Global Scaling Up Handwashing Project

Scaling Up Handwashing Behavior:

Findings from the Impact Evaluation Baseline Survey in Peru

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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.

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As an integral component of the Water and Sanitation Program's (WSP's) Global Scaling Up Handwashing Project, a cross–country impact evaluation (IE) study is being conducted in Peru, Senegal, Tanzania, and Vietnam. This study is led by the World Bank's WSP IE Team.

The project's Global IE Team oversees the IE design, methodology, and country teams. It is led by Bertha Briceno (in its early stages the Global IE was led by Jack Molyneaux), together with Alexandra Orsola-Vidal and Claire Chase. Professor Paul Gertler has provided guidance and advice throughout the project. Global IE experts also include Sebastian Galiani, Jack Colford, Ben Arnold, Pavani Ram, Lia Fernald, Patricia Kariger, Paul Wassenich, Mark Sobsey, and Christine Stauber. At the country level, the Peru IE Team manages the in-country design, field activities, and data analysis, and it is led by principal and co-principal investigators Sebastian Galiani and Alexandra Orsola, with operational assistance from Carlos Augusto Claux. Andres Drenik has also provided significant research support during the data analysis.

The Peru IE has also benefited from continuous support from Eduardo Perez, the project's global task team leader, Rocío Flórez Peschiera, the project's country task manager, and the Global and Peru technical team comprised of Hnin Hnin Pyne, Jacqueline Devine, Nathaniel Paynter, Craig Kullmann, Catherine Amelink, Christianne Frischmuth, Doris Alfaro, Carlos Augusto Claux, Jorge Aguela, and WSP support staff.

The technical body of the National Department for Health Promotion (Ministry of Health) and the Environmental Education Department (Ministry of Education) provided contributions to the initial impact evaluation concept design. The initial impact evaluation design was presented to the Ministry of Health and the Ministry of Education in Lima, Peru, in April and May 2007.

Global Scaling Up Handwashing is a WSP project focused on learning how to apply innovative promotional approaches to behavior change to generate widespread and sustained improvements in handwashing with soap at scale among women of reproductive age (ages 15–49) and primary school-aged children (ages 5–9). The project is being implemented by local and national governments with technical support from WSP. 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 Alexandra Orsola-Vidal 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.

WSP reports are published to communicate the results of WSP's work to the development community. Some sources cited may be informal documents that are not readily available.

SANITATION FOR ALL

Executive Summary

Background

In response to the preventable threats posed by poor sanitation and hygiene, the Water and Sanitation Program (WSP) launched two large-scale projects, Global Scaling Up Handwashing and Global Scaling Up Rural Sanitation,[1] to improve the health and welfare outcomes for millions of poor people. Local and national governments are implementing these projects with technical support from WSP.

Global Scaling Up Handwashing aims to test whether handwashing with soap behavior can be generated and sustained among the poor and vulnerable using innovative promotional approaches. The primary objectives are to reduce the risk of diarrhea in young children and increase household productivity by stimulating and sustaining the behavior of handwashing with soap at critical times. Overall, the project aims to generate and sustain handwashing with soap practices among 5.4 million people living in Peru, Senegal, Tanzania, and Vietnam, the four countries where the project has been implemented to date.

Handwashing with soap at critical times—such as after contact with feces and before handling food—has been shown to substantially reduce the incidence of diarrhea. It reduces health risks even when families do not have access to basic sanitation and water supply. Despite this benefit, rates of handwashing with soap at critical times remain low throughout the world.

In an effort to induce improved handwashing behavior, the project intervention borrows from both commercial and social marketing fields to bring about the desired outcomes. Behavior change communications campaigns and messages developed by the project have been designed and strategically delivered across multiple, integrated channels, in multiple settings, to "surround" target audiences with handwashing promotion.

One of the project's global objectives is to learn about and document the health and welfare impacts of the project intervention. To measure the magnitude of these impacts, the project is implementing an impact evaluation (IE) using a randomized-controlled experimental design in each of the four countries to establish the causal effect of the intervention (treatment) on specific health and welfare outcomes. The IE includes several rounds of household and community surveys: pre-intervention (*baseline*), concurrent (*longitudinal*), and post-intervention (*endline*). The surveys are designed to collect information on the characteristics of the eligible population and to track changes in desired outcomes.

This technical paper presents the findings of the WSP impact evaluation (IE) baseline survey in Peru and is one in a series of papers presenting IE findings from surveys conducted in each project country.

Peru Intervention

The handwashing project in Peru, implemented in 788 randomly selected districts located in 104 provinces, comprises a primary audience of mother/caregivers and children; the secondary targeted audience includes community-based agents such as schoolteachers, health promoters, and local leaders. In Peru, the project objective is to reach women (ages 14–49) and children (ages 5–12) in order to stimulate and sustain handwashing behavior change in a total of 1.3 million of those reached by project end.

The main components of the intervention include:

- Mass media and promotional events at the provincial level that combine local radio and outreach activities in public spaces to promote behavior change among the primary target audience, and
- School and community social mobilization activities at the district level, including educational sessions and promotional events, to reinforce messages among the primary target audience, and promote capacity building among the secondary target audience.

Methodology and Design

The IE study in Peru includes 120 of the 788 districts located in 80 of the 104 provinces and covers a representative sample of the population targeted by the intervention. The IE is designed to separately assess the effects of the two main intervention components as explained above. In addition, it assesses the impact of the handwashing curricula implemented in primary schools.

[1] For more information on Global Scaling Up Rural Sanitation, see www.wsp.org/scalingupsanitation.

In Peru, the IE baseline survey was conducted from May through August 2008, in a total of 3,526 households. Data was collected on a range of indicators, including: household characteristics, education, income, assets, water sources, sanitation, handwashing facilities and behavior, child environment, maternal depression, handwashing determinants, exposure to health interventions, relationship between family and school, diarrhea prevalence, acute lower respiratory infection (ALRI) and other health symptoms, child development, growth, anemia, and mortality. In addition, community questionnaires were conducted in all sample locations and structured observations of handwashing behavior, water microbiology samples, and child fecal samples were collected in a subsample of 160 households.

Findings

The main findings of the IE baseline survey in Peru are presented below.

Household demographics

Size, age, education, income—Households averaged 5.3 members, with 1.4 children under age five. On average, the household head was 37; around one-half of household heads had attained secondary education and the majority (95 percent) were employed. The average monthly household income per capita was 165 Peruvian *nuevos soles* (S/.).

Water, sanitation, and hygiene

Access to water supply—Three-quarters of the households had access to improved sources of drinking water, but for the poorest households, access to improved water sources decreased to 70 percent. Households living along the coast of Peru had higher access (86 percent) than those living in the mountains (73 percent) or the jungle (62 percent).

Access to sanitation—Half of the households had access to improved sanitation. The highest percentage of access to improved sanitation was observed among households located along the coast (54 percent), while the lowest access was for households located in the jungle (33 percent). Access for households located in the mountains was just below the average (47 percent). Over 20 percent of all households had no sanitation facilities of any type.

Handwashing with soap behavior—Although almost all caregivers report having washed their hands with soap at least once during the previous day, less than half confirmed having done so at times of fecal contact (46 percent of caregivers associated handwashing with soap with toilet use and 42 percent with cleaning children's bottoms). Handwashing with soap was higher at times of cooking or food preparation (68 percent), but lower when feeding a child (34 percent). Handwashing with soap increased with income at every critical juncture. In nearly two-thirds of the households (64 percent) a handwashing station stocked with soap and water was observed within the household or the yard. The number of households with an observed handwashing station with soap and water was higher in the jungle (72 percent) than along the coast (67 percent) or in the mountains (62 percent). The higher the income, the closer the handwashing station was to the toilet or kitchen facility. Over half of the caregivers (53 percent) appeared to have clean fingernails and about two-thirds had clean palms (67 percent) or clean finger pads (68 percent).

Environmental contamination—Households with access to improved sanitation presented lower counts of bacteria in hand rinses, drinking water, and on sentinel objects; households with access to an improved water source showed higher levels of water contamination. Water and caregivers' hand-rinse samples from households with a handwashing station with soap and water had lower counts of bacteria, but counts from child's hand-rinse samples and objects were higher in these households. When taking income levels into account, there was a declining trend of *Escherichia coli* (*E. coli*) counts with increased income. Households living along the coast presented the highest *E. coli* counts in samples taken from the mother; households located in the jungle showed the highest *E. coli* counts in objects and water.

Child health

Parasitical infestations—The most frequent parasites detected were *Giardia* and *Blastocystis*. On average, parasites were detected in 12 percent of the stool samples collected. Prevalence of parasites was lower among households with access to improved sanitation (7 percent) than those with unimproved sanitation (18 percent). Similarly, parasitical prevalence was lower among households with access

to improved water sources (8 percent) than those with unimproved water sources (25 percent). The lowest prevalence of parasites was found in households with a handwashing station stocked with soap and water (3 percent) and highest in those without (29 percent). Parasitical prevalence decreased as income increased; disaggregated by geographic location, prevalence was twice as high in the mountains (22 percent) than in the jungle (11 percent) or the coast (9 percent).

Diarrhea prevalence—Ten percent of children under the age of five had presented diarrhea symptoms in the previous 48 hours, 18 percent in the past seven days, and 20 percent in the past 14 days. Prevalence of diarrhea was higher in those households with unimproved sanitation (12 percent) and lower for those with improved sanitation (8 percent); however, diarrhea prevalence was not lower in households with access to a handwashing station with soap and water nor in households with access to improved water sources, compared to those without access. Diarrhea prevalence appeared to be uncorrelated with income, but it varied noticeably by geographic location. For instance, diarrhea prevalence in the jungle (13 percent) and the mountains (11 percent) was twice as high than rates found along the coast (6 percent).

Acute lower respiratory infection (ALRI) prevalence—On average, 4 percent of children presented ALRI symptoms in the previous 48 hours, and 6 percent in the previous seven days. ALRI prevalence increased for those children living in households with unimproved sanitation and those with unimproved water sources. ALRI prevalence was higher for children living in the mountains (6 percent) and lower for those living along the coast (2 percent). As with diarrhea, similar percentages of households presented ALRI symptoms in the previous week, irrespective of whether or not they had a handwashing station stocked with soap and water.

Anemia—Three-quarters of the samples taken indicated the presence of anemia. This proportion was lower for households with improved sanitation (70 percent) than those with unimproved sanitation (79 percent). Anemia presence was lower among households living in the jungle (70 percent) than those living along the coast (75 percent) or the mountains (76 percent). An unexpected result was that the percentage of individuals suffering from anemia increased with income level. A partial, plausible explanation could be that children in poor households were more likely to receive iron supplements.

Nutrition and child development

Nutrition—The average child was breastfed for 12 months, although over 60 percent of caregivers gave their children infant formula during the first three days of life. Vitamin A was given to 23 percent of the children and iron supplements to 22 percent.

Growth measures—Arm circumference was found to be higher than the population mean, as were the body mass index and the weight for length/height. By contrast, average weight-for-age, length/height-for-age, and head circumference were found to be lower than the population mean estimated by the World Health Organization (WHO). On average, children coming from households without improved sanitation, improved water source, or soap and water at handwashing station tended to have a lower average z-score for each anthropometric measure included in the analysis. All six measures increased with income. With respect to disaggregation by geographic area, all six measures indicated that children living along the coast were in a better situation than those living in the mountains and the jungle.

Child care environment—Three-quarters of the children (75 percent) appeared clean at the time of the interview but almost half of them had dirty fingernails (47 percent). The overall cleanness of children (hands, clothes, fingernails, face) increased with income. The majority of the children played both with toys (83 percent) and with adult household members (84 percent). Each of these percentages increased as income levels increased.

Cognitive development—An index of child development was developed for specific skills for age, including communication, social-personal, and gross motor skills. We systematically observed a lower degree of development for every type of skill in children from households without improved sanitation, without improved water source, and without soap and water at the handwashing station. All the measures increased with income, but no clear-cut pattern was observed when disaggregated by geographic location.

Abbreviations and Acronyms

ALRI	Acute Lower Respiratory Infection
C	Counterfactual or Control Group
C-Schools	Counterfactual or Control Group in Schools
E. coli	*Escherichia coli*
ENAHO	National Household Survey (Encuesta Nacional de Hogares)
Hb	Hemoglobin
HH(s)	Household(s)
HW	Handwashing
IE	Impact Evaluation
T1	Mass Media Treatment or Treatment 1
T2	Social Mobilization Treatment or Treatment 2
T2-Schools	Treatment 2 in Schools
WHO	World Health Organization
WSP	Water and Sanitation Program

Contents

Figures

Tables

Boxes

Map

I. Overview

1.1 Introduction

In December 2006, the Water and Sanitation Program (WSP) began implementation of two related large-scale sanitation and hygiene projects with funding from the Bill & Melinda Gates Foundation. The interventions include the Global Scaling Up Handwashing Project and the Global Scaling Up Rural Sanitation Project. The goal of the handwashing project is to reduce the risk of diarrhea and therefore increase household productivity by stimulating and sustaining the behavior of handwashing with soap at critical times in 5.4 million people in Peru, Senegal, Tanzania, and Vietnam. Thus, on average, the project will improve the handwashing behavior of over one million people per country.

Handwashing with soap at critical times (such as after contact with feces and before handling food) has been shown to substantially reduce the incidence of diarrhea. It reduces health risks even when families do not have access to basic sanitation and water supply service. Despite this benefit, rates of handwashing with soap at critical times are very low throughout the world.

The project aims to test whether this handwashing behavior can be improved among the poor and vulnerable using innovative promotional approaches. In addition, it will undertake a structured learning and dissemination process to develop the evidence, practical knowledge, and tools needed to effectively replicate and scale up future handwashing programs.

WSP's vision of success is that at the end of project we will have demonstrated that handwashing with soap, at scale, is one of the most successful and cost-effective interventions to improve and protect the health of poor rural and urban families, especially children under age five. Moreover, we envision the effort to develop the evidence, practical knowledge, and tools for effective replication and scaling up of future handwashing programs, potentially reaching more than 250 million people in more than 20 countries by 2020.

The handwashing project's global activities test innovative approaches at scale and have four main objectives:

- Design and support the implementation of innovative large-scale, sustainable handwashing programs in four diverse countries (Peru, Senegal, Tanzania, and Vietnam).
- Document and learn about the impact and sustainability of innovative large-scale handwashing programs.
- Learn about the most effective and sustainable approaches to triggering, scaling up, and sustaining handwashing with soap behaviors.
- Promote and enable the adoption of effective handwashing programs in other countries and—through the translation of results and lessons learned—position handwashing as a global public health priority into effective advocacy and applied knowledge and communication products.

The handwashing project also aims to complement and improve upon existing hygiene behavior change and handwashing approaches, and to enhance them with novel approaches, including commercial marketing, to deliver handwashing with soap messages, along with broad and inclusive partnerships of government, private commercial marketing channels, and concerned consumer groups and NGOs. These innovative methods will be combined with proven community-level interpersonal communications and outreach activities, with a focus on sustainability. In addition, the project incorporates a rigorous impact evaluation component to support thoughtful and analytical learning, combined with effective knowledge dissemination and global advocacy strategies.

As reflected above, the process of learning, which is supported in monitoring and evaluation components, is considered critical to the project's success. As part of these efforts, the project will document the magnitude of health impacts and relevant project costs of the interventions. To measure the magnitude of these impacts, the project is implementing an impact evaluation (IE) using a randomized-controlled experimental design in each of the four countries to establish the causal effect of the intervention (treatment) on specific health and welfare outcomes. The IE includes several rounds of household and community surveys: pre-intervention (*baseline*), concurrent (*longitudinal*), and post-intervention (*endline*). The surveys are designed to collect information on the characteristics of the eligible population and to track changes in desired outcomes.

This report is part of a series presenting the analysis of baseline data collection surveys conducted in the implementation countries during 2008 and 2009.

Global Scaling Up Project Impact Evaluation Rationale and Aims

The overall purpose of the IE is to provide decision makers with a body of rigorous evidence on the effects of the handwashing and sanitation projects at scale on a set of relevant outcomes. It also aims to generate robust evidence on a cross-country basis, understanding how effects vary according to each country's programmatic and geographic contexts, and generating knowledge of relevant impacts such as child cognitive development, anthropometric measures, anemia, acute lower respiratory infection, and productivity of mother's time, among many others.

The studies will provide a better understanding of at-scale sanitation and hygiene interventions. The improved evidence will support development of large-scale policies and programs, and will inform donors and policy makers on the effectiveness and potential of the Global Scaling Up projects as massive interventions to meet global needs.

1.2 Project Background

In Peru, the handwashing project targets mothers/caregivers of children under five years old, and it is aimed at improving handwashing with soap practices. Children under five represent the age group most susceptible to diarrheal disease and acute respiratory infections, which are two major causes of childhood morbidity and mortality in less developed countries. These infections, usually transferred from dirty hands to food or water sources, or by direct contact with the mouth, can be prevented if mothers/caregivers wash their hands with soap at critical times (such as before feeding a child, cooking, eating, and after using a toilet or changing a child's diapers).

Children under five represent the age group most susceptible to diarrheal disease and acute respiratory infections, which are two major causes of childhood morbidity and mortality in less developed countries.

In an effort to improve handwashing behavior, the intervention borrows from both commercial and social marketing fields. This entails the design of communications campaigns and messages likely to bring about the desired behavior changes, and delivering them strategically so that the target audiences are "surrounded" by handwashing promotion. Some key elements of the intervention include:

- Key behavioral concepts or triggers for each target audience
- Persuasive arguments stating why and how a given concept or trigger will lead to behavior change, and
- Communication ideas to convey the concepts through many integrated activities and communication channels.

In an effort to improve handwashing behavior, the intervention borrows from both commercial and social marketing fields.

School initiative promotes handwashing with soap in Cajamarca

1.3 Project Components

The overall objective of the project is to improve the health of populations at risk of diarrhea and ALRI, especially in children under five years old, through a strategic communications campaign aimed at increasing handwashing behavior with soap at critical times (before preparing food, feeding, or eating, and after going to toilet or changing diapers).

In Peru, the handwashing project is implemented in 788 randomly selected districts in a total of 104 provinces. The intervention has the objective to reach 5.9 million women and children.

