Global Scaling Up Handwashing Project

Measuring the Behavioral Determinants of Handwashing with Soap

July 2012

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The Water and Sanitation Program is a multi-donor partnership administered by the World Bank to support poor people in obtaining affordable, safe, and sustainable access to water and sanitation services.

By Orlando Hernandez, Jacqueline Devine, Jonathan Karver, Claire Chase, and Yolande Coombes

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Global Scaling Up Handwashing is a Water and Sanitation Program (WSP) project focused on applying innovative behavior change approaches to improve handwashing with soap behavior among women of reproductive age (ages 15-49) and primary school-age children (ages 5-9). It is being implemented by local and national governments with technical support from WSP in four countries: Peru, Senegal, Tanzania, and Vietnam. For more information, please visit www.wsp.org/scalinguphandwashing.

This Technical Paper is one in a series of knowledge products designed to showcase project findings, assessments, and lessons learned in the Global Scaling Up Handwashing Project. This paper is conceived as a work in progress to encourage the exchange of ideas about development issues. For more information please email Orlando Hernandez at wsp@worldbank.org or visit www.wsp.org.

WSP is a multi-donor partnership created in 1978 and administered by the World Bank to support poor people in obtaining affordable, safe, and sustainable access to water and sanitation services. WSP's donors include Australia, Austria, Canada, Denmark, Finland, France, the Bill & Melinda Gates Foundation, Ireland, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom, United States, and the World Bank.

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Executive Summary

Background

This Technical Paper presents lessons learned from the application of the Focus, Opportunity, Ability, and Motivation (FOAM) framework to identify handwashing determinants The analysis presented used data derived from formative research studies, monitoring surveys, and impact evaluation baseline studies conducted by the Water and Sanitation Program (WSP) through its Global Scaling Up Handwashing Project. That project (2007–2012) was implemented by national and local national governments in Peru, Senegal, Tanzania, and Vietnam with technical support from WSP.

The discussion focuses on findings from the analysis of data collected in Peru and Senegal and provides practical recommendations for researchers and program managers working in handwashing promotion. In addition to offering a rationale for measuring handwashing determinants, the paper describes the FOAM framework and details the process used to measure the determinants, focusing on lessons learned.

Methodology

To design an effective handwashing promotion intervention, it is essential to identify the triggers of that practice. The identification of handwashing behavioral determinants informs the design of communication strategies, and it is useful to track their effectiveness, particularly to determine if the triggers were mobilized and if they influenced targeted practices.

Existing research has identified five critical handwashing junctures for child caretakers:

- after cleaning a child's bottom,
- after defecation,
- before preparing food,
- before feeding a child, and
- before eating.

These junctures are essential components of handwashing promotion programs to reduce diarrhea among children. This paper seeks to address whether and how the determinants of handwashing with soap vary across junctures and juncture subcategories (i.e., those associate with fecal contact versus those associated with food handling). Because the frequency of handwashing varies across junctures and settings, establishing which determinants come into play each time suggests the need to contextualize handwashing promotion programs.

In the context of the FOAM framework, *focus* identifies the actions to be performed and the actors who should perform them; *opportunity* identifies the chances to perform the actions and the availability of required resources; *ability* addresses individual and contextual factors that make the action's performance possible; and *motivation* identifies psycho-social factors and the extent to which performing the desired action is in the individual's best interest.

To identify handwashing determinants, the FOAM framework's components were broken down into subcomponents based on the specific context and identified junctures. The following subcomponents constituted the handwashing determinants:

- target behavior and target population (focus);
- access/availability, product attributes, and social norms (opportunity);
- knowledge and social support (ability); and
- belief/attitudes, outcome expectations, threat, and intention (motivation).

Using PSI's Tracking Results Continuously (TRaC) methodology as a guide, WSP measured the determinants of handwashing with soap using the following six-step approach:

- Develop statements to measure the different determinants.
- Pretest statements using Likert-type scales.
- Modify statements based on the pretest.
- Conduct a pilot study with a larger (preferably random) sample.
- Construct valid, reliable scales to measure each determinant.

- Conduct relevant analysis to determine whether a statistical relationship exists between reliable scales and the target practice.

To monitor changes in handwashing determinants, the researchers looked for changes in mean Likert-type scale scores over time, and examined whether such changes were associated with exposure to messages disseminated through different channels used in a given communication intervention.

Lessons Learned

This Technical Paper focuses on the lessons learned in applying the six-step methodology in Peru and Senegal, where a total of eight valid and reliable measures of handwashing determinants were constructed out of 10 considered. As the following summary shows, those lessons are organized into five categories: instrument design, data collection, scale construction, predicting handwashing, and program follow-up.

Instrument Design

- When designing instruments (questionnaires) for a specific context, pretesting and piloting are crucial because different country settings offer different challenges.
- To reduce response bias to statements, it might be necessary to test different instrument forms. Translating complex ideas and adapting them to different languages and cultural settings can be difficult, so translators should be skilled at both linguistic translation and cultural interpretation.

Data Collection

- Pilot studies can help determine the best data-gathering strategies for obtaining a good spread of responses and avoiding skewedness.
- To guarantee success, additional quality control steps might be needed. Being both cautious and flexible can help you determine whether additional safeguards are needed to get the measure right.
- Follow-up and supervision of data collection fieldwork is crucial, particularly during early stages.

Scale Construction

- Determining validity and reliability of scales are different procedures, and both must be implemented following the PSI protocol.
- Valid scales might not be reliable scales, and usable scales must be reliable.
- Statements required to construct valid and reliable scales can vary from country to country.

Predicting Handwashing

- The process will lead to the identification of handwashing predictors. The predictors may vary depending on the context and the juncture. Thus, perfectly valid and reliable scales will be necessary but not sufficient to predict handwashing practices.
- Different predictors can be used to attempt prediction of different types of handwashing (after fecal contact, before food handling, or both).
- Predictors might perform in an opposite way from what you expect. For example, an increase in threat perceptions might negatively relate to handwashing practices. Such cases can result from instrumentation issues, but also from the fact that the correlation used to establish predictability is a measure of association but not causality.
- In this study, the access/availability and habit determinants operated as predictors in more than one site, whereas six other determinants operated as predictors in one single site and not in the other.

Program Follow-Up

- In follow-up surveys, use only statements that make up valid and reliable scales, but do not cherrypick items for monitoring or evaluation purposes. The key is to measure the determinant, not the responses to individual and isolated statements.

In addition to discussing these lessons, this Technical Paper highlights various areas for future research, including the need to further develop and test the beliefs/attitudes measurement; the importance of the habit measurement—as defined by the Self-Reported Habit Index (SRHI)—in the FOAM framework context; and the possibility of treating

responses to items as categorical instead of as continuous variables when measuring handwashing determinants.

In terms of specific guidance for researchers engaging in similar activities, the report offers several key recommendations:

- Expand the framework's application in other sites, using items included in the study's annexes to measure determinants in further field-testing opportunities.
- If you cannot use all items associated with the determinants in the baseline studies, conduct separate formative research.
- Before applying this approach, examine items to be used to ensure that testing begins with a single set of harmonized formulations.
- If the predictors vary by handwashing juncture, explore whether the formulation of items by juncture adds predictive value.
- Continue testing the SRHI's utility, but design a set of items that are tested as a generic set across country applications.

Conclusions

Using the six-step approach to measure determinants requires rigor, and should not be undertaken without sufficient resources to support the process. At very least, programs considering this approach should be able to accommodate piloting and an adequate sample size, as well as provide appropriate analytical and statistical skills.

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I. Introduction

This document is primarily intended for researchers and monitoring and evaluation specialists working in handwashing promotion, especially those targeting mothers to reduce diarrheal disease among children under five years of age. It may also be useful to program managers of handwashing promotion interventions who are interested in innovative research and monitoring methods.

This technical paper captures the lessons generated in the process of measuring handwashing determinants identified by the Focus, Opportunity, Ability, and Motivation (FOAM) framework. The data presented in this document was obtained through various formative research studies and monitoring surveys, as well as impact evaluation baseline studies conducted by the Water and Sanitation Program (WSP) as part of its Global Scaling Up Handwashing Project.

The document starts with a short introduction to the project, followed by a discussion of the rationale for measuring handwashing determinants. The document provides a brief overview of FOAM prior to detailing the process used to measure handwashing determinants, primarily focusing on results from two sites (Peru and Senegal), drawing lessons learned along the way. Table 1 lists the studies, including the country and study sample size, conducted by the project and referenced in this paper.

The document demonstrates how researchers and program managers can use this approach to investigate the relationship between determinants and handwashing practices and track progress as the intervention unfolds.

Section 5.5 is devoted to the measurement of the Self Reported Habit Index (SRHI). This section also addresses the relationship between the index and handwashing practices.

The conclusion offers a series of practical recommendations for readers seeking to replicate the approach in their programs as part of their formative, monitoring and/or evaluation research. It also addresses the approach's limitations.

TABLE 1: STUDIES CONDUCTED TO MEASURE HANDWASHING DETERMINANTS IN THE GLOBAL SCALING UP HANDWASHING PROJECT

Country	Study	Sample Size
Peru	Impact Evaluation Baseline Study	n=3,411
	Intercept Monitoring Surveys 2009 and 2010	n=1,530 (2009) n=1,521 (2010)
Senegal	Doer/Non-Doer Study	n=1,770
Vietnam	Impact Evaluation Baseline Study	n=3,123

II. The Global Scaling Up Handwashing Project

A behavioral determinant is an underlying factor that influences handwashing with soap at critical junctures.

