WATER AND SANITATION PROGRAM: **WORKING PAPER**

Nudging and Habit Change for Open Defecation:
New Tactics from Behavioral Science

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Executive Summary

Open defecation (OD) remains a critical global health challenge, affecting almost 1 billion people around the world and contributing significantly to the estimated 842,000 people who die each year because of poor sanitation, hygiene practices, and unsafe water supplies (WHO, 2014).

To date, most behavior change frameworks for addressing OD have focused on relatively conscious, "reflective" drivers of behavior, including people's emotions (e.g., pride, shame), rational knowledge (e.g., of germ theory), social norms, and explicit action plans (e.g., commitments to change; see Sigler, 2014).

Using the framework popularized by Kahneman (2011), these factors can be described as **"System 2" drivers** of behavior (i.e., relatively conscious and motivational factors). It is now well established, however, that human behavior can also be heavily influenced by **"System 1" drivers** (i.e. relatively automatic, cue-driven drivers; Marteau et al., 2012; Wood & Neal, 2015). System 1 factors of particular relevance to OD include people's hygiene habits (e.g., mindlessly repeated behaviors cued by context) and "nudges" (i.e., small changes to the environment that can channel decision making and behavior in new ways, Thaler & Sunstein, 2008).

In this working paper, we draw on basic scientific findings from psychology, cognitive science, and behavioral economics to propose a framework of **8 System 1 Principles to support the initiation and maintenance of OD behavior change**. In doing so, we build from the general framework advanced in the World Bank Group's (2015) *World Development Report: Mind, Society, and Behavior*, which emphasized three core insights from behavioral science, namely that people think (a) automatically, (b) socially and (c) using mental models that channel their decision-making.

The 8 principles were developed through an iterative process involving (a) thematic coding of field research findings regarding OD, (b) identification of potential behavioral science principles matched to the themes identified in the field research, (c) consultation with 9 sanitation and hygiene experts with extensive experience in OD interventions around the world, and (d) consultation with 7 academic behavioral scientists with expertise related to each principle. The process culminated with the development of a simple summary and activation guidance for each principle.

The 8 System 1 Principles to support the initiation and maintenance of OD behavior change behavior change are as follows:

1. Ensure critical products and infrastructure are immediately and consistently physically available for the end user.
   - Example: Promote latrine construction at secondary locations (transit, markets), so that new latrine use habits are not disrupted.

2. Create or capitalize on context change to drive new behavior of toilet use.
   - Example: Capitalize on seasonal migration patterns or other events that disrupt existing behaviors – time interventions to co-occur with these shifts.

3. Piggyback on other existing behaviors and cues.
   - Example: Build community latrines that piggyback on existing established behaviors in a community (e.g., washing clothes, water gathering).

4. Strategically increase friction for the undesired behaviors and lessen it for desired ones.
   - Example: Promote pre-packaged options (e.g., "Easy Latrines" in Cambodia) that simplify the latrine construction process.

5. Support context-stable repetition for latrine use.
    - Example: Reward context-stable use of community latrines (reward repeated use at the same place and time, at least initially).

6. Embed ritualized elements in the change process.
    - Example: Integrate OD messaging into already ritualized cultural practices (e.g., "no loo, no bride" campaign in India).

7. Leverage point-of-action reminders and cues.
    - Example: Create salient cues at typical OD sites to act as reminders that these physical spaces have a new meaning (e.g., use vermillion powder to ritually cleanse the site).

8. Highlight descriptive and "localized" norms that reduce cognitive demands.
    - Example: Develop and frame incentive systems in ways that work at the level of a local group (e.g., local village or women's group), rather than individuals or entire area.

We emphasize that these 8 principles are meant to augment, not replace, approaches based on System 2 thinking. A core insight from the behavioral sciences (see Kahneman, 2011) is that human behavior is the product of both System 2 thinking (rational, motivated) and System 1 thinking (automatic, cue driven habits). Thus, the most challenging behavior change problems will invariably require a set of targeted System 1 and System 2 tactics working in unison.

Finally, as field practitioners explore folding these ideas into OD interventions, we encourage the use, where practical, of randomized control trials (RCTs), the robust measurement of outcome data, and the sharing of successes and failures alike. In particular, we encourage the sharing of new ways to translate, tailor, and "bring to life" these basic science principles as makes sense in specific environments, cultures and sub-populations.

Foreword

Rich and poor alike, people sometimes act in ways that undermine their own health and well-being. After all, humans are creatures of habit, and many of our daily actions run on auto-pilot with limited conscious thought.

Until recently, this aspect of human behavior, often called "System 1 thinking," was largely off-limits for development practitioners. We simply knew too little about the cognitive biases and mechanisms that govern System 1 thinking and we lacked practical tools for applying them to real-world development challenges.

Fortunately, that is beginning to change.

In 2015, the World Development Report: Mind, Society and Behavior, summarized a wide range of new scientific findings on ways to "nudge" and trigger positive behavior change by leveraging automatic thinking, social influence, and mental models. As the WDR showed, these approaches show high potential in shifting behaviors as diverse as corruption, parental caregiving practices, household savings, and conservation, among many others.

In that spirit, Nudging and Habit Change for Open Defecation could not be more timely and valuable. This Working Paper tackles one of our most pressing sanitation challenges—and one that has proven especially resistant to traditional, rational tactics such as information-based interventions. By carefully marrying academic findings from behavioral science with field-based insights from sanitation experts, the report creates a powerful blueprint for new intervention tactics that are evidence-based yet practical. I look forward to seeing how the eight System 1 principles described in the following pages inspire new progress in creating and maintaining change in open defecation practices.

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I. Introduction

Global Persistence of Open Defecation (OD)

Approximately 2.4 billion people around the world lack access to improved sanitation facilities and just under 1 billion people engage in open defecation (OD; WHO/UNICEF 2015). Poor sanitation, in turn, drives a range of diseases, including diarrhea, trachoma, and soil-transmitted helminth infections (Pruss-Unstun et. al 2008). Diarrhea alone has a devastating impact on child morbidity and mortality, especially in low-income settings; it accounts for approximately 800,000 deaths of children under 5 years of age each year (Liu et al., 2012). Although the challenges associated with OD are global in nature, they are especially prevalent in India, which accounts for roughly two-thirds of the global OD population and one-third of those without improved sanitation facilities (WHO/UNICEF 2015).

In 2000, The United Nations Millennium Development Goals (MDGs) established a target of halving the global population that lacks access to safe water and improved sanitation. Between 1990 and 2015, approximately 2 billion people gained access to improved sanitation, but OD practices have proven especially difficult to change (Millennium Development Report, 2014). The sanitation component of the MDG is currently expected to fall short by at least 500 million people (WHO, UNICEF 2014).