In Peru, the handwashing project is implemented in 788 randomly selected districts in a total of 104 provinces. The intervention has the objective to stimulate and sustain handwashing behavior change in a total of 1.3 million women and children. The implementation comprises two different components:

- **Component 1—Mass Media and Promotional Events: Mass-communications campaign at the provincial level**
  The communications strategy focuses on the availability and use of soap for handwashing and the need to wash hands with soap immediately before cooking or eating, and after going to the bathroom. It targets women ages 14 to 49, and children from 5 to 12 years of age. The main means of communication are local media (mainly radio) and unconventional media, such as market speakers.
- **Component 2—School & Community: Social mobilization at the district level**
  This component comprises several activities to achieve an integral and sustainable change at the community level. It also targets women from 14 to 49 and children from 5 to 12 years of age, but it engages multiple actors in the community over a period of time; these actors participate and become agents of change. The specific activities include:
  i. Institutional development elements to ensure sustainability, including advocacy, partnership building, and capacity strengthening,
  ii. A communications campaign through local media and promotional events (street parades, local theaters, etc.) focused on the school and community, and
  iii. Training of community actors and agents of change (such as teachers, medical professionals, community leaders), and provision of educational handwashing sessions for mothers and children.

1.4 Objectives of the Study

The objective of the IE is to assess the effects of the project on individual-level handwashing behavior and practices of caregivers and children. The IE also addresses important issues related to the effect of intended behavioral change on child health and development outcomes.

The objective of the IE is to assess the effects of the project on individual-level handwashing behavior and practices of caregivers and children. By introducing exogenous variation in handwashing promotion (through randomized exposure to the project), the IE also addresses important issues related to the effect of intended behavioral change on child health and development outcomes. In particular, it provides information on the extent to which improved handwashing behavior impacts infant health and welfare.

The IE aims to address the following primary research questions and associated hypotheses:

1. What is the effect of handwashing promotion on handwashing behavior?
2. What is the effect of handwashing promotion on health and welfare?
3. Which promotion strategies are more cost-effective in achieving desired outcomes?

The purpose of this report is to provide baseline information for the selected indicators and outcomes of interest included in the survey.

II. Methodology

2.1 Randomization

To address the proposed research questions, a proper IE methodology that establishes the causal linkages between the intervention and the outcomes of interest is needed.

In order to estimate the causal relationship between the project (treatment) and the outcomes of interest, the construction of an accurate counterfactual is required—that is, one needs a comparison group that shows what would have happened to the target group in the absence of the intervention.

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In order to estimate the causal relationship between the project (treatment) and the outcomes of interest, the construction of an accurate counterfactual is required—that is, one needs a comparison group that shows what would have happened to the target group in the absence of the intervention. In the case of the project intervention, which is being implemented over a two-year period, it is possible that factors such as weather, macro-economic shocks, or other new and ongoing public health, nutrition, sanitation, and hygiene campaigns, for example, could influence the same set of outcomes that are targeted by the project (e.g., diarrhea incidence in young children, health, and welfare). To account for factors external to the intervention, counterfactuals are created using comparison groups (control) that are equivalent to the treatment group on every dimension (observed and unobserved) except for the treatment, and thus account for time-varying factors that may affect the target population. Since a good counterfactual approximates what would have happened to treatments in the absence of the treatment, any differences in the average outcome measurements of treatment and control groups following the implementation can be understood as the causal effect of the intervention.

The randomization process, by which a random selection of communities receives the treatment and the remaining serve as controls, generates an appropriate counterfactual for the purposes of the impact evaluation.

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Survey team interviews caregivers

to a sub-set of communities can ensure the treatment and comparison groups are equal, on average,[1] and thus an appropriate counterfactual can be measured. A randomized experimental evaluation with a comparison group is valuable because it reduces the possibility that observed before-and-after changes in the intervention group are due to factors external to the intervention. If no control group is maintained and a simple pre-to post-assessment is conducted of the project, one cannot attribute changes in outcomes to the intervention with certainty.

The use of a random control group also helps to prevent other problems that affect our inference about the effects of the intervention. For example, communities chosen purposively as areas with a high likelihood of success for programs such as the project because of favorable local conditions (strong leadership, existing water and sanitation infrastructure, highly educated population, etc.) are likely to be different from areas that are considered less desirable for implementation. If a non-random control group is used, a comparison of treated and untreated areas would confuse the program impact with pre-existing differences, such as different hygiene habits, lower motivation, or other factors that are difficult to observe. This is known as *selection bias*. A random control group avoids these difficulties by ensuring that the communities that receive the program are no different on average than those that do not.

2.2 Study Design

In order to assess the impact of each of the components of the project in the health of children younger than five years old, the evaluation study has two main treatments, that is, one per component. These are the Mass Media Treatment at the provincial level, also referred to as Treatment 1 (T1), and the Social Mobilization Treatment at the district level, also referred to as Treatment 2 (T2). As previously mentioned, in order to evaluate and identify the health impacts of each component, a counterfactual to T1 and T2 is needed, which we refer to as the Control (C). The three groups, T1, T2, and C include households with children under two years old at the time of the baseline.

In order to assess the impact of each of the components of the project in the health of children younger than five years old, the evaluation study has two main arms, that is, one per component or treatment.

Additionally, the evaluation assesses the isolated impact of one subcomponent of T2: the promotion of handwashing behavior in primary schools, implemented in a limited number of schools. This school effect can be estimated by comparing households with children who attend "treated" primary schools to its counterfactual, that is, households with children who attend similar primary schools, but where handwashing promotion is not offered. Thus, to evaluate the impact of the school subcomponent, two additional groups are necessary: Treatment 2 in Schools (T2-Schools) and an extra counterfactual (C-Schools).

Additionally, the evaluation assesses the isolated impact of one subcomponent of T2: the promotion of handwashing behavior in primary schools, implemented in a limited number of schools.

This design allows us to investigate the impact of T1 and T2 (relative to control districts), and also enables us to investigate the differential impact on

[1] Technically, this is only true with infinite sample sizes, which is unaffordable and unnecessary. Instead, this study seeks to minimize the risk that the means of the treatment and comparison groups differ significantly. For details of mean comparison tests across treatment and control groups, please see Annex 3: Test of Baseline Balance.

households that have children in treated schools from that on households that do not (T2 relative to T2-Schools).

2.3 Sampling Size and Strategy

The sample size (total number of households) was chosen so as to capture a minimum effect size of 20 percent on the key outcome indicator of diarrhea prevalence amongst children under two years old at the time of the baseline.

The primary objective of the project is to improve the health and welfare of young children. The sample size (total number of households) was chosen to capture a minimum effect size of 20 percent on the key outcome indicator of diarrhea prevalence among children under two years old at the time of the baseline. The selection of households with children in this age group was made under the assumption that health outcome measurements for young children in this age range are most sensitive to changes in hygiene in the environment. Data was collected for household members of all age ranges and the corresponding data analysis was conducted for older children and adults as well.

Power calculations indicated that, in order to capture a 20 percent reduction in diarrhea incidence, around 600 households per treatment arm would need to be surveyed. Therefore, since the evaluation consists of three treatment groups and two control groups, the final sample incorporates approximately 3,000 households, each with children less than two years of age at the time the survey was conducted. An additional 500 households were added to the sample size in order to address potential attrition (loss of participants during the project); thus the minimal necessary sample size was 3,500 households (around 700 households per arm).

To select the sample, the IE team used a three-stage sampling methodology:

- **Stage 1: Province Level**
  From 195 total provinces in Peru, Pisco and Lima were excluded at the request of the implementation team.[2] Of the remaining 193 provinces, 80 provinces were randomly chosen. Out of these 80 provinces, two groups of 40 provinces each were randomly formed: Group of Provinces 1 (GP1) and Group of Provinces 2 (GP2).
- **Stage 2: District Level**
  Out of the first group of 40 provinces, GP1, 40 districts between 1,500 and 100,000 habitants were randomly chosen to receive T1. From the second group, GP2, 80 districts between 1,500 and 100,000 habitants were selected randomly; 40 of them were randomly assigned to receive T2, and the other 40 districts to serve as C to T1 and T2.
- **Stage 3: Household Level**
  For each of the three sets of 40 districts (120 districts total) allocated to T1, T2, and C, 15-20 households with children under two years of age were selected at random in each district. Also, in each of the 40 districts

[2] The province of Pisco was excluded because an earthquake had just hit the area. The province of Lima was excluded for being mainly urban and because most of its districts were too large for this type of intervention.

allocated to T2, an additional set of 15–20 households with children under two and at least one sibling attending a treatment school was randomly chosen to assess the isolated effect of the school sub-component T2-Schools. Finally, in each of the 40 districts allocated to C, an additional set of 15–20 households with children under two and at least one sibling attending a no-treatment school was also randomly selected to serve as the counterfactual for T2-Schools (C-Schools).

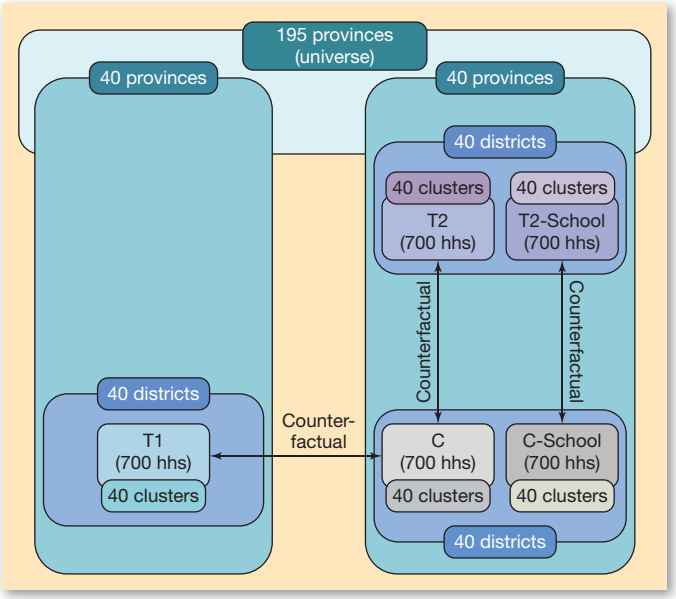
This sample selection process explained above is illustrated in Figure 1.

The household survey was based on cluster sampling, and included a total of 120 districts chosen among 80 provinces (both choices made at random). The expectation was to conduct a total of 3,500 household questionnaires and 120 community questionnaires (one per district). By the end of the survey, data was collected from 3,576 households and 120 districts in 80 provinces.

By the end of the survey, data was collected from 3,576 households and 120 districts in 80 provinces.

In addition to the household survey, fecal samples from children under two years old, water samples taken from caregiver and child's hand rinses, drinking water, and a sentinel toy were collected with the purpose of assessing the health status of children and the level of fecal contamination in the household. These measures were taken from a subsample of 160 households. Structured observations of handwashing behavior were also collected in the same subset of 160 households.

FIGURE 1: PERU IMPACT EVALUATION SAMPLE SELECTION



2.4 Variables for Data Analysis

In order to measure potential impacts of the intervention the study collects data on diarrhea, productivity, education, nutrition, child growth and development, iron deficiency, environmental contamination, parasite prevalence, and handwashing behavior and its determinants.

The IE aims to assess both the effect of the project on handwashing behavior and the effect on infant health and welfare. In order to measure potential impacts of the intervention the study collects data on diarrhea, productivity, education, nutrition, child growth and development, iron deficiency, environmental contamination, parasite prevalence, and handwashing behavior and its determinants.

The above variables are collected through three different surveys: the baseline survey (collected before the intervention), a longitudinal survey (collected a total of 10 times before, during, and after the intervention), and a post-intervention survey (collected after the intervention has finalized).

Box 1 and Box 2 summarize the variables measured and how measurements were performed.

BOX 1: HEALTH AND WELFARE IMPACTS

What Does the Evaluation Measure?	How Is It Being Measured?	Measuring Instrument
Diarrhea prevalence	Caregiver-reported symptoms collected in a 14-day health calendar	Household questionnaire
Productivity of mother's time	Time lost to own and child's illness	Household questionnaire
Education benefits	School enrollment and attendance	Household questionnaire
Child growth	Anthropometric measures:[3] weight/height, arm and head circumferences	In household collection of anthropometric measures
Child development	Caregiver reported personal-social, communication, and gross motor skills	Modified Ages & Stages Questionnaire (ASQ)[4]
Anemia	Hemoglobin concentration (<110g/L per international standards)[5]	In household collection and analysis of capillary blood using the HemoCue photometer
Environmental contamination	Prevalence of *E. coli* in: drinking water, hand rinses (caregiver & children), sentinel toy	In household collection of samples, and microbiological analysis in lab
Parasite prevalence	Parasite prevalence in fecal samples	In household collection of samples, and parasitological analysis in lab

[3] Habicht 1974.
[4] Bricker & Squires 1999.
[5] Stoltzfus & Dreyfus 1999.

BOX 2: HANDWASHING BEHAVIOR AND DETERMINANTS

What Does the Evaluation Measure?	How Is It Being Measured?	Measuring Instrument
Handwashing w/soap behavior	Direct observation of handwashing station stocked with soap and water	Household questionnaire
	Self-report handwashing with soap behavior	Household questionnaire
	Observed handwashing with soap behavior	Structured observations
Determinants to handwashing with soap behavior[6]	Opportunity, ability, and motivation determinants	Household questionnaire

Head circumference is measured to assess child health

2.5 Instruments for Data Collection

The baseline survey was conducted May through August 2008 and included the following instruments:

- **Household questionnaire:** The household questionnaire was conducted in all 3,576 households in 120 districts to collect data on household membership, education, labor, income, assets, dwelling characteristics, water sources, drinking water, sanitation, observations of handwashing facilities and other dwelling characteristics, handwashing behavior, child discipline, maternal depression, handwashing determinants, exposure to health interventions, relationship between family and school, and mortality.
- **Health questionnaire:** The health questionnaire was conducted in all 3,576 households in 120 districts to collect data on children's diarrhea prevalence, ALRI and other health symptoms, child development, child growth, and anemia.
- **Community questionnaire:** The community questionnaire was conducted in 120 districts to collect data on community/districts variables.
- **Structured observations:** Structured observations were conducted in a subsample of 160 households to collect data on direct observation of handwashing behavior.
- **Water samples:** Water samples were collected in a subsample of 160 households, to identify *Escherichia coli* (*E. coli*) presence in hand rinses (mother and children), sentinel toy, and drinking water.
- **Stool samples:** Stool samples were collected in a subsample of 160 households to identify prevalence of parasites in children's feces.

[6] The analysis for determinants to handwashing with soap behavior change is not included in this report.

The post-intervention survey will be conducted October through December 2010 and will collect, at least, all the indicators collected during the baseline survey.

A total of ten longitudinal surveys will be conducted during the study. The post-intervention survey will be conducted October through December 2010 and will collect, at least, all the indicators collected during the baseline survey.

The survey instrument was drafted by the WSP global impact evaluation team, which is formed by experts from a variety of disciplines. The complete instrument, which included a set of household, community, and longitudinal questionnaires, was translated into Spanish and pre-tested in a pilot survey including 60 households.

Hemoglobin concentrations were measured in children under two years old at the household level using the HemoCue Hb 201 photometer, a portable device that allows for immediate and reliable quantitative results. Using sterile and disposable lancets (pricking needle), a drop of capillary blood was obtained from the child's second or third finger and collected in a cuvette, and then introduced into the HemoCue machine. Hemoglobin concentration appeared in the display screen of the device in about one minute, and results were transferred to the questionnaire. Anthropometric measures were made according to standardized protocols using portable stadiometers, scales, and measuring tape.[7]

Water samples from a hand rinse, drinking water, and sentinel objects were analyzed to determine presence of *E. coli* and other types of coliforms. The samples were collected within the household, inoculated using the Colilert® reactive and transported to a lab. At the lab, samples were incubated at 35 degrees Celsius for 24 hours, and the results were read using an ultraviolet lamp. This procedure precluded sampling in areas where the cold chain could not be maintained. Fecal

Health survey team carries equipment to measure health outcomes

[7] Habicht 1974.

samples were collected in the same subsample of households and transported to a central lab in Lima for parasitological analysis.

After the questionnaires were administered, structured observations were conducted. During a five-hour period, the researcher observed the handwashing behavior of the primary caregiver. Opportunities for handwashing for persons other than the primary caregiver were also noted if the individual came into the line of sight of the interviewer. During the five-hour period, the interviewer noted any opportunity for handwashing and whether handwashing occurred during that time, as well as the details of the opportunity: the type of critical event, the cleansing agent used (e.g., bar soap, liquid soap, mud), washing of both hands, and method of hand drying. Critical events of interest included fecal contact (going to the toilet, defecating, or changing children's diapers), preparing food, eating, or feeding children.

Field team members administered the instruments. Each field survey team consisted of a team supervisor, two health members, and three interviewers. Those teams working in districts where structured observations of handwashing behavior were collected included an extra person in charge of the observations. Thus, the field personnel for the collection of the baseline data included a total of 15 field supervisors, 30 health members, 45 interviewers, and 10 observers.

Field team supervisors were required to have previous fieldwork experience in conducting similar studies, a required level of superior technical education, and to show a satisfactory performance in all areas of training (anthropometry, biometrics, and especially questionnaire training). Health specialists had to be standardized in order to collect anthropometric, anemia, and Ages and Stages Questionnaire (ASQ) data. The Nutritional Research Institute (Instituto de Investigacion Nutricional), with support from the global IE team, conducted the training for the collection of child-related data, and was in charge of the standardization in the three measures (anthropometrics, anemia tests, and ASQ). Interviewers were required to complete the training satisfactorily and conduct at least three interviews in under-the-average time. Finally, observers (for structured observations) had to complete the training course successfully and conduct three four-hour observations, of which the trainers supervised at least one.

Specific training was designed for each member of the survey team according to the specific skills required for the task to be performed in the field.

III. Sample Representativeness

3.1 Geographic Representativeness

The purpose of the IE design was to evaluate the causal effect of the intervention on a set of outcomes. As previously discussed, a randomized experimental design was used to ensure an accurate comparison between treatment and control groups. Thus, the evaluation design was intended to be representative of the population targeted by the intervention, rather than representative of the Peruvian population.

The sample included in the IE study is not representative of the Peruvian population at the national level because the selection of provinces and districts was random and not weighted by population.

The sample included in the IE study is not representative of the Peruvian population at the national level because the selection of provinces and districts was random and not weighted by population, as would be necessary to be geographically representative. Because populations differ across provinces and districts, the three-stage sampling design introduced a type of bias (with respect to geographical representativeness) because selection probabilities varied across administrative units.

