from jug, dipper, etc.)?

Sanitation

1. **Do you have a latrine? Can you show it to me?**
2. **Who uses the latrine?**
3. **How often do family members use this latrine?**
4. Does anyone in your house need help to use the latrine?
5. Do your children use the latrine? If not, where do they defecate?
6. How do you dispose of your infant's and/or children's feces?

Handwashing

1. **Where do you wash your hands? Can you show me?**
2. **Do you use soap to wash your hands?**
3. **When do you wash your hands?**
4. How do you wash your hands?

Food hygiene

1. Where do you prepare food for cooking?
2. **Do you wash the food preparation surfaces? When do you wash them? How do you wash them?**
3. Are there foods you wash before cooking? Do you wash your food before cooking?
4. **How and where do you store (cooked/prepared) food? For how long?**
5. Do you reheat stored food?
6. How do you wash and store your dishes and cooking utensils?

C. Integration Practices for Agricultural Programs

Food and agricultural systems provide opportunities for promoting WASH practices that can contribute to better health and improved nutritional status via multiple entry points (e.g., planting, processing, animal care, and food preparation). Poor worker health and hygiene, manure, human feces, rodents, and insects can also result in biological contamination of food. Irrigation water can also be a source of contamination. The objective of improved WASH from 'field to fork' is to prevent

exposure to contaminated food and water with the goal of improving health and nutrition. Some specific practices to reduce the ingestion of pathogens due to agricultural practices include:

- **Reducing ingestion of soil-based pathogens.** Most foods are grown on soil-based media; *Listeria monocytogenes*, *Bacillus cereus*, and *Clostridium botulinum* are dangerous pathogens commonly found in soils, underscoring the need for proper handling of foods that will be consumed raw. Contact with improperly treated wastes and biosolids can cause foodborne illnesses such as *Salmonella*, *E. coli*, *Shigella*, viruses, and parasites transmitted via wastes. Other biological contaminants that can lead to health and nutrition problems include mycotoxins and viruses, such as Hepatitis A, *Norovirus*, and aflatoxin.

Good WASH practices are integral to good agricultural practices from planting through post-harvest. Interventions that can make a dramatic difference in improving health and nutritional outcomes include: 1) the provision of hand washing and toilet facilities in the field and processing facilities; and, 2) social and behavior change communication on good hygiene practices, such as handwashing after using the toilet and not handling food when sick.

- **Reducing mycotoxins in food.** Mycotoxins are produced by some fungi, such as *Aspergillus*, *Fusarium*, and *Penicillium*. They can poison both humans and animals and have severe adverse effects on many organs. For example, aflatoxin, which is produced by two *Aspergillus* species and is one of the most toxic substances occurring in nature, can be lethal when ingested in large quantities or be a potential carcinogen with chronic exposure to low amounts (Groopman and Kensler, 1999). Aflatoxin is a common contaminant of staple foods in sub-Saharan Africa (Wild, 2007). Enteropathies may also exacerbate the absorption of these mycotoxins.

Drought stress during the growth of the fungus increases the amount of aflatoxin, so adequate water may reduce outbreaks. Irrigated corn generally has fewer problems with *Aspergillus* infection likely due to better growing conditions and less drought stress. Further, allowing grains to fully mature before harvest can reduce contamination with mycotoxins. Proper storage at low temperatures and low moisture is also necessary to reduce proliferation. In developing countries, grain is almost always stored at higher than optimal temperatures (30°F / -1°C). An awareness campaign in Kenya on proper drying and storage of maize resulted in lower serum aflatoxin levels in households that received the information. Pre-harvest and food processing interventions are crucial to reducing exposure. Pre-harvest interventions include controlled irrigation, pest management, and sowing cultivars resistant to fungal growth and aflatoxin production. Suggested interventions during food processing and preparation are removal of contaminated portions, washing, crushing, and dehulling (Strosnider et al., 2006).

