# Sanitation in Nepal: Links to Nutrition and Research Priorities

Patrick Webb
Jerry Shively
Prajula Mulmi

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Tufts University
Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy
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## The Problem[1]

Globally, approximately 2.4 billion people do not have access to improved sanitation facilities, while 1.1 billion of those people practice open defecation (WHO 2012a; JMP 2012). Open defecation contributes substantially to the insanitary environment in which too many children grow up. About 2 million people die every year due to diarrheal diseases; most of them are children less than 5 years of age. Indeed, diarrhea is the second leading cause of death globally among children under 5, killing more young children than HIV/AIDS, malaria and measles combined. As a result, the sanitary disposal of excreta, and introduction of sound hygiene behaviors are seen to be "of capital importance to reduce the burden of disease." (WHO 2012a)

In Nepal, diarrhea and other morbidity conditions related to poor sanitation and hygiene continue to be major causes of childhood illness and death. The 2006 NDHS reported that 12% of children under 5 suffer from diarrhea (with 5% dying), while the 2011 NDHS suggested that conditions have not substantially improved, with 14% of children having had diarrhea in the 2 weeks preceding the survey (MOHP 2011). Indeed, as of 2010, roughly 40% of Nepal's rural households use a bush or open fields for defecation–down from 50% half a decade ago, but still a huge problem (MOHP 2011).

## The Role of Sanitation in Nutrition

According to the World Health Organization, "malnutrition in all its forms increases the risk of disease and early death [and] nutritional status is compromised where people are exposed to high levels of infection due to unsafe and insufficient…inadequate sanitation." (WHO 2012b) Diarrhea is not the only pathway through which poor sanitation impacts nutritional status, but it is one of the most important mediators. Individuals suffering from diarrhea cannot fully benefit fully from nutrients consumed due to inadequate absorption and losses through stools (and fevers impairing appetite), as well as dehydration. At the same time, undernourished children are more susceptible to, and less able to recover from, infectious diseases like diarrheal diseases.

Figure 1 demonstrates this multidirectional feedback, where inadequate intake of nutrients interacts with disease, and both contribute as 'immediate causes' of various compromised nutrition outcomes. At the same time, the importance of sanitation is highlighted as one of the 'underlying causes' as part of the box entitled 'unhealthy household environment.' In other words, addressing both chronic and acute nutrition problems requires not only improved access to a quality diet (nutrients into the body) but also reduced exposure to disease (nutrients lost to the body), and enhanced care and behavior of those most at nutritional risk (namely, mothers and young children).

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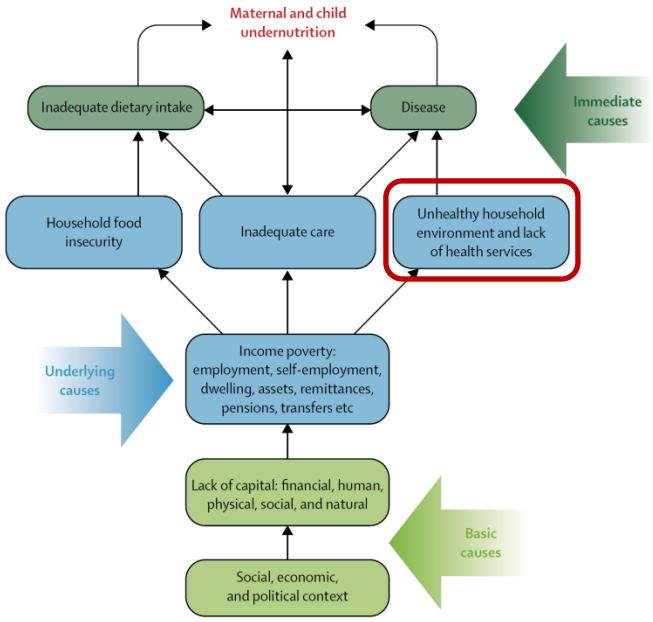



Figure 1. **Conceptual Framework of the Determinants of Undernutrition**. Source: Adapted from Black et al. (2008)

The inverse relationship between lack of appropriate sanitation and exposure to diarrheal diseases in Nepal is illustrated by Figure 2. Districts with poor sanitation (and higher rates of open defecation) tend to have higher than average rates of diarrhea, and these are more often than not the same districts recording slower improvements in nutrition outcomes (that is, higher prevalence rates of wasting and/or stunting in children under 5).