Diarrhea is one of the main threats to child health. Washing hands with soap at critical times—after contact with feces and before handling food—could substantially reduce diarrheal rates by up to 31 percent.[1] However, rates of handwashing with soap remain low throughout the developing world and large-scale promotion of handwashing behavior change is a challenge.

The Global Scaling Up Handwashing Project is a Water and Sanitation Program (WSP)-supported initiative focused on learning how to apply innovative promotional approaches to behavior change in order to generate widespread and sustained improvements in handwashing with soap at scale among women of reproductive age and primary school-aged children. The project, which will end in 2012, is being implemented by national and local national governments with technical support from WSP in Peru, Senegal, Tanzania, and Vietnam.[2]

[1] Waddington et al. 2009
[2] For more information, see www.wsp.org/scalinguphandwashing

III. The Rationale for Measuring Handwashing Determinants

Kawata[3] and Curtis et al.[4] have argued that handwashing serves as both a primary and a secondary barrier to prevent the transmission of diarrheal disease. It serves as a primary barrier to remove fecal matter after contact with stools, and as a secondary barrier to prevent pathogens from getting into food and fluids that will later be consumed by others, allowing pathogens to find new hosts. From this discussion, five critical handwashing junctures for child caretakers have been identified as essential components of hygiene promotion programs to reduce diarrhea among children under five:

- After cleaning a child's bottom,
- After defecation,
- Before preparing food,
- Before feeding a child, and
- Before eating.

Although cleansing agents other than soap (e.g., ash or sand) may be used, available research to date is on the impact of handwashing when soap is used.

Among the initial steps in designing an intervention to change handwashing is identifying the factors that determine this practice. From a behavior change perspective, knowing the determinants of handwashing helps:

- Design more effective communication strategies, and
- Determine whether handwashing promotion improved the factors that influence handwashing with soap.

Given that handwashing with soap should occur at the junctures mentioned above, a question that should be answered is whether handwashing with soap is influenced by the same determinants across junctures or if the factors vary by juncture or by juncture subcategory (i.e., those associated with fecal contact vs. those associated with food handling).

Exploration of these distinctions will be of significance because handwashing across junctures is not practiced with the same level of frequency across different settings and may need to be contextualized. After observing mainly primary and secondary child caretakers in Kenyan households, Schmidt et al.[5] concluded, for example, that out of 5,182 opportunities for handwashing, handwashing with soap occurred in only 25 percent of the cases, with 32 percent of caretakers doing so after fecal contact and 15 percent before handling food. In Peru, on the other hand, when a different research methodology was used, the reverse was detected. Using self reports as handwashing measures, Galiani and Orsola-Vidal[6] concluded that in that same country, handwashing with soap is more common at the time of cooking (68 percent) than after defecation (46 percent), after cleaning a child's bottom (42 percent), or even before feeding a child (34 percent). Although methodologies could influence the differences, what remains true is that regardless of how you measure the behavior, handwashing at critical junctures remains uneven.

[3] Kawata 1978
[4] Curtis, Cairncross, and Yonli 2000
[5] Schmidt et al. 2009
[6] Galiani and Orsola-Vidal 2010

IV. The FOAM Behavior Change Framework

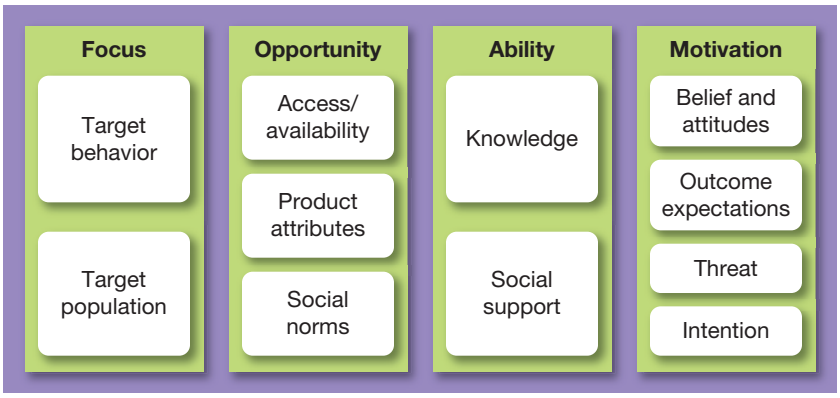
To identify determinants that influence handwashing, the project uses the Focus, Opportunity, Ability, and Motivation (FOAM) framework.[7] Components of this model are presented in Figure 1. This framework has been used in other global health interventions, mainly by Population Services International (PSI), and is based on the original work proposed by Rothschild.[8] Succinct definitions of the framework's components follow:

- **Focus** refers to the fact that a behavior change intervention must clearly identify what actions should be performed and who should perform them. Ajzen and Fishbein[9] argue that the definition of behaviors must include not only the action to be performed (handwashing), but also the context in which it is performed (such as after defecation or before eating). The target audience for handwashing practices may be, for example, primary or secondary caretakers of children under a certain age or even providers delivering babies or caring for newborn children.
- **Opportunity** refers to the chance that the behavior be performed and includes the resources needed to perform the behavior. Under this category, one may find external factors over which individuals expected to engage in the behavior may have little or no control.
- **Ability** includes individual and contextual factors that make the performance of a given action possible. At the contextual level, it may include social support needed to engage in the action, and at the individual level it may include skills and proficiencies to perform the action.
- **Motivation** includes psycho-social factors and is associated with the extent to which performing the desired action is in the individual's best interest. Coombes and Devine have argued that motivation has a direct influence on behavior, yet this influence is moderated by both opportunity and ability.

Figure 1 contains a breakdown of the different model components into subcomponents. In this paper, we refer to those subcomponents as *handwashing determinants*.

This framework permits program managers and researchers to have needed flexibility in identifying handwashing determinants because factors that influence handwashing—or any behavior for that matter—may be content as well as juncture specific. That is, handwashing determinants that operate in a given country setting might not operate in another. By the same token, handwashing determinants that influence one juncture might not influence another. The measurement of determinants suggested by this framework in three different countries and in connection with different handwashing junctures will allow us to see if this in fact the case.

FIGURE 1: FOAM BEHAVIOR CHANGE FRAMEWORK FOR HANDWASHING WITH SOAP



[7] Coombes and Devine 2010; see www.wsp.org/wsp/sites/wsp.org/files/publications/WSP_IntroducingFOAM_HWWS.pdf
[8] Rothschild 1999
[9] Ajzen and Fishbein 1980

V. Measuring Handwashing with Soap Determinants

The measurement of handwashing determinants requires certain steps. These steps, which have been detailed elsewhere, address the approach developed by PSI as part of their Tracking Results Continuously (TRaC) methodology.[10] For PSI, data collection on determinants is done as part of formative research for audience segmentation as well as for monitoring and evaluation purposes, and it is useful in program planning and decision-making. This is also true in the context of the Global Scaling Up Handwashing Project. The examples described in this section were implemented for audience segmentation purposes, as was the case of the Senegal where a doer/non-doer study was conducted to identify the determinants associated with handwashing with soap, but also for monitoring and evaluation purposes, as was the case for Peru.

A scale is a measure of an attribute or a construct through the use of statements that when put together help identify an underlying dimension. Scales used in this paper are considered to be interval scales and are helpful in calculating scores that can be used in classifying individuals or studying relationships between program components through statistical analysis.

PSI uses a rigorous process of scale construction. Details about the full-blown process can be found in the references cited above. For brevity, the major steps of the methodology used as part of this exercise in the context of the WSP Global Scaling Up Handwashing Project can be summarized as follows:

- Develop statements to measure the different determinants.
- Pretest statements using Likert-type scales.
- Modify statements based on the pretest.
- Conduct a pilot study with a larger sample, preferably selected at random.
- Construct valid and reliable scales to measure each determinant (validity and reliability require different procedures to represent substeps within scale construction).
- Conduct relevant tests to determine whether a statistical relationship exists between reliable scales and the practice of interest.

A short discussion on each of these steps follows.

5.1 Developing Items to Measure Handwashing with Soap Determinants

Key Steps

- Start with a generic list of items per determinant.
- Add country-specific items to the list to make it relevant.
- Translate and back translate items to be pretested.
- Addition of country-specific items does not guarantee that they will be empirically integrated to a scale or predict practices, but it might permit the scale to be sensitive to local context.

[10] K. O'Connell et al. 2006; Lipovsek et al. 2006a; Lipovsek et al 2006b; Yang et al. 2007

The first step in measuring determinants required that the Global Scaling Up Handwashing Project develop statements for use in different types of surveys (e.g., household or intercept). These statements were developed based on previously conducted formative research and on the experience of program managers and researchers. The list of statements per determinant included both generic and country-specific items. Statements were contextualized so they would make sense and be relevant to the communities where the programs were to be implemented. As the methodology used to measure determinants suggests, seven to 10 items were identified per FOAM subcomponent and incorporated into survey instruments prior to pretest.

The project first developed a generic list of statements that could be used in the various countries. Statements developed had positive and negative formulations. A positive formulation was one in which the statement was written to reflect the program's objectives. This is the case with Statement 3 in Table 2: "In most homes in my community, soap and water are available to wash hands after going to the toilet." A negative formulation was one in which the statement reflected a perspective different from that sought by program objectives. Statement 1 is an example of a negative formulation: "Most people you know wash their hands just with water." As is the case in the social sciences, it was assumed that negatively formulated items would reduce the chances of response bias associated with passively accepting a statement or accepting a statement to please the enumerator.

Following are three examples in which the list of generic items proposed to be used across countries was expanded to add country-specific items and help contextualize the measures. These examples refer to the following FOAM determinants: Social Norms, Social Support, and Beliefs/Attitudes.

