# Rapid prototyping a school-based health program in the developing world

David I. Levine[a], William Riggs[b,*], Kelsey Steffen[b]

[a] University of California, Berkeley, United States
[b] Cal Poly, San Luis Obispo, United states

## ARTICLE INFO

## ABSTRACT

Basic sanitation and hygiene can prevent roughly a million deaths a year. This study examines the rapid prototyping of a pilot school-based handwashing, safe water, and sanitation program in Chennai, India. Our content analysis identified challenges in the classroom (Localization; Curriculum supplies; Program implementation; Communication and language; and Teacher commitment), factors outside the class but within the school (School administration and support and Hygiene and sanitation facilities and supplies) and factors outside the school such as family and slum conditions. We report on the pilot, the barriers it faced, and the changes we made in pursuit of a sustainable school-based health program.

Low-cost preventions such as washing hands with soap and improved sanitation can save millions of lives a year (World Health Organization, 2009; WaterAid, 2012). While standard health interventions typically provide supplies and/or information, they usually lead to only modest behavior change (Aittasalo et al., 2012).

These limitations on the impacts are to be expected: People in public U.S. restrooms do not usually wash hands after defecating, and (until recently) doctors in U.S. hospitals usually did not wash hands between patients. But in both cases, individuals are more likely to use soap if they knew someone was watching (Pittet et al., 2004; Harris and Munger, 1989; Gaby et al., 2009)—changing norms being an important complement to supplies and information. Consistent with this literature, we have created a curriculum of games, stories and vivid activities to teach about and to change norms about handwashing, safe water and sanitation. Our target audience is elementary school students (though most materials work for lower secondary students) living in poor communities. This study reports on a pilot of that school-based health, hygiene, and sanitation curriculum.

The pilot took place in five schools in Chennai, India, a city of over 4 million people. The piloting involved multiple cycles of rapid prototyping and improvement of the curriculum (Collins and Chambers 2005; Chou et al., 2013). The team tried out a variety of educational materials, revised the materials and presented them several other times in different classes and schools. Some materials went through up to 5 revisions. The pilot intervention accomplished its goals of helping improve the intervention, leading to short-run behavior change such as handwashing with soap (sometimes), and helping us understand barriers to scaling this program.

To help understand these barriers facing our curriculum, we conducted a content analysis on qualitative observations recorded during the pilot program. These observations can inform other community-and-school-based health programs. We conclude by discussing how we continued to revise the curriculum to address those barriers, continuing to use rapid prototyping, as we continue to develop a more sustainable version of the curriculum (as of 2016 under development in Tamil Nadu and New Delhi).

## 1. Literature review

Every year, large amounts of resources are spent implementing community-based health programs, yet few of them continue after the initial implementation period (Shediac-Rizkallah and Bone, 1998). The greatest challenge to the implementation of a sustainable health intervention program is behavior change (WaterAid, 2012).[1]

Behavior change is more likely to succeed when there is an understanding of what motivates, facilitates, or prohibits hygienic behavior (Curtis and Cairncross, 2003). Previous studies, have identified motivators for behavior change to include the need to protect children, the need to conform to family or group norms, comfort and convenience, pride, disgust, dignity, economics, and existing cultural beliefs. This list goes far beyond the benefits of good health as a result of improved hygienic practice (WaterAid, 2012). John Oldfield, suggests there needs to be a change in the cultural perception of sanitation practices in India, which is consistent with the results of (Bennett et al.,

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2014) that beliefs in non-pathogenic theories of disease can impede uptake of safe behaviors. People need to be motivated to preserve their dignity and avoid shame from practices such as open defecation (Bliss, 2015), particularly in settings where many people consider open defecation cleaner and at least as sanitary.

In late 2014, the Prime Minister of India, Narendra Modi launched the Clean India Campaign, pledging that every Indian household will have a toilet by 2019. Unfortunately, even when sanitation supplies, such as toilets, have been provided, many people are unwilling to use them. (Sethuraman, 2012). In a recent study of 32,000 rural households, half of the respondents believed that defecating in the open was the same or better for health than using a toilet (Bliss, 2015; Coffey et al., 2016). More generally, while the campaign has led to millions of new toilets, there is limited public attention to the health problems from lack of safe sanitation (Sethuraman, 2012) and little emphasis on maintenance or education (Gahlot, 2015). Addressing the sanitation crisis not only requires proper sanitation infrastructure, but also a societal awakening about the costs of the sanitation crisis, and the burdens the entire country bears (Bliss, 2015).

### 1.1. School-based health, hygiene, and sanitation programs

Schools are potentially well-suited for health and hygiene interventions as they are often hubs for fecal-oral diseases and are also a site where teachers can integrate health education into daily lessons and practices. Schools may also facilitate knowledge sharing among students. Schools are also ideally situated to establish new norms among students and to implement routines. It is plausible that instilling new behaviors is most effective for younger children (Aarts et al., 1997).

