Chapter 1
A Systems Approach for Sustainably Reducing Childhood Diarrheal Deaths in Developing Countries

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ABSTRACT

Diarrhea is the second leading cause of death and is the major cause of malnutrition in children under age 5 worldwide. More than 50 percent of the cases occur in developing countries, particularly in sub-Saharan Africa and Southeast Asia. Open defecation, substandard fecal disposal systems, and contaminated water supplies are the typical causes of diarrheal diseases. This public health crisis in low income countries mirrors the experiences of today’s industrialized nations two centuries ago. The lessons learned from their sanitary evolution can be instructive in charting a sustainable path towards saving the lives of almost 2 million children annually. In this chapter a case study of Cuba’s sanitary reformation is also presented to showcase successes, similar to those of developed countries, within a developing country and economically challenging context.

INTRODUCTION

Diarrhea is the second leading cause of death and the major cause of malnutrition in children under age 5 (World Health Organization (WHO), 2013b). Of the more than 1.5 million childhood deaths due to diarrhea each year, over 50 percent of all cases occur in developing countries, particularly in sub-Saharan Africa and Southeast Asia (Walker et al., 2013). Diarrhea is usually a symptom of an infection of the intestinal tract and presents as the passage of three or more loose or watery stool at least three times per day or more frequently than normal for an individual (WHO, 2013b). The most common etiologic agents, namely bacteria, viruses and protozoa, are primarily transmitted via the fecal-oral route (Tinuade et al., 2006). This means that most diarrheal pathogens are transmitted from the feces of an individual to his/her and/or the mouth of another. The underlying

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assumption is: an individual must be exposed to or come in contact with the causative agent(s) to become infected and thus acquire the disease. This also implies that if the disease agents are removed or prevented from the environment of the at risk population, members will not become exposed and consequently develop the disease. Open defecation, substandard sanitation systems and subsequent pollution of nearby drinking water sources are usually implicated in disease causation (United Nations (UN), 2014). This is because fecal matter and its environmental repositories contain most common diarrheal etiologic agents. Thus, sanitation interventions such as latrines and, providing clean water and washing hands facilities, interrupt the fecal-oral transmission pathways. They are therefore effective in preventing and reducing diarrheal incidence, associated morbidity and mortality as well as subsequent sequelae such as malnutrition. For example, research has shown that access to improved system of feces disposal may reduce the rate of childhood diarrhea by up to 43 percent (Cumming, 2009; WHO, 2013a).

In general diarrhea is, a very common, easily preventable and treatable disease, considered to be no more than a nuisance in most cases. In fact, there are about 1.7 billion incidence of diarrhea each year in both developed and developing countries (WHO, 2013b). However, developing countries are characterized by more adverse morbidity (persistent and reoccurring episodes) and higher mortality (death) health outcomes. For example, in developed countries the average disease incidence range from 1-3 episodes per person per year compared to 5-18 per person per year in developing countries (Guerrant, Hughes, Lima, & Crane, 1991). Rotavirus, which is a common cause of diarrhea in children under age 5 in the United States (US) causes about 300 deaths annually compared to over 220,000 actual hospitalizations (Pont, Grijalva, Griffin, Scott, & Cooper, 2009). In contrast, Rotavirus-induced diarrhea can be a death sentence for children in poor countries. For example, in 2008, the number of Rotavirus associated diarrheal deaths in some sub-Saharan African countries included, Angola (8,788), Uganda (10,637), Ethiopia (28,218), DR Congo (32, 653) and Nigeria (41,057) (Tate et al., 2012). The implication of this is, sadly, every 20 second a child, particularly in a low income country, dies of this relatively innocuous disease for which vaccine exits, is therefore preventable and for which treatment exists (Onda, Crocker, Kayser, & Bartram, 2014; UN, 2014). The World Health Organization (WHO) reports that children in sub-Saharan Africa are thus 16 times more likely to die before age 5 than children in developed regions and over half of these deaths could have been prevented by simple and affordable water and sanitation interventions (WHO, 2013a).

When one considers these somber numbers, it begs the question, is every life on this planet of equal value? In addition, should a child be condemned to unnecessary morbidity, misery and inevitable death, simply on the basis of a lottery of birth? This flies in the face of environmental justice, which demands that no one group should disproportionately bear the burden of adverse health outcomes from environmental hazards while not being able to enjoy the benefits available to other groups simply on the basis of geography and income. The solutions for sustainably providing and implementing clean water and improved sanitation and, reducing childhood diarrheal deaths exist, they are affordable and history has provided precedence that they work. What is left is the focused economic, social and political will of the international community and the affected countries to employ them. In other words, these large scale community health challenges are best tackled by employing a systems approach.
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