Table 2 includes the items used to measure social norms. Kelly defines social norms as rules that govern how individuals in a group in society behave.[11] Table 2 lists eight generic items used in different project countries, and four country-specific items added in Senegal. Some of the items in the table have a negative formulation in which disagreement rather than agreement is expected. The coding of such items is inverted to construct a scale. Items with a negative formulation are identified by the symbol ®, indicating reverse coding.

TABLE 2: ITEMS USED TO MEASURE SOCIAL NORMS AROUND HANDWASHING WITH SOAP

Statement Type	Statements
Generic items pretested in Peru and Senegal	1. Most people you know wash their hands just with water.®
	2. Most people you know only wash their hands with soap after going to the toilet.®
	3. In most homes in your community, soap and water are available to wash hands after going to the toilet.
	4. It is important that all mothers make sure they wash their hands with soap before preparing food.
	5. People who don't wash their hands with soap deserve to be criticized.
	6. People with good education are more likely to wash their hands with soap.
	7. People who have a high social status are more likely to wash their hands with soap.
	8. I would criticize a mother who did not wash her hands before feeding her baby.
Country-specific items added in Senegal	9. Most people you know wash their hands with soap before eating.
	10. In your community, many people only wash their hands before eating.®
	11. People that wash their hands only with water are not good members of society.
	12. It may be enough to wash the right hand, which is the one that will be in contact with food.

Note: The ® symbol indicates reverse coding.

[11] Kelly 1955, 1991

The generic items presented focus on the extent to which it is either common practice or believed to be important to use soap after going to the toilet or before cooking (Items 2, 3, and 4); they also address which groups in a given community abide by the norm (Items 6 and 7) and focus on the need to sanction those that do not apply this norm (Items 5 and 8). The field team in Senegal considered it important to expand the list of items and added statements about handwashing before handling food that were similar to those regarding handwashing after defecation. They also included a statement relevant in a context where washing instead of wiping is used for anal cleansing after defecation, a practice common in Senegal.

Table 3 lists generic and country-specific items used to measure social support. For the work conducted in the context of project, social support was defined as the assistance an individual may receive from others to perform a practice. This assistance may be:

- Informational (e.g., explaining to target audiences why handwashing with soap after using the toilet is important),
- Emotional (e.g., praising target audiences for engaging in promoted practices), or
- Physical (e.g., assisting target audience in accomplishing promoted practice).

The items added in Peru respond to components of handwashing promotion programs in that country where school-based activities targeting children, their families, and their communities were part of prior interventions or an integral part of the Global Scaling Up Handwashing Project.

Table 4 presents the generic and the Senegal-specific items used to measure beliefs and attitudes. The items represent the individual's understanding and perceptions about handwashing with soap. The Senegal-specific items focus on religious and local myths that may have a negative impact on handwashing with soap and could influence Senegalese mothers to refrain from using soap given prevailing animist or Islamic beliefs and traditions.

Annex 1 includes the statements used to measure the determinants in Senegal and Peru under the project. The items in this annex are presented as examples of statement development and provide a wider perspective about which items may help define different determinants.

TABLE 3: ITEMS USED TO MEASURE SOCIAL SUPPORT FOR HANDWASHING WITH SOAP

Statement Type	Statements
Generic items	1. Because handwashing with soap is natural, you don't need to be taught how to do it.®
	2. Information on the importance of handwashing with soap has never been given to you.®
	3. It is important to teach your children to wash their hands with soap.
	4. It's a mother's job to make sure her children wash their hands properly.
	5. Someone in your household would criticize you if they saw you wash your hands with soap too often.®
	6. If a child does not want to wash their hands there is nothing you can do about it.®
	7. The school promotes handwashing among children.
Peru-specific items	8. It is important to work together with the teacher to promote changes in the child such as handwashing.
	9. It is important for parents to attend school meetings and school activities.
	10. It is the responsibility of parents to send soap to the school for washing hands.
	11. If the soap is placed near the bathroom, children will wash their hands more.
	12. Parents should know what their children learned in school.
	13. Older siblings can teach young children to wash their hands.

TABLE 4: ITEMS USED TO MEASURE BELIEFS AND ATTITUDES ABOUT HANDWASHING WITH SOAP

Statement Type	Statements
Generic items used in different sites	1. If you wash your hands really well with water you don't need to use soap.®
	2. You only need to wash your hands with soap if they look dirty or smell bad.®
	3. Handwashing with soap is important to stay healthy.
	4. Clean people are more trustworthy.
	5. Handwashing is done to prevent you from getting sick.
	6. You need soap to get rid of invisible germs and dirt when you wash your hands.
	7. You can't be a good person if you are not clean.
	8. Washing your hands with soap before feeding a child is important only if you use your hands to feed them.
	9. Washing hands uses up water in a household that could be better used for other purposes.®
	10. You don't need to wash your hands with soap if you know you have not touched anything dirty.®
	11. If you wash your hands many times with water you do not need to use soap.
Some specific items added in Senegal	12. The use of soap to wash hands before praying makes you impure.
	13. The use of soap to wash hands removes the protection you get from talismans.
	14. The use of soap for handwashing is not recommended before visiting sacred forests.
	15. If water is enough to purify you to pray, water should also be enough to wash hands before eating.

5.2 Pretesting Items Using Likert-Type Scales

Key Steps

- Reformulate statements to help respondents understand them more easily.
- Reformulate statements using the second person; for example, "You wash hands with soap to get rid of invisible germs."
- Identify strategies to capture more easily levels of agreement and disagreement with statements.

Statement pretesting contributed to data quality, primarily by ensuring that study participants understood the statements and could react properly to them expressing their opinion using degrees of agreement or disagreement. Pretesting occurred with a sample that represented different target audiences for future behavior change interventions. These were rural and peri-urban mothers of children under five.

The measurement of determinants followed principles typically used in attitude and belief measurement requiring the use of a Likert-type scale. This procedure relied on asking study participants to respond to a statement by providing levels of agreement or disagreement with the statement. Table 5 shows the levels of agreement and disagreement and the scores associated with statements used in the studies to measure handwashing determinants. As indicated earlier, we applied reverse coding in the case of negatively formulated statements so that for scale construction all statements are scored in the same direction.

The use of Likert-type scales in a developing country context may prove difficult given the educational level of study participants. To facilitate responses, the measurement of handwashing determinants demonstrated that two alternatives are possible. One is to use pictorials to elicit different levels of agreement. The second alternative requires breaking down responses into two steps where agreement

TABLE 5: SCORING OF RESPONSES TO LIKERT-TYPE SCALE STATEMENTS

Level of Agreement	Score
Total agreement	4
Partial agreement	3
Partial disagreement	2
Total disagreement	1

or disagreement is requested first, and the level of agreement or disagreement is requested second. A neutral response was not used, even though this is common practice when using Likert-type scales.

A Likert-type scale was not used to measure knowledge because knowledge measures were usually categorical. Knowledge questions asked respondents to indicate how to practice handwashing correctly with the expectation that study participants would mention the need to use both water and soap instead of only water. The answer provided was recategorized as "correct" or "incorrect." Knowledge questions also explore, for example, whether study participants know the critical handwashing junctures. Unprompted and prompted responses may be recorded. A fuller set of knowledge questions may be found in Annex 1. The option to use a dichotomous response to measure knowledge in this specific case reflects the fact that scales might not always be appropriate for measuring the determinants proposed by the FOAM framework.

An important lesson learned in the measurement of handwashing determinants is that all generic items associated with a given determinant should be tested in all sites. It is important to measure the construct as opposed to measuring specific items because items will only gain significance as they become part of a whole set of items. Testing individual items and modifying which items are tested at each application will be counterproductive. Individual items may change at different speeds in response to a handwashing promotion intervention and the critical issue is to see the accrued changes for all items that make up a scale. Furthermore, to measure a given determinant in a systematic way, the same measure must be repeated over time to see if the implemented intervention modified the determinant. If changes are made from measurement to measurement, what is being measured changes and that intervention's effectiveness will not be detected.

The pretest of the instrument may lead to modifications either in the formulation of the items or in the way in which the data is recorded on the survey instrument. The pretest of instruments may suggest which items might be confusing or hard to understand. This is particularly true because some of the items may have been originally formulated as negative statements to limit response bias, and such formulation might have made the statement more difficult to understand. The pretest might also suggest simpler language that can be used to construct the statements presented.

Another lesson learned from the pretest in the project countries is that items had to be personalized. In both Senegal and Peru, the research team found it was preferable that items be formulated in the second person singular, for example: "You know of a place where you can buy soap" or "Someone in your household would criticize you if they saw you wash your hands with soap too often." By the same token, items in the third person were avoided.

5.3 Piloting the Items with a Larger Randomly Selected Sample

Key Steps

- Different testing methodologies may be compared prior to implementing a larger pilot.
- The comparison may be conducted by exposing respondents to all testing methodologies and asking respondents to rank them.
- Once a methodology is chosen, a larger pilot may be undertaken.
- Data from the larger pilot should be analyzed to ensure that scales can be constructed easily.

Once a series of items that are understood based on pretest results and modifications is determined, the next step is to pilot them and see if they are useful for constructing valid and reliable scales. The pilot required a larger sample representing different subpopulations of interest such as residents of urban, peri-urban, and rural areas (done in Senegal), residents in different sociocultural contexts (e.g., coast, mountain, and jungle as is typically the case in Peru), or primary and secondary child caretakers (e.g., mothers and mothers-in-law). Random selection of the sample was important so scales could be constructed using a sample similar to the one that would represent the population (to make population inferences) once a full-blown study was conducted. The random selection of respondents allowed the program to offset potential criticisms that the pilot was conducted among the more educated, more accessible and more urban respondents and that the items would be less useful with strata at the other end of the scale on these dimensions (education level, accessibility, and residence pattern). Further replications of this model will have to determine whether a random sample is necessary.