In addition to the national scale, the sample is likewise not representative at the provincial, district, or household levels, due to the following reasons:

- At the provincial level, Lima and Pisco were excluded from the overall sample of provinces, and out of the total 195 provinces in the country, only 80 provinces were selected (less than half of the total provinces).
- Similarly, at the district level, only 120 districts were selected from over 1,800 districts in Peru (less than 10 percent of the total number of districts). Moreover, the sample only included districts with populations between 1,500 and 100,000 inhabitants. An additional characteristic of the districts included in the IE sample is that they all had at least one primary school. Each of these factors suggests that selected districts need not be representative of all districts.

Household members during survey interview

- Lastly, at the household level, between 15 and 20 households were selected per district. Although the size of the district was taken into consideration in choosing the exact number of households, the population per district was not precisely weighted for representativeness. Rather, the criteria were: 10 households for districts under 2,250 residents; 15 households for districts between 2,250–6,000 residents; and 20 households for districts over 6,000 residents. Crucially, the IE sample only included households with at least one child less than two years old. These factors prevent the claims about the representativeness of sampled households.

The IE sample was designed with the primary intention of producing internally valid estimates of program impacts and would not be suitable for computing country or district level population statistics without appropriate corrections. For further details on the selected list of provinces and districts, please refer to Annex 1.

The IE sample was designed with the primary intention of producing internally valid estimates of program impacts and would not be suitable for computing country or district level population statistics without appropriate corrections.

3.2 Comparison Between WSP Baseline Study and Peru Population

In this subsection we compare some basic characteristics of the Peruvian population against characteristics of the individuals included in the IE subsample. The main reason behind this exercise was to confirm the external validity of the results presented throughout the document. We concentrated on four groups of variables: demographics, educational attainment, occupation, and total household income per capita. We used the Peru 2007 National Household Survey/Encuesta Nacional de Hogares (ENAHO) data for the comparison (ENAHO 2007).[8]

Table 1 presents the demographics for both subsamples. The population included in the WSP impact evaluation baseline survey comprises a much younger population than the general population. On average, the individuals interviewed in the WSP survey were 18.4 years old, whereas the average age of total population was 28.3 years. The primary reason for this difference is that there were no childless households in the WSP sample. While the average number of children under the age of five per household was 0.43 in Peru, this figure was 1.37 in the WSP sample.

The population included in the WSP impact evaluation baseline survey comprises a much younger population than the general population.

Regarding educational attainment, there appears to be no significant differences between the individuals included in the WSP survey and total population (Table 2). Although in this subsample there was a smaller proportion of individuals with no education, the proportion of those with trade, undergraduate, or graduate education was also smaller compared to the total Peruvian population older than 14 years old.

Regarding educational attainment, there appears to be no significant differences between the individuals included in the WSP survey and total population.

In what follows, we focus on the occupational differences between both subsamples in order to assess the different possibilities of income generation. As we can

[8] We excluded the Metropolitan Area of Lima from the ENAHO. The population considered in the ENAHO was selected following the restriction of age imposed by the WSP survey for each group of questions. Nominal income-related variables were adjusted by the inflation rate of 2008 obtained from the Instituto Nacional de Estadistica e Informatica (INEI).

TABLE 1: DEMOGRAPHICS

	WSP Survey	ENAHO
Age (% Individuals):		
0–4	26.0%	9.9%
5–9	13.0%	10.7%
10–14	9.7%	12.6%
15–19	7.6%	10.7%
20–24	8.6%	8.0%
25–29	9.8%	6.9%
30–34	8.6%	6.6%
35–39	6.0%	6.3%
40–44	3.3%	5.8%
45–49	2.1%	4.9%
+50	5.5%	17.6%
Average Age	18.64	28.27
Total Number of Children Under Five (% HHs):		
0	0.0%	66.6%
1	66.7%	25.1%
2	29.2%	7.4%
3	3.9%	0.8%
4	0.1%	0.1%
Average number of children under five (number of children)	1.37	0.43

see in Table 3, the percentage of individuals of the total population over 14 years old that had a job was almost 10% higher than that of the WSP subsample. Furthermore, there was a much higher proportion of individuals who "look after the home" in the WSP subsample (31.5%) compared to that of the total population (10%). This last result was probably driven by the presence of at least one child in the WSP survey, since a high proportion of women were the mothers of those young children and stayed at home in order to take care of them.

TABLE 2: EDUCATIONAL ATTAINMENT

	WSP Survey	ENAHO
Level of Education Attained (% Individuals):		
No Education	3.41%	9.4%
Kindergarten	4.8%	2.0%
Primary	45.6%	42.2%
Secondary	41.8%	32.3%
Trade School	4.8%	7.1%
University	2.9%	6.5%
Higher	0.0%	0.6%

TABLE 3: OCCUPATION

	WSP Survey	ENAHO
Last Week Activity (% Individuals):		
Working	57.2%	67.5%
Not working, but has a job	1.4%	1.4%
Looking for work	0.9%	2.3%
Studying	5.9%	6.0%
Looking after the home	31.5%	10.0%
Rent earner	0.0%	1.2%
Permanently unable to work	0.9%	2.3%
Retired	0.1%	–
Not working and not looking for job	2.1%	9.3%
Primary Employment Status (% Individuals):		
Self-employed	54.4%	37.8%
Employee	36.6%	30.2%
Employer or boss	0.4%	5.6%
Worker with no remuneration	7.8%	23.5%
Day laborer	0.9%	–
Other	0.1%	2.90%

We also find important differences concerning primary employment status. In the WSP subsample there was a much larger proportion of self-employed workers than in the total population, 54.4% and 37.8% respectively. Also, the WSP population had a smaller proportion of employers and workers with no remuneration, indicating a smaller household income per capita in the WSP sample.

Finally, we present two measures of income: salaries received in the primary work and total household income per capita.[9] Figure 2 presents the distribution of salaries divided into two groups: dependent and independent workers.

The average salary of the dependent workers surveyed by the WSP survey was 521.91 Peruvian *nuevos soles* (S/.), while the average salary of those surveyed in the ENAHO was S/. 680.40. Moreover, the maximum salary earned by dependent workers in the WSP survey was almost S/. 1,000 less than the one earned by total dependent workers in Peru. The same difference applies to the subsample of independent workers included in the WSP survey, whose average income was S/. 332.70, while that of the total independent workers of Peru was S/. 381.70.

The average salary of the dependent workers surveyed by the WSP survey was 521.91 Peruvian *nuevos soles* (S/.), while the average salary of those surveyed in the ENAHO was S/. 680.40.

[9] In the ENAHO we considered the gross salary for the dependent workers. For the independent workers, we included the payments received in kind, since the ENAHO does not divide the independent worker's income into monetary and inkind income (the WSP survey does not include income perceived in kind). The ENAHO measure of total HH income per capita includes: dependent workers' salary, independent workers' income, other labor income, domestic and foreign transfers, income received from the rent of household assets, and other extraordinary income. For these three income measures we used the imputed, deflated, and annualized variables provided by the ENAHO, which were inflation-adjusted and divided by 12 in order to have monthly values.

FIGURE 2A: DISTRIBUTION OF SALARIES RECEIVED IN THE PRIMARY OCCUPATION: DEPENDENT WORKERS

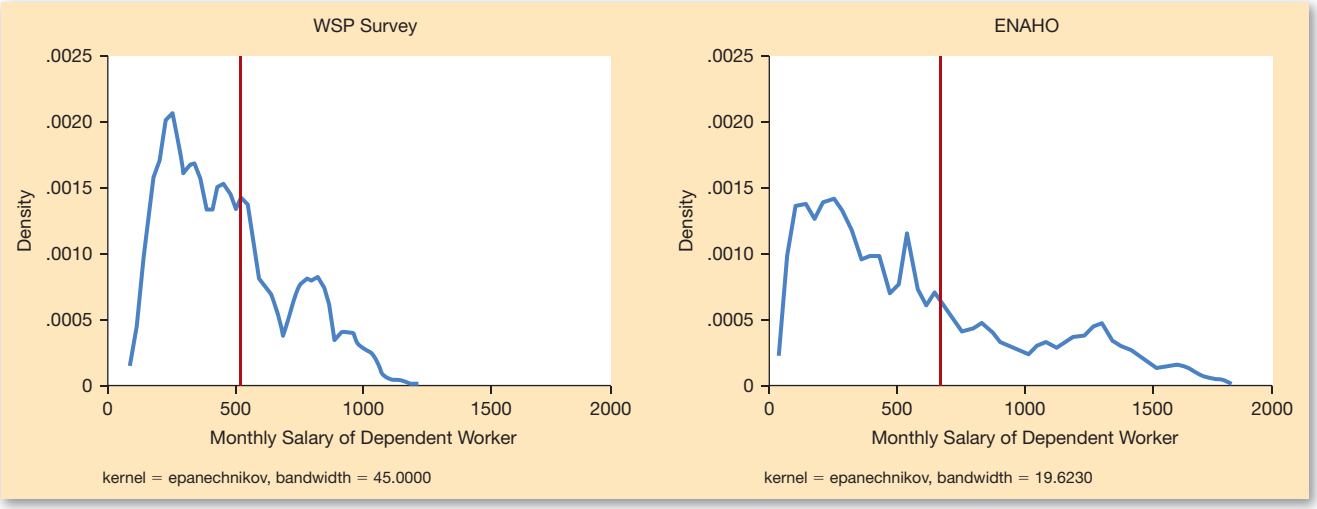
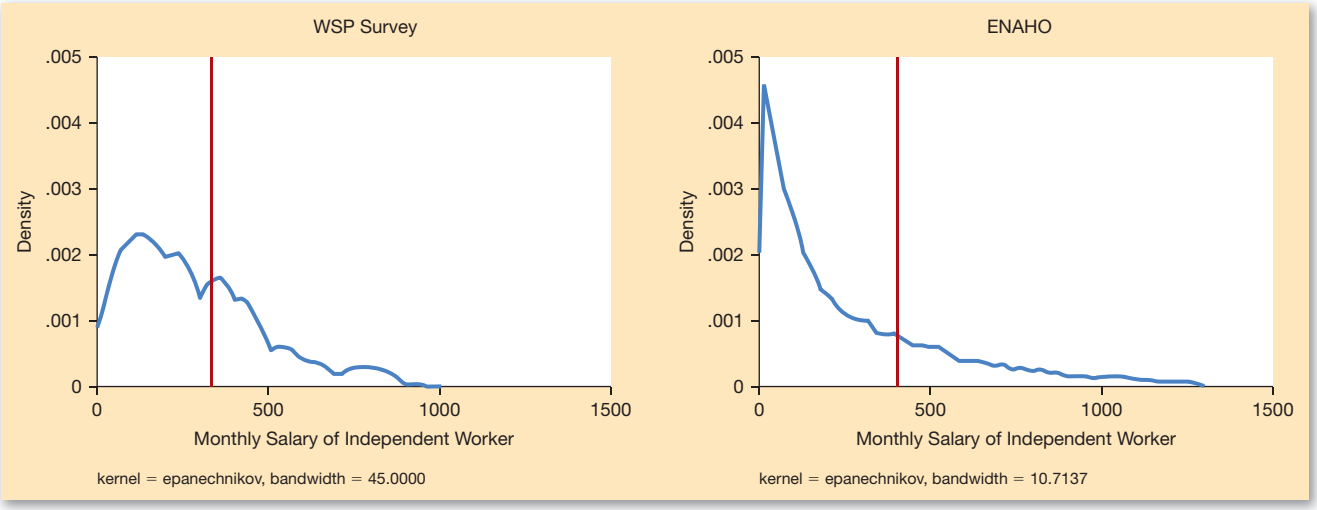
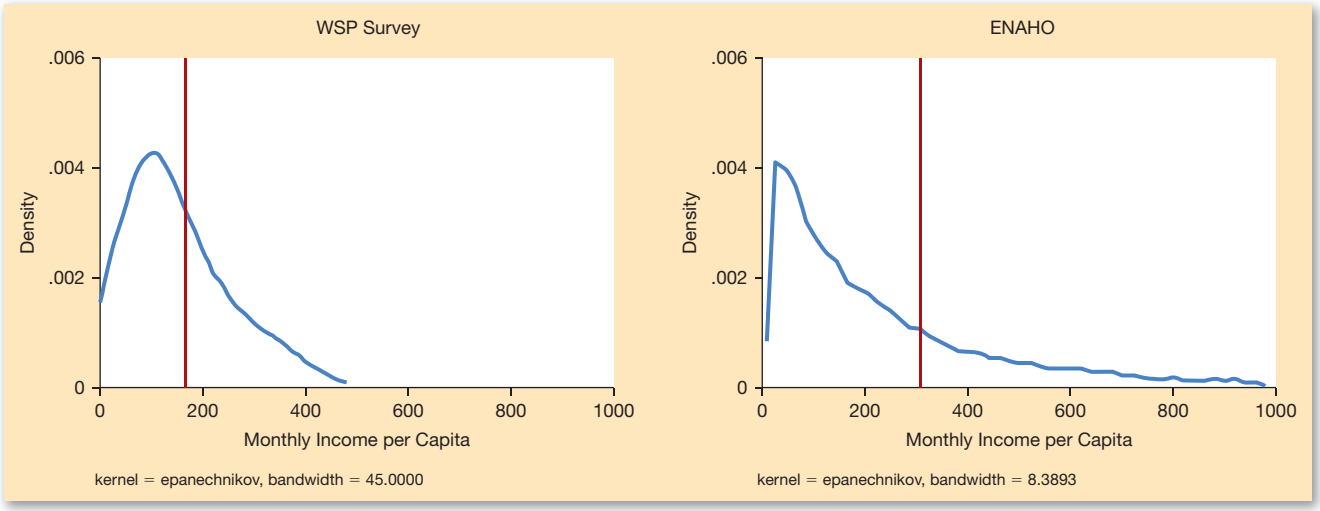


FIGURE 2B: DISTRIBUTION OF SALARIES RECEIVED IN THE PRIMARY OCCUPATION: INDEPENDENT WORKERS



Even before considering other types of household income, one could predict that, on average, the total household income per capita was going to be much smaller in the household interviewed by the WSP survey. The main reasons for this are that households in our sample had on average a larger household size, as well as less labor income. Figure 3 presents the distribution of the total household income per capita. The average monthly income per capita among households included

FIGURE 3: DISTRIBUTION OF MONTHLY INCOME PER CAPITA



in the WSP survey was S/. 165.30; on the contrary, Peru's average monthly household income per capita was S/. 328.60. Therefore, since our subsample was on average poorer than the average Peruvian households, we expected many of the individual's responses to be influenced by the individual's household income, possibly because for those households with lower income, income level may have had a higher marginal effect on the topics covered in this report.

IV. Findings

Throughout this report, we disaggregate all the findings by income and geographic criteria, and for outcomes of interest (child development, diarrhea, etc.) We also disaggregate the variables by sanitary conditions: access to water, sanitation facilities, and a handwashing station.

Throughout this report, we disaggregate all the findings by income and geographic criteria, and for outcomes of interest (child development, diarrhea, etc.) we also disaggregate the variables by sanitary conditions: access to water, sanitation facilities, and a handwashing station. The importance of this group of variables is directly related to their effects over the probability of an individual getting sick due to unsanitary-environment related diseases.

Table 4 presents summary statistics related to access to improved drinking-water source and improved sanitation facility,[10] as well as access to an observed handwashing station with soap and water.[11] On average, 47.8% of the surveyed households had access to improved sanitation. This figure rose to 54.4% for households located in a coastal area and declined to 32.5% for those located in the jungle. The number of households with access to improved water was higher; over 75.6% of the households had access to an improved water source. Again, this proportion was higher for those households located in a coastal area and lower for those in the jungle, 86.3% and 62% respectively. Finally, almost 65% of the households had a handwashing station with soap and water. Households in the jungle of Peru had the highest percentage of handwashing stations with soap and water.

Map 1[12] presents a disaggregation of these variables by administrative department. The proportion of households having access to improved sanitation and improved water sources was clearly higher for the departments located near the Peruvian coast, as we have already mentioned. However, when using maps to show this information, we divide Peru into two large groups of departments with a very unequal percentage of households having improved sanitation and water source.

TABLE 4: PERCENT DISTRIBUTION OF WATER, SANITATION, AND HYGIENE CONDITIONS BY GEOGRAPHIC AREA

	Geographic Area			
(*) As per JMP Definition	Coast	Jungle	Mountain	Total
Access to Improved Sanitation Facility* (% HHs)	54.4%	32.5%	47.1%	47.8%
Access to Improved Drinking-Water Source* (% HHs)	86.3%	62.0%	72.4%	75.6%
Observed HW Station with Soap and Water (% HHs)	66.5%	72.3%	62.0%	64.4%

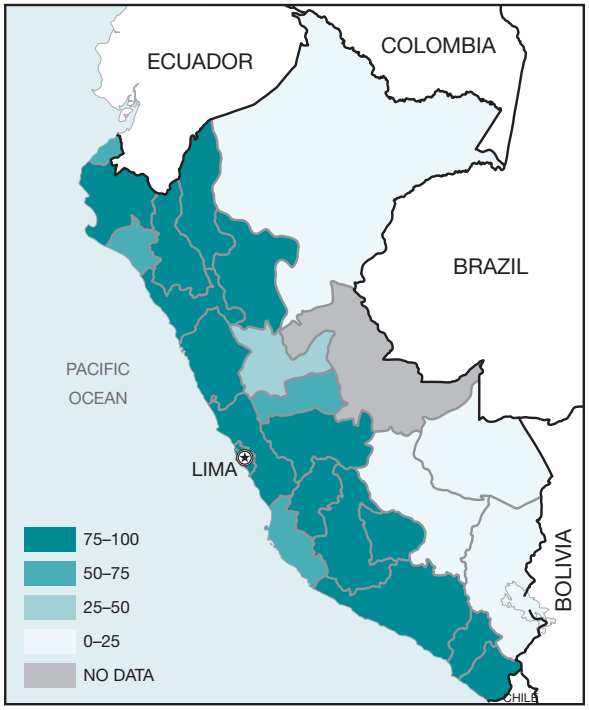
[10] The "Access to Improved Sanitation Facility" and "Access to Improved Drinking-Water Source" variables were created following the definitions and recommendations made by the WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation (http://www.wssinfo.org/definitions/infrastructure.html).

[11] The variable change "Observed HW Station with Soap and Water" responds to the number of households with an observed handwashing station stocked with soap AND water within the dwelling and/or yard premises.