Current Behavior Change Strategies for OD

The persistence of OD is complex and multi-determined, encompassing a mix of supply-side issues (e.g., access to latrines, affordable building materials) and demand-side, or "user-centered," issues (e.g., cultural and religious beliefs, relative convenience and affordability of OD; for a recent review, see O'Connell, 2014).

To date, most of the demand-side interventions and frameworks for OD have emphasized relatively **conscious, "reflective" drivers of behavior change**, including people's emotions (e.g., pride, shame), their rational knowledge (e.g., awareness of germ/fecal matter transmission), social norms, and explicit action plans (Sigler et al., 2014). Popularized by Kahneman (2011), these factors are often described as **"System 2" drivers** of behavior (i.e., relatively conscious and motivational factors).

As an example of a primarily System 2 approach to OD, Community-Led Total Sanitation (CLTS) interventions engage the community in a process of conscious self-realization that leverages shame, pride, and concrete action planning to move people towards OD free (ODF) status (Sigler, 2014). Similarly, the SaniFOAM behavior change framework (Devine, 2009) focuses primarily on identifying factors related to opportunity, ability and motivation that influence sanitation behaviors such as OD. These can be regarded as principally, although not exclusively, System 2 strategies.

These approaches have achieved some marked success and they incorporate the very best tactics currently known to promote OD change. However, even with these tools, many attempts to alter OD in the field still fail, or achieve only short-term success that does not "stick" or maintain over time (see Sigler, 2015).

In this report, we propose that further advances can be made by incorporating new insights about the role that **habits, nudges and other "System 1" drivers** (i.e., relatively automatic and non-conscious factors) play in supporting and sustaining behavior change (Marteau et al., 2012; Thaler & Sunstein, 2008; Wood & Neal 2015). In doing so, we build from the general framework advanced in the World Bank Group's World Development Report (WDR, 2015), which emphasized three core insights from behavioral science, namely that people think (a) automatically, (b) socially and (c) using mental models that channel their decision making.

In the following pages **we propose 8 high potential System 1 Principles** to support the initiation and maintenance of OD behavior change. In brief, these principles were generated through a multi-stage process beginning with a review of qualitative and quantitative research findings from the OD field literature. We then mapped recurring themes from the field literature to evidence-based behavior change

tactics from behavioral science, including social psychology, behavioral economics, and cognitive science. The principles were then vetted, refined, and given executional detail through structured interviews with a team of 7 academic experts and 8 sanitation and hygiene experts. Our process is described in more detail in the Methodology section below.

In the following pages, we provide a brief overview of System 1 versus reflective System 2 thinking, focusing on habit change and nudging. We then describe each of the 8 System 1 Principles, including the supporting basic science and examples of successful applications in real world settings. We also unpack the ways these principles (a) map to consistent patterns seen in OD behavior around the world, (b) inspire specific new OD intervention tactics, and (c) can be folded into existing program activities commonly used in OD behavior change.

A BRIEF PRIMER ON HABITS AND NUDGES: SYSTEM 1 TACTICS FOR BEHAVIOR CHANGE

In recent decades, great advances have been made in the scientific study of behavior change. One key innovation has been the discovery that many factors can significantly impact people's behavior, yet bypass their conscious decision-making, attitudes, goals, and awareness (e.g., Ariely, 2009; Thaler & Sunstein, 2008; Wood & Neal 2007; WDR, 2015).

BOX 1: HABITS AND NUDGES

- **Habits** Frequent, learned behavioral responses that are cued automatically by context cues, such as physical settings and preceding actions in a sequence (e.g., morning bathing sequence, food preparation habits, daily travel.

- **Nudges** Environmental cues that signal a desired response from the end user or channel their decision making (e.g., placing fruit at eye level to encourage consumption, changing defaults so that people have to deliberately opt-out of healthy behaviors).

These processes are actively studied in multiple academic fields, including social psychology (e.g., Kahneman, 2011; Wood & Neal, 2007), behavioral economics (e.g., Thaler & Sunstein, 2008), cognitive neuroscience (e.g., Marteau et al., 2012) and health psychology (Rothman et al., in press). Each of these disciplines has its own nuances and terminology, but all of them emphasize that drivers of human behavior can be grouped into:

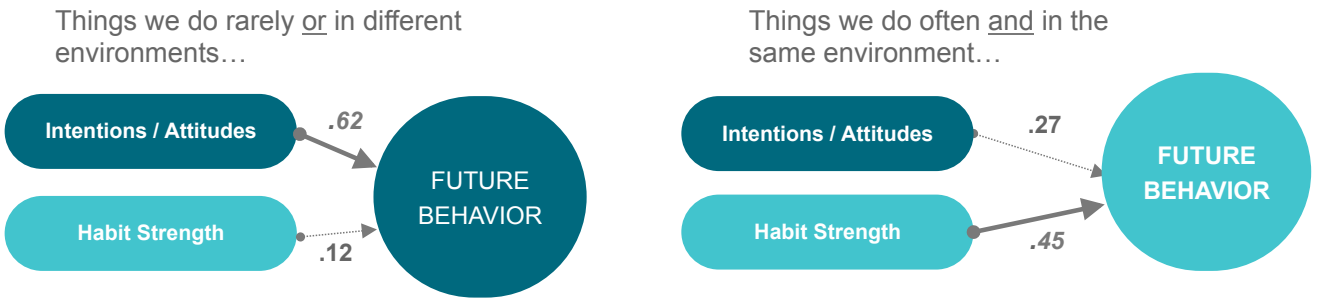
- A more conscious, goal-directed system that uses decision-making to direct behavior towards emotionally and motivationally valued outcomes. **This system is called System 2.**

- A more automatic, cue-driven system that uses familiar behavior patterns, signals from the environment, and simple decision rules (e.g., heuristics) to guide behavior. **This system is called System 1**.

Most of the time, these two systems work together harmoniously and efficiently (Kahneman, 2011). System 2 allows us to consciously monitor and carefully establish new behaviors, and ensures that these new behaviors meet our goals. Once a stable behavioral pattern is set up and repeated, we spontaneously engage System 1, which allows us to redirect our limited attention, willpower, and goal setting elsewhere.

Sometimes, however, System 1 and System 2 come into conflict and push behavior in different directions. This phenomenon is powerfully illustrated by behavior prediction studies. Typically, these studies focus on a specific behavior (e.g., seat belt use) and measure the strength of relevant System 2 factors (e.g., people's goals/intentions to wear a seat belt) and the strength of relevant System 1 drivers (i.e., their habits of wearing/not wearing a belt). The critical question then becomes: which system is the biggest predictor of what people actually do in the future? In a meta-analysis of many such studies, Ouellette and Wood (1998) found the striking pattern depicted in Box 2.