The pilot study in Senegal was divided into two phases.

- First, a **qualitative study** was conducted to establish which of three different methodologies was more useful for collecting opinions from study participants. This step helped select the methodology that would be used to elicit gradual agreement responses to the statements used to measure determinants. In this exercise, aided and unaided responses were collected and study participants assessed the three methodologies in focus groups. The findings of the focus groups permitted researchers to establish which methodology was easiest for potential respondents to use and, in their view, more efficiently tapped into respondents' opinions.
- Second, a **quantitative study** was implemented after a method for soliciting information was chosen. Statements associated with all determinants plus questions regarding knowledge and observations needed to measure handwashing practices were included in a questionnaire used to interview 120 child caretakers from rural and peri-urban areas. Data obtained from this pilot were used to construct scales following the procedure outlined in the following sections. Of the 11 scales tested, eight were constructed, demonstrating that it was possible to use the PSI methodology to identify determinants and that a study with a fuller sample could be undertaken.

5.4 Constructing Valid and Reliable Scales to Measure Determinants

Key Steps

- Determine the scale's validity through factor analyses of determinants.
- Determine the scale's reliability by establishing the item's internal consistency using an approach such as Cronbach's Alpha.

The construction of scales is a two-step process. The first step allows researchers to determine the scale's validity, and the second determines its reliability.

The validity of a scale is determined through factor analysis of items. There should be as many factor analyses as there are determinants studied through the survey.

BOX 1: VALIDITY AND RELIABILITY OF SCALES

Principal Components Analysis (PCA) to Establish Validity

This analysis permits the study of a scale's validity because it is based on the assumption that if one wants to measure a construct, one needs to make sure that items used to measure it cluster together and group around an underlying statistical dimension that represents that construct. Factor analysis allows researchers to find those underlying dimensions and determine which items are pulled together by the dimension. That dimension is what factor analysis calls *factors*. As is typically done in social and behavioral research, factors with an Eigen value higher than 1 and items with a Pearson correlation higher than 0.30 with that factor are retained as elements of a potential scale that measures the determinant under analysis. These correlations are also known as factor loadings.

Cronbach's Alpha to Establish Reliability

As it is customary in social and behavioral sciences, reliable scales will be those that obtain a 0.70 Cronbach's Alpha score. This score is equivalent to the average of all split-half correlations between items.

The methodology used by WSP suggests using a principal components analysis (PCA) to establish a scale's validity. Subsequently, to address reliability concerns, the internal consistency of these items needs to be established. Calculation of a Cronbach's Alpha is a possible approach to achieve that objective.

Details about these procedures can be found in Box 1.

Three important points to keep in mind are:

- Valid scales may end up being unreliable.
- Only valid and reliable scales should be used in further analysis.
- The statements that make up a valid and reliable scale may vary from country to country but together they measure the same construct.

Table 6 presents results for the scale to measure Access/Availability. Data come from Peru and Senegal. The table indicates which study was used to establish scale validity and the study sample size.

There were six Access/Availability statements tested in both countries, one statement tested only in Peru and three items tested only in Senegal. Table 6 indicates that the validity threshold was met by six cross-country statements (Statements 1 to 6), and by one country-specific statement (Statement 8) in Peru and the country-specific statements (Items 7, 8, and 9) in Senegal.

The data in Table 6, however, clearly indicate that the factor loadings are different for any of the cross-country items considered. However, these findings do not mean that the weight of the statements merit a different interpretation in each country. In the end what matters is that both items help to construct a valid scale in any country.

Table 6 represents a best-case scenario as all generic and all country-specific statements included in the survey helped to construct a valid scale. It is also special because all cross-country items put to test came out with acceptable factor loadings, which are no more than correlations between the statements and the factor isolated through the analysis. The data presented in Table 7 paint a different picture. This table presents scale construction findings to study the validity of the measure of beliefs and attitudes. The table includes factor loadings for six generic statements (Items 1 to 6) and five statements (Items 7 to 11) used only in Senegal.

TABLE 6: STATEMENTS INTEGRATING A VALID SCALE TO MEASURE ACCESS/AVAILABILITY IN PERU AND SENEGAL

		Factor Loadings	
Statement Type	Statements	Peru Baseline (n=3,411)	Senegal Doer/Non-Doer Study (n=1,770)
Generic statements with acceptable factor loadings	1. You know of a place where you can buy soap.	.50	.39
	2. There is always enough water to wash your hands when you need to.	.59	.45
	3. You can buy soap when you decide to do it without asking someone else.	.67	.59
	4. Soap and water are always available in your house to wash hands after going to the toilet.	.77	.70
	5. You can always find soap when you need to use it.	.75	.84
	6. Soap and water are always available in your house to wash hands before eating.	.70	.67
Country-specific statements with acceptable factor loadings	7. Sometimes you want to wash your hands but soap and water are just not there when you need them.®	n/a	.48
	8. Soap must be place in handwashing areas (kitchen, bath/toilet).	.44	n/a
	9. At home you have a (designated) place for handwashing.	n/a	.31
	10. Soap here is affordable.	n/a	.57

TABLE 7: STATEMENTS USED TO EXPLORE VALIDITY FOR THE BELIEFS/ATTITUDES SCALE IN PERU AND SENEGAL

		Factor Loadings	
Statement Type	Statements	Peru Baseline (n=3,411)	Senegal Doer/ Non-Doer Study (n=1,770)
Generic statements	1. If you wash your hands really well with water you don't need to use soap.®	.64	.43
	2. You only need to wash your hands with soap if they look dirty or smell bad.®	.71	.12
	3. Washing your hand with soap before feeding a child is important only if you use your hands to feed them.®	.51	–.05
	4. You don't need to wash your hands with soap if you know you have not touched anything dirty.®	.70	.37
	5. If you wash your hands many times with water you do not need to use soap.®	.63	.42
	6. Washing hands uses up water in a household that could be better used for other purposes.®	.52	.14
Country-specific statements	7. It is important to wash hands with soap to keep in good health.	n/a	.57
	8. You wash your hands to avoid getting sick.	n/a	.63
	9. You wash hands with soap to get rid of invisible germs.	n/a	.62
	10. Clean people inspire trust.	n/a	.49
	11. You cannot be a good person if you are not clean.	n/a	.37

Note: Circled factor loadings indicate statements that performed differently in each of the countries where data were gathered.

An important lesson to draw from the data presented in this table is that a statement found to have an acceptable factor loading in one country might behave very differently in another. The best example of how differently statements may behave in country comparisons is statement 2. In this case, in Peru the factor loading is 0.71, which means that the statement meets the validity threshold. However, in Senegal the factor loading is –0.05, indicating that statement 2 has a negative factor loading and does not meet the validity threshold because in this country the statement was negatively associated with the scale. To have a valid scale, statement 2 was included in further analysis conducted with the data from Peru, but it was dropped from further analysis conducted with the data from Senegal.

The data in Table 7 also indicate that all the cross-country Beliefs/Attitudes statements can be used for further analysis in Peru, but that in addition to statement 3, statements 2 and 6 must also be excluded for Senegal as the analysis moves into exploring scale reliability and beyond.

After items that can help establish scale validity have been identified, the next step in scale construction is to determine if the items are reliable.

Using the same two scales as above, Tables 8 and 9 indicate which items meet the reliability criterion for the determinants Access/Availability and Beliefs/Attitudes, respectively.

Table 8 indicates that the reliability score was 0.83 in Peru and 0.79 in Senegal, above the acceptable threshold of 0.70 in both cases. Table 8 also shows that only the generic items (Items 1 to 6) were needed to have a reliable scale in Peru, and that the only country-specific statement applicable (number 8) had to be excluded. On the other hand,

TABLE 8: STATEMENTS COMPRISING A RELIABLE AND FINAL SCALE TO MEASURE ACCESS/AVAILABILITY IN PERU AND SENEGAL

		Statement Status	
Statement Type	Statements	Peru Baseline (n=3,411)	Senegal Doer/Non-Doer Study (n=1,770)
Generic statements	1. You know of a place where you can buy soap.	Included	Out
	2. There is always enough water to wash your hands when you need to.	Included	Out
	3. You can buy soap when you decide to do it without asking someone else.	Included	Included
	4. Soap and water are always available in your house to wash hands after going to the toilet.	Included	Included
	5. You can always find soap when you need to use it.	Included	Included
	6. Soap and water are always available in your house to wash hands before eating.	Included	Included
Country-specific statements	7. Sometimes you want to wash your hands but soap and water are just not there when you need them.®	n/a	Included
	8. Soap must be place in handwashing areas (kitchen, bath/toilet).	Out	n/a
	9. At home you have a (designated) place for handwashing.	n/a	Out
	10. Soap here is affordable.	n/a	Included
Reliability score measured through Cronbach's Alpha coefficient		.83	.79

Notes:
1. Circled factor loadings indicate statements that need to be excluded or that may not part of the research implemented in a given country from further analysis per the PSI methodology.
2. Statements marked as "included" were used to construct the final scale.
3. n/a: Not applicable

Source: Adapted from Delisio 2009 and Karver 2011

TABLE 9: STATEMENTS USED TO CONSTRUCT A RELIABLE AND FINAL SCALE TO MEASURE BELIEFS/ ATTITUDES IN PERU AND SENEGAL

		Countries	
Statement Type	Statements	Peru Baseline (n=3,411)	Senegal Doer/Non-Doer Study (n=1,770)
Generic statements	1. If you wash your hands really well with water you don't need to use soap.®	Included	Out
	2. You only need to wash your hands with soap if they look dirty or smell bad.®	Included	Out
	3. Washing your hands with soap before feeding a child is important only if you use your hands to feed them.®	Included	Out
	4. You don't need to wash your hands with soap if you know you have not touched anything dirty.®	Included	Out
	5. If you wash your hands many times with water you do not need to use soap.®	Included	Out
	6. Washing hands uses up water in a household that could be better used for other purposes.®	Included	Out
Country-specific statements	7. It is important to wash hands with soap to keep in good health.	n/a	Out
	8. You wash your hands to avoid getting sick.	n/a	Out
	9. You wash hands with soap to get rid of invisible germs.	n/a	Out
	10. Clean people inspire trust.	n/a	Out
	11. You cannot be a good person if you are not clean.	n/a	Out
Reliability score measured through Cronbach's Alpha coefficient		.78	.68

Note: Circled factor loadings indicate statements that need to be excluded from further analysis per the PSI methodology or were never included in the initial study in a given site.

n/a: Not applicable

Source: Adapted from Delisio 2009 and Karver 2011

four generic items (Items 3 to 6) and two country-specific items (Items 7 and 10) were needed to have a reliable scale in Senegal. Thus, although a total of six statements were needed for a reliable Access/Availability scale in each one of these countries, only four of those items were common to both sites. Statements used to construct the final scale are marked as "included." In the end, it might be necessary to drop some statements to obtain a reliable scale.