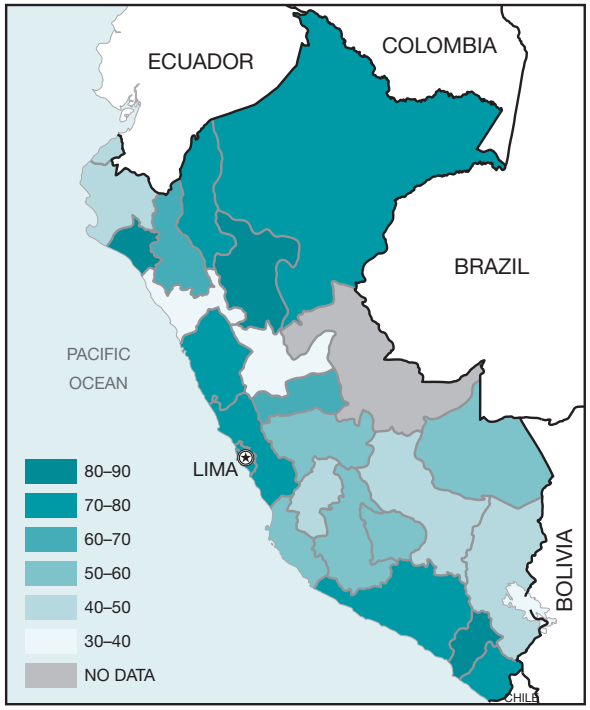
[12] The maps were computed without using sampling weights.

MAP 1: MAP OF PERU WITH DESCRIPTIVE STATISTICS BY ADMINISTRATIVE DEPARTMENT

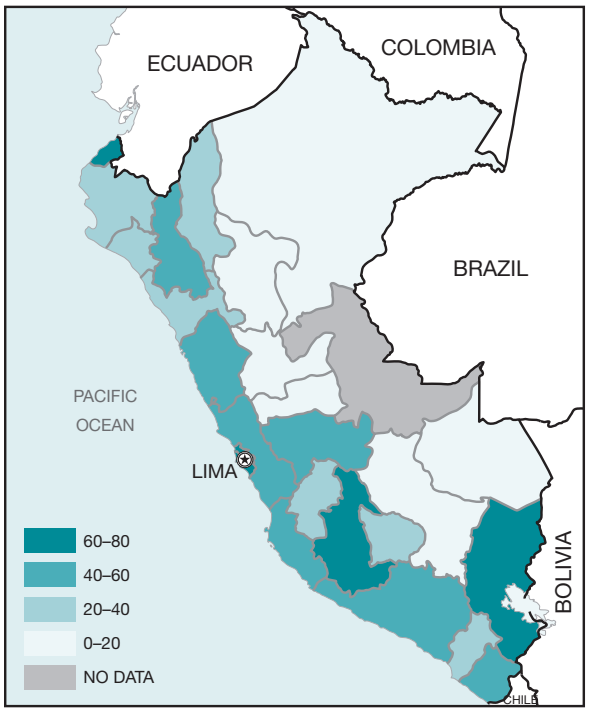
PERCENTAGE OF HOUSEHOLDS WITH IMPROVED WATER SOURCE



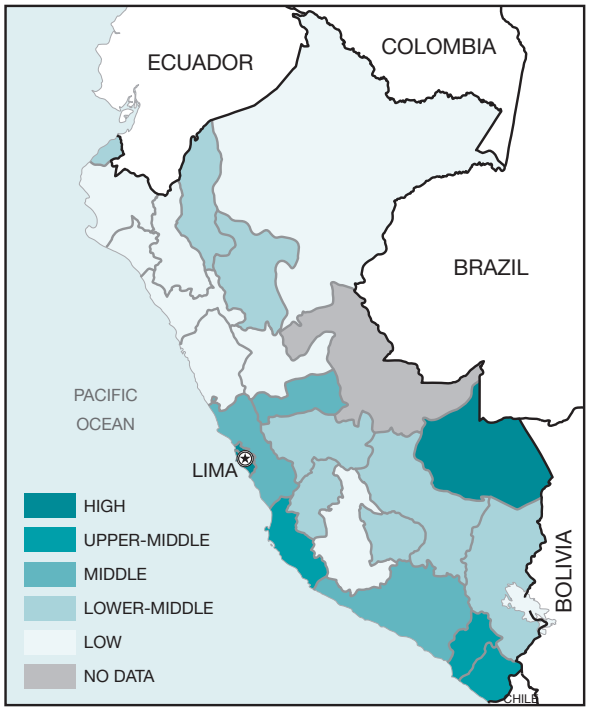
PERCENTAGE OF HOUSEHOLDS WITH A HANDWASHING STATION WITH SOAP AND WATER



PERCENTAGE OF HOUSEHOLDS WITH IMPROVED SANITATION



AVERAGE INCOME GROUP



We then analyze the proportion of households having soap and water available at the handwashing station, disaggregated by department. We find that many departments having a very low proportion of households with improved sanitation and water source present a high proportion of households having soap and water at handwashing station.

In order to provide an explanation for the results recently found, we show the distribution of the Peruvian departments according to some measure of household wealth level. As previously mentioned throughout this document, the tabulation of the variables is disaggregated by total household income per capita quartiles, which is an important determinant of certain household characteristics (especially in this subsample, where there is a large proportion of poor individuals relative to the total Peruvian population). For this purpose, total household income was calculated considering the total monthly labor income provided by household members (salaries received in the first, second, and/or other jobs, income received from a pension plan, unemployment, and/or health insurance) and the total monthly household non-labor income (interest on investments, rents, scholarships, government transfers, donations, income received from household and/or agricultural production, etc.).[13]

Total household income per capita was calculated by dividing total household income by the total number of household members; the quartile classification was constructed by considering only one observation per household. The result of this classification is geographically displayed in Map 1 (Average Income Group). The relevant division of Peru according to the average income group by department seems to be a North-South classification. The correlation figures presented in Table 5 reinforces the weak relationship between these four variables.

4.1 General Household Characteristics

An average household consisted of five individuals, among whom there was more than one child younger than five years old. Household heads were 37 years old on average, half of them had some level of secondary education, and almost everyone was employed.

Table 6 shows a brief summary of household basic socio-economic variables. An average household consisted of five individuals, among whom there was more than one child younger than five years old. Household heads were 37 years old on average, half of them had some level of secondary education, and almost everyone was employed. Their average monthly income was S/. 482 (equivalent to US$174[14]), which varied highly across household heads (S/. 453). Other household members were, on average, much younger (14.5 years old) and less educated (only 38.5% had some level of secondary education). More than a third of other household members were employed and their average monthly income was S/. 320 (equivalent to US$115). Finally, the average household income per capita was certainly low in comparison with the average Peruvian family (S/. 165, equivalent to US$59).

[13] Interviewee responses related to income sources and income reception frequencies were standardized into a monthly frequency, considering months of 30 days. When specific information was not available, individual labor income was estimated by an earnings equation. These estimated incomes were not included when presenting labor income statistics.

[14] The US-Nuevos Soles exchange rate was provided by the Central Bank of Peru, on March 15, 2010.

TABLE 5: CORRELATIONS BETWEEN WATER, SANITATION, HYGIENE CONDITIONS, AND INCOME GROUP

	Access to Improved Water Source	Access to Improved Sanitation	Observed HW Station with Soap and Water	Income Group
Access to Improved Drinking-Water Source	1.000			
Access to Improved Sanitation	0.248	1.000		
Observed HW Station with Soap and Water	0.167	0.180	1.000	
Income Group	0.068	0.254	0.132	1.000

TABLE 6: SUMMARY STATISTICS

	Mean	Standard Deviation
HH size	5.3	1.8
Number of children under five years	1.4	0.6
HH Head:		
Age	36.9	11.6
HH head has secondary education (% HH heads)	50.4%	—
HH head is employed (% HH heads)	95.2%	—
Labor income (in S/.)	482.7	453.4
Other HH Members:		
Age	14.5	14.8
Other HH member has secondary education (% other HH members)	38.5%	—
Other HH member is employed (% other HH members)	37.0%	—
Labor income (in S/.)	320.7	348.1
HH monthly income per capita (in S/.)	165.3	152.6

Table 7 presents the distribution of basic household demographic variables: age of the household members, household size, and total number of children under the age of five per household. The mean and median age of the household members was 18.6 and 15 respectively. The higher concentration of individuals was among the younger ones. On average, poorer households were composed of younger members. The mean household size was 5.8 members for the poorest households and 5.1 for richest. While 74.1% of the poorest households had five or more members, only 54.1% of the richest ones had the same number of members. Furthermore, the mean number of children under the age of five per household was 1.4. This figure was higher for poor households and lower for rich households. There was a higher proportion of females (52.33%) than males (47.67%) in this sample, but about 90.48% of the 3,576 interviewed households had a male household head.

Table 8 presents the percent distribution of education for individuals aged five years and older. A high proportion of them attended school, even in the case of poor households. Notwithstanding, 35% of the household heads had attained primary education only, while 50.4% of them had received secondary education. These figures were lower for the rest of the household members and for poorer households.

When asked about their weekly time distribution, currently enrolled students answered that they spent most of time at school (with no significant differences found between the sexes). The figures are summarized in Table 9. Only 2.2% of the males and 0.7% of the females had a paid job; 6.4% and 4.5% of the males and females, respectively, worked without a salary. Regarding school and household related activities, females tended to spend more time taking care of children than males, and slightly more time doing school homework.

The survey collected detailed information on the assets and non-labor income that each household possesses, and on the characteristics of the dwelling in which each household resides: type of dwelling; ownership situation; walls, floor, and roof material; light source; cooking and heating fuel. Table 10 presents a complete summary of household assets per income quartile.

Almost 20% of the households declared having income sources other than labor, and this percentage was higher for poorer households. The average non-labor income, considering only positive values, was S/. 126 per household.

TABLE 7: PERCENT DISTRIBUTION OF THE BASIC SOCIO-DEMOGRAPHIC CHARACTERISTICS

	Income Quartile				
	1st	2nd	3rd	4th	Total
Age:					
0–4	7.2%	6.9%	6.2%	5.7%	26.0%
5–9	4.5%	3.6%	2.7%	2.2%	13.0%
10–14	3.6%	2.6%	1.6%	1.8%	9.7%
15–19	1.8%	1.8%	1.8%	2.2%	7.6%
20–24	1.3%	2.1%	2.1%	3.0%	8.6%
25–29	2.2%	2.5%	2.6%	2.6%	9.8%
30–34	2.4%	2.0%	2.2%	2.0%	8.6%
35–39	1.7%	1.5%	1.5%	1.4%	6.0%
40–44	1.0%	0.8%	0.6%	0.9%	3.3%
45–49	0.5%	0.6%	0.5%	0.5%	2.1%
+50	1.3%	1.3%	1.4%	1.6%	5.5%
Total	27.3%	25.5%	23.2%	23.9%	100.0%
Age of HH head (average)	37.01	36.84	36.04	37.52	36.85
Age of other HH members (average)	13.35	14.01	14.99	16.12	14.55
HH head is male (% HH heads)	39.6%	35.8%	38.5%	36.9%	37.7%
Other HH member is male (% other HH heads)	87.7%	93.8%	90.5%	90.0%	90.5%
HH Size:					
2	0.4%	0.7%	0.1%	0.4%	0.4%
3	10.2%	10.8%	17.9%	17.4%	14.1%
4	15.3%	23.3%	28.6%	28.1%	23.8%
5	23.6%	24.5%	24.6%	20.2%	23.2%
6	20.7%	16.4%	15.5%	17.5%	17.5%
7	12.5%	11.7%	5.5%	5.6%	8.8%
8	8.2%	5.6%	3.5%	6.3%	5.9%
9	5.4%	3.4%	2.8%	1.1%	3.2%
10	2.6%	2.2%	1.1%	2.3%	2.0%
11	0.9%	1.2%	0.1%	0.8%	0.8%
12	0.2%	0.2%	0.3%	0.4%	0.3%
13	0.0%	0.0%	0.1%	0.0%	0.0%
15	0.0%	0.3%	0.0%	0.0%	0.1%
HH size (average)	5.8	5.5	4.9	5.1	5.3
Total Number of Children Under Five Years of Age:					
1	56.3%	57.9%	71.1%	81.6%	66.7%
2	36.9%	38.1%	26.2%	15.7%	29.2%
3	6.4%	4.0%	2.7%	2.7%	3.9%
4	0.4%	0.0%	0.0%	0.0%	0.1%
Number of children under five years of age (average)	1.5	1.5	1.3	1.2	1.4

TABLE 8: PERCENT DISTRIBUTION OF INDIVIDUAL'S EDUCATION

	Income Quartile				
	1st	2nd	3rd	4th	Total
Number of HH heads that attended school (% HH heads)	93.8%	97.7%	98.7%	98.9%	97.3%
Educational Attainment of HH Head (% HH Heads):					
Kindergarten	0.0%	0.1%	0.0%	0.0%	0.0%
Primary	53.2%	35.4%	28.8%	23.5%	35.0%
Secondary	43.6%	57.1%	48.3%	52.6%	50.4%
Trade School	2.0%	5.6%	16.2%	11.5%	8.9%
University	1.0%	1.9%	6.7%	12.1%	5.5%
Higher	0.0%	0.0%	0.0%	0.4%	0.1%
No Education	0.1%	0.0%	0.0%	0.0%	0.0%
Other HH members (>5 years old) attended school (% other HH heads)	93.0%	97.0%	97.3%	98.7%	96.4%
Educational Attainment of Other HH Members (% HH Members Other Than HH Head):					
Kindergarten	8.3%	7.4%	4.2%	5.4%	6.4%
Primary	63.8%	55.0%	42.3%	33.0%	49.0%
Secondary	25.5%	33.0%	45.7%	52.0%	38.6%
Trade School	1.2%	3.4%	4.9%	4.4%	3.4%
University	0.4%	0.3%	2.6%	5.2%	2.0%
No Education	1.0%	0.9%	0.5%	0.0%	0.6%

TABLE 9: ACTUAL DISTRIBUTION OF STUDENTS' TIME

	Male	Female	Total
Teenagers Spent Hours in (% HH Teenagers):			
School	94.5%	95.8%	95.2%
Studying	96.6%	97.3%	96.9%
Children care	65.7%	74.4%	70.0%
Homework	64.3%	69.4%	66.9%
Paid work	2.2%	0.7%	1.4%
Unpaid work	6.4%	4.5%	5.5%

As expected, poorer households (1st quartile) had on average lower non-labor incomes than richer households (4th quartile), S/. 92 and S/. 197 respectively. This is not surprising since a higher percentage of poorer households tended to work on and receive income from agricultural activities. This is reflected by the higher percentage of poor households possessing other plots of land, farm equipment, and a higher average number of animals per household (these animals are specifically "farm," not domestic, animals).

Dwelling characteristics are observed for each household

The figures show that the majority of the households, 78.3%, had a radio, cassette, or CD player. This percentage was higher for the richest households, 90.3%, but it was also high for the poorest households, 72.2%. Owning

TABLE 10: PERCENT DISTRIBUTION OF HOUSEHOLD ASSETS AND NON-LABOR INCOME

	Income Quartile				
	1st	2nd	3rd	4th	Total
Average household non-labor income (in S/.)	92.1	112.4	139.0	197.4	125.9
HH Assets (% HHs):					
Radio, CD, cassette	72.2%	75.7%	75.2%	90.3%	78.3%
TV	39.0%	63.3%	82.2%	85.5%	67.5%
VCR	9.6%	18.4%	33.3%	55.1%	29.1%
Computer	0.0%	1.2%	1.7%	9.1%	3.0%
Bicycle	12.0%	20.1%	29.1%	29.7%	22.7%
Motorbike	1.2%	3.2%	5.1%	5.0%	3.6%
Car or Tractor	0.2%	0.4%	4.3%	8.6%	3.4%
Refrigerator	3.3%	8.9%	13.1%	34.1%	14.8%
Gas stove	19.2%	50.6%	69.4%	84.0%	55.7%
Other type of stove	12.9%	12.7%	13.9%	17.6%	14.3%
Blender	11.1%	17.6%	37.7%	62.8%	32.3%
Toaster	0.0%	0.7%	1.4%	6.1%	2.0%
Microwave	0.0%	0.0%	2.3%	6.2%	2.1%
Washing machine	0.0%	1.8%	0.3%	3.7%	1.4%
Water boiler	0.4%	1.1%	2.5%	10.9%	3.7%
Other houses/properties	16.6%	8.8%	7.4%	6.9%	10.0%
Machinery, equipment for family business	1.3%	2.9%	2.2%	4.0%	2.6%
HH owns other piece of land (% HHs)	43.5%	29.7%	20.7%	15.9%	27.5%
HH owns farm equipment (% HHs)	24%	16%	9%	11%	15%
HH has animals (% HHs)	78%	69%	58%	54%	65%

luxury items such as a TV or VCR will vary highly based on income status; for instance, 85.5% of the richest households had a TV, while the percentage for poorest households was only 39%. On average, only 14.8% of households had a refrigerator, and the figure was much lower for poorest households (3.3%). Regarding cooking stoves, 84% of the richest households had a gas stove, while in the poorest households the percentage was only 19.2%.

The analysis of the household dwelling characteristics displayed by Table 11 shows that more than 95% of the households lived in a detached, independent dwelling. The average number of rooms per dwelling was 2.97. Also, in 48.1% of the cases the owner of the dwelling (fully paid) was a household member, in 22.9% the dwelling was borrowed from a friend or family member and in 8.2% of the cases the dwelling was rented.

Concerning dwelling materials, 37.5% of the households had walls made of un-backed brick/adobe, 22.3% and 8.2% had brick and wood/logs walls, respectively. The use of other walling materials like mud/bamboo/canvas, tin/zinc sheeting, and woven mats was rare, regardless of the income group. Tin/zinc sheeting was the most common roofing material (55.1%), followed by brick (10.3%), woven mats (7.1%) and concrete (6.9%). In 53.1% of the dwellings the floor was clay or dirt (this figure rose to 78.1% in the case of the poorest households) and in 41.3% of the dwellings the material used was concrete (polished or unpolished).

The survey also included information regarding dwelling's lighting source and type of fuel used for cooking and heating the dwelling. In 75.5% of the surveyed households electricity was the primary lighting source, with candles being the second alternative (14%), and kerosene the third (8%). Forty-nine percent of the households used gas as the primary cooking fuel (13.3% of the poorest households), followed by wood (39.1% of the total number of households and 71.6% of the poorest). Almost none of the households heated their dwelling (97.2%), and those that did used primarily a wood stove (2.6%).