- **Reducing chemical contamination.** Chemical food contaminants include organic and inorganic fertilizers, pesticides, and fungicides. Irrigation water provides another pathway for contaminants – both chemical and biological. Improper application and disposal of chemical contaminants can result in increased morbidity and mortality in humans, especially those with immune systems already weakened by poor nutrition and/or health.
- **Reducing animal waste contamination.** Good practices are also essential in animal systems, and interventions focusing on containing animals and prevention of exposure of children's hands from fecal bacteria from contaminated floors and yard soil are just as, if not more important, than handwashing and water treatment (Ngure et al., 2013). In one study, the highest microbial load for fecal-oral microbial transmission in children was found in the active exploratory ingestion of soil and chicken feces (Ngure et al., 2013). A secondary behavior that affected environmental cleanliness was crawling on contaminated soil and floors. Appropriate waste management, such as confinement of animals and

poultry, can diminish the opportunities for contamination. With dairy animals, hygiene goes both ways, e.g., hands should be washed before and after milking to protect both milk and milker, as well as cleaning the udder and ensuring a clean bucket. Existing agriculture and WASH interventions do not address these fecal-oral contamination pathways and are failing to protect infants and young children from ingesting soil, feces, and other pathogens at a critical growth and developmental stage.

- **Using a multiple-use water services (MUS) approach.** MUS is an approach to optimize water availability and quality at the community level in order to provide for domestic, agricultural, and household water needs, as well as addressing sustainable management of the water resource. Most freshwater withdrawal is for agriculture, but the use of rural and peri-urban water supplies for both domestic and agricultural use is common (e.g., drinking water, gardens, and livestock). Systems are not typically designed or managed for multiple uses, leading to problems with sustainability and environment or risks to human health. The MUS approach can be customized by adding additional sectoral activities to enhance benefits, for example: 1) adding the full WASH package with sanitation and hand-washing to complement the increased drinking water supply; and, 2) providing training and facilitating supply chains for adoption in improved horticultural practices (or supporting other productive uses of water). MUS is most appropriate in areas where water availability is limited or where only one water source is available to meet all the community's needs.
- **Ensuring that irrigation runoff is not used for drinking water.** Irrigation water can be contaminated with pathogens from farm animals and toxins from pesticides and other chemical treatments. This water should remain separate from household drinking water.

D. Monitoring and Evaluation Including Indicators

Project evaluations are crucial in determining which interventions are most effective in reducing undernutrition rates for both wasting and stunting. They also provide key evidence for identifying the primary mechanisms by which undernutrition occurs in children and the WASH-related interventions that reduce wasting and stunting rates. Strong monitoring & evaluation activities are essential for assessing the benefits of integrated WASH and nutrition programming.

The commonly used indicators are the WASH outcome indicators from the F framework 3.1.6.8 and are described in the Water and Development Strategy WASH-nutrition webinar. There are some standard F indicators in 3.1.9.1 to address diet, but no standard indicators exist for the suite of Essential Nutrition Actions. Feed the Future and USAID's Office of Food for Peace and Office of Foreign Disaster Assistance have standard indicators for nutrition, and programs may also develop their own indicators to monitor improvements to acute malnutrition, stunting, or anemia rates.

Although indicators for diarrheal disease reduction might seem to be an informative means of evaluation, the complexity associated with measuring such health makes this an inappropriate choice at the project level. Measurement of disease-specific mortality and morbidity requires significant expertise in order to properly classify the diseases of interest. Furthermore, large sample sizes are required to detect differences in disease outcomes between comparison groups, and these large sample sizes require complex statistical analysis. Both of these issues lead to a long follow-up period, requiring substantial funding and logistical support, and USAID does not recommend using reduction in diarrheal disease at the project level. Instead, USAID relies on national-level, population-based surveys such as Demographic and Health Surveys to indicate trends in diarrhea prevalence.

Finally, as discussed earlier, undernutrition is not always associated with diarrheal disease; thus, we may need to use linear growth rates or some other indicator of stunting to better understand the impacts of a combined WASH and nutrition program on nutrition.