Table 9 indicates that the Beliefs/Attitudes scale proved reliable in Peru, but not in Senegal. The Cronbach's Alpha coefficient was 0.78 in Peru, but only 0.68 in Senegal, just below the cut-off threshold of 0.70. All generic items were needed to construct a reliable scale in Peru. The fact that only reverse-coded items were used in Peru to test the scale's reliability did not seem to be problematic to construct an acceptable scale in that country. Because none of the valid items proved to be reliable in Senegal, the Beliefs/Attitude scale was not used in further analyses in Senegal.

The different performance of statements associated with Beliefs/Attitudes reiterates the point that individual statements integrating a scale may vary by country, and that statements that were useful in scale construction in one country might prove useless in another. By the same token, a reliable scale in one country might prove unreliable in another.

However, a word of caution is in order. Researchers might argue that the possibility remains that items associated with a scale hang together because they are very similar and not necessarily because they measure the construct of interest. That is, individuals might not perceive the nuances that may exist between items and respond in a similar fashion

to items that to them seem the same. Spreading items that conceptually measure the same construct throughout a survey may help address this issue. However, different formulations of items might need to be included in further research to explore whether this possibility is in fact valid.

5.4.1 List of Valid and Reliable Scales Constructed Across Sites

Table 10 presents the list of FOAM determinants for which valid and reliable measures were constructed using Likert-type scales. The information presented in this table indicates what country data were used to construct the measures.

The information presented in Table 10 can be summarized as follows:

- The project constructed a total of eight valid and reliable measures of handwashing determinants out of a total of 10 considered.
- Seven measures were constructed using data from Senegal and two were constructed using data from Peru.
- As may be observed from Table 10, the number of determinants studied in Senegal was larger than that studied in Peru. Had the exact same determinants been studied in Peru, the number of valid and reliable measures there might have been larger than that the table shows. It is possible to assume that the scales that proved unreliable in Senegal reflect the inability to properly measure the determinants they are expected to represent.

When comparisons between countries are drawn, the information in Table 10 also shows that:

- Only one of the scales constructed (Access/Availability) was found to be valid and reliable in both countries.
- Two scales—Social Support and Intention—proved invalid and unreliable in both countries.
- Two of the valid and reliable measures constructed are Senegal specific: Descriptive Norms and Cultural/Religious Myths, and as a result the label "not applicable" is reflected in the column for Peru.

The data from Vietnam were also analyzed to construct scales to measure handwashing determinants. Two data sets from Vietnam were used for this purpose: baseline data and tracking survey data. However, no valid and/or reliable scale emerged from these analyses. Possible explanations for the lack of success in the case of Vietnam are discussed in the Lessons Learned section.

TABLE 10: VALID AND RELIABLE SCALES CONSTRUCTED TO MEASURE HANDWASHING WITH SOAP DETERMINANTS

		Countries	
FOAM Framework Components	FOAM Framework Determinants	Peru Baseline (n=3,411)	Senegal Doer/Non-Doer Study (n=1,770)
Opportunity	Access/Availability	Valid and reliable	Valid and reliable
	Soap Attributes		Valid and reliable
	Social Norms		Valid and reliable
	Descriptive Norms	Not applicable	Valid and reliable
Ability	Social Support		
Motivation	Beliefs/Attitudes	Valid and reliable	
	Cultural/Religious Myths	Not applicable	Valid and reliable
	Threat		Valid and reliable
	Expectations		Valid and reliable
	Intentions		

Note: Empty cells indicate determinants that were neither valid nor reliable for that country.

5.5 Measuring Handwashing with Soap Habit in Peru and Vietnam

One of the project's expectations is that handwashing with soap at critical junctures will become habitual. The Global Scaling Up Handwashing Project explored the usefulness of one measure of habit available in the literature and integrated it in several surveys. This measure is known as the Self Reported Habit Index (SRHI). The project added this measure to the different scales constructed for determinants to explore if it was related to handwashing. A description about this measure and results obtained in its application follow.

Verplanken[12] argues that habits have three dimensions:

- History of repeating the behavior over time;
- Automatic responses to a given situation guided by external clues; and
- Self identity and personal style associated with how individuals organize everyday life.

SRHI statements associated with each of these components can be found in Annex 2 and are adapted following Verplanken's[13] suggestions for the construction of the index. Among the studies referenced in this paper, these statements were included in a baseline household survey for the impact evaluation of Scaling Up Handwashing in Vietnam,[14] and in an intercept survey conducted in different locations through Peru among randomly selected mothers making market purchases.[15]

The Global Scaling Up Handwashing Project wanted to determine if the items associated with SRHI make up a valid and reliable scale. The PSI methodology was applied to make that determination.

Table 11 includes the factor loadings of the different items included in the survey instrument to determine the scale's validity. The table establishes the connection between the type of statements suggested by Verplanken[16] and those used in the surveys indicated. Ten statements met the validity criteria in Peru and only four did so in Vietnam. Statements that need to be excluded from further analysis per the PSI methodology are circled. These are statements 1 and 3 in Peru, and statements 1 to 5, 7, 8, and 12 in Vietnam.

The analysis of both the Peru and the Vietnam data revealed only one factor. This cross-country finding confirms the argument submitted by Verplanken that the measure of the SRHI is unidimensional despite the different three dimensions that are considered to construct it.[17]

Table 12 shows the results of the SHRI reliability analysis. Data presented in this table indicates that the reliability threshold was met in Peru, but not in Vietnam. Cronbach's Alpha score was 0.81 in Peru, but only 0.52 in Vietnam. The statement, "Washing hands with soap requires effort."® was not part of the final reliable scale and had proven not valid in either Peru or Vietnam. These findings also confirm that statements that may help construct valid and reliable scales in one setting may perform very differently in another. The measure of habits developed in Peru comes closer to the model proposed by Verplanken,[18] but is not identical.

[12] Verplanken 2009
[13] Verplanken 2003
[14] Karver 2010a
[15] Karver 2010b
[16] Verplanken and Orbell 2003
[17] Verplanken 2010
[18] Verplanken 2003

TABLE 11: FACTOR LOADINGS OF ITEMS ON FACTOR IDENTIFY WHEN MEASURING HABITS BY COUNTRY

Initial SRHI Items Suggested by Verplanken	Handwashing Statements Used in WSP Surveys	Peru 2010 Intercept Survey (n=1,521)	Vietnam IE Baseline Survey (n=3,123)
Behavior is something that:			
. . . would require effort not to do	1. Washing hands with soap requires effort. ®	.16	–0.08
. . . I do without thinking	2. You wash your hands with soap without needing to remind yourself. (You have to wash your hands with soap without needing to think about it.)	.53	.18
. . . I start doing before I realize I am doing it	3. You start washing your hands before you realize you are doing it. (Without realizing you are doing it in Peru.)	.25	.08
. . . I would find hard not to do	4. You find it difficult to stop washing your hands with soap.	.43	.28
. . . belongs to my (daily) routine	5. Washing hands with soap is not part of your daily routine.®	.40	.08
. . . I do automatically	6. You wash your hands with soap automatically.	.71	.39
. . . I have been doing for a long time	7. You have been washing your hands with soap for a long time.	.72	.26
. . . I have no need to think about doing	8. You have to think about it, each time you wash your hands with soap/you have to think twice before washing your hands with soap.	.47	.14
. . . I do frequently	9. You often/frequently wash your hands with soap.	.70	.60
. . . is typically me	10. Washing your hands with soap is typically you.	.78	.38
. . . makes me feel weird if I do not do it	11. You would feel uncomfortable if you did not wash your hands. (With soap added in Peru.)	.45	.56
. . . I do without having to consciously remember	12. You always have to remind yourself to wash your hands with soap.®	.39	–.12

Note: Circled factor loadings indicate statements that need to be excluded from further analysis per the PSI methodology.