The benefits of school-based programs can extend beyond the students. Often in developing countries, young students are tasked with the responsibility to care for younger siblings, and can influence those siblings and possibly the entire family's hygiene practices (Ozier, 2014; WaterAid, 2012). Unfortunately, little attention is currently paid to sanitation programming in schools, despite the evidence that these programs can improve students' lives (World Health Organization, 2014).

#### 1.1.1. Facilities and supplies

Schools often lack basic facilities for safe behaviors, including water for handwashing, safe water for drinking, and enough working toilets (ideally with separate facilities for girls [Snel, 2003]). Hardware is necessary, but not sufficient, as there also must be maintenance (such as keeping toilets working, changing elements in water filters), cleaning (especially of toilets), and a steady stream of supplies. Most obviously, while some school-based programs assume soap is available (Curtis and Cairncross, 2003), many schools lack soap (Biran et al., 2009).

Educational programs also often call for educational materials to be available on the school premises. This presents additional barriers, where teachers and program implementers need to bring supplies themselves. It is also a challenge to make educational supplies inexpensive and well adapted to the local conditions (WaterAid, 2012). Without proper materials or supplies, many programs fail, especially when the initial program stops, and outside sources no longer provide and/or monitor the supplies (IRC, 2007).

#### 1.1.2. Behavior change for teachers and school administrators

Previous programs have also often encountered barriers within the school such as a lack of training for teachers, lack of educational methods that are child centered, no organization within the school to support the implementation, and a lack of student supervision (Snel, 2003). The importance of teachers has been highlighted in several studies implementing hand-washing lessons in rural India, with high teacher involvement increasing students practicing personal hygiene activities (Dongre et al., 2007).

Low support for implementation by school institutions is one of the key factors contributing to the failure of school health and hygiene programs (IRC, 2007). The lesson and activities presented in most programs are not familiar in practice to the teachers or school staff. Without sufficient support from the school to supply basic materials that reinforce the lessons, and basic hygienic practices, even the most motivated of teachers have struggled to implement programs on their own (Gachuhi, 1999; Gatawa, 1995).

Thus, most long-running programs in a school or other community environment have only done so with someone outside the community facilitating, funding, and continually evaluating the progress of the program (Minkler, 2005). Determining methods of monitoring, collecting data, and evaluating the level of sustainable change is one of the greatest challenges that face program facilitators (WaterAid, 2012). There is still very little information regarding program longevity and behavior change following the initial program implementation period (Fewtrell et al., 2005).

### 1.2. Rapid prototyping

While this list of obstacles is familiar from around the globe, addressing these barriers (and identifying new ones) requires local knowledge. Thus, we use community-based and participatory design (Corburn, 2005; Collins et al., 2005; Minkler et al., 1997; Minkler, 2000) coupled with rapid prototyping (Leung et al., 2004; Byrne and Sahay, 2007). This approach involves our team working with local teachers and students to modify our curriculum repeatedly to better suite users' needs and local conditions.

## 2. Intervention and research methods

### 2.1. The curriculum

The purpose of our pilot was to teach basic health and sanitation behaviors to children through interactive games, stories, and songs. Lessons focused on prevention of diarrheal disease by demonstrating the importance of washing hands with soap, drinking clean water, and using toilets. The intervention was based on all theories of learning and of behavior change that we thought might apply: rational decision-making, the importance of habits and routines, social relationships, and the role of vividness and reminders (Aunger et al., 2009; Ajzen, 1991; Godin and Kok, 1996; Bandura, 2004; Wakefield et al., 2010; Umberson and Montez, 2010).

The stories and games are engaging because they are based on *conflict* between pathogens and people, they focus on disgusting things like *poop* (which interests young children), and they *relate to students' lives*.

## 3. Constructing the curriculum

### 3.1. Heuristics for creating activities

To construct the curriculum, we used several heuristics: Existing materials that taught these health lessons, the core health lessons as creativity prompts, adapting existing activities to our lessons, using existing activities as creativity prompts, and "Be the germ." For each prompt and each candidate activity, we looked for ties to our several theories of behavior change. For example, we tried to increase how vivid each activity was, how closely it related to students' lives, how it promoted norms of safe behaviors, and so forth.

#### 3.1.1. Existing teaching materials that taught these health lessons

We reviewed all WASH teaching materials we could find. Sources included teaching materials from Community-led total sanitation, other NGOs such as CAWST and SODIS Foundation, books for U.S. children on handwashing (e.g., Cole, 1989) and advice on the web for parents and/or teachers (e.g., KidsHealth.org (Nemours Children's