TABLE 11: DWELLING CHARACTERISTICS

	Income Quartile				
	1st	2nd	3rd	4th	Total
Type of Dwelling (% HHs):					
Detached house	95.4%	94.5%	95.1%	95.8%	95.2%
Room in other dwelling	2.7%	3.4%	2.9%	2.9%	3.0%
Other	1.9%	2.1%	2.0%	1.3%	1.9%
Average number of dwelling's rooms	2.90	3.00	2.96	3.04	2.97
Dwelling Ownership (% HHs):					
HH member, still paying	4.1%	5.3%	4.5%	6.1%	5.0%
HH member, fully paid	47.4%	48.2%	49.8%	46.9%	48.1%
Rented	6.0%	6.7%	11.8%	8.4%	8.2%
Family/Friend Loan	20.5%	20.7%	23.4%	27.2%	22.9%
Other	22.1%	19.1%	10.6%	11.5%	15.8%
Walling Materials (% HHs):					
Brick	6.0%	15.9%	23.1%	44.5%	22.3%
Concrete	1.4%	5.9%	11.6%	6.4%	6.3%
Unbaked brick, adobe	59.3%	39.9%	31.6%	19.0%	37.5%
Wood, logs	9.3%	7.0%	7.2%	9.2%	8.2%
Woven mats	2.0%	6.3%	6.0%	3.4%	4.4%
Other	22.1%	24.9%	20.5%	17.5%	21.3%
Roofing Materials (% HHs):					
Brick	0.5%	5.6%	9.2%	26.0%	10.3%
Concrete	1.6%	6.4%	8.2%	11.4%	6.9%
Wood, logs	0.6%	0.6%	0.3%	1.1%	0.7%
Tin, zinc sheeting	61.7%	59.6%	55.0%	43.9%	55.1%
Bamboo	2.2%	2.0%	4.5%	2.5%	2.8%
Woven mats	4.2%	8.6%	9.1%	6.4%	7.1%
Other	29.3%	17.2%	13.7%	8.8%	17.3%
Flooring Materials (% HHs):					
Painted wood	0.69%	0.69%	0.40%	0.70%	0.62%
Concrete	8.1%	18.7%	25.6%	39.1%	22.8%
Clay, dirt floor	78.1%	56.3%	47.1%	30.6%	53.1%
Unpolished concrete	9.2%	21.1%	22.7%	21.0%	18.5%
Other	3.9%	3.2%	4.3%	8.6%	5.0%
Dwelling Lighting Source (% HHs):					
No Lighting	0.4%	0.1%	0.2%	0.0%	0.2%
Electricity	58.7%	72.9%	85.1%	85.5%	75.5%
Kerosene	19.6%	8.4%	2.7%	1.0%	8.0%
Candles	17.9%	16.9%	9.9%	11.1%	14.0%
Other	3.5%	1.7%	2.1%	2.3%	2.4%
Dwelling Cooking Fuel (% HHs):					
Gas	13.3%	40.8%	64.4%	79.2%	49.3%
Wood	71.6%	46.1%	24.5%	13.7%	39.1%
Peat/Manure	4.2%	2.2%	1.2%	1.4%	2.2%
Other	11.0%	10.9%	9.9%	5.8%	9.4%

(*Continued*)

TABLE 11: (Continued)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Dwelling Heating Fuel (% HHs):					
Do not heat dwelling	95.8%	96.8%	98.6%	97.6%	97.2%
Wood Stove	3.8%	3.1%	1.4%	2.2%	2.6%
Other	0.4%	0.1%	0.1%	0.2%	0.2%

Table 12 presents information on the principal activity for any individuals over 15 years old. More than 95% of the household heads were employed in the week previous to the interview, but only 37% of the other household members older than 15 years were employed. For the poorest households, these figures were lower (93.6% and 24.1% for household heads and other HH members, respectively). The week before the interview, unemployed household heads were mainly looking after their homes and searching for work (33.7% and 20.9%, respectively). Regarding the other household members that were unemployed, they spent most of the week looking after their homes and studying (78% and 14.9%, respectively).

The rest of the variables correspond to all employed individuals, household heads, and other household members. A very high proportion of those individuals that worked or helped the family generate income were self-employed (54.4%), especially in the poorest households (66.4%). The rest of them were basically employees (36.6%) or workers without remuneration (7.8%).

The average monthly salary for the primary job was S/. 411. Those members employed made the highest average salary, S/. 529, followed by those who were self-employed, S/. 333 (with the exception of those who responded "other" to type of employment). The weekly average number of hours worked was 45.6 hours a week; those employed by others or self-employed worked more hours than daily laborers and employers. On average, an individual had worked 9.5 months in the same job. On average, poorer households had worked 10.5 months in the same job, while richer households had worked in the same job for nine months.

On average, 3.3% of the households had lost work or school hours during the previous 14 days to take care of their sick child. This percentage increased for households with unimproved water sources, unimproved sanitation, or no handwashing station with soap and water.

Households were asked if they had lost work or school hours due to their children getting sick, and results are summarized in Table 13. On average, 3.3% of the households had lost work or school hours during the previous 14 days to take care of their sick child. This percentage increased for households with unimproved water sources, unimproved sanitation, or no handwashing station with soap and water. This percentage was relatively stable across different income levels. However, when looking at these figures by geographic area we observed that a higher percentage of households living in the mountains (4.2%) had lost hours due to children's sickness than those living in the jungle (2.7%) or on the coast (1.5%).

TABLE 12: INDIVIDUAL'S ACTIVITY AND PRIMARY WORK

	Income Quartile				
	1st	2nd	3rd	4th	Total
HH head is employed (% HH heads)	93.6%	95.3%	95.9%	95.8%	95.2%
Other HH member is employed (% other HH members)	24.1%	30.9%	38.9%	50.5%	37.0%
Last Week Activity—HH Head is Unemployed:					
Looking for work	13.6%	33.2%	25.0%	14.4%	20.9%
Studying	0.0%	2.9%	3.2%	0.0%	1.4%
Looking after the home	51.1%	19.9%	33.7%	22.2%	33.7%
Not working and not looking for job	18.2%	7.7%	27.1%	8.5%	15.4%
Other	17.1%	36.4%	11.1%	54.9%	28.7%
Last Week Activity—Other HH Member is Unemployed:					
Looking for work	0.8%	1.1%	2.7%	0.4%	1.2%
Studying	14.2%	15.4%	14.9%	15.3%	14.9%
Looking after the home	78.5%	78.7%	77.9%	76.8%	78.0%
Not working and not looking for job	5.0%	3.4%	3.2%	6.7%	4.5%
Other	1.5%	1.5%	1.3%	0.8%	1.3%
Primary Employment Status (% All Employed):					
Self-employed	66.4%	58.8%	50.0%	46.4%	54.4%
Employee	14.1%	29.5%	43.9%	51.3%	36.6%
Employer or boss	0.0%	0.6%	0.7%	0.0%	0.4%
Worker without remuneration	17.6%	9.5%	5.1%	1.9%	7.8%
Day laborer	1.8%	1.5%	0.3%	0.2%	0.9%
Other	0.1%	0.1%	0.0%	0.1%	0.1%
Monthly Salary:					
Self-employed	135	242	328	609	333
Employee	194	326	473	722	529
Employer or boss	120	264	335	447	305
Day laborer	183	264	266	343	235
Other	—	77	—	2,000	1,004
Total	147	270	395	669	411
Hours Worked per Week:					
Self-employed	43.1	40.7	44.3	43.7	42.9
Employee	42.8	48.4	56.0	55.7	53.3
Employer or boss	36.0	55.3	35.5	31.0	43.8
Worker without remuneration	29.6	27.9	27.8	30.2	28.8
Day laborer	39.0	35.3	39.8	34.0	37.1
Other	21.0	38.8	—	11.0	24.2
Total	40.6	41.8	48.5	49.6	45.6

(*Continued*)

TABLE 12: (Continued)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Months Worked in Past 12 Months:					
Self-employed	10.9	9.9	9.4	8.9	9.8
Employee	9.1	9.5	9.1	9.1	9.2
Employer or boss	12.0	11.7	8.5	11.2	10.0
Worker without remuneration	10.2	9.1	9.2	9.4	9.6
Day laborer	10.3	10.4	7.4	5.7	9.7
Other	12.0	12.0	—	4.0	9.2
Total	10.5	9.8	9.2	9.0	9.5

TABLE 13: HOUSEHOLDS WITH TIME LOSS DUE TO CHILD ILLNESS

	% of HHs
By Sanitary Conditions:	
Improved sanitation	2.80%
Unimproved sanitation	3.70%
Improved water source	3.10%
Unimproved water source	3.70%
HW station stocked w/soap & water	2.70%
No HW station stocked w/soap & water	4.30%
By Income Quartile:	
1st	3.30%
2nd	3.60%
3rd	3.20%
4th	2.90%
By Geographic Area:	
Coast	1.50%
Jungle	2.70%
Mountain	4.20%
Overall	3.30%

4.2 Water Source and Safe Water-Use Behavior

The survey also investigated household water source and the treatment that household members applied to drinking water. Questions related to water source are disaggregated by season (rainy versus dry season); however, as almost every household had the same water source during the whole year, we present the results only for the rainy season. Results are summarized in Tables 14 and 15.

Three-quarters of the households (75.6%) had access to an improved water source; this percentage was higher for the wealthiest percentiles. Households living along the coast of Peru had higher access to improved water sources (86.4%) than those living in the mountains (72.5%) or the jungle (62%).

Three-quarters of the households (75.6%) had access to an improved water source; this percentage was higher for the wealthiest percentiles. Households living along the coast of Peru had higher access to improved water sources (86.4%) than those living in the mountains (72.5%) or the jungle (62%).

TABLE 14: ACCESS TO IMPROVED WATER SOURCES

	% of HHs
By Income Quartile:	
1st	69.60%
2nd	76.70%
3rd	78.50%
4th	77.60%
By Geographic Area:	
Coast	86.40%
Jungle	62.00%
Mountain	72.50%
Overall	75.60%

When taking a narrower look at the data, we found three main sources of drinking water in the surveyed households: piped water from inside the dwelling (30.2%), piped water from public tap (17.2%), and piped water located in the yard (12.2%). On average, 19.7% of these water sources were located in the household's own yard or plot, 14.6% within the dwelling, and the rest (65.6%) were located elsewhere. In 70.5% of the households the water sources were covered, while in 25.3% the water sources were uncovered. The percentage of covered water sources in poorer households was much lower than the average, 58.1%, and higher in richer households, 75.8%.

TABLE 15: TYPE OF WATER SOURCE

	Income Quartile				
	1st	2nd	3rd	4th	Total
HH Source of Water for Drinking Use (% HHs):					
Piped water, into dwelling	21.4%	26.2%	35.3%	37.9%	30.2%
Piped water, into yard, plot	17.3%	10.5%	8.8%	12.0%	12.2%
Piped water, public tap, standpipe	11.0%	20.6%	20.3%	17.2%	17.3%
Tube well, bore hole	2.0%	2.7%	2.1%	1.2%	2.0%
Dug well, protected	1.6%	0.8%	1.6%	2.4%	1.6%
Dug well, unprotected	2.9%	2.1%	0.6%	0.7%	1.6%
Spring water, protected	15.2%	14.8%	10.3%	6.8%	11.8%
Spring water, unprotected	5.4%	1.4%	1.2%	0.5%	2.1%
Tanker truck	0.2%	3.8%	9.7%	7.6%	5.3%
Surface water	7.8%	3.8%	1.0%	2.9%	3.9%
Other	15.3%	13.5%	9.0%	10.7%	12.1%
Source Location (% HHs):					
In own dwelling	15.4%	17.2%	13.7%	11.6%	14.6%
In own yard, plot	21.8%	17.1%	18.8%	21.4%	19.7%
Elsewhere	62.8%	65.6%	67.6%	67.0%	65.6%
Covered Source (% HHs):					
Covered	58.1%	71.8%	77.8%	75.8%	70.5%
Open	39.5%	22.2%	19.7%	17.7%	25.3%
Both covered and open	2.3%	6.0%	2.5%	6.5%	4.3%

Drinking water stored inside the household's kitchen

In the majority of the households (80.3%) an adult female was in charge of collecting water from the source.

In the majority of the households (80.3%) an adult female was in charge of collecting water from the source. The task was performed by an adult male only in 16.6% of the households and by a child under 15 years old in 3.1% Among all the households that pay for the water (76.3% of the households), 49% of them received an unlimited amount.

Table 16 summarizes water-use behavior. On average, 83.5% of the households stored water. Of those, 82.4% washed the storage container more than once a week, 14.4% washed it once per week, 3% rarely washed the storage container, and almost no one never washed the container. Almost 87% of the households that washed their storage container used soap, detergent, or bleach and 10.7% of them used only water. In comparison, in the poorest households a lower proportion of them used soap, detergent, or bleach and a higher proportion used only water.

More than 85% of the households prepared the water before drinking it (79.3% in the case of the poorest households and 94.1% in the case of the richest ones); 88.2% did it every day during the week before the interview, 7.2% did it every other day, and 4.2% prepared the water only once or twice during the entire week. Boiling the water was the most common procedure for preparing the drinking water (96.8%).[15] Also, in 5.6% of the poorest households, individuals let the water stand and settle before drinking it.

Less than half of the households had access to improved sanitation facilities, and among the poorest households access to improved sanitation was as low as 31.6%. On the coast, access to improved sanitation increased to 54.4%, but the percentage of households with improved sanitation facilities in the jungle is 32.6%.

4.3 Sanitation Facilities

Since diarrheal disease is often the result of virus and bacteria propagation, keeping a clean and disinfected environment is crucial in its prevention, particularly in handwashing and defecation stations. In this section we investigate the most

[15] The interviewees were given the possibility to choose more than one procedure for preparing the drinking water.

TABLE 16: SAFE WATER-USE BEHAVIOR

	Income Quartile				
	1st	2nd	3rd	4th	Total
Storage Container: Washing Frequency (% HHs):					
Never	0.2%	0.3%	0.1%	0.0%	0.1%
Rarely	4.9%	2.6%	2.0%	2.6%	3.0%
Once a week	20.3%	15.3%	11.1%	10.7%	14.4%
More than once a week	74.6%	81.8%	86.9%	86.7%	82.4%
How Water Container Is Washed (% HHs):					
Water only	18.5%	8.6%	4.2%	11.2%	10.7%
Soap, detergent, bleach	77.9%	90.3%	95.0%	87.8%	87.6%
Other	3.6%	1.2%	0.9%	1.0%	1.7%
Water Treatment: Frequency (Past Seven Days, % HHs):					
Not in the past seven days	0.6%	0.3%	0.2%	0.3%	0.3%
Every day	81.7%	89.7%	87.2%	93.7%	88.2%
Every other day	9.7%	6.6%	8.5%	4.4%	7.2%
Once or twice	8.1%	3.4%	4.2%	1.6%	4.2%
Water Treatment (Past Seven Days, % HHs):					
Boiling treatment	95.0%	96.1%	97.7%	98.1%	96.8%
Chlorine treatment	3.0%	5.1%	3.2%	2.4%	3.4%
Let stand and settle	5.6%	2.1%	0.8%	0.6%	2.2%
Other	0.5%	0.4%	0.4%	0.6%	0.5%

common sanitation facilities available in the surveyed households. Table 17 shows that less than half of the households had access to improved sanitation facilities, and among the poorest households access to improved sanitation was as low as 31.6%. On the coast, access to improved sanitation increased to 54.4%, but the percentage of households with improved sanitation facilities in the jungle was 32.6%.

When looking at the types of sanitation facilities (see Table 18), we observed the most common type of toilet facility found in our sample was the flushed toilet piped to the sewer system (32.1%), followed by pit latrine without slab or open pit (27.3%). An average of 20.3% of the households had no sanitation facilities of any type, and the figure increased to 30.4% for the poorest households. Most of these facilities were located in the household yard (35.4%), inside the household (33.4%), or in a nearby location less than a 10-minute walk away (22.3%) or in other locations more than a 10-minute walk away (7.3%).

An average of 20.3% of the households had no sanitation facilities of any type, and the figure increased to 30.4% for the poorest households.

On average, more than 8% of the total toilet facilities were public and 28% of them were shared. Poorer households had similar percentages of public and shared toilet facilities than wealthier households (7.3% versus 8%, and 24.5% versus 26.5%). Regarding the safety of female household members when using the toilet facility during the night, only 74.7% of them declared being safe. This figure was lower for poorest households and higher for the richest ones (65.9% versus 82.8%, respectively).

Example of open pit latrine in household's backyard

TABLE 17: ACCESS TO IMPROVED SANITATION

	% of HHs
By Income Quartile:	
1st	31.60%
2nd	42.70%
3rd	50.40%
4th	66.80%
By Geographic Area:	
Coast	54.40%
Jungle	32.60%
Mountain	47.10%
Overall	47.80%

When asked about the satisfaction level with the sanitation facility, only 18.3% of the interviewees answered to be very satisfied, 41.7% to be somewhat satisfied, 19.2% less than satisfied and 22% completely dissatisfied. The level of satisfaction with the sanitation facility improved as income increased. This is consistent with previous figures showing that poorer households had lower access to improved sanitation facilities.

Table 19 summarizes household responses when asked about the main reasons for building or improving the toilet facility (only for those cases in which a household member actually built or improved their facility). On average, 41.5% of household heads put family's health consideration as the primary reason, followed by location and cleanness considerations (20.3%) and convenience (17.1%). When asked about the probability of installing a private toilet facility during the next 12 months, 48.5% of the households declared a low probability and 14.5% of the households declared a zero probability of doing so. The principal and most common constraint

The principal and most common constraint mentioned by the households for building a private sanitation facility was the high cost involved.