TABLE 12: ITEMS INTEGRATING RELIABLE AND FINAL SCALE OF HABITS IN PERU AND SENEGAL

Initial SRHI Items Suggested by Verplanken	Handwashing Statements Used in WSP Surveys	Peru 2010 Intercept Survey (n=1,521)	Vietnam Baseline Survey (n=3,123)
Behavior is something that: . . . I do without thinking	1. You wash your hands with soap without needing to remind yourself. (You have to wash your hands with soap without needing to think about it.)	Included	Out
. . . I start doing before I realize I am doing it	2. You start washing your hands before you realize you are doing it. (Without realizing you are doing it in Peru.)	Out	Out
. . . I would find hard not to do	3. You find it difficult to stop washing your hands with soap.	Included	Out
. . . belongs to my (daily) routine	4. Washing hands with soap is not part of your daily routine.®	Included	Out
. . . I do automatically	5. You wash your hands with soap automatically.	Included	.39
. . . I have been doing for a long time	6. You have been washing your hands with soap for a long time.	Included	Out
. . . I have no need to think about doing	7. You have to think about it, each time you wash your hands with soap/you have to think twice before washing your hands with soap.	Included	Out
. . . I do frequently	8. You often/frequently wash your hands with soap.	Included	.60
. . . is typically me	9. Washing your hands with soap is typically you.	Included	.38
. . . makes me feel weird if I do not do it	10. You would feel uncomfortable if you did not wash your hands. (With soap added in Peru.)	Included	.56
. . . I do without having to consciously remember	11. You always have to remind yourself to wash your hands with soap.®	Included	Out
Reliability measured through Cronbach's Alpha coefficient		.81	.58

Note: Statements marked as "included" were used to construct the final scale.

5.6 Using Reliable Scales that Measure Determinants to Predict Handwashing with Soap

Key Steps

- Spot checks, a proxy measure often used in handwashing, are conducted to determine whether washstands have the necessary supplies to practice handwashing and whether handwashing supplies are available at washstands in or near toilets and cooking areas.
- Different determinants may predict handwashing at different junctures.
- Future explorations of determinants must take into account the difference between toilet defecators and open sanitation defecators.

One of the final steps of the process outlined here is to explore the relationship between the reliable scales constructed and handwashing.

The measurement of handwashing is not an easy task. It has been discussed in considerable detail elsewhere by Ram.[19] In a survey context, it is a commonly accepted practice in the Water, Sanitation and Hygiene (WASH) sector to prefer objective measures of handwashing. An objective measure that has become acceptable in recent years requires establishing whether there is a handwashing device with the necessary supplies (water and soap). It is recognized, of course, that this proxy measure will not be able to determine whether handwashing is practiced at critical junctures or if it is done consistently or as frequently as may be needed. Yet, Biran et al.[20] found an association between increased rates of handwashing following latrine use and ownership of a washstand. Additionally, Luby and Halder[21] concluded that children under five living in households with a washing station had a lower risk of showing negative health outcomes, even those associated with respiratory illness.

The project has adopted two proxy measures of handwashing practices based whether handwashing stands are located inside or within three meters of latrines or at a cooking station. This definition has permitted Karver[22] to speak of three types of handwashing behaviors based on when handwashing occurs:

- Handwashing with soap after fecal-related events (defined through a proxy requiring that study participants be caretakers who live in households with handwashing stands and with handwashing supplies inside or within 3 meters of an existing household sanitation facility);
- Handwashing with soap before food-related events (defined through a proxy requiring that study participants be caretakers who live in households with handwashing stands and with handwashing supplies near the place in the household where food is prepared); and
- Ideal handwashing (defined as the combination of the previous two categories).

In the remainder of this discussion, "non-handwashers" are those study participants that did not meet the previous definitions.

Logistic regression is the appropriate method of analysis to establish the relationship between determinants and handwashing practices because the former are scales (thus continuous variables) whereas the latter are dichotomous variables. The scales are continuous variables, and the measure of practices permit classifying study participants as handwashers or non-handwashers. Logistic regression allows the determination of the likelihood that a study participant will be classified as a handwasher. This would happen if the scores on the scales measuring determinants increase. In this analysis, the determinants are the independent variables and the handwashing practices are the dependent variables. If the logistic regression analysis concludes that there is a statistically significant relationship between the independent and dependent variable, a unit increase on the independent variable will increase the odds of the individual being considered a handwasher.

[19] Ram 2010
[20] Biran, Tabyshalieva, and Salmorbekova 2005
[21] Luby and Halder 2008
[22] Karver 2010, 2011

Although there may be similar determinants that influence handwashing at different junctures, it is also possible that there are determinants by juncture. The latter assumption is based on the premise that in the perception of the practitioner, handwashing with soap after defecation may not necessarily be the same as handwashing with soap before food handling. In this regard, many scenarios are possible. Hypothetically, for example, Access/Availability alone may influence handwashing after defecation, but Access/Availability together with Social Norms may influence handwashing before handling food. By extension, the type of determinant influencing post-defecation handwashing may vary from Senegal to Vietnam. Findings on the relationships between the determinants and the different categories of handwashers are the focus of a separate report.[23] To illustrate the use of the methodology, Table 13 summarizes the usefulness of only two determinants plus the Habit scale in predicting post-defecation handwashing and pre-food handling defecation in Senegal. Therefore, it is not comprehensive of all findings, which will be the subject of a separate report. Table 13 reflects data for the entire sample of the second round of the Doer-Non/Doer study conducted in the winter of 2010–2011.

The data in this table shows the weighted average scores for the scales presented. Weighted scores provide opportunity to make comparisons across scales possible because the number of statements used to construct the scales vary from scale to scale. These scores are presented for "non-handwashers" and "handwashers" under the handwashing conditions established: fecal-related events, food-handling-related events, and both. The odds ratios and significance levels for the difference between non-handwashers and handwashers are also included.

Odds ratios represent the likelihood of being labeled a handwasher or not. Odds ratios are significant if the likelihood of being labeled a handwasher is higher than what would be expected by chance alone.

The data in Table 13 indicate that of the scales presented, only two predict handwashing:

Access/Availability and Habits. However, the predictive value of these two scales comes in only when considering handwashing in connection with food-handling-related events.

- The odds ratio is 1.91, suggesting that a point increase in the scale score increases by 1.91 times the likelihood of study participants being labeled a handwasher.
- The odds ratio in this case is 2.5, suggesting that a point increase in the scale score increases by 2.5 times the likelihood of study participants being considered a handwasher.

The data in Table 13 also show that the Social Norms determinant is not related to handwashing. It is not associated with any of the measures of handwashing considered. By the same token, neither handwashing after fecal-related events nor the combination of handwashing after fecal and before food-handling events can be predicted by any the three scales considered.

These findings clearly indicate that valid and reliable scales may have no predictive value or that if they do, they may predict handwashing at some events but not necessarily all of them. Handwashing at different junctures may in fact be considered different practices because behavior is contextual and handwashing with soap after defecation may in fact be different from handwashing with soap before eating or before feeding a child. Qualitative formative research may help explore the significance of these different junctures for target populations.

- Note that positively skewed responses to FOAM scales will not be too useful when studying the relationship between determinants and practices. In fact, there may be ceiling effects and little room for changing determinants in such situations. With positively skewed scales, interventions may find it harder to influence determinants, and in the end changes in determinants may be too small to have any influence on practices.

[23] Devine et al. 2011

TABLE 13: ROLE OF ACCESS, SOCIAL SUPPORT, AND HABITS AS DETERMINANTS OF HANDWASHING AFTER FECAL EVENTS, BEFORE FOOD-HANDLING EVENTS, OR BOTH IN SENEGAL

Handwashing Juncture	Determinant	Weighted Average Scale Score		Odd Ratio	Significance Level
		Non-handwashers	Handwashers		
Fecal-related events	Access/Availability	3.02	3.02	.87	.41
	Social Norms	3.26	3.33	1.07	.80
	Habits	3.49	3.55	1.22	.46
Food-handling-related events	Access/Availability	2.93	3.24	1.91	.00**
	Social Norms	3.20	3.40	.96	.79
	Habits	3.43	3.65	2.5	.00**
Both fecal- and food-handling-related events	Access/Availability	3.02	3.02	.08	.29
	Social Norms	3.26	3.38	1.23	.50
	Habits	3.49	3.60	1.49	.22

** Significance at .00

Source: Excerpted from Karver 2011

- In addition, it may be noted that the magnitude of the significant difference in mean scores between non-handwashers and handwashers is not large. That is, two tenths or a third of a point may prove to be a statistically significant difference at that sample size. Although seemingly small, these are typical findings in social and behavioral research that is based on Likert-type scales and should not be a concern.

VI. Monitoring Changes in Handwashing Determinants

Key Issues

- Changes in mean scale score may be detected over time.
- These changes may be associated with exposure to messages disseminated through different channels used in a given communication intervention.
- The changes detected may be higher among the study participants exposed to the intervention than among those not exposed to it.

Once determinants have been established following the procedures outlined above, they can be used to design and monitor interventions. If interventions include messages that can activate the determinants, changes in the scores measuring them should be expected. In addition, an increase in scores should be related to exposure to information via the channels used by those same interventions.

The use of determinants to design interventions is described in other publications produced by the Global Scaling Up Handwashing Project. For information on this topic, please consult WSP's series of Learning Notes documenting the Behavior Change Journey in each country.[24] These publications illustrate how relationships that were detected between determinants and handwashing informed intervention design.

Table 14 illustrates how the use of determinants was applied for monitoring purposes, in this case Access/Availability in Peru. More specifically, it examines weighted average scores for the Access/Availability scale by round of measurement. We considered two measurements one year apart, the round means each time that the measurement occurred through monitoring surveys and the type of channel used (mass media, direct consumer contact, or interpersonal communication). It presents accrued data by type of channel.

The findings in this table indicate that statistically significant differences were detected only in the case of interpersonal communication channels. The data show that there is a relationship between exposure through these channels and the Access/Availability scale. The data in Table 14 suggest that changes in mean scores for Access /Availability between the two rounds of measurement are greater among those who were exposed to behavior change communication (BCC) channels than for those who were not exposed.