BOX 2: IMPACT OF HABITS VS. INTENTIONS ON FUTURE BEHAVIOR



Box 2. Behavior prediction pattern reported in Ouellette and Wood's (1998) meta-analysis. Numbers reflect correlation coefficients (r values). Habit strength reflects the frequency and context stability of the behavior in past performance. Intentions/attitudes reflect people's stated preferences about what they wish to do in the future.

Critically, for behaviors that people perform infrequently or in different settings, System 2 drivers, such as attitudes and intentions, are stronger predictors of their future behavior. However, behaviors that are performed frequently in the same setting are better predicted by habit strength, which belongs to System 1. This is because System 2 loses its influence for behaviors that people have performed frequently and in the same setting and way each time.

As we explain next, these insights set the stage for a deeper understanding of how System 1 can derail current intervention efforts to stop OD, and opportunities that exist to turn System 1 from a liability to an asset in OD behavior change.

HOW CAN SYSTEM 1 DERAIL BEHAVIORAL INTERVENTIONS?

As practitioners and researchers know, it is difficult to get people to change their behavior (Webb & Sheeran, 2006), and even more difficult to maintain that change over time (Volpp et al., 2008). Unsuccessful interventions can generally be classed into those that **fail to disrupt** behavior at all (i.e., they achieve no measurable behavior change) and those that initially change behavior but the changes **fail to stick** (i.e., initial behavior change gives way to "relapse").

System 1 can play a strong role in both of these types of failures. As we saw above, when people frequently repeat a behavior in the same setting (e.g., defecation outside) and/or in the same action sequence (e.g., wake up, then walk, then defecate), control of the behaviors generally will have shifted away from System 2 to System 1. For this reason, interventions that focus primarily on System 2 may often have limited behavioral impact. The intervention will fail to disrupt because System 1 is in charge of the behaviors and the intervention is targeting the wrong system. Demonstrating this, Webb and Sheeran's (2006) meta-analysis of 47 studies found that interventions targeting intentions are generally effective at changing behaviors that people perform infrequently (e.g., blood donation) but are generally ineffective at changing habits (e.g., seat belt use).

System 1 can also cause relapse—or stickiness failures—for interventions that initially succeed in changing behavior. Oftentimes, an intervention will temporarily change people's behavior, but this change does not last and people shortly return to their old behavior (Volpp et al., 2008). Why does this happen? Learning and memory research shows that System 1 habits, even when changed, tend not to be forgotten. Instead, they become dormant in people's memory and can be revived relatively easily even after significant time has passed (Bouton, 2000). Thus, people's short-term successes at changing their behavior can fail to stick because habits re-exert themselves over time, causing relapse to old ways of acting (Tobias, 2009). This does not mean that old habits never die. However, they are remarkably resilient and can re-emerge rapidly when cues associated with those habits are present.

A WAY FORWARD: AUGMENTING OD INTERVENTIONS WITH NUDGES AND HABIT CHANGE TACTICS

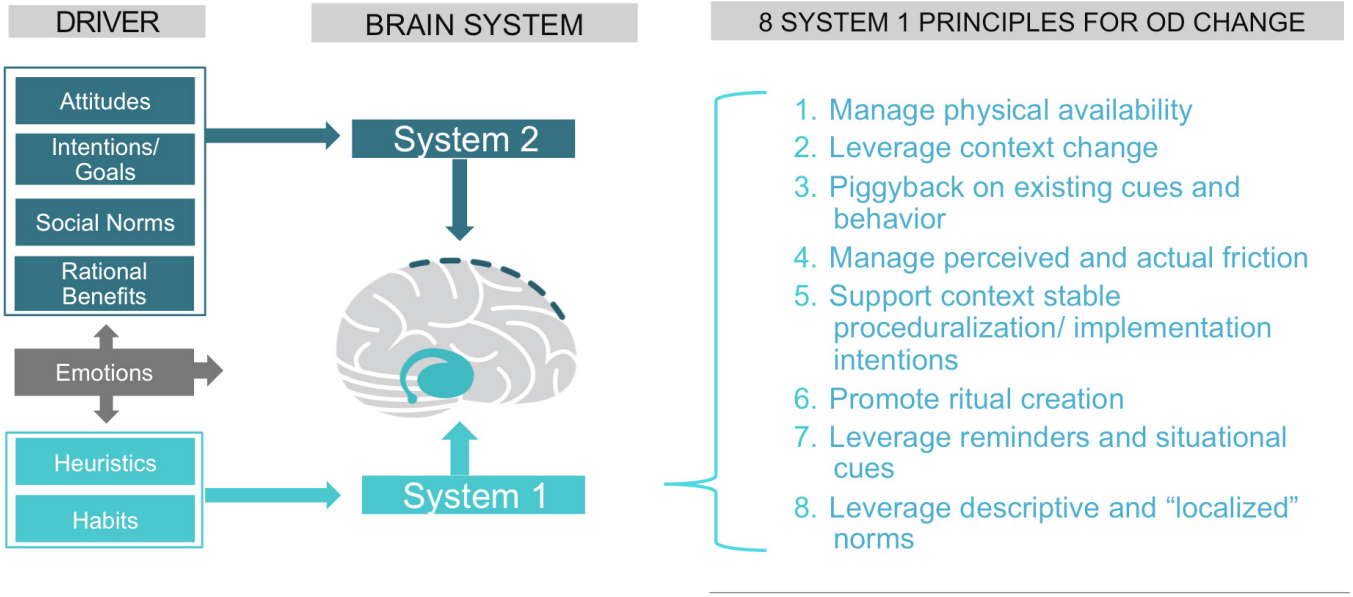
To summarize, the System 2 tactics that work for new or infrequently performed behaviors generally will not successfully disrupt and stick where System 1 is in charge. Therefore, these tactics need to be augmented with tactics that target System 1. In the remainder of this document we introduce 8 principles that have high potential to address System 1 and create disruptive and lasting change in OD behavior. Box 3 below summarizes these principles.

METHODOLOGY FOR ARRIVING AT THE PRINCIPLES

We arrived at the 8 principles via 5 steps. At Step 1, we collated the peer-reviewed literature (PubMed) and grey literature (formative research reports and internal documents from the World Bank's Water and Sanitation Program) addressing OD behavior, and latrine construction, usage and maintenance. We reviewed studies that reported on specific OD interventions (e.g., CLTS) as well as studies that were purely descriptive (i.e., did not involve interventions). This process generated a database of over 340 specific findings from the field. At Step 2, we thematically coded the field insights to identify instances where habits or other System 1 processes might plausibly underlie, or contribute to, an observed finding. Coding was performed independently by three expert coders and any inter-coder differences were resolved through discussion.