TABLE 18: HOUSEHOLD MAIN SANITATION FACILITY CHARACTERISTICS

	Income Quartile				
	1st	2nd	3rd	4th	Total
HH Main Sanitation Facility (% HHs):					
Flush, to piped sewer system	15.4%	27.6%	35.2%	50.4%	32.1%
Flush, to other place	5.9%	6.2%	6.3%	7.1%	6.4%
Ventilated improved pit latrine	8.7%	5.0%	4.3%	3.2%	5.3%
Pit latrine with slab	3.1%	4.8%	5.3%	6.3%	4.9%
Pit latrine without slab, open pit	30.4%	26.3%	32.2%	20.3%	27.3%
Hanging toilet, latrine	1.3%	1.2%	1.2%	0.8%	1.1%
No facilities	32.3%	26.2%	13.0%	9.6%	20.3%
Other	3.0%	2.9%	2.6%	2.3%	2.7%
Public toilet facilities (% HHs)	7.3%	8.7%	10.1%	8.0%	8.6%
Location of Main Sanitation Facility (% HHs):					
Inside household	17.0%	33.8%	42.0%	41.1%	33.4%
In own yard	39.0%	28.5%	32.6%	41.5%	35.4%
Less than 10-min. walk	28.5%	27.2%	18.8%	14.6%	22.3%
More than 10-min. walk	11.9%	8.8%	5.9%	2.3%	7.3%
Other	0.2%	0.2%	0.0%	0.2%	0.2%
No designated area	3.5%	1.6%	0.7%	0.3%	1.5%
Sanitation facility is safe during night (% HHs)	65.9%	68.2%	82.1%	82.8%	74.7%
Sanitation facility is shared with other households (% HHs)	26.5%	31.6%	29.1%	24.5%	27.9%
Satisfaction with Sanitation Facility (% HHs):					
Very satisfied	17.0%	16.6%	20.5%	22.8%	19.2%
Somewhat satisfied	35.6%	40.3%	47.8%	43.6%	41.8%
Less than satisfied	20.5%	16.4%	12.9%	18.6%	17.1%
Completely dissatisfied	26.9%	26.7%	18.9%	15.1%	21.9%

TABLE 19: IMPROVEMENT OF SANITATION FACILITIES

	Income Quartile				
	1st	2nd	3rd	4th	Total
Principal Reason for Building or Improving Toilet (% HHs):					
No reason given	0.0%	1.9%	0.5%	0.0%	0.6%
Convenience or location	24.7%	24.2%	14.5%	5.6%	17.1%
More healthy for the family	46.8%	42.9%	32.6%	44.0%	41.5%
Easier to keep clean	14.6%	11.2%	23.2%	32.1%	20.3%
Privacy, dignity	4.1%	5.4%	7.0%	2.7%	4.8%
Safety, security	4.2%	6.4%	9.4%	2.1%	5.5%
Comfort	4.0%	3.7%	10.2%	12.0%	7.5%
Other	1.7%	4.5%	2.7%	1.5%	2.6%

(*Continued*)

TABLE 19: (Continued)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Probability of Future Toilet Installation (% HHs):					
High	7.9%	10.8%	9.1%	3.8%	8.3%
Medium	19.2%	29.4%	26.4%	47.7%	28.8%
Low	55.0%	51.3%	50.5%	29.9%	48.5%
None	17.8%	8.6%	14.0%	18.6%	14.5%
Principal Constraint for Installing Toilet (% HHs):					
No constraints	0.0%	0.5%	0.3%	0.0%	0.2%
High cost	72.7%	70.8%	65.5%	40.4%	64.9%
No one to build it	5.7%	14.2%	4.4%	5.4%	8.0%
Materials not available	11.0%	5.7%	9.1%	8.8%	8.6%
Water table, soil conditions	2.7%	0.1%	0.7%	2.6%	1.5%
Savings, credit issues	3.8%	2.3%	0.5%	13.7%	4.5%
Tenancy issues	1.6%	4.7%	10.9%	4.7%	4.8%
Limited space	0.3%	0.5%	1.4%	18.3%	3.9%
Other	2.3%	1.3%	7.3%	6.2%	3.6%

mentioned by the households for building a private sanitation facility was the high cost involved (64.9%). Other constraints were the unavailability of materials (8.6%) and the unavailability of labor force (8%). The reasons expressed by the poorest households focused more heavily on cost considerations (72.7%); the richest households also focused on lack of savings and/or credit (13.7%).

The most common practice for disposal of child feces among the poorest households was to throw the feces in the bushes or in the ground.

Table 20 reports some final characteristics of household sanitary condition. In 24.6% of the households, hardly any flies were observed near the sanitation facility, in 26.3% of them few flies were found, and in 23.8% of the households flies were always present and in abundance. Also, in 74.6% of the households there were no feces visible inside or around the household. The most common practice for disposal of child feces among the poorest households was to throw the feces in the bushes or in the ground; 23.8% of them threw the feces in the garbage and 19.8% disposed the feces in the toilet or latrine. Among the richest households, the most common practice was to dispose child feces in the garbage (65.5%); 26.4% of the households used the toilet or latrine for disposal, and 8.1% threw the feces directly to the ground or into a hole.

Findings of the direct observation by the interviewers of the household cleanness are reported in Table 21. More than 63% of the households were considered to be clean; however, in 17.6% of the households food was found to be uncovered and in 47.2% of the observations garbage was observed in the kitchen or inside the house.

TABLE 20: OTHER CHARACTERISTICS OF HOUSEHOLD SANITARY CONDITION

	Income Quartile				
	1st	2nd	3rd	4th	Total
Flies Near Sanitation Facility (% HHs):					
Always and many	30.2%	24.5%	21.6%	18.8%	23.8%
Always and some	15.9%	15.4%	14.9%	16.1%	15.6%
Sometimes and many	14.6%	10.2%	6.0%	8.1%	9.8%
Sometimes and few	24.9%	27.0%	26.8%	26.7%	26.3%
Rarely, hardly any	14.5%	22.9%	30.6%	30.3%	24.6%
Visible Feces In/Around HH (% HHs):					
None	63.5%	72.0%	79.8%	83.2%	74.6%
1–5 feces	17.3%	17.7%	16.3%	10.8%	15.5%
More than five feces	19.2%	10.4%	3.9%	6.0%	9.9%
Disposal of Child Feces (% HHs):					
Bushes, ground	33.6%	24.8%	14.7%	6.8%	20.0%
Pit, hole in the ground	11.4%	5.8%	4.2%	8.1%	7.4%
Open sewer, drain	5.0%	5.7%	4.5%	0.9%	4.0%
Toilet, latrine	19.8%	17.3%	21.7%	26.4%	21.3%
Garbage	23.8%	40.1%	52.5%	65.5%	45.4%
River	10.4%	5.7%	3.4%	2.5%	5.5%
Basin, sink	9.0%	3.7%	4.4%	1.8%	4.7%
Other	6.9%	11.9%	8.4%	3.1%	7.5%

TABLE 21: HOUSEHOLD CLEANNESS

	Income Quartile				
	1st	2nd	3rd	4th	Total
HH is clean (% HHs)	48.5%	59.5%	66.3%	80.1%	63.4%
HH has uncovered food (% HHs)	29.5%	19.9%	13.5%	7.2%	17.6%
HH has garbage in kitchen or house (% HHs)	61.3%	47.9%	47.0%	32.4%	47.2%

4.4 Handwashing Behavior

The handwashing project seeks to achieve health and welfare impacts by promoting handwashing with soap; therefore measuring handwashing behavior at critical junctures is crucial. The survey includes several modules aiming to measure handwashing behavior. The questions include self-reported handwashing behavior with soap at critical moments, observations of handwashing station(s) stocked with soap and water (as well as its location), observations of mother's hands, and structured observations of handwashing behavior.

The interviewers asked caregivers to mention under what circumstances they used soap to wash their hands in the last 24 hours. Table 22A summarizes the answers disaggregated by critical juncture. Almost all caregivers (99.6%) confirmed having washed their hands with soap at least once since yesterday, but handwashing with

Less than half of the caregivers reported handwashing with soap at times of fecal contact. . . . Regarding food handling, 68.3% of caregivers associated having washed hands with soap with cooking or preparing food and 34.1% with feeding their children.

TABLE 22A: SELF-REPORTED HANDWASHING BEHAVIOR WITH SOAP BY INCOME QUARTILE (PREVIOUS 24 HOURS)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Washed hands with soap at least once in previous 24 hr (% caregivers)	99.3%	99.6%	99.8%	99.6%	99.6%
Washed Hands with Soap At Least Once in Previous 24 Hours During the Following Events (% Caregivers):					
Using the toilet (% caregivers)	33.8%	43.9%	49.7%	56.5%	46.0%
Cleaning children's bottoms (% caregivers)	35.6%	40.6%	41.0%	49.7%	41.7%
Cooking or preparing food (% caregivers)	68.2%	66.2%	67.0%	71.7%	68.3%
Feeding children (% caregivers)	25.3%	35.4%	35.3%	40.7%	34.1%

TABLE 22B: SELF-REPORTED HANDWASHING BEHAVIOR WITH SOAP BY GEOGRAPHIC AREA (PREVIOUS 24 HOURS)

	Geographic Area			
	Coast	Jungle	Mountain	Total
Washed hands with soap at least once in previous 24 hours (% caregivers)	99.3%	99.6%	99.8%	99.6%
Washed Hands with Soap At Least Once in Previous 24 Hours During the Following Events (% Caregivers):				
Using the toilet (% caregivers)	50.1%	36.2%	45.6%	46.0%
Cleaning children's bottoms (% caregivers)	49.3%	20.1%	41.6%	41.7%
Cooking or preparing food (% caregivers)	60.5%	59.7%	73.8%	68.3%
Feeding children (% caregivers)	32.1%	27.5%	36.4%	34.1%

soap at critical moments was much lower. Less than half of the caregivers reported handwashing with soap at times of fecal contact (46% of caregivers associated handwashing with use of toilet and 41.7% with cleaning children's bottoms). Regarding food handling, 68.3% of caregivers associated having washed hands with soap with cooking or preparing food and 34.1% with feeding their children. Handwashing with soap increased with income at every juncture. Table 22B shows the same figures disaggregated by geographical area. Caregivers living in the jungle had the lowest rates of handwashing with soap for all critical junctures. For instance, only 20.1% of caregivers in the jungle associated washing hands with soap with cleaning children's bottoms while that figure was 49.3% on the coast. Similarly, 36.2% of caregivers living in the jungle associated handwashing with soap with toilet use, compared to 50.1% on the coast.

Despite the fact that practically all caregivers reported to wash hands with soap at least once since the previous day, only 64.4% of households had an observed handwashing station with both soap and water. Table 23A and Table 23B disaggregate these findings by income and geographical area. The number of households with an observed handwashing station with soap and water was much higher among the wealthiest households (72.5%) than among the poorest

Handwashing station stocked with water and soap

TABLE 23A: OBSERVATION OF HANDWASHING STATION WITH SOAP AND WATER BY INCOME QUARTILE

	Income Quartile				
	1st	2nd	3rd	4th	Total
Observed HW station with soap and water (% HHs)	55.4%	62.5%	67.3%	72.5%	64.4%
Location of HW Station (% HHs):					
Inside toilet or kitchen facility	27.2%	33.7%	34.1%	37.6%	33.1%
In yard, within three feet of toilet or kitchen facility	15.6%	16.8%	23.0%	20.6%	19.0%
In yard, 3–10 feet from toilet or kitchen facility	20.5%	16.8%	21.7%	25.0%	21.0%
In yard, more than 10 feet from toilet or kitchen facility	21.4%	21.9%	19.8%	13.2%	19.1%

TABLE 23B: OBSERVATION OF HANDWASHING STATION WITH SOAP AND WATER BY GEOGRAPHIC AREA

	Geographic Area			
	Coast	Jungle	Mountain	Total
Observed HW station with soap and water (% HHs)	66.5%	72.3%	62.0%	64.4%
Location of HW Station (% HHs):				
Inside toilet or kitchen facility	50.0%	44.0%	22.7%	33.1%
In yard, within three feet of toilet or kitchen facility	17.8%	18.3%	19.7%	19.0%
In yard, 3–10 feet from toilet or kitchen facility	14.3%	20.0%	24.6%	21.0%
In yard, more than 10 feet from toilet or kitchen facility	4.1%	29.3%	25.0%	19.1%

(55.4%). The percentage was also higher in the jungle (72.3%), than on the coast (66.5%) or in the mountains (62%). The observed handwashing station was located in the yard in almost 60% of the households, and inside the toilet or kitchen facility in 33% of households. The higher the income, the closer the handwashing station was to the toilet or kitchen facility. Thus, in 27.2% of the poorest households the handwashing station was inside the kitchen or toilet facility compared to 37.6% in those households with the highest income. On the contrary, 21.4% of the poorest households had the handwashing station in the yard more than 10 feet from either the kitchen or the toilet facility, while the percentage is only 13.2% in the richest households. Table 23B also shows that households living in the mountains had not only the lowest percentages of handwashing stations with soap and water overall, but the location of the handwashing station also tended to be further from the kitchen or toilet facility. For instance, only 22.7% of the households in the mountains had the handwashing station inside the kitchen or toilet facility, compared to much higher percentages of households along the coast and in the jungle (50% and 44% respectively).

Despite the fact that practically all caregivers reported to wash hands with soap at least once since the previous day, only 64.4% of households had an observed handwashing station with both soap and water. . . . In 16.5% of the households no cleansing agent of any type (no soap, mud or ash) was observed.

If a different handwashing station was used to wash hands when preparing food or feeding a child than the one used after going to the toilet, both handwashing stations were observed and information regarding their characteristics was collected for all stations used. Thus, Table 24A summarizes characteristics of the handwashing station used after going to the toilet. There were two types of handwashing devices most commonly used, a basin or bucket (49.2%) and a tap or faucet (48.1%). In 86.8% of households, water was observed at the

TABLE 24A: OBSERVATION OF HANDWASHING STATION USED AFTER GOING TO TOILET

	Income Quartile				
	1st	2nd	3rd	4th	Total
Water is available at HW station (% HHs)	80.1%	84.6%	88.9%	92.7%	86.8%
Location of HW Station (% HHs):					
Inside toilet facility	4.1%	13.9%	16.5%	23.8%	14.5%
Inside cooking place	16.7%	13.7%	8.7%	4.7%	11.0%
In yard, less than three feet away from toilet	18.0%	16.0%	24.3%	23.7%	20.5%
Between 3 and 10 feet away from toilet	11.9%	12.5%	17.2%	22.5%	16.0%
More than 10 feet away from toilet	33.2%	32.6%	26.1%	21.1%	28.2%
No specific place	16.1%	11.3%	7.1%	4.4%	9.8%
HW Device, Toilet (% HHs):					
Tap, faucet	43.9%	46.4%	45.2%	56.1%	48.1%
Basin, bucket	52.7%	51.3%	53.2%	40.3%	49.2%
Other	3.4%	2.3%	1.6%	3.5%	2.7%
Soaps Available at HW Station (% HHs):					
Multipurpose bar soap	16.0%	15.0%	17.7%	11.2%	14.9%
Beauty, toilet bar soap	17.6%	24.2%	32.0%	46.8%	30.6%
Powder soap, detergent	41.4%	46.0%	44.2%	39.3%	42.7%
No soap observed	34.7%	25.4%	21.7%	19.7%	25.1%
Ash and Mud at HW Station (% HHs):					
Ash	1.3%	1.0%	0.2%	0.6%	0.8%
Mud	27.9%	20.4%	15.2%	8.5%	17.7%
Ash and Mud	6.6%	6.9%	2.9%	1.4%	4.4%
No ash nor mud observed	64.2%	71.7%	81.7%	89.5%	77.2%
No cleansing agents at HW station (no soap, nor ash, nor mud observed) (% HHs)	20.0%	15.8%	14.6%	15.9%	16.5%

handwashing station; in 74.9%, there was at least one type of soap available. The most frequently observed types of soaps were powder soap or detergent (42.7%), beauty or toilet bar soap (30.6%) and multipurpose bar soap (14.9%). Regarding the use of mud or ash, both ash and mud were found at the HW station in 4.4% of the households, and mud alone was found in 17.7% of the households. Finally, in 16.5% of the households no cleansing agent of any type (no soap, mud, or ash) was observed.

Table 24B presents the analysis of the same variables for those 44.2% households that used a different handwashing station to wash hands when preparing food or feeding a child than the one used to wash hands after going to the toilet (the reported results correspond only to those handwashing stations that are different than those reported in Table 24A). Results show that 45.3% of the handwashing stations were located inside the kitchen or cooking area, 19.5% in an area located between three and 10 feet away from the kitchen, 16.9% in a yard less than three feet away from the kitchen, and 9.4% in a place located more than 10 feet away from the kitchen. The observations of these facilities reveal that the most common device was a container from which water was poured (62.7%) and a tap or faucet (36.1%). In 82.6% of the households, water was observed at the handwashing station. Regarding the availability of soap, in 86.9% of the cases soap was observed; in those households in which soap was available, powder or laundry soap and detergent were the most observed type of soap (65.9%), followed by beauty or toilet soap (13.2%) and multipurpose soap (7.8%). In 10.8% of the households mud was observed and in 5.3% of the households both ash and mud was found. Finally, in 16.5% of the households no cleansing agent of any type (no soap, mud, or ash) was observed.

TABLE 24B: OBSERVATION OF HANDWASHING STATION USED WHEN PREPARING FOOD OR FEEDING A CHILD

	Income Quartile				
	1st	2nd	3rd	4th	Total
Water is available at HW station (% HHs)	83.5%	77.0%	80.3%	88.9%	82.6%
Location of HW Device (% HHs):					
Inside toilet facility	2.0%	3.5%	0.3%	3.1%	2.2%
Inside cooking area	48.7%	46.3%	44.2%	42.0%	45.3%
In yard, less than three feet away from kitchen	13.3%	16.2%	21.6%	16.4%	16.9%
Between 3 and 10 feet away from kitchen	21.5%	14.7%	22.2%	19.5%	19.5%
More than 10 feet away from kitchen	8.3%	13.6%	5.8%	10.1%	9.4%
No specific place	6.3%	5.8%	5.9%	9.0%	6.8%
Type of HW Station (% HHs):					
Tap, faucet	15.2%	28.1%	41.5%	57.0%	36.1%
Container from which water is poured	82.6%	71.0%	57.8%	41.8%	62.7%
Other	2.2%	0.9%	0.8%	1.2%	1.2%
Soaps Available at HW Station (% HHs):					
Multipurpose bar soap	11.9%	8.7%	7.4%	3.6%	7.8%
Beauty, toilet soap	6.3%	6.4%	4.1%	33.8%	13.2%
Powder or laundry soap, detergent	51.8%	63.2%	82.1%	66.1%	65.9%
No soap observed	39.7%	27.4%	14.2%	10.8%	22.6%
Ash and Mud at HW Station (% HHs):					
Ash	2.2%	0.5%	1.5%	0.0%	1.0%
Mud	20.0%	14.2%	7.7%	2.8%	10.8%
Ash and mud	6.9%	11.0%	3.7%	0.4%	5.3%
No ash nor mud observed	70.9%	74.3%	87.1%	96.8%	82.8%
No cleansing agents at HW station (no soap, nor ash, nor mud observed) (% HHs)	30.9%	16.9%	11.4%	9.5%	16.9%

Tables 25A and 25B summarize the observations of mother hands. On average, in 67.9% of the cases, caregiver's palms appeared to be clean. This figure was lower for the households with the lowest income (61.2%) and considerably higher for those with the highest income (82.6%). Similarly, high-income households appeared to have cleaner fingernails and finger pads (72.3% and 81.7% respectively) than the poorest ones (44.6% and 61.7%). When looking at the figures by geographic location, the findings show that those households living in the jungle had cleaner hands in general (cleaner palms, fingernails, and finger pads) than those living on the coast or in the mountains. The figures are consistent with those in Table 23B, which show households living in the jungle had the highest percentage of handwashing stations stocked with soap and water.