The importance of interpersonal communication detected through this monitoring exercise is satisfying because the program in Peru emphasized those channels

[24] Coombes and Paynter 2011, Devine and Flórez Peschiera 2010, Devine and Koita 2010

over media and direct consumer contact activities during periods between measurements. The small number of study participants that reported exposure through those channels, however, is challenging because it may reflect how little coverage may be attained by using them, regardless of the magnitude of change they generate.

TABLE 14: AVERAGE SCORES FOR ACCESS/AVAILABILITY SCALE BY EXPOSURE, PERU TRACKING SURVEYS 2009 AND 2010

Type of Exposure		Access and Availability			
		Round 1 (n=1,530)	Round 2 (n=1,521)	F-stat.	Significance
Mass media (MM) (n=838/3,051)	Exposed	2.816	2.870	0.06	.800
	Not exposed	2.796	2.859		
All direct consumer contact (DCC) (n=627/3,051)	Exposed	2.856	2.864	2.68	.102
	Not exposed	2.788	2.862		
All interpersonal communication (IPC)channels* (n=1,866/3,051)	Exposed	2.774	2.875	8.09	.005
	Not exposed	2.816	2.862		

*Significant at the .05 level

Source: Excerpted from Karver 2011

VII. Lessons Learned

The application of the methodology to measure handwashing determinants discussed in this document was possible in Peru and in Senegal, two of the three countries in which the exercise was conducted. In these two sites, a total of eight valid and reliable measures of handwashing determinants were constructed out of 10 considered. Relationships between many of the determinants and handwashing practices were also detected. The Access/Availability and Habits determinants worked in more than one site. Although the details of those relationships are presented in a different document,[25] it is clear that different determinants are associated with different measures of handwashing. A single set of determinants is not likely to predict handwashing at all junctures. Although further testing needs to be conducted in different settings, what also emerges is that the relationships between determinants and handwashing practices are contextual and vary from one country to the next.

Researchers interested in applying the methodology described in this document should keep in mind that there may be counterintuitive and spurious findings where negative instead of positive relationships between determinants and practices are detected. In such instances, it will be important to remember that the relationships detected may not imply causality and that the practice and the determinant in question may be influenced by a third factor or that the practice is influencing the construct. Further qualitative research may also help clarify such relationships.

The measurement of handwashing determinants described in this document contributed to the design and, to a lesser extent, the monitoring of handwashing promotion interventions in Senegal and Peru.[26] This methodology proposes a roadmap that should be followed as suggested. Quality assurance is an important element in all steps. Although a set of generic statements may be made available per determinant for their eventual use in different country settings, they need to be adapted or expanded to fit local realities. Data collection efforts will require refinements and may lead to the inclusion of sub-steps to the process, making the piloting longer, for example, without altering the general principles behind the guidelines that the methodology proposes.

The ultimate goal of handwashing promotion is that the use of water and soap to practice handwashing at critical junctures becomes sustainable. Some would argue that this may be achieved if handwashing with soap becomes automatic at critical junctures, and that automaticity is possible if the practice is habitual. Appropriate measures of habitual handwashing practices remain a challenge.

Through this experience, the Global Scaling Up Handwashing Project has learned several lessons that are worth sharing with the international hygiene promotion community. These lessons will be useful for researchers and program managers interested in the using the PSI methodology to measure handwashing determinants with the goal of increasing project effectiveness. These lessons are summarized below and are organized in categories following the cycle of research activities to support program implementation: instrument design, data collection, initial data analysis (broken down into scale construction and predicting handwashing), and program follow-up.

7.1 Instrument Design

- Pretesting and piloting are crucial steps of the methodology. There should be no assumption that the experience accumulated in one country can be easily transferred to another. Each country setting may offer its own challenges. The different steps outlined in the PSI methodology must be honored to be successful.
- All items must be tested and piloted at each site because the usefulness of the items to construct a valid and reliable scale may end up being country specific.
- Statements may generate response bias. Different instrument forms may need to be tested to reduce it.

[25] Devine et al. 2012
[26] Coombes and Paynter 2011, Devine and Koita 2010

- It may prove difficult to translate complex ideas originating in a Western context and adapt them to different languages and cultural settings. For example, some of the statements associated with the SRHI such as "Handwashing is typically you" proved challenging. Translators involved in making the translations should be not only good linguistic translators but also good cultural interpreters. Of course, back translation is essential for quality assurance purposes.

7.2 Data Collection and Entry

- Different data gathering strategies may be needed to obtain a good spread of responses and avoid skewedness. Pilot studies will help determine what that useful strategy will be. Options currently being tested include direct response to statements using different levels of agreement, aided responses through visuals, and stepwise approaches.
- Additional quality control steps may be necessary to guarantee success. In the case of Senegal, for example, the piloting of statements required more work than in Peru and different aided response methodologies had to be tested. Be cautious and ready to be flexible if additional safeguards are needed to get the measure right.
- Follow-up and supervision of fieldwork to collect data is crucial. This is particularly important at the initial stages of data collection. If a research firm is hired to collect data, that agency's fieldwork must be monitored as the research activity is rolled out. The initial batches of data collected may need to be entered quickly to get a sense of whether responses requiring levels of agreement are not too skewed. It is better to start slowly and detect problems early to avoid ending up with poor-quality work completed on schedule, and problems with data collection detected only at later stages of the process.

7.3 Scale Construction

- The procedures to determine validity and reliability of scales are different; both need to be implemented following the protocol.
- Because these procedures are different, valid scales might not be reliable scales. To be acceptable, however, scales must be reliable.
- Statements required to construct valid and reliable scales may vary from country to country. In the end, what matters is that the determinant is measured properly, independent of country variations in its components.

7.4 Predicting Handwashing

- Perfectly reliable scales may or may not be predictors of handwashing practices. Do not expect all reliable scales to be handwashing predictors. A predictor in one country may not perform the same way in another.
- Predictors may attempt to predict different types of handwashing (after fecal contact, before food handling, or both). Handwashing after fecal contact may in fact be different from handwashing before handling food. As such, the predictors would also vary.
- Predictors may perform in the opposite direction from what is expected. Increases in the perception of threat, for example, may be negatively related to handwashing practices. If this is the case, however, this may be the result of instrumentation issues or of the fact that the correlation used to establish predictability is only a measure of association and not causality.
- The Access/Availability and Habit determinants operate as predictors in more than one site. Five other determinants operate as predictors in Senegal but not in Peru, and one additional determinant operates in Peru but not in Senegal.

7.5 Follow-Up

- In follow-up surveys, use only the reduced number of statements that make up valid and reliable scales. Yet, do not cherry pick items for monitoring or evaluation purposes as what is important is measuring the determinant and not the responses to individual and isolated statements. If the number of items retained for follow-up surveys continues to be too large and the surveys end up being too long, consider rotating the scales tracked. As such, round 1 may include scales 1, 3, and 5, and round 2 may include scales 2, 4, and 6.

7.6 Further Testing

- The measurement of Beliefs/Attitudes may require further development and testing. The incorporation of cultural and religious myths and beliefs to this determinant is not yet clear. They may end up constituting a separate scale in its own right as has been observed in Senegal.
- Qualitative research will be required to explore issues of this nature as well as to explore the differences that handwashers may see between different handwashing junctures.
- No determinant was identified in Vietnam. This may have been the result of multiple factors associated with how the testing of the framework was implemented in that country.
- There is clear indication that handwashing determinants can be used to monitor program activities. Changes in determinants can be traced back to program interventions in Peru. However, the relative limited coverage of those activities is worrisome, regardless of the magnitude of the change generated in the people they have influenced.
- The SRHI behaves in the same manner as the handwashing determinants in the FOAM framework. Not all SHRI items proposed theoretically end up integrating a valid and reliable measure of Habit. The importance of the measurement of Habit in the larger context of the FOAM framework needs to be further defined. Habit measurement, as defined by the SRHI, however, cannot be considered as a measurement of practices in the handwashing arena because self-reported handwashing is considered unreliable.
- Further research is also required to explore the possibility of treating responses to items as categorical instead of treating them as continuous variables because multi-statement scales may not always work to measure the determinants studied through the Global Scaling Up Handwashing Project. For knowledge in which a response is either correct or incorrect, categorical questions are clearly more appropriate.

VIII. Additional Implications for Replication

This section focuses on lessons learned, providing the basis for guidance that may be used for similar research activities carried out in the future.

Further Develop the Evidence about the Approach's Usefulness

- Seek opportunities to expand the application of the framework in other sites. Use the items included in the Annexes to measure determinants in further field-testing opportunities.

Practical Aspects of Future Applications

- If the incorporation of all items associated with the determinants in baseline studies is not possible, conduct separate formative research. This approach would allow programs to benefit from the results of this research to design behavior change communication programs.

Potential Measurement Refinements

- Prior to further applications of this approach in the context of handwashing programs, revise items to be used to ensure that future testing begins with one full set of harmonized formulations. At this point, there are minor variations in the formulation of several items considered generic and usable across countries.
- If the predictors vary by handwashing juncture, explore whether the formulation of items by juncture adds predictive value. To date, the thinking has been that handwashing after defecation or before handling food are identical behaviors, but this may not be the case given that the contexts in which the practice is performed are not identical. Reflect that distinction in statement formulation. Currently, items to measure determinants address the different junctures indistinctively. It is assumed, for example, that the social norms around handwashing should include items that address handwashing both after defecation and before preparing food. If they are separated and are used to predict handwashing at different junctures, results may vary.

Reflections about the Self Reported Habit Index

- Continue testing the utility of the SRHI. However, design a set of items that are tested as a generic set across country applications. Do not modify this set or replace items that make sense to researchers and program implementers as this index was already developed through multiple testing by its original authors.