At Step 3, we used the behavioral science literature—including social psychology, health psychology, cognitive science, and behavioral economics—to identify high potential strategies for influencing the common themes that emerged at Step 2. As part of Step 3, we also consulted

BOX 3: 8 SYSTEM 1 PRINCIPLES FOR OD BEHAVIOR CHANGE



Box 3. 8 Principles for Leveraging Nudges and Habit Change Tactics (System 1) to Support OD Behavior Change.

a group of basic science experts from academia who study various System 1 tactics for behavior change (see Table 1 below) This process generated a preliminary list of approximately 40 principles.

At Step 4, we consulted nine field experts (see Table 2) with extensive knowledge of OD behavior and intervention approaches in various regions (e.g., India, South East Asia and Africa) and settings (e.g., urban, rural, river). At this point, we refined the list of principles to 8 with the highest potential. Finally, at Step 5, we created an activation plan for each principle, by unpacking examples of successful implementation in other domains as well as identifying potential links to existing OD change tactics and hypotheses about genuinely new actions that could be taken. These activation ideas were refined in consultation with the academic and field experts.

TABLE 1: ACADEMIC EXPERTS CONSULTED AT STEP 3

Academic Experts	Areas of Expertise
Prof. Markus Brauer University of Wisconsin	Social psychology, attitude change, social influence,
Prof. Robert Dreibelbis University of Oklahoma	Sanitation and hygiene behavior change
Prof. Francesca Gino Harvard University	Psychology, behavioral economics, ritual creation
Prof. Mushfiq Mobarak Yale University	Sanitation and hygiene behavior change
Prof. Mike Norton Harvard University	Social psychology, behavioral economics, nudging
Prof. Kathleen Vohs University of Minnesota	Social psychology, cognitive science, behavior change
Prof. Wendy Wood University of Southern California	Social psychology, health psychology, attitude change

TABLE 2: OD, SANITATION AND HYGIENE EXPERTS CONSULTED AT STEP 4

OD, Sanitation & Hygiene Experts	Affiliation
Yolande Coombes	Independent Consultant/World Bank Group
Craig Kullmann	World Bank
Steve Luby	Stanford University
Nila Mukherjee	Independent Consultant/World Bank
Hans-Joachim Mosler	EAWAG
Katherine O'Connell	Independent expert/ World Bank
Julia Rosenbaum	FHI360
Jan Willem Rosenboom	The Bill & Melinda Gates Foundation
Viengsamay Vongkhamsao	World Bank

II. The 8 Principles

Principle 1: Strategically increase/decrease the physical availability of key products and infrastructure

Principle Overview:

As a necessary, but not sufficient condition for change - *increase* the likelihood that supporting products/ infrastructure for latrine use are consistently and immediately physically available in the environment (without active searching/effort). Alternatively, or in addition, *decrease* the physical availability of products/ infrastructure needed for OD.

Basic Science:

Habits are *automatically* triggered by context cues, including physical settings, preceding actions, and times of day. If these critical cues are not consistently present in the environment (without active seeking/effort), the desired habit will not occur unless motivation is extremely high (Wood, Tam, & Witt, 2005).

Relevance to OD:

Principle 1 captures the basic idea that certain physical structures and products (e.g. latrines near fields for farm workers) need to be consistently and easily available to people if they are to have any chance of changing their behavior. Importantly, these physical features will be necessary but not sufficient to initiate behavior change. For example, findings from a global review of WSP initiatives in rural settings indicate that, in many countries, people who have easy physical access to a latrine at home still engage in OD (O'Connell, 2014). However, maximizing the consistent physical availability of enabling products remains a critical first step for new latrine-use habits to form. Where possible, latrines need to be available not only at home, but in other contexts and times of day that are a part of daily life, such as at work, near crop fields, in public places like markets and in the homes of others. For example, in rural Cambodia, 2% of adults with access to latrines at home reported defecating in the open while at home but when outside of the home, 43% of this same group practices OD (Cambodia WSP Demand Assessment Report, 2007). OD while working in agricultural fields is considered typical behavior since there is no access to sanitation facilities and going home to use a toilet was perceived as a waste of time (Qualitative Report for Understanding Rural Sanitation, Bihar, 2012).

Several opportunities to leverage Principle 1 emerged in the literature we reviewed. First, OD often becomes difficult to practice (i.e., OD is physically less available) during rainy season when rain is consistent, roads or fields are flooded, dry space is constrained, and insects are more prevalent (WSP reports from Kenya, Indonesia, Meghalaya, Rajasthan, Bihar). Illness, disability and old age are also often cited as circumstances when OD is difficult or impossible to perform (WSP reports from Meghalaya, Rajasthan, Bihar). Safety at nighttime, and from wild animals were also cited in a few reports as deterrents of OD, especially among women (WSP reports from Kenya, Indonesia, Meghalaya, Rajasthan, Bihar).

HOW TO EXECUTE/EXAMPLES OF APPLICATION

Supporting new behavior:

- The consistent physical availability of soap within easy reach has been found to be critical to the formation of a new handwashing with soap practice (Luby, 2009).
- "Lucky iron fish" (picture to right) used to treat iron deficiency (http://www.luckyironfish.com). Fish is highly "physically available" – can be kept in cooking pot and removed just before food is added to automatically dose with iron. Also leverages Principle 3 (piggybacking), 4 (friction) and 5 (context stable repetition).

Undermining existing (unhealthy) behavior:

- Banning visual display of cigarettes (which reduced the physical availability of cigarettes) at point-of-purchase is effective at reducing impulse/habitual cigarette purchases (Wakefield, Germain, & Henriksen, 2008).

Physical Availability Challenges

- Lack of consistently available sanitation facility (alternative not physically available) at home and during work creates "gaps" in availability of latrines.
- Lack of availability of masons and materials to build, maintain and improve latrines.
- Structural soundness of latrines (risk of collapse in rainy season), reducing physical availability of functional latrines.
- When pit is full and not easily emptied, latrine becomes "unavailable", causing relapse to OD.
- In many contexts, plastic bags are highly physically available, leading to use of "flying toilets".

Physical Availability Opportunities

- Rainy season reduces physical access to OD, creating opportunity to shift people to latrines.
- Illness temporarily reduces physical access to OD and could be leveraged too.
- Old age reduces access to OD.
- Safety (night time, wild animals) reduces access to OD.