Additional implementation-level indicators for handwashing can be found in Annex 8 of [UNICEF's Handwashing Promotion: Monitoring and Evaluation Module](#).

V. Examples from the Field

Programs that combine WASH and nutrition interventions have shown impressive results with respect to health impact and coverage. The programs did not compare the outcomes of independent and integrated interventions, so it is difficult to draw conclusions about the effect of integration on outcomes.

A. Bangladesh

The SHOUHARDO Project (Strengthening Household Ability to Respond to Development Opportunities) in Bangladesh, which operated from 2006–2010, included a package of interventions incorporating WASH and increased access to nutrition including Title II food rations to children ages 6–23 months as well as pregnant and lactating women. The program focused on vulnerable populations in rural areas and promoted both short- and long-term structural interventions. The program promoted essential WASH actions, such as handwashing before preparing food, latrine use, and hygiene practices, along with health education and nutrition-specific interventions, including exclusive breastfeeding in the newborn's first 6 months of life, vitamin A, and iron-folic acid supplementation. The program was able to achieve improvements to both WASH and nutrition coverage, and it reduced stunting. Over the three years (Smith et al., 2013):

- Dietary diversity score increased by 26 percent
- Vitamin A coverage increased
- Access to safe water increased from 57 to 72 percent
- Access to improved sanitation increased from 14 to 55 percent
- Mothers washing their hands before food preparation increased from 60 to 94 percent
- Stunting decreased from 56 to 40 percent in the 6–24 month age group
- None of the children experienced increases in stunting during the 0–5 year age group

The evaluation showed that women's empowerment interventions had a strong independent impact on stunting.

B. Peru

The Good Start Program conducted from 1999–2004 (based on participatory community-based program integrating WASH, nutrition, and early child development) in the Andean Highlands of Peru combined capacity building and community participation. Primary interventions included prenatal visits, nutrition during pregnancy, husband support of breastfeeding, infant and young child feeding, consuming iodized salt, vitamin A and iron supplementation, promotion of immunization, handwashing, adequate disposal of the child's excreta, locating domestic animals outside the household area, and early child stimulation. Over the four year program:

- Stunting decreased from 54 to 37 percent
- Anemia prevalence dropped from 76 to 52 percent
- Low serum retinol, an indication of vitamin A status, dropped from 30 to 5 percent

C. Ethiopia

The Legambo Child Caring Practices Project (2004 to 2006) was carried out in a food insecure area in South Wollo Zone, Amhara Region, Ethiopia. Villages were selected to receive an intervention that emphasized one of the following: health (free essential drugs and micronutrients and health education); nutrition (education messages, community gardens, prevention and treatment of diarrhea, and immunization); WASH (hygiene messages and construction of pit latrines and clean water sources); all three options; or no interventions. All households benefited from the Productive

Safety Net Program for food-insecure households, based on cash or grain transfers upon verifiable behavior change, therapeutic feeding for malnourished children, a general food ration, and community-based health care. Target beneficiaries included pregnant women and mothers who had children under age 3. Results showed:

- The WASH group was the only one to show reduced stunting (10.1 percent below baseline)
- All groups showed improved knowledge of the causes of diarrhea
- The sample sizes were likely too small to detect medium-term effects in stunting
- Lack of randomization may have affected the conclusions