IX. Conclusion

Measuring determinants through the approach documented in this technical paper is not an easy process and should not be undertaken unless the program has sufficient resources to manage it. A budget that can accommodate piloting and an adequate sample size and appropriate analytical and statistical skills are two resources that should be highlighted. Even when relationships between determinants and specific handwashing practices have been established, causality may not be inferred. In low resource settings, alternate methodologies, such as barrier analysis, may be considered to identify salient determinants.[27]

[27] See http://barrieranalysis.fhi.net for example.

Annex 1: Example of Questionnaire Used to Measure Opportunity, Ability, and Motivation in Senegal

ITEMS TO MEASURE OPPORTUNITY

Access/Availability
• You know of a place where you can buy soap.
• You can use laundry soap for handwashing.
• You have a designated place(s) in your house for handwashing.
• There is always enough water to wash your hands when you need to.
• You can buy soap when you decide to do it without asking someone else.
• Soap and water are always available in your house to wash hands after going to the toilet.
• You can always find soap when you need to use it.
• Soap and water are always available in your house to wash hands before eating.
• Sometimes you want to wash your hands but soap and water are not there when you need them.®
Product Attributes
• Soap removes bad smells from your hands.
• Soap makes you feel clean and fresh.
• Soap makes you feel healthy.
• Soap makes your child look pretty and clean.
• It does not matter which type of soap you use for handwashing after going to the toilet.
• It does not matter which type of soap you use for handwashing before cooking.
• It does not matter which type of soap you use for handwashing before feeding a child.
• Soap is needed to remove invisible dirt and germs when handwashing.
• Soap makes you more beautiful.
• Soap protects you and your family from disease.

ITEMS TO MEASURE OPPORTUNITY (*continued*)

Social Norms
• Most people you know wash their hands with soap before they eat.
• In your community most people do not have the habit of washing their hands with soap.®
• Someone who does not wash their hands with soap is disgusting.
• Most people you know wash their hands just with water.®
• Most people you know only wash their hands with soap after going to the toilet.
• In most homes in your community, soap and water are available to wash hands after going to the toilet.
• It is important that all mothers make sure they wash their hands with soap before preparing food.
• People who don't wash their hands with soap are not good members of the community.
• Not everyone in your household washes their hands with soap.®
• People who don't wash their hands with soap deserve to be criticized.
• People with good education are more likely to wash their hands with soap.
• People who have a high social status are more likely to wash their hands with soap.
• I would criticize a mother who did not wash her hands before feeding her baby.
• A person who does not wash their hands with soap is putting the whole community at risk of disease.
• It is important that everyone in the community makes sure they wash their hands with soap after going to the toilet.
• You feel happy when you know you are contributing to good hygiene in your community.

ITEMS TO MEASURE ABILITY

Knowledge	
• Why do you think babies have diarrhea?	
• What are ways to prevent babies from getting diarrhea? (Record all answers.)	• Use clean water for daily care • Eat cooked foods • Drink boiled/treated water • Do not overfeed children • Do not give children unusual foods • Wash children's hands with water • Wash children's hand with water and soap • Keep the children clean • Wash caretaker's hands with water • Wash caretaker's hands with water and soap • Do not know • Impossible to prevent • Other responses (Indicate clearly)
• According to you, which method makes your hands be the cleanest: (Do not read answers)	• Washing hands with water • Washing hands with water and soap • Using wet towels • Other (Indicate clearly)

(*continued*)

ITEMS TO MEASURE ABILITY (*continued*)

• When do you think it is necessary to wash your hands with soap? (Record all answers)	• Not necessary as washing only with water is more than enough • Any time • After going to the toilet • After washing the baby's bottom/changing the baby's diaper • Before preparing food • Before eating • Before feeding/breastfeeding the baby • Other (Indicate clearly)

Social Support
• Because handwashing with soap is natural, you don't need to be taught how to do it.®
• Information on the importance of handwashing with soap has never been given to you.®
• It is important to teach children to wash their hands with soap.
• It's a mother's job to make sure her children wash their hands properly.
• Radio and TV provide important information on handwashing.
• Someone in your household would criticize you if they saw you wash your hands with soap too often.®
• If a child does not want to wash his or her hands there is nothing you can do about it.®
• The school promotes handwashing among children.
• You have received health messages about the importance of handwashing with soap.
• Health workers provide important information on handwashing.
• Community leaders provide important information on handwashing.
• Religious, traditional communication leaders provide important information on handwashing.

ITEMS TO MEASURE MOTIVATION

Beliefs and Attitudes
• If you wash your hands really well with water you don't need to use soap.®
• You only need to wash your hands with soap if they look dirty or smell bad.®
• Handwashing with soap is important to stay healthy.
• Clean people are more trustworthy.
• Handwashing is done to prevent you from getting sick.
• You need soap to get rid of invisible germs and dirt when you wash your hands.
• You can't be a good person if you are not clean.
• Washing your hands with soap before feeding a child is important only if you use your hands to feed them.
• Washing hands uses up water in a household that could be better used for other purposes.®
• You don't need to wash your hands with soap if you know you have not touched anything dirty.®
• If you wash your hands many times with water you do not need to use soap.®
Outcome Expectations
• There is nothing you can do to prevent diarrhea.®
• Washing hands with soap can prevent other disease like colds, coughs, and pneumonia.
• If you want to prevent disease, you have to wash your hands with soap and not just water.

ITEMS TO MEASURE MOTIVATION (*continued*)
• If you make sure your children wash their hands with soap you can reduce how often they get diarrhea.
• If you care for your life you will make sure you wash your hands with soap.
• People will think highly of you if they see you wash your hands with soap before eating.
• People will think you are strange if you wash your hands with soap before feeding your child.®
• You would worry what people will think of you if they see you washing your hands with soap after coming out of a toilet.®
• When you wash your hands with soap you know you are protecting your children's health.
Threat
• In this house, my child is not at risk of getting diarrhea.®
• Children are more at risk than adults of getting diarrhea if they do not wash their hand with soap.
• Children are more at risk than adults of getting respiratory infections if they do not wash their hand with soap.
• Pneumonia can kill a young child.
• Diarrhea can kill a young child.
• Children who have diarrhea all the time don't grow normally.
Intention
• It is important to make sure you have money to buy soap.
• You make sure you have soap available for handwashing in the home.
• You make sure your household has enough water for handwashing.
• You have to check children to make sure they have washed their hands.
• When you can see your hands are dirty is when you know you should wash them.
• When you have touched something dirty is when you know you should wash them.
• If you have not touched anything dirty, smelly or bad and your hands are clean there is no need to wash them before eating.®

Annex 2: Example of Questionnaire to Measure Handwashing Determinants Used in the Peru Impact Baseline Study

ITEMS USED TO MEASURE OPPORTUNITY

Access/Availability
• You know of a place where you can buy soap.
• There is always enough water to wash your hands when you need to.
• You can buy soap when you decide to do it without asking someone else.
• Soap and water are always available in your house to wash hands after going to the toilet.
• You can always find soap when you need to use it.
• Soap and water are always available in your house to wash hands before eating.
• Sometimes you want to wash your hands but soap and water are just not there when you need them.®
• Soap must be placed in handwashing areas (kitchen, bath/toilet).
Social Norms
• Most people you know wash their hands just with water.®
• Most people you know only wash their hands with soap after going to the toilet.®
• In most homes in your community, soap and water are available to wash hands after going to the toilet.
• It is important that all mothers make sure they wash their hands with soap before preparing food.
• People who don't wash their hands with soap deserve to be criticized.
• People with good education are more likely to wash their hands with soap.
• People who have a high social status are more likely to wash their hands with soap.
• I would criticize a mother who did not wash her hands before feeding her baby.

ITEMS USED TO MEASURE ABILITY

Social Support
• Because handwashing with soap is natural, you don't need to be taught how to do it.®
• Information on the importance of handwashing with soap has never been given to you.®
• It is important to teach children to wash their hands with soap.
• It's a mother's job to make sure her children wash their hands properly.
• Someone in your household would criticize you if they saw you wash your hands with soap too often.®
• If a child does not want to wash their hands there is nothing you can do about it.®
• The school promotes handwashing amongst children.
• It is important to work with the teacher to promote behavior change among children, such as handwashing.
• It is important for parents to attend school meetings and activities.
• Parents have the responsibility of sending the school soap for handwashing.
• If soap were placed near the bathroom, children could wash their hands more often.
• Parents should know what their children learned in school.
• Older siblings can teach younger siblings to wash their hands.

ITEMS USED TO MEASURE MOTIVATION

Beliefs and Attitudes
• If you wash your hands really well with water you don't need to use soap.®
• You only need to wash your hands with soap if they look dirty or smell bad.®
• Washing your hands with soap before feeding a child is important only if you use your hands to feed them.®
• Washing hands uses up water in a household that could be better used for other purposes.®
• You don't need to wash your hands with soap if you know you have not touched anything dirty.®
• If you wash your hands many times with water you do not need to use soap.®
• It is worth taking a few extra seconds to add soap when washing your hands.

Annex 3: Example of Questionnaire Section to Measure Habits Used in Peru

HABITS

Previous handwashing experience	You have been washing your hands with soap for a long time.
	You wash your hands with soap frequently.
	Washing your hands with soap is not part of your daily routine.®
Automaticity	You wash your hands without realizing that you are doing it.
	Washing hands with soap requires no effort.
	You wash your hands with soap without even thinking about it.
	You wash your hands with soap automatically.
	You have to think about it twice before washing your hands with soap.®
	You have to deliberately remember to wash your hands with soap.®
Self identity	You feel uneasy when you do not wash your hands with soap.
	You would find it difficult to stop washing your hands with soap.
	Washing hands with soap is typically you.

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