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- New product innovations that ensure OD alternatives are consistently, easily readily at hand (e.g., PeePoo bags as alternatives to "flying toilets"; http://www.peepoople.com).
- Launching Micro-Finance Initiatives to support latrine purchase at the same time as OD interventions to ensure alternatives to OD are consistently, immediately at hand.
- Ensuring latrines are constructed in contexts beyond the home (e.g., transit points, markets, schools, workplace).
- Examine the potential in a "total solid waste" strategy where all waste/trash is in a given setting is removed (not just sanitation). Thus, the physical availability of all waste is radically altered in an environment at one time. See experience in Rwanda, where a total solid waste strategy may be demonstrating value in shifting OD practices.

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- Micro-Finance Initiatives that support keeping public toilets open later at night and earlier in the morning (thus increasing physical availability), when operators would normally close them because they are not sufficiently profitable. Thus, removing disruptions in the physical availability of latrines.
- During OD mapping activities in CLTS interventions, opportunities may exist to reduce the physical availability of common OD locations in the village (e.g., repurposing common OD sites for an alternative use, barricading usual OD sites) so they are physically altered and less physically available.
- Construct public toilets before initiating CLTS to ensure availability of toilets while households construct their toilets.

Principle 2:
LEVERAGE CONTEXT CHANGE

Principle Overview:
Disruptions to the physical environment and/or familiar action sequences create a "window of opportunity" for a new habit to form.

Basic Science:
When people undergo major shifts in context or life circumstances, their existing habits are temporarily vulnerable to change (see Rothman et al., in press). Context change can include major shifts in the external environment (e.g., moving to a new house or area), but even small context changes can sometimes be enough to change behavior (Neal, Wood, Wu and Kurlander, 2011). Thus, a wide array of context shifts can be useful entry points to support the initiation of a new behavior.

HOW TO EXECUTE/EXAMPLES OF APPLICATION

- Providing free public transport vouchers is more effective when the vouchers are sent to people who have recently moved house because their car-use habits are temporarily disrupted (Verplanken, Walker, Davis, & Jurasek, 2008).

Relevance to OD:
One challenge for Principle 2 is that the physical context and other daily activities before and after an intervention like CLTS triggering remain mostly the same. However, we found several examples from the OD literature that may present windows of opportunity to leverage Principle 2. As described under Principle 1, seasonality (especially rainy season) presents a yearly context change were OD becomes difficult to practice and presents an opportunity for more consistent latrine use.

The WSP reports highlight several life stage changes, such as illness, birth, marriage or receiving a new daughter-in-law, having elder or ill household members, as circumstances where having a latrine is advantageous and OD temporarily becomes a disadvantage. For example, those who adopted toilet use reported that marriage of a son and having a new daughter-in-law was a trigger for adopting a toilet to avoid humiliation and shame (WSP report Bihar, 2012). Among this report and others, survey respondents also indicated that having visitors to their home, especially those that are accustomed to using toilets, was a motivator for toilet adoption to avoid shame or to improve social status (WSP reports Bihar, Meghalaya, Malawi).

Context Change Challenges

- Physical context and other daily activities remain mostly the same pre/post CLTS triggering.

Context Change Opportunities

- Seasonal changes (physical context).
- Life stage changes, illness, birth (i.e., many new action sequences), marriage or receiving a new daughter-in-law, having visitors, having elders or those who are sick in the home.

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- Capitalize on "circular migration" patterns to disrupt OD practices while people are temporarily away from their home environment (e.g., seasonal worker migration, major holiday migration such as Pchum Benh in Cambodia). They will be more likely to change when away from home and may bring their new "latrine habits" back to their home environment. See Chowdhury, Guiteras & Mobarak (2015).

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- Find mechanisms to deliver interventions when they will coincide with major changes in physical context or life stage – e.g., promote OD change through trained birth assistants, midwives, and antenatal clinics, etc.
- Strategic timing of interventions so they occur during or immediately after large context changes, especially changes that impact cues directly involved in OD (e.g., rainy season altering accessibility of habitual OD sites).
- Build new strategies that can be deployed rapidly during disease outbreaks (e.g., Cholera) when people's existing behaviors are altered (e.g., they stop shaking hands and switch to the "Cholera handshake") and they are actively thinking about hygiene.

Principle 3:
PIGGYBACK ON EXISTING CUES AND BEHAVIORS

Principle Overview:
Cues and behaviors that are already well established in people's daily practices can be linked to the new, desired behavior. This increases the likelihood that the new behavior is performed and is often more effective than trying to insert a new behavior in isolation from existing practices.

Basic Science:
Instead of creating a new, desired behavior "from nothing," it can be more effective to attach the behavior to an existing physical cue in the environment, or an existing behavior, that is already established in people's daily practice or cultural understanding (Judah, Gardner, & Aunger, 2013).

HOW TO EXECUTE/EXAMPLES OF APPLICATION

Piggybacking on existing behavior:
- It is more effective to teach children to floss after brushing (rather than before brushing) because this sequence piggybacks the new behavior (flossing) onto an existing habit (brushing). The existing habit, thus, becomes a cue to automatically perform the new behavior (Judah, Gardner, & Aunger, 2013).

Piggybacking on physical cues:
- Mrembo wash station (picture to right) has a mirror installed on the front. The mirror is aspirational and triggers mirror-checking behavior, which causes people to engage with the wash station.

Relevance to OD:
We found a number of challenges for Principle 3 in the OD field research. In several states in India, OD is part of a morning routine that includes a walk that is perceived as pleasant and advantageous for overall well-being. OD thus "piggybacks" on daily rituals of a time to walk, check on crop fields, and socialize. For those working in agriculture, especially in rural settings, OD is perceived as typical behavior, natural or a part of the job since human feces is commonly perceived as a fertilizer for crops. In communities near rivers or bodies of water, OD may piggyback on familiar or pleasant cues such as the feel or sound of water or instant removal of waste.

There are potential opportunities to leverage Principle 3 from existing behaviors or activities. For example, existing community routines and daily practices around good hygiene could be leveraged to connect latrine use to proper hygienic behavior. In Kenya, people who maintain good hygiene are perceived to be healthier, happier and confident, and are considered role models in some communities (WSP report Kenya, 2013). Religious or moral principles could also serve as piggybacking opportunities. Bundling latrine construction with other highly desired improvements in house may also be an opportunity to piggyback on decisions or actions that have already gained household momentum (Jenkins, 2005) or are existing daily habits (see Programmatic Implications below).

Piggybacking Challenges

- OD piggybacks on morning routine/walk.
- OD is inherent to some jobs such as working the crops and using human feces as fertilizer.
- OD piggybacks on daily ritual of "time to talk, walk and socialize".
- River OD involves many familiar/pleasant cues (feel of water, instant removal of waste etc).