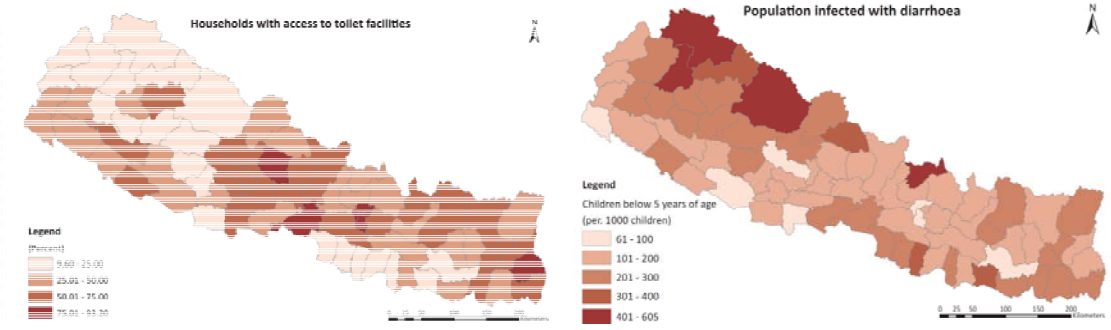



Figure 2. **Maps of Sanitation Insufficiency and Diarrhea in Nepal**
Source: Reproduced with permission of World Food Programme (2010)

## Evidence-Based Action to Improve Sanitation

Nepal's commitment to improved access to water and sanitation is strong. Public spending (from funds obtained through domestic taxes and external transfers) on sanitation and drinking water stood at 0.8% of Gross Domestic Product in 2010–the same level as Thailand and considerably higher than Pakistan or Bangladesh (GLAS 2012). Nepal was one of the first countries in South Asia to include zinc in the treatment protocol of diarrhea along with ORS and oral rehydration therapy (Wang et al. 2011).

Looking forward, at the second High Level Meeting (HLM) of the Sanitation and Water for All (SWA) Partnership (held in Washington DC on April 20, 2012), government ministers and donors agreed to a set of concrete commitments addressing barriers to effective delivery of sustainable sanitation facilities. Nepal was one of 13 developing countries present that committed to scaling-up "community approaches to total sanitation," including Community-Led Total Sanitation (CLTS), and the government agreed to develop a Sector Wide Approach (SWAp) for sanitation to ensure that each district across the country establishes a District Sanitation & Hygiene Fund (SWA 2012). Furthermore, the Multi-Sectoral Nutrition Plan (MNSP) notes that the government of Nepal seeks to achieve "100% access to sanitation facilities by 2017" and that a new approach called "Community-Led Total Behaviour Change in Hygiene and Sanitation" (CLTBCHS) would be applied to help this happen. This community-based approach focuses on changing 5 key behaviors: (i) hand washing with cleaning agent; (ii) safe disposal of feces; (iii) safe handling and treatment of drinking water; (iv) bathing, clothes washing, teeth brushing; and (v) waste management (GON/NPC 2012).

That said, while these 5 behaviors are widely accepted as critical to successful universalization of sanitation at the community level, understanding how to make them happen is less widely understood. The WHO and others have suggested that answering the question "What works to effectively extend and sustain [hygiene and sanitation provision]?" is becoming ever more difficult with the rapidly changing financial, political and physical environment." (GLAAS 2012) Thus, while national commitment to scaling up community activity is appropriate, the call for evidence-based action in this domain, like others, raises questions about the evidence available for cost-effective action in Nepal, including the measurable impact of CLTS.