On average, in 67.9% of the cases, caregiver's palms appeared to be clean. . . . When looking at the figures by geographic location, the findings show that those households living in the jungle had cleaner hands in general (cleaner palms, fingernails, and finger pads) than those living on the coast or in the mountains.

Findings of structured observations of handwashing behavior are summarized in Annex 2.

TABLE 25A: OBSERVATIONS OF CAREGIVERS HANDS BY INCOME

	Income Quartile				
	1st	2nd	3rd	4th	Total
Caregiver's Fingernails Appear to Have . . . (% Caregivers):					
Visible dirt	27.3%	22.8%	30.0%	10.7%	22.7%
Unclean appearance	28.1%	29.6%	19.9%	17.0%	23.7%
Clean appearance	44.6%	47.6%	50.1%	72.3%	53.7%
Caregiver's Palms Appear to Have . . . (% Caregivers):					
Visible dirt	18.1%	16.7%	19.2%	6.9%	15.2%
Unclean appearance	20.7%	22.1%	14.1%	10.4%	16.8%
Clean appearance	61.2%	61.1%	66.7%	82.6%	67.9%
Caregiver's Finger Pads Appear to Have . . . (% Caregivers):					
Visible dirt	17.2%	17.7%	23.3%	6.7%	16.2%
Unclean appearance	21.2%	22.3%	13.6%	11.6%	17.2%
Clean appearance	61.7%	60.1%	63.1%	81.7%	66.7%

TABLE 25B: OBSERVATIONS OF CAREGIVERS HANDS BY GEOGRAPHIC AREA

	Geographical Area			
	Coast	Jungle	Mountain	Total
Caregiver's Fingernails Appear to Have . . . (% Caregivers):				
Visible dirt	24.2%	10.5%	24.1%	22.7%
Unclean appearance	24.8%	26.1%	22.6%	23.7%
Clean appearance	50.9%	63.3%	53.3%	53.7%
Caregiver's Palms Appear to Have . . . (% Caregivers):				
Visible dirt	11.9%	6.1%	18.6%	15.2%
Unclean appearance	16.6%	19.2%	16.5%	16.8%
Clean appearance	71.5%	74.7%	64.9%	67.9%
Caregiver's Finger Pads Appear to Have . . . (% Caregivers):				
Visible dirt	11.3%	6.2%	20.5%	16.2%
Unclean appearance	18.3%	19.6%	16.1%	17.2%
Clean appearance	70.4%	74.2%	63.4%	66.7%

4.5 Mass-Media Consumption

On average, 16.9% of caregivers of children under two years old recalled a handwashing campaign.

A large part of this project's success depends on whether households are responsive to the media environment, and whether they have any access to it. These findings are summarized in Table 26A. On average, 16.9% of caregivers of children under two years old recalled a handwashing campaign. Of those who recalled a handwashing campaign, 42.9% remembered a campaign message to, "Wash hands with water and soap," 44% recalled the slogan, "Washing hands prevents diarrhea," 39.5% remembered being told, "[You] must wash hands before eating or cooking," and 33.6% declared remembering a campaign whose theme was, "[You] must wash hands after using toilet." A higher percentage of households with soap and water at the handwashing station recalled the "Wash hands with water and soap" campaign than those without. However, this result does not present evidence for a causal relationship. The means of transmission that had the

TABLE 26A: MASS-MEDIA CONSUMPTION BY OBSERVED HANDWASHING STATION WITH SOAP AND WATER

	Soap and Water at Handwashing Station		
	Yes	No	Total
Caregiver recalls any handwashing campaign (% caregivers)	16.9%	16.8%	16.9%
Campaign Theme (% Caregivers):			
Wash hands with water and soap	47.5%	34.4%	42.9%
Washing hands prevents diarrhea	45.4%	41.4%	44.0%
Must wash hands before eating, cooking	36.4%	45.2%	39.5%
Must wash hands after using toilet	31.0%	38.5%	33.6%
Other	2.8%	5.9%	3.9%
Means of Campaign Transmission (% Caregivers):			
School, teacher	10.5%	6.7%	9.1%
Market	0.5%	0.1%	0.3%
Radio	12.0%	16.3%	13.5%
TV	1.1%	1.8%	1.4%
Community organization	7.7%	15.0%	10.3%
Health center, health agent	65.4%	65.7%	65.5%
Other	13.7%	6.9%	11.3%
Media Channel (% Caregivers):			
None	7.0%	10.1%	8.1%
Radio	67.3%	68.3%	67.6%
TV	57.6%	40.7%	51.6%
Newspapers	8.4%	5.5%	7.4%
Public address speakers	0.5%	0.6%	0.5%
Other	0.4%	0.9%	0.6%

largest reach were health centers and health agents (65.5%), followed by radio (13.5%), community organizations (10.3%), and schools (9.1%). As expected, the types of media consumed more frequently were radio (67.6%) and TV (51.6%).

Table 26B disaggregates the same variables by geographical area. A higher percentage of caregivers living in the mountains (20.5%) and in the jungle (16.9%) recalled hearing, seeing, or receiving handwashing campaigns than those living on the coast (9.8%). When analyzing the most common means of communication we observe that caregivers living on the coast were more familiar with TV, while those living in the jungle and in the mountains relied more on radio communication. Finally, 16% of caregivers living in the jungle were not familiar with any kind of media.

A higher percentage of caregivers living in the mountains (20.5%) and in the jungle (16.9%) recalled hearing, seeing, or receiving handwashing campaigns than those living on the coast (9.8%).

As previously mentioned, no causal relationships can be inferred from these cross tabulations. Still, in order to search for any relevant correlation, it is interesting to compare the handwashing habits of caregivers who recalled any handwashing campaign to the habits of those who did not recall any campaign. Table 26C presents

TABLE 26B: MASS-MEDIA CONSUMPTION BY GEOGRAPHIC AREA

	Geographic Area			
	Coast	Jungle	Mountain	Total
Caregiver recalls any handwashing campaign (% caregivers)	9.8%	16.9%	20.5%	16.9%
Campaign Theme:				
Wash hands with water and soap	20.9%	48.5%	47.4%	42.9%
Washing hands prevents diarrhea	52.1%	29.0%	44.2%	44.0%
Must wash hands before eating, cooking	21.6%	29.8%	45.3%	39.5%
Must wash hands after using toilet	19.2%	15.7%	39.8%	33.6%
Other	5.3%	3.9%	3.5%	3.9%
Means of Campaign Transmission:				
School, teacher	11.9%	4.0%	9.2%	9.1%
Market	0.0%	0.0%	0.5%	0.3%
Radio	3.1%	8.6%	16.8%	13.5%
TV	0.0%	4.2%	1.3%	1.4%
Community organization	24.5%	7.1%	7.3%	10.3%
Health center, health agent	52.7%	81.3%	66.4%	65.5%
Other	13.9%	0.2%	12.2%	11.3%
Media Known:				
None	7.7%	15.8%	6.9%	8.1%
Radio	53.0%	65.2%	75.6%	67.6%
TV	72.7%	35.9%	43.6%	51.6%
Newspapers	9.0%	2.3%	7.5%	7.4%
Public address speakers	0.0%	2.5%	0.4%	0.5%
Other	0.5%	1.5%	0.5%	0.6%

TABLE 26C: SELF-REPORTED HANDWASHING BEHAVIOR BY RECALL OF HANDWASHING CAMPAIGN

	Recall of Any Handwashing Campaign		
	Yes	No	Total
Washed hands with soap at least once in previous 24 hrs (% caregivers)	99.3%	99.6%	99.8%
Washed Hands with Soap At Least Once in Previous 24 Hours During the Following Events (% Caregivers):			
Bathing a child	30.4%	21.9%	23.3%
Bathing oneself	23.2%	22.0%	22.2%
Using toilet	49.5%	45.7%	46.0%
Cleaning baby bottom	37.2%	43.0%	41.7%
Cleaning latrine	1.4%	0.9%	1.0%
Cleaning toilet	4.5%	5.3%	5.2%
Returning home	10.1%	12.4%	12.0%
Preparing food, cooking	77.4%	67.1%	68.3%
Feeding children	39.7%	33.4%	34.4%

(*Continued*)

TABLE 26C: (Continued)

	Recall of Any Handwashing Campaign		
	Yes	No	Total
Washing child's hands	8.4%	9.9%	9.7%
Cleaning dishes	36.5%	33.6%	34.1%
Doing laundry	38.1%	44.3%	43.3%
Because they look dirty	10.4%	6.2%	6.9%

the results. As almost all caregivers reported washing their hands with soap since yesterday, the results did not vary by income group. But when asked about every specific situation in which they washed their hands, a higher proportion of caregivers who recalled any handwashing campaign had washed their hands more frequently. However, this higher figure could be due to the fact that those households who recalled handwashing campaigns were aware of the social desirability of washing hands at particular critical times.

4.6 Family-School Relationship

In this subsection we present information about the family-school relationship, since schools could be sources of sanitary-related diseases and of sanitary-related information and education.

Table 27 shows that a very high proportion of caregivers participated in school activities (91.2%) and that 29.4% of them recalled some health and hygiene-related campaigns. A higher number of caregivers coming from households with a handwashing station with soap and water recalled a campaign promoted at the school. The most frequent campaign topics were personal hygiene (30.5%), oral hygiene (27.1%) and handwashing (20.4%). Also, a high percentage of caregivers (70.2%) admitted having contributed with the campaign by donating their time (32.7%), products (21.9%), or money (13.1%). When looking at the disaggregation by geographical area, we see that caregivers coming from the jungle or the mountains of Peru tended to collaborate more with the school in order to promote a better personal hygiene, not only by participating more in school activities but also by contributing more in school-organized health campaigns.

Furthermore, caregivers had directly contributed to hygiene in the school environment as almost 75% of them sent soap to the school. Results are reported on Table 28A and 28B. As expected, this figure was slightly higher for those caregivers coming from households with soap and water at their handwashing station.

School pupils in Lambayeque use handwashing dispenser distributed by the project

TABLE 27A: FAMILY-SCHOOL RELATIONSHIP BY ACCESS TO HANDWASHING STATION WITH SOAP AND WATER

	Handwashing Station with Soap and Water		
	Yes	No	Total
Caregiver participates in school activities (% caregivers)	92.1%	89.6%	91.2%
Caregivers recalls any campaign on health and hygiene promoted by school (% caregivers)	30.8%	27.0%	29.4%
Campaign Theme:			
Tuberculosis	3.4%	2.1%	3.0%
Oral hygiene	30.5%	20.0%	27.1%
Personal hygiene	23.9%	44.3%	30.5%
Nutrition	7.1%	2.7%	5.7%
Handwashing	20.5%	20.2%	20.4%
Other	33.1%	23.9%	30.1%
Ways of Contributing to the Campaign:			
Money	10.8%	18.0%	13.1%
Products	23.2%	19.1%	21.9%
Dissemination and calling people	2.4%	3.3%	2.7%
Own time	29.7%	38.9%	32.7%
Other	6.0%	0.5%	4.2%
Did not contribute	32.1%	25.0%	29.8%

TABLE 27B: FAMILY-SCHOOL RELATIONSHIP BY GEOGRAPHIC AREA

	Geographic Area			
	Coast	Jungle	Mountain	Total
Caregiver participates in school activities (% caregivers)	84.2%	89.9%	95.5%	91.2%
Caregiver recalls campaign on health and hygiene promoted by school (% caregivers)	29.9%	27.7%	29.5%	29.4%
Campaign Theme:				
Tuberculosis	1.8%	0.0%	4.2%	3.0%
Oral hygiene	22.2%	27.7%	29.9%	27.1%
Personal hygiene	24.4%	38.4%	32.7%	30.5%
Nutrition	7.4%	6.4%	4.6%	5.7%
Handwashing	8.4%	16.8%	28.1%	20.4%
Other	44.1%	24.5%	22.8%	30.1%
Ways of Contributing to the Campaign:				
Money	9.6%	19.6%	14.1%	13.1%
Products	32.5%	17.6%	16.4%	21.9%
Dissemination and calling people	6.4%	0.0%	1.0%	2.7%
Own time	19.9%	30.8%	40.6%	32.7%
Other	2.7%	0.0%	5.9%	4.2%
Did not contribute	36.4%	33.9%	25.3%	29.8%

TABLE 28A: SOAP CONTRIBUTION TO SCHOOLS BY OBSERVED HANDWASHING STATION WITH SOAP AND WATER

	Soap and Water at Handwashing Station		
	Yes	No	Total
Caregiver Sent Soap to School (% Caregivers):			
Never	28.7%	19.3%	22.6%
Sometimes	54.6%	60.2%	58.2%
Many times	16.8%	20.5%	19.2%
Reason For Not Sending Soap:			
Forgot	6.0%	5.5%	5.8%
No money	9.4%	38.0%	22.2%
Not important	5.3%	3.9%	4.7%
None of their business	5.8%	5.5%	5.7%
It would get lost or stolen	7.4%	4.8%	6.3%
Other	57.1%	41.3%	50.1%

TABLE 28B: SOAP CONTRIBUTION TO SCHOOLS BY GEOGRAPHIC AREA

	Geographic Area			
	Coast	Jungle	Mountain	Total
Caregiver Sent Soap to School (% Caregivers):				
Never	11.7%	36.2%	26.4%	22.6%
Sometimes	60.2%	47.6%	59.1%	58.2%
Many times	28.1%	16.3%	14.5%	19.2%
Reason For Not Sending Soap:				
Forgot	6.1%	7.9%	5.2%	5.8%
No money	38.3%	12.9%	20.4%	22.2%
Not important	9.4%	5.9%	3.2%	4.7%
None of his business	17.8%	2.9%	3.2%	5.7%
It would get lost or stolen	10.5%	1.4%	6.4%	6.3%
Other	13.8%	66.3%	55.3%	50.1%

When asked why some of them did not contribute soap, only a small fraction mentioned money constraints (16.4%). A higher proportion of caregivers coming from households with soap and water declared having forgotten, or said it was not important or none of their business (17.7% in total). The fact that they did have soap and water at their handwashing station indicates some concern about their child's sanitation and cleanness. These figures contradict that view.

4.7 Child Care Environment

It is largely recognized that characteristics of the caregiver and the quality of care a child receives have huge impacts on young children's health, nutritional status, and development (Black et al. 2008; Engle et al. 2007; Grantham-McGregor et al. 2007; Victora et al. 2008; Walker et al. 2007). Moreover, some of these factors have been found to be significant predictors of child outcomes beyond variation due to socioeconomic and education variables. To enable us to more carefully tease out the potential effects of the interventions on child health, growth, and development, we gathered information on feeding practices, caregiving behavior, and caregiver well-being.

Table 29 summarizes breastfeeding habits within the interviewed households. The average breastfeeding time was

TABLE 29: CHILD BREASTFEEDING (CHILDREN <2)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Average months breastfeeding	13.1	10.7	11.9	12.2	11.9
Still breastfeeding (% children)	88.0%	83.4%	76.3%	78.6%	81.6%
Colostrum given during first three days (% children)	94.3%	88.8%	92.9%	91.9%	92.0%
Liquid given during first three days, other than colostrum or breast milk (% children)	17.2%	21.6%	30.8%	31.8%	25.3%
Liquid Other Than Breast Given During First Three Days (% Children):					
Instant formula	50.0%	63.4%	71.7%	58.3%	62.0%
Milk (other than breast milk)	7.0%	15.6%	6.2%	17.9%	12.0%
Plain water	4.9%	4.4%	16.5%	8.6%	9.4%
Sugar, glucose water	1.8%	2.2%	0.1%	0.1%	0.9%
Gripe water	32.1%	18.9%	9.7%	8.4%	15.2%
Tea, infusions	10.5%	2.1%	4.0%	2.2%	4.2%
Other	8.9%	5.0%	7.8%	7.2%	7.2%

The average breastfeeding time was 12 months, and 92% of children received colostrum during the first three days after childbirth.

12 months, and 92% of children received colostrum[16] during the first three days after childbirth. Although it is recommended that mothers feed only with breast milk during the first six months of life, about one-quarter of mothers also fed their babies liquids other than colostrum or breast milk during the first three days of life. These other liquids were mainly infant formula (62%), gripe water (15.2%), and milk (12%).

The survey also included a section on child diet. Specifically, caregivers of infants under the age of two were asked about liquids and food given to their children in the day previous to the interview. Results are reported in Table 30. Breast milk was given to the majority of the children (77%), followed by plain water (47.6%), and other type of milk (33.1%). With respect to food, 73.3% of the children received solid or semi-solid food three times, on average. When asked about dietary supplements, 22.3% of caregivers declared giving iron pills or syrup to her child and 22.9% affirmed having given vitamin A.

Children's overall cleanness (hands, clothes, fingernails, face) increases with income.

The survey examined the care situation of the children under the age of five by including questions related to cleanness and clothing, and about the attention and care given by their caregiver. Table 31 shows that on average, during the week previous to the interview, every child under the age of two had been left almost one time in the charge of another child. Richer households tended to leave their children more times alone at home. The interviewer also observed the overall cleanness of children during the interview. Three-quarters of the children under the age of five had a clean aspect, 37.7% of them exhibited dirty hands, 46.5% displayed dirty

[16] Colostrum is produced prior to mature breast milk during pregnancy and through the first 3–6 days of life. It contains not only necessary nutrients, but also properties that help protect the baby from viral and bacterial infections.