Piggybacking Opportunities

- Opportunity to piggyback on existing behavioral habits around good hygiene where those already exist (e.g., connect latrine use to other hygiene behaviors that may be more established in that community – washing clothes, bathing).
- Opportunity to piggyback latrine construction on other home improvements.

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- If ritualized socializing is part of the OD habit in a community, explore construction of café/ shaded area for socializing new public toilet to maintain existing habit (see Principle 6 also). For example, see the "Bloc Sanitaire" experience in Madagascar and Ethiopia.
- Piggyback/bundle latrine construction and upgrades onto other, already established construction activities (such as annual roof repairs or applications to have a water supply connected to home).
- WaterAid innitiative in Nepal, piggyback hygiene interventions onto successful immunization programs.

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- Build community latrines that also support other, already established daily routines such as water gathering, washing of clothes, or socializing. Latrine use can then piggyback on these established, daily behaviors.
- Piggyback voucher systems for latrine construction onto antenatal care visits.

Principle 4:
REDUCE PERCEIVED AND ACTUAL FRICTION FOR NEW BEHAVIOR / ADD FRICTION TO THE OLD

Principle Overview:
Eliminate even minor amounts of choice, effort, and decision-making or "friction" required to perform the new (desired) behavior and/or add friction to the existing (undesired) behavior.

HOW TO EXECUTE/EXAMPLES OF APPLICATION

Removing friction from desired behaviors

- New medication management systems provide patients with their personal daily medications pre-sorted, thus removing much of the friction (decision-making, multiple steps) usually required to adhere to a medicate regimen.

Adding friction to undesired behaviors

- When smoking bans were introduced in UK pubs, people with strong habits to smoke while drinking were no longer able to effortlessly light a cigarette when they felt the urge. The resulting behavioral friction (needing to leave the pub to smoke) is thought to have disrupted the automated association between drinking and smoking and, in turn, helping to reduce smoking rates (Orbell & Verplanken, 2010).

Basic Science:
When a new behavior requires even small amounts of effort, decision-making or added steps (especially compared to the status quo), relapse to old ways of acting will be much more likely (Murray & Häubl, 2007). Conversely, the likelihood of disrupting existing (undesired) behaviors can be increased by adding friction.

Relevance to OD:
The convenience—or lack of friction—associated with OD is a commonly cited factor that maintains the behavior. In India, for example, common OD locations, such as agricultural fields while working, are viewed as easily accessible and natural places to practice OD. Rivers or bodies of water that are easy to access make OD simple, convenient and easy to dispose of waste (O'Connell, 2014) and thus pose minimal friction for practicing OD. Perceived and actual maintenance requirements of latrines can also generate friction to building or using latrines since cleaning, repairing, and maintaining the superstructure and emptying the pit are commonly cited disadvantages or barriers to latrine use or construction (Tyndale Biscoe, 2013, WSP report for Kenya, Malawi, Meghalaya).

Despite these challenges, there are opportunities to leverage Principle 4 in development of sanitation products. Sanitation facilities that exhibit desirable qualities, such as being easy to use, easy to maintain and clean, easy to access, usable at all year and times of day, could decrease the perceived or actual friction to using a latrine. In addition to physical or structural attributes, behavioral or emotional components can be leveraged to increase friction for undesirable behavior, such as OD. For example, the shame of a long walk to engage in OD can be used to cause friction for practicing OD.

Friction Challenges

- The process of building a latrine is often multi-step, requiring a range of products sourced from different locations. This creates many opportunities to abandon the process. Common OD locations are easily accessible/lack friction (e.g., fields while working).
- River OD is especially "frictionless" because the experience is pleasant/waste "disappears".
- Latrine maintenance generates friction through cleaning/pit emptying. This friction may trigger relapse to OD.

Friction Opportunities

- Current OD behavior sometimes involves significant effort/friction (e.g., having to carry water for anal cleansing). This friction could be exploited to drive latrine use (e.g., see Programmatic Implications below).

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- Development of "Easy Latrines" in Cambodia, which pre-packages all required elements for a working latrine in an easy-to-self-install design.
- Offering routine pit emptying services that reduce the friction associated with maintenance, thus reducing the likelihood that users abandon the latrine and revert to OD.
- Include desirable, "easy" product attributes (close proximity, usable all year and all times of day).
- Identify the "smallest do-able action" (SDA) that is easy to implement and will have the largest impact on the key outcome (e.g., Alive & Thrive/FHI 360 identified "do not give water" as the highest impact SDA to promote exlcusive breastfeeding in Vietnam. Communications were then targeted narrowly and successfully to change this specific SDA (see Jimerson, 2016).

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- Explore the potential of simple heuristics/ rules that increase the distance people feel they need to walk to engage in OD (e.g., a simple "1000 step" rule would be easy to remember and may add significant friction to OD).
- In locations where anal cleansing with water is common, develop latrines that provide easy filling of water pots, making latrine use less burdensome than carrying water for OD.

Principle 5:
SUPPORT CONTEXT-STABLE REPETITION

Principle Overview:
Where possible, encourage context-stable repetition. Context-stable repetition can include repeating the desired behavior in the same physical setting, at same time of day, or in same action sequence. This can be enhanced through implementation intentions.

Basic Science:
Habits are more likely to form when people not only repeat frequently, but repeat in the same setting, at the same time of day and/or in the same action sequence (Neal, Wood, Labrecque, & Lally, 2012). This kind of repetition can be promoted by implementation intentions instructions, which require people to visualize/specify the particular context in which they will perform the new/desired behavior (Gollwitzer & Shearan, 2006).

HOW TO EXECUTE/EXAMPLES OF APPLICATION

- If people are asked to form 5 specific "if-then links" to support fruit/vegetable consumption, they will be significantly more likely to carry out those intentions/change their behavior (see Harris et al., 2014). The if-then links must specify the particular context or situational triggers for the behavior (e.g., respondent writes down: If I eat out during the day, then I will have a banana after my food).

Relevance to OD:
Several of the WSP reports indicated that seasonal changes, especially rainy season, affect the OD practice. Seasonal changes present challenges for Principle 5 because the context in which sanitation behaviors are performed are not stable (changes in access, availability, comfort, safety). Other challenges to a stable context for latrine use are poor latrine construction (Tyndale, Biscone, 2013) and degradation of the latrine structure. Both change the context for latrine use and disrupt consistent practice or revert back to OD. For example, a market assessment for WSP in rural Malawi identified latrine durability (through seasonal changes and natural degradation) as an important barrier to latrine construction and reconstruction (WSP Market Assessment for Rural Sanitation in Malawi, 2011).