## What is Known about Community-Led Total Sanitation in Nepal?

According to Chambers (2009), Community-Led Total Sanitation and its still-evolving variants are "widely and correctly recognized as a revolutionary participatory approach to rural sanitation." CLTS is an approach aimed at facilitating rural communities to: a) conduct their own appraisal of sanitation problems; b) derive their own conclusions; and c) promote community-wide action. This approach is pursued in contrast to conventional government investment approaches which are sometimes characterized as instructing (rather than facilitating), subsidizing engineering-based solutions (rather than promoting behavior change), and using numbers of latrines constructed as a metric of success (rather than numbers of people adopting innovations in their practices).

Originating in Bangladesh in the late 1990s, CLTS was introduced to Nepal in 2004, and has been implemented in 38 communities distributed across 5 districts, as well as a few experiments in School-Led Total Sanitation. So far, 19 of the communities have been declared open defecation free (ODF) and the others are moving towards such a designation (ODF status depends on the community meeting at least 12 key conditions defined in Box 1). Theoretically, ODF is an absolute status representing zero presence of exposed feces exposed anywhere in a community, but as Chambers (2009) points out, "ODF statistics must be taken for what they are–claims and certifications of progress," as opposed to firm, verifiable metrics of improved conditions and related outcomes. Indeed, although more than 20 developing countries have adopted CLTS as a practice designed to scale up good sanitation, very few of these have been able to demonstrate significant progress (fewer than a handful, according to Chambers 2009). A review by Mehta (2008) of evidence of CLTS impact in India and Indonesia, finding plenty of evidence of sustained behaviors, but little evidence based on empirical verification, certification and counting.

1. All households use hygienic latrines
2. Latrines are kept clean
3. Hands are washed with cleaning agent at critical times
4. Food kept covered
5. Drinking water kept covered
6. Household environment kept covered
7. Footwear worn in the latrine
8. Water sources kept clean
9. Roads and paths kept clean
10. Waste (including fecal matter) is disposed of appropriately
11. Personal hygiene kept up
12. Waste water reused appropriately (i.e. for gardens)

**Box 1: Indicators for determining Open Defecation Free status**
Source: NEWAH 2007.

Knowledge of the impact of CLTS in Nepal is equally weak. A review of CLTS activities commissioned by NEWAH in 2007 did document that many latrines had been constructed in implementation communities (without financial subsidies), and that 94% of them were clean (CETS 2007). Additionally, handwashing practices had improved, and understanding of the importance of sanitation and hygiene were much improved in a very short period of time, at low cost. The reviewers documented an average household cost of implementing (their own) CLTS as roughly NRs. 1,700, compared with more than NRs. 2,600 for sanitation activities in non-CLTS project. In terms of outcomes, it was reported that "there was drastic reduction in the intensity of [self-reported] diseases like diarrhea, dysentery, skin diseases, and fever due to CLTS project." (CETS 2007)

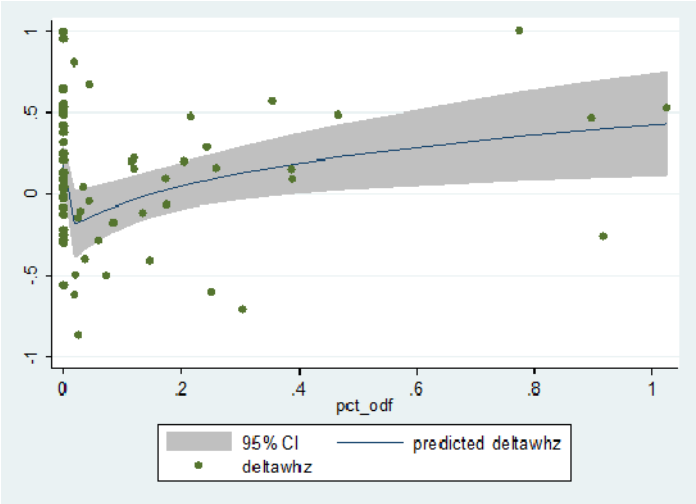
But can improvements (if confirmed empirically) be "due to" the implementation of CLTS? We don't know. As Chambers makes clear, "anecdotal evidence is so widespread, and seems such commonsense, that it is easy to believe. However, caution is in order. […] At best, the findings

are suggestive, and an invitation for further research." Is there any evidence that sanitation has improved, or that there is less diarrhea and undernutrition in districts where the CLTS activities have been implemented compared with other parts of those regions or Nepal as a whole?