References

- Black R.E., Victora C.G., Walker S.P., Bhutta Z.A., Christian P., de Onis M et al. Maternal and Child Undernutrition and Overweight in Low-income and Middle-income countries. *The Lancet* 2013; 382(9890); 427-451. DOI:10.1016/S0140-6736(13)60937-X.
- Cairncross S., Hunt C., Boisson S., Bostoen K., Curtis V, Fung I.C.H., Schmidt W.P. Water, Sanitation and Hygiene for the Prevention of Diarrhoea. *J of Epidemiology* 2010; 39:i193-i205.
- CHERG, 2013, ChildInfo: Child Survival and Health. http://www.childinfo.org/mortality_underfive.php
- Cumming O., London School of Tropical Medicine and Hygiene, Personal Communication. 2013.
- Dangour A.D., Watson L., Cumming O., Boisson S., Velleman Y., Cavill S., Allen E., and Uauy R.. Interventions to Improve Water Quality and Supply, Sanitation and Hygiene Practices, and Their Effects on the Nutritional Status of Children. *Editorial Group: Cochrane Public Health Group* 5 Oct 2011. DOI: 10.1002/14651858.CD009382.
- Groopmann J.D. and Kensler T.W. *CRC Critical Reviews in Toxicology*. 1999; Chapter 19, p. 113-124.
- Korpe P.S. and Petri W.A. Environmental Enteropathy: Critical Implications of a Poorly Understood Condition. *Trends Mol Med*. Jun 2012; 18(6): 328–336.
- Lin A., Arnold B.F., Afreen S., Goto R., Huda T.M., Haque R. et al. Household Environmental Conditions Are Associated with Enteropathy and Impaired Growth in Rural Bangladesh. *Am. J. Trop. Med. Hyg.* 2013; 89 (1): 130-137. DOI 10.4269/ajtmh.12-0629
- Luby S.P., Halder A.K., Huda T, Unicomb L., and Johnston R.B. The Effect of Handwashing at Recommended Times with Water Alone and with Soap on Child Diarrhea in Rural Bangladesh: An Observational Study. *PLOS Medicine* 2011; 8(6):e1001052. DOI: 10.1371/journal.pmed.1001052
- Ngure F.M., Humphrey J.H., Mbuya M.N.N., Majo F, Mutasaet K., Govha M. et al. Formative Research on Hygiene Behaviors and Geophagy among Infants and Young Children and Implications of Exposure to Fecal Bacteria. *Am. J. Trop. Med. Hyg.* 2013; 89(4):709–716. DOI:10.4269/ajtmh.12-0568
- Prendergast A. and Kelly P. Review: Enteropathies in the Developing World: Neglected Effects on Global Health. *Am. J. Trop. Med. Hyg.* 2012; 86(5):756–763 DOI:10.4269/ajtmh.11-0743
- Pruss-Ustun A., Bartram J., Clasen T, Colford J.M., Cumming O., Curtis V. et al. Burden of Disease from Inadequate Water, Sanitation, and Hygiene in Low- and Middle-Income Settings: a Retrospective Analysis of Data from 145 countries. *Trop. Med. Intl. Health*, in press.
- Smith L.C., Khan F, Frankenberger T.R. and Wadud A.K.M.A.. Admissible Evidence in the Court of Development Evaluation? The Impact of CARE's SHOUHARDO Project on Child Stunting in Bangladesh. *World Development* 2013; 41: 196-216. <http://dx.doi.org/10.1016/j.worlddev.2012.06.018>
- Spears D. How Much International Variation in Child Height Can Sanitation Explain? Policy Research Working Paper 6351. World Bank. 2013.
- Strosnider H., Azziz-Baumgartner E., Banziger M., Bhat R.V, Breiman R., Brune M.N. et al. Workgroup Report: Public Health Strategies for Reducing Aflatoxin Exposure in Developing Countries. *Environ Health Perspect.* 2006; 114(12): 1898–1903. DOI: 10.1289/ehp.9302
- Wild C.P. Aflatoxin Exposure in Developing Countries: the Critical Interface of Agriculture and Health. *Food Nutr Bull.* 2007; 28(2 Suppl): S372-80.

Additional Resources

The following resources are references to find additional information about WASH and nutrition. Where information differs, the USAID Evaluation Policy and the USAID ADS (Automated Directives System) 200 series take precedence over that in other resources.

[WASHplus](#)
[Multi-Sectoral Nutrition Strategy](#)

[Improving Nutrition Outcomes with Better Water, Sanitation and Hygiene: Practical Solutions for Policies and Programmes](#)
[USAID Water and Development Strategy](#)
[USAID Water and Development Strategy Implementation Field Guide](#)
[USAID Water and Development Strategy Webinar focused on WASH-Nutrition](#)

This implementation 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 3, 2015).