To support context-stable repetition, the literature we reviewed highlighted opportunities around sanitation product design and the context in which a sanitation facility would be placed. Since proximity of the latrine was a commonly cited barrier to use (mainly to due inconvenience or a perceived waste of time to go to a latrine that was further away than defecate in the open), placement of latrines near the home but in an acceptable or culturally appropriate place (e.g., away from sites of worship) could support context stability. The WSP reports consistently indicated that convenience, cleanliness, comfort, privacy, easy maintenance, durability, and functionality through seasons are key motivators for latrine adoption. While latrines designed with a user-centered approach support a desirable context for latrine adoption (Jenkins, 2005), they may also support repetitive use in a desirable and stable context.

Context Stability Challenges

- Poor latrine construction/need for frequent maintenance reduces the opportunity to practice context-stable usage of latrines.
- Variable, limited opening times for public toilets acts as barrier to context-stable usage.

Context Stability Opportunities

- Latrine construction near home with desirable attributes.
- Seasonal changes can reduce context stability of OD because people cannot engage in the behavior at all times or at typical places.

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- Develop incentive systems that reward users for using latrines at the same time of day and same location (vs. incentivizing usage regardless of time and place). Reward systems of this kind are being trialed via membership cards that work via RFID technology (which allows people's use of the latrine to be passively tracked without needing to swipe a card).

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- Examine the potential of "community toilets" (which may prioritize usage by many users, but few use with sufficient frequency to form lasting habits). We note that, although community toilets have high potential from a habit change perspective, they also carry unique management challenges.

Principle 6:
ADDING "RITUALIZED" ELEMENTS TO THE INTERVENTION CAN ENHANCE EFFECTIVENESS AND ADVOCACY

Principle Overview:
Where appropriate, promote inclusion of "ritualized elements" in the new behavior or intervention process to promote adoption.

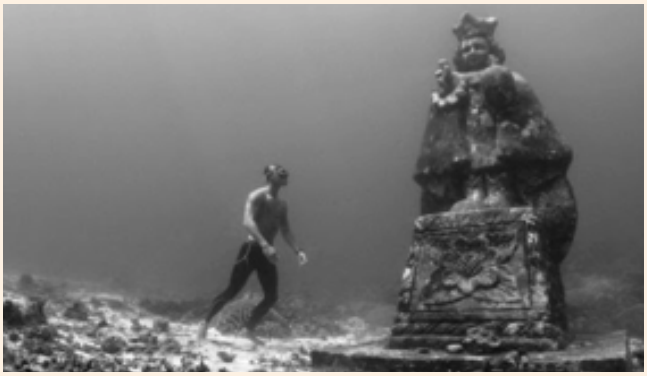
Basic Science:
When behaviors become ritualized (i.e., linked with deep personal or culturally relevant meaning) they can (a) attract more attention/psychological engagement, (b) be seen as more credible, (c) emotionally bind people to each other around group-based values, and (d) be more likely to be socially transmitted (Lienard & Boyer, 2006; Rosano 2012).

Relevance to OD:
From the qualitative reports in India, we know that certain rituals can support OD. For example, the WSP reports from communities in Bihar and Rajasthan reported OD as a part of ritualized morning walks which were considered pleasant, beneficial and supportive of well-being and good bowel movement (WSP reports Bihar, Rajasthan). However, creating new rituals could support better sanitation behaviors. For example, creating new rituals around purification or pride during public declarations of ODF status can be an opportunity to leverage Principle 6.

HOW TO EXECUTE/EXAMPLES OF APPLICATION

Including a meaningful ceremonial component to an action can elevate it to the status of a ritual, increasing the likelihood that people perform the behavior. Opportunities can be found to create cues/visible signs of the ritual (e.g., ink on finger in elections).

In Bohol, Philippines, local fishermen were using dynamite and cyanide to fish, leading to the rapid destruction of the aquatic ecosystem. To curb this behavior, statues of the Virgin Mary and other religious figures were submerged around the reef system, instantly bringing the behavior into conflict with deeply held, religious and ritualized cultural themes.



Ritual-Building Challenges

- Ritualized morning walks, which include OD, are viewed as positive and pleasant.
- "Filth" near home/close to religious or sacred sites considered is already considered morally wrong – this brings latrine use into conflict with religious rituals.

Ritual-Building Opportunities

- Opportunity to create rituals around purification/ pride and public declarations around ODF.

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- If ritualized socializing is part of the OD habit in a community, explore construction of café/shaded area for socializing new public toilet to incorporate OD into an existing ritual.
- UNLI Rural Sanitation program in Phillipines developed a simple hand gesture to remind people/serve as a ritualized mnemonic about the campaign.

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- In CLTS interventions, test ways to add a plausible ritual element at the end of the transect walk/ODF pledge. This ritual component could symbolically capture the "end of OD" and the transition point to ODF. Engage local religious/ traditional leaders to devise appropriate, context-specific rituals (e.g., Hindus throwing sindoor/Vermilion powder over common OD sites to signal ritualistic purification).
- Integrate ODF thinking into major cultural rituals including holidays, festivals (e.g. reinforce the "no loo, no bride" association around weddings).

Principle 7:
LEVERAGE REMINDERS AND INTENTIONAL CUES

Principle Overview:
If people intend to engage in a behavior, remind them of the behavior periodically, especially when they are in the appropriate context.

Basic Science:
Following through on an intention requires a person to remember the new behavior, but it is easy to forget or neglect it. Reminders, especially in that appropriate context, can mitigate forgetting (Cole-Lewis, & Kershaw, 2010; Elder, Ayala, & Harris, 1999; Fry, & Neff, 2009).

Relevance to OD:
The aforementioned rituals or existing routines can reinforce poor sanitation behaviors. For example, morning walks that include OD among communities in certain Indian states can serve as a cue or reminder to carry out typical behavior (OD). Other cues within that context, like the time of day or a sunrise, may also be cues for OD practice.

HOW TO EXECUTE/EXAMPLES OF APPLICATION

Telephone, email, text message, and postal reminders for numerous behaviors, including diet, physical activity, medication adherence and smoking. Physical signs placed in locations where the problem behavior is likely to occur. Signs can leverage culturally powerful imagery.

Reminder & Cue Challenges

- Existing routines (e.g., the morning walk) can serve as cue/reminder to carry out typical behavior (OD).
- Time of day (e.g., sunrise) can serve as cue/reminder to OD behavior.

Reminder & Cue Opportunities

- Opportunity to piggyback on religious cues that signal OD is not acceptable in immediate environment (e.g,, use of Arabic on walls near common OD sites in Bangladesh).