At this point in time, there is insufficient quality of data to be able to answer such questions fully. The individual (still small-scale) CLTS interventions have not yet invested heavily in empirical data collection (baseline, end-line, counter-factual), meaning that program-specific evidence of impact is not available for Nepal. An alternative would be to go above the program level and consider changes at VDC level for those in which CLTS has been implemented compared with those where it has not. For example, one can take data from the Demographic and Health Surveys (DHS) for 2006 and 2011 to identify VDCs that have been declared open-defecation free (at any point between 2005 and 2010) versus all those that have not.[2] If one could identify greater change in key outcomes between 2006 and 2011 in ODF-declared locations then in the rest of the country this could at least be suggestive (albeit not confirmative) that CLTS impacts are measurable.

Figure 3 shows a non-parametric analysis of the *change* in Z score between 2006 and 2011 by percent of each district in the country (N=75) that has been declared ODF against weight-for-height of children under 5 years old (stunting). It suggests that the share of a district that is declared ODF is associated with a small, but significant improvement in change in nutrition outcomes. This should be seen as preliminary since the small positive outcomes are strongly driven by just 3 district-level positive deviants in the right hand upper quadrant of the graphic. What is more, one cannot claim that any direction of causality; that is, nutrition improvements at district level could be driven by investments outside of CLTS, which in itself may have raised awareness and led to ODF as an outcome rather than a driver of change. That said, this macro approach to analysis offers some promise to shed light on a data-scarce domain.

**Figure 3: Change in child wasting (2006-2011) by share of district declared ODF**




[2] This makes no assumption that ALL households in an ODF VDC are in fact ODF—simply that a commitment was made and recognized in certain VDCs to enhance local sanitation facilities and hygienic practices.

Similarly, Figures 4 and 5 show absolute differences between districts by share of ODF VDCs, with separate lines for 2006 and 2011, first for stunting outcomes (height-for-age), and then for wasting (weight-for-height). There are many zeros down the left-hand axis given that most districts in Nepal are still not declared ODF. Once again, the fitted lines suggest that there are benefits for a district in improved nutrition outcomes to having a higher share of its administrative area declared ODF—particularly in relation to wasting (which would be expected given the strong link often drawn between lack of sanitation, disease, diarrhea and wasting).