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- Incentive programs for latrine use can leverage text message reminders and can do so using messaging schedules that are timed and framed to promote latrine usage at the same time and place each day.

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- Clearly highlight traditional OD places with adverse cues (e.g., Hindus throwing sindoor/ Vermilion powder over OD sites - see also Principle 6).
- To propote ODF status, adapt interventions based on the RANAS model that combine public commitments to wash with soap with distinctive head scarves that act as a stable cue to remind people about adherence (Contzen, Meili & Mosler, 2015).
- To propote ODF status, adapt handwashing interventions that place colored footsteps from latrines to wash stations (see Dreibelbis et al., 2016), by painting colored footsteps from common OD sites to public toilets.

Principle 8: LEVERAGE DESCRIPTIVE AND "LOCALIZED" NORMS

Principle Overview:

Social norms are a powerful way to influence people's behavior. There are two major kinds of social norms (1) Injunctive norms, which describe what people should do (e.g., "most people think that smoking is unhealthy and unattractive") and (2) Descriptive norms, which describe what most people actually do (e.g., "90% of people are non-smokers"). Both can be effective at changing behavior, but evidence suggests that descriptive norms may work in a more automatic, effortless "System 1" way. Also, descriptive norms can be made even more effective by framing them using "localized" language that links to the actual context and immediate circumstances of the intended audience.

Basic Science:

New research suggest that injunctive social norms are effective primarily for people who can engage in some degree of System 2 thinking (i.e., they can think about the norm and engage in self-control). In contrast, descriptive norms appear to work even when people cannot engage System 2 thinking in this way. This is important, given recent evidence that poverty acts like a "cognitive tax," limiting people's ability to engage in effortful, System 2 thinking (Mani, Mullainathan, Shafir, & Zhao, 2013). Thus, descriptive norms may be especially powerful and under-leveraged as tools for driving behavior change among the poor.

HOW TO EXECUTE/EXAMPLES OF APPLICATION

A sign in hotel rooms that stated, "75% of the guests who stayed in this room participated in our new resource savings program by using their towels more than once" was more effective in promoting re-use of hotel towels than a sign stating, "75% of the guests participated in our new resource savings program by using their towels more than once" (Goldstein, Cialdini & Griskevicius, 2008).

So how can descriptive norms be optimally framed to influence behavior? New research shows that descriptive norms are most impactful when they are presented in a way that matches the intended audience's personal, immediate circumstances (Goldstein, Cialdini & Griskevicius, 2008). Thus, social norms are generally more successful if they refer not to "people in general" but rather to people who closely match the end user's exact local circumstances (i.e., norms should be "localized").

Relevance to OD:

Localized norms can pose challenges for stopping OD and achieving consistent latrine use. We found a strong perception that OD is "normal practice" in certain communities among the literature we reviewed. In a number of communities OD was reported as very common, practiced for years and through generations, normal and habitual (Coffey, Gupta, 2014; Patil, 2014; WSP report Bihar, Indonesia, Kenya, Meghalaya, Rajasthan).

However, there are several localized norms that might be leveraged to improve sanitation behaviors. For example, in Cambodia an advantage of owning a latrine is higher social status and prestige (WSP report Cambodia, 2007) and in Malawi improved social status was a key motivator for latrine construction (WSP report Malawi, 2011). Communities in East Java who have pride in collective achievement were more likely than other communities to achieve ODF outcomes (Mukherjee, 2011). In Bihar, 28% of cited pride and 45% cited honor as main reasons for opting for toilets (WSP report Bihar, 2012). In a global review of influencers of OD in rural settings, shame and humiliation were cited in Peru, India, Tanzania and Kenya as drivers of latrine to own, construct or reconstruct a latrine (O'Connell, 2014). Each of these components (pride, honor, shame, humiliation) reflect and depend on local norms of respective communities and thus present as opportunities to utilize Principle 8.

Normative Challenges

- Strong perception that OD is the “normal practice” in our community”.
- Awareness that OD has been practiced for generations, hence is accepted as local norm.

Normative Opportunities

- Achieving social status from latrine ownership and reducing shame/increasing pride from OD are strong drivers. These drivers reflect and depend on the “local norms” of the community.

PROGRAMMATIC IMPLICATIONS 1: MAPPINGS TO RECENT INNOVATIONS/TACTICS

- Once OD behavior begins to change in an intervention (e.g., post-triggering in CLTS), develop new intervention activities that highlight how the majority behavior has shifted, reinforcing the new descriptive norm.
- Develop incentive systems that provide rewards at the level of the local group (e.g., village, women’s groups) rather than individual households, to create and reinforce a new provincial norm around ODF status.

PROGRAMMATIC IMPLICATIONS 2: NEW IDEAS AND EXTENSIONS

- Construct public latrines at the “best schools” (creating an aspirational association) and fund them to open early so that parents and children can use them during school drop-off and pick up (see also Principle 1).

III. Concluding Remarks

In this report, we have advanced 8 System 1 Principles that can be used to promote the initiation and maintenance of behavior change around OD and latrine use. Building on the World Bank's 2015 *World Development Report: Mind, Society, and Behavior*, the principles were derived from basic science in social psychology, cognitive science, behavioral economics, and health psychology. Critically, we focused specifically on "System 1" tactics that do not depend on the end users' rational, effortful decision-making or their motivational systems (see Thaler & Sunstein, 2011; Wood & Neal, 2015). Instead, we focused on ways to disrupt existing OD habits and nudge people automatically towards forming new, latrine use habits that are maintained over time.

The 8 System 1 Principles to support OD behavior change are as follows:

1. Ensure critical products and infrastructure are immediately and consistently physically available for the end user.

2. Create or capitalize on context change to drive new behavior.

3. Piggyback on other existing behaviors and cues.

4. Address friction for the old and new behaviors.

5. Support context-stable repetition for latrine use.

6. Embed ritualized elements in the change process.

7. Leverage point-of-action reminders and cues, and,

8. Highlight descriptive and "localized" norms that reduce cognitive demands.

In closing, we reiterate that these 8 principles are designed to augment, not replace, approaches based on System 2 thinking. As we have emphasized throughout, human behavior is the product of both System 2 (rational, motivated) and System 1 (automatic, cue driven habits). Thus, the most powerful behavior change strategies are likely to come from combining different intervention tactics that, collectively, address both systems.

Finally, as field practitioners explore folding these ideas into OD interventions, we encourage the use, where practical, of randomized control trials (RCTs), the robust measurement of outcome data, and the sharing of successes and failures alike. In particular, we encourage the sharing of new ways to translate, tailor, and "bring to life" these basic science principles as makes sense in specific environments, cultures, and sub-populations.

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