**Figure 4: Child stunting in 2006 and 2011 by share of district declared ODF**

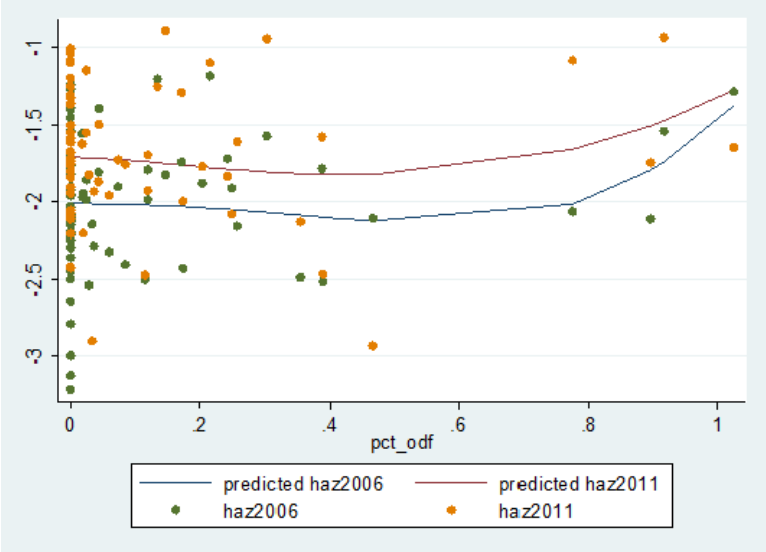
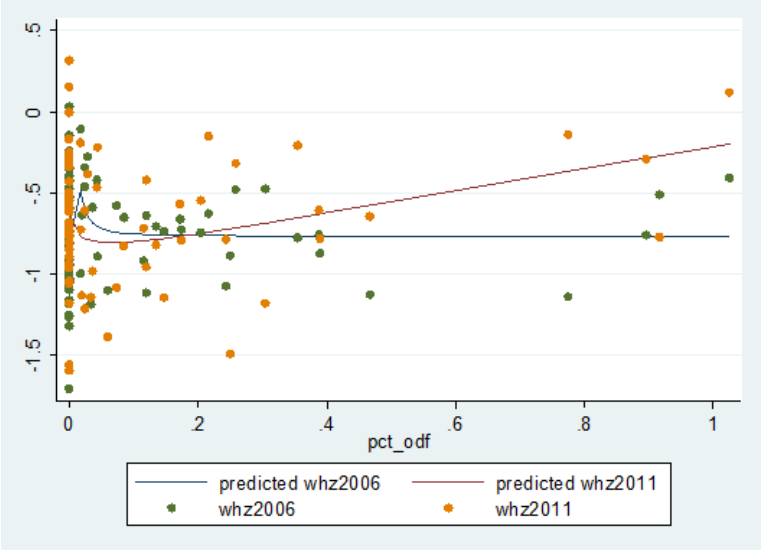



**Figure 5: Child stunting in 2006 and 2011 by share of district declared ODF**




That said, there is high variance; the positive correlation is driven by less than a handful of units of observation toward the right-hand side of the graphics, and while positive, the correlations are weak. In other words, one cannot read too much into these preliminary analyses, but further analysis is definitely warranted.

## Conclusions

CLTS in Nepal has only been implemented at a pilot scale. Not only has it been implemented in a small number of districts, but in each district it has not been implemented universally (that is, only in selected clusters of communities per district—what CETS (2007) called an "island" of success—but too few to impact district level outcome data). Similarly, there are additional factors requiring attention when seeking to achieve desired human outcomes (rather than just behaviors or investments). Diarrhea is associated not only with poor sanitation, but also with quality of the water supply, presence and use of oral rehydration therapy, seasonality of diseases, diet quality, and more. And negative deviants are not identified; the few who do not in fact adopt CLTS practices, meaning that their 'old' behaviors potentially threaten gains made by everyone else.

As a result, little is known empirically about: a) rates of change that can be expected when scaling up such interventions; b) if there are additional replicable approaches to behavior change that are embraced by all individuals in a community, not just by some individuals; c) how much measurable impact on disease prevalence (i.e. diarrhea) can be attributed to such interventions (versus other forms of intervention); and d) how much impact on nutrition outcomes can be expected. Responses to each of these questions are a priority requirement for policymakers seeking to determine the most appropriate investment allocations among possible interventions for sanitation.

While encouraging progress has been made in enabling developing-country populations to access and use enhanced sanitation facilities, it is unlikely that the world will meet the MDG sanitation target by 2015. Globally, 63% of the population use improved sanitation facilities, an increase of almost 1.8 billion people since 1990—but another billion people continue to defecate in the open, which contributes significantly to the global burden of disease (UNICEF and WHO 2012). It therefore makes policy sense to prioritize improvements in sanitation both for its own sake, and as one of the paths towards accelerating reductions in undernutrition. The benefit-cost ratios of interventions to attain universal access of improved sanitation across South Asia have been estimated at 4.6 (as of 2010)—higher than the 2.8 ratio for sub-Saharan Africa (Hutton 2012).

However, empirical evidence of the costs of improving sanitation in the remoter (lower-population density) parts of Nepal remains limited, and knowledge of the opportunity costs of household participation in community-based approaches (and household material investments in sanitation facilities) also remains scarce. Nepal's government and non-governmental professionals have laid out appropriate targets and plans for attaining universal sanitation, but the steps to be taken will falter without empirical evidence of what works in what context.

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