TABLE 30: INFANT/YOUNG CHILD FEEDING (CHILDREN <2)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Liquids Given Yesterday (% Children):					
Breast milk	81.9%	78.1%	73.9%	74.1%	77.0%
Plain water	39.4%	43.9%	48.6%	58.7%	47.6%
Infant formula	5.8%	4.2%	6.9%	7.4%	6.0%
Fortified child food	7.9%	8.2%	7.6%	7.5%	7.8%
Homemade gruel	23.9%	16.6%	14.2%	34.7%	22.3%
Other milks	21.8%	32.1%	42.8%	36.1%	33.1%
Fruit juice	12.3%	17.7%	23.8%	16.9%	17.6%
Caffeine beverages	15.0%	15.0%	12.7%	18.1%	15.2%
Other	17.8%	19.2%	18.0%	30.6%	21.3%
% of children that were given solid or semi-solid food yesterday	67.1%	72.2%	75.5%	78.8%	73.3%
Average number of times food was given yesterday	3.0	3.0	2.9	2.9	3.0
Food Given Yesterday (% Children):					
Grain-based food	85.4%	85.6%	89.6%	81.7%	85.6%
Vitamin A food	77.2%	77.1%	79.8%	72.8%	76.7%
Roots, potatoes	92.6%	90.5%	92.0%	84.6%	89.8%
Fruits, vegetables	78.3%	81.4%	82.8%	92.4%	83.9%
Meat red, white	82.7%	87.7%	93.6%	90.1%	88.7%
Beans, peas, lentils	65.4%	65.3%	60.3%	51.0%	60.3%
Oil, fats, butter	75.9%	79.0%	84.5%	87.4%	81.9%
% of children that ever received vitamin A	25.6%	23.2%	24.0%	18.7%	22.9%
% of children that were given iron pills or syrup	21.1%	25.7%	24.7%	17.6%	22.3%
% of children that feed themselves	48.7%	52.0%	55.5%	55.5%	53.1%

TABLE 31: INFANT/YOUNG CHILD CARE SITUATION (CHILDREN <5)[17]

	Income Quartile				
	1st	2nd	3rd	4th	Total
Child was left at the charge of another child during past week (number of times)*	0.8	0.9	0.9	0.5	0.8
Child was left alone during previous week (number of times)*	0.2	0.6	0.3	0.7	0.4
Child appeared clean with no offensive odor (% children)	60.3%	71.7%	79.7%	89.6%	74.5%
Child has dirty hands (% children)	46.2%	39.1%	35.9%	27.7%	37.7%
Child has dirty finger nails (% children)	58.8%	48.2%	46.2%	30.0%	46.5%
Child has pot-belly (% children)	19.7%	17.2%	7.6%	6.3%	13.1%
Child has dirty face (% children)	38.1%	32.0%	30.5%	17.3%	30.0%
Child wears clothes (% children)	42.3%	35.1%	27.5%	19.0%	31.7%
Child wears shoes or has shoes available (% children)	83.1%	83.4%	83.0%	86.0%	83.8%

[17] Note: The first two questions in Table 31 correspond only to children under two years old.

fingernails and 30% had a dirty face. In regards to clothing, 31.7% of the children were seen wearing clothes (of which 99.2% had dirty clothes) and 83.8% of them were wearing shoes (or shoes were available). Children's overall cleanness (hands, clothes, fingernails, face) increased with income.

On average, caregivers devoted more than five hours per day taking care of their children.

Interviewers were asked to observe interaction between the caregivers and their children during the interview, and results are reported on Table 32A. More than 90% of the caregivers kept the child in sight during the interview: 77.4% talked to the child, 51.4% played or interacted in order to promote his/her development and learning, 64.9% smiled to or laughed with the child, and 5.2% of the caregivers spanked the child during the interview. Caregivers coming from wealthier households interacted more with their children during the interview. On average, caregivers devoted more than five hours per day taking care of their children.

The survey also included a section of caregiver behavior towards child discipline (only for caregivers of children under the age of two). Findings are summarized in Table 32B and indicate that 56.6% of the caregivers explained to their children the reason why some behavior was inappropriate, 20.4% of caregivers shook their child during the last month, 48.3% of them shouted or yelled at the child, 26.6% spanked or slapped the child, and 6.7% used an insulting name. Although over one-fourth of the households reported having spanked or slapped their under

TABLE 32A: INFANT/YOUNG CHILD CARE SITUATION DURING INTERVIEW

	Income Quartile				
	1st	2nd	3rd	4th	Total
Caregiver keeps child in sight (% caregivers)	88.0%	86.7%	91.1%	95.4%	90.0%
Caregiver talks to child (% caregivers)	71.4%	78.9%	79.1%	81.5%	77.4%
Caregiver promotes child's development/learning (% caregivers)	44.4%	46.3%	57.6%	59.7%	51.4%
Caregiver smiles/laughs to child (% caregivers)	60.1%	61.7%	69.2%	70.0%	64.9%
Caregiver spanks the child (% caregivers)	2.9%	8.3%	5.9%	3.8%	5.2%
Average daily caring time	5.52	5.75	5.52	6.04	5.70

TABLE 32B: DISCIPLINE MEASURES TOWARDS INFANT DURING PREVIOUS MONTH (CHILDREN <2)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Caregiver took away or forbade something (% caregivers)	18.3%	21.3%	33.3%	32.6%	26.3%
Caregiver explained why the behavior was wrong (% caregivers)	43.3%	52.8%	60.7%	69.7%	56.6%
Caregiver shook the child (% caregivers)	12.5%	22.4%	24.5%	22.4%	20.4%
Caregiver shouted or yelled at the child (% caregivers)	36.8%	41.6%	60.1%	54.9%	48.3%
Caregiver spanked, slapped the child (% caregivers)	17.0%	25.4%	34.2%	30.0%	26.6%
Caregiver that hit the child on the bottom or elsewhere (% caregivers)	1.1%	3.7%	3.5%	1.0%	2.3%
Caregiver that used an insulting name (% caregivers)	1.9%	6.4%	8.7%	9.8%	6.7%
Caregiver thinks that physical punishment is necessary (%caregivers)	8.4%	5.7%	9.8%	2.2%	6.5%

Surveyors collected observations on child hygiene, care, and cleanness

two-year-old child during the previous month, only 6.5% of the households agreed that physical punishment was necessary in order to raise and educate a child.

Furthermore, there were specific questions related to household support for learning and development. These include the availability to play with objects, and the frequency with which adults engaged children in various activities demonstrated to promote language and cognitive development. Table 33 shows that 62.5% of the children under the age of two played with household objects and 82.6% of them played with toys. Only 4.9% of the children attend a nursery or child center; this may be due to the fact that many centers only served children three to five years of age. While the majority of children played with an adult (83.9%) or were taken on an outing outside the home (91.8%) in the past three days, only about one-quarter of caregivers read books or told stories to the child in the past three days. The results reported in Table 33 reinforce previous findings that showed more time and effort dedication by the caregivers coming from households with higher incomes.

While the majority of children played with an adult (83.9%) or were taken on an outing outside the home (91.8%) in the past three days, only about one-quarter of caregivers read books or told stories to the child in the past three days.

TABLE 33: INFANT/YOUNG CHILD LEARNING ENVIRONMENT (CHILDREN <2)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Child plays with household objects (% children)	57.9%	59.7%	65.3%	67.3%	62.5%
Child plays with toys (% children)	73.5%	84.2%	85.9%	87.1%	82.6%
Child attended early education programs (% children)	1.6%	9.1%	4.6%	4.4%	4.9%
Adult reads books with child (% adults)	19.3%	21.9%	26.8%	33.9%	25.4%
Adult tells stories to child (% adults)	19.9%	22.1%	23.7%	23.7%	22.3%
Adult take child outside home (% adults)	86.9%	88.6%	94.6%	97.3%	91.8%
Adult plays with child (% adults)	78.3%	77.6%	88.0%	92.3%	83.9%

TABLE 34: MATERNAL DEPRESSION

	Felt Fearful	Restless Sleep	Felt Lonely	Felt Sad	Enjoyed Life	Could Not Get Going
Never or rarely (% caregivers)	18.7%	13.2%	16.6%	4.6%	18.4%	34.6%
Little of the time or occasionally (% caregivers)	25.5%	29.4%	22.9%	24.7%	39.4%	24.9%
Sometimes or about half the time (% caregivers)	39.5%	34.4%	28.7%	37.7%	27.6%	23.5%
Most or all of the time (% caregivers)	16.3%	23.0%	31.8%	33.0%	14.5%	17.0%

Finally, this survey also considered maternal depression, as it is an important determinant of the child's health environment. Results show that 13.2% of the mothers felt depressed most or all of the time during the last seven days and 24.8% declared feeling depressed sometimes or about half the time. Table 34 presents the most common symptoms of depression for those mothers who answered being depressed "Sometimes or about half the time," or "Most or all the time." More than 70% of these mothers felt sad sometimes or most of the time, 60.5% felt lonely, 55.8% declared feeling fearful, and 57.4% experienced restless sleep.

4.8 Child Development

The survey included a section related to child development, in which caregivers were asked a number of questions about the child's reaction to specific stimuli (i.e., response to mother's voice, reaction to seeing self in a mirror) or whether the child had yet achieved various milestones (i.e., sitting, walking, saying some words, etc.). We measured three domains: communication skills, including pre-verbal babbling, as well as producing and understanding language; gross motor skills, including control of certain postures or coordination of movements requiring large muscle systems; and personal-social skills or behaviors related to engaging with others, as well as to becoming independent. Scores on these types of outcomes have been useful for discriminating between groups of children with different environmental (poverty, etc.) and biological (stunting, etc.) profiles. The questions administered to each child were selected to measure a range of behaviors representing lower- to higher-than average development per age range (based on U.S. estimates of age-related behaviors, as international standards are not available). With this information, we computed a "degree of child development" index per skill with higher scores

TABLE 35A: CHILD DEVELOPMENT Z-SCORES BY SANITARY CONDITIONS (CHILDREN <2)

	Improved Sanitation		Improved Water Source		Soap and Water at HW Station	
	Yes	No	Yes	No	Yes	No
Average communication skills-for-age z-score	0.12	0.00	0.09	−0.06	0.07	0.04
Average gross motor skills-for-age z-score	0.21	−0.07	0.13	−0.16	0.14	−0.08
Average personal-social skills-for-age z-score	0.17	0.02	0.12	−0.02	0.13	0.00

TABLE 35B: CHILD DEVELOPMENT Z-SCORES BY INCOME QUARTILE (CHILDREN <2)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Average communication skills-for-age z-score	−0.06	0.06	0.09	0.13	0.06
Average gross motor skills-for-age z-score	−0.16	−0.05	0.16	0.27	0.06
Average personal-social skills-for-age z-score	0.03	−0.03	0.10	0.23	0.09

TABLE 35C: CHILD DEVELOPMENT Z-SCORES BY GEOGRAPHIC AREA (CHILDREN <2)

	Geographic Area			
	Coast	Jungle	Mountain	Total
Average communication skills-for-age z-score	0.19	0.03	−0.01	0.06
Average gross motor skills-for-age z-score	0.05	0.17	0.05	0.06
Average personal-social skills-for-age z-score	0.06	−0.02	0.12	0.09

Several child development measures were collected during the survey

representing a higher level of development in that domain. Table 35 presents the z-scores[18] for these variables disaggregated by sanitary conditions, income, and geographic area.

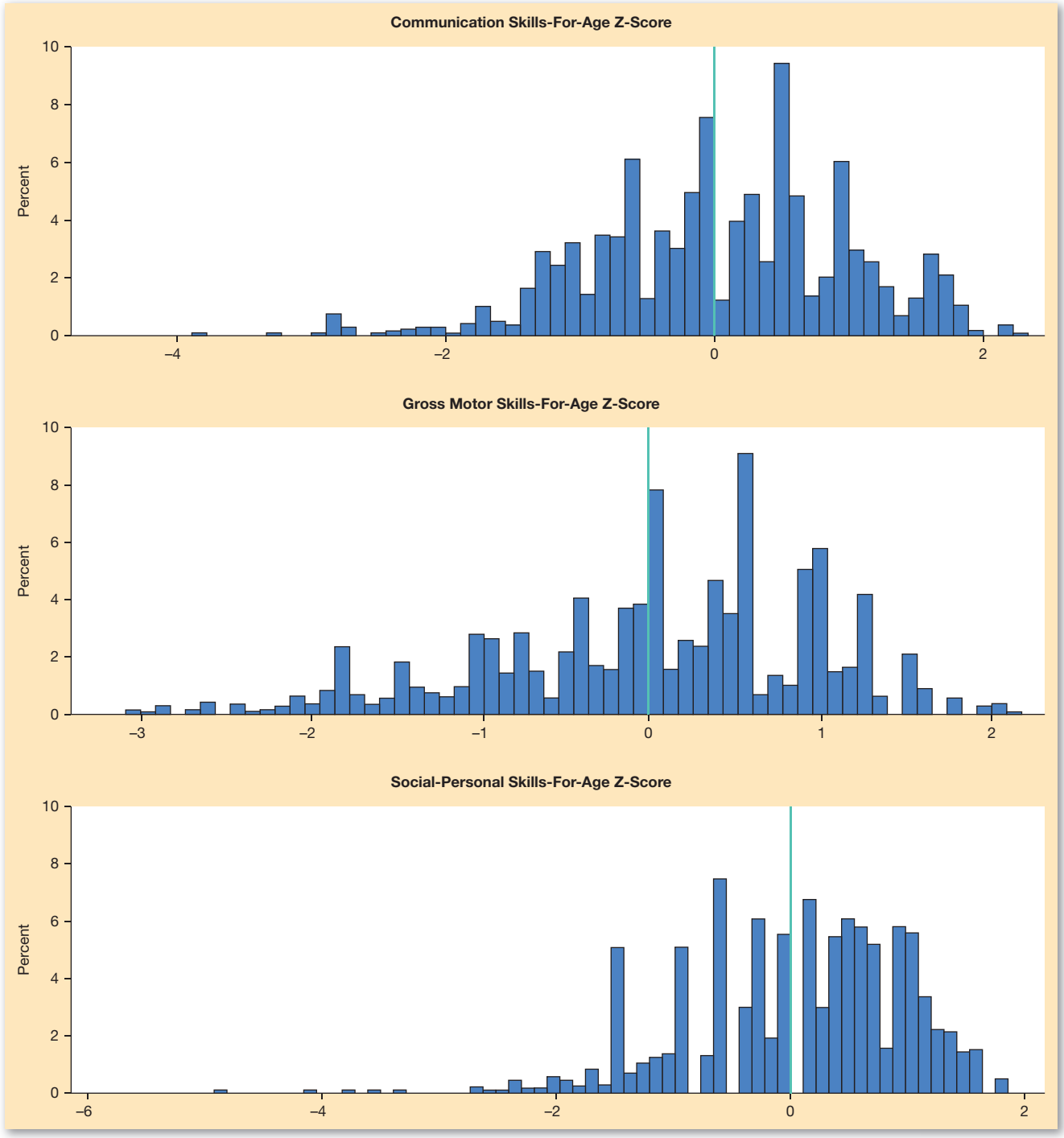
We systematically observed for every type of skill a lower degree of development in those children from households without improved sanitation, without an improved water source, and without a handwashing station stocked with soap and water. Although we cannot infer any causal relationship between the variables in this bivariate analysis, the figures show a correlation between the sanitary conditions and the degree of child's development. Furthermore, all of the measures increased with the income level, since previous tables have showed that richer households can afford to provide healthier nourishment for younger children and to spend more time stimulating their development. When disaggregating the data by geographic area we did not find a clear-cut pattern, since in each area there is a skill for which the children coming from that area are better than others.

We systematically observed for every type of skill a lower degree of development in those children from households without improved sanitation, without an improved water source, and without a handwashing station stocked with soap and water. . . . When disaggregating the data by geographic area we did not find a clear-cut pattern, since in each area there is a skill for which the children coming from that area are better than others.

Figure 4 shows the histograms for the three variables' z-scores. All of them had a mean value equal to 0. The median values for the communication skills-for-age z-score, the gross motor skills-for-age z-score, and the personal-social skills-for-age z-score were –0.06, 0.09, and 0.19, respectively.

[18] A z-score, or standard score, indicates how many standard deviations an observation is below or above the average (mean). As the mean is normalized to zero, any negative z-scores would be below the mean, and any positive z-scores would be above the mean.

FIGURE 4: HISTOGRAMS OF CHILD DEVELOPMENT MEASURES' Z-SCORES (CHILDREN <2)



4.9 Diarrhea and Acute Lower Respiratory Infection Prevalence

Previous sections have shown that many of the interviewed households lacked access to improved water, improved sanitation, and handwashing stations with soap and water, which made them prone to contract any diseases related to sanitary and hygiene deficiencies. Tables 36 through 39 display the analysis results of health-related questions for the group of children under the age of five. Specifically, we concentrate on two diseases: diarrhea and ALRI.

TABLE 36A: DIARRHEA PREVALENCE BY SANITARY CONDITIONS (CHILDREN <5)

	Improved Sanitation		Improved Water Source		Soap and Water at HW Station	
	Yes	No	Yes	No	Yes	No
Child had diarrhea symptoms in previous 48 hours (% children)	7.6%	12.0%	10.0%	10.2%	10.2%	9.7%
Child had diarrhea symptoms in previous week (% children)	16.6%	19.9%	18.5%	18.1%	18.5%	18.4%
Child had diarrhea symptoms in past 14 days (% children)	17.7%	21.9%	19.4%	21.7%	19.8%	20.4%

TABLE 36B: DIARRHEA PREVALENCE BY GEOGRAPHIC AREA (CHILDREN <5)

	Geographic Area			
	Coast	Jungle	Mountain	Total
Child had diarrhea symptoms in previous 48 hours (% children)	6.04%	13.35%	11.39%	10.01%
Child had diarrhea symptoms in previous week (% children)	14.08%	22.63%	19.87%	18.45%
Child had diarrhea symptoms in past 14 days (% children)	14.94%	24.31%	21.81%	20.04%

TABLE 37: DIARRHEA TREATMENT BY INCOME QUARTILE (CHILDREN <5)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Child had diarrhea symptoms in previous 48 hours (% children)	10.2%	8.5%	12.3%	9.2%	10.0%
Child had diarrhea symptoms in previous week (% children)	17.6%	16.6%	23.7%	16.1%	18.5%
Child had diarrhea symptoms in past 14 days (% children)	19.1%	17.9%	24.9%	18.5%	20.0%
Caregiver did seek public care provider (% caregivers)	94.9%	96.2%	85.0%	95.4%	93.2%
Caregiver did not pay for the intestinal treatment (% caregivers)	75.9%	69.1%	36.4%	74.3%	60.0%
Caregiver Did Seek Medical Advice (% Caregivers):					
Did not seek	45.2%	43.5%	66.3%	65.6%	55.1%
Day visit to doctor	54.1%	54.5%	30.3%	31.7%	42.7%
Other	0.7%	2.1%	3.4%	2.8%	2.2%
Type of Treatment Given:					
No treatment	46.4%	25.2%	25.9%	56.4%	37.7%
Pill or Syrup	45.3%	65.9%	65.9%	36.8%	54.2%
Traditional remedies	2.9%	4.8%	1.2%	4.2%	3.1%
Oral rehydration solution	1.6%	1.4%	2.5%	0.0%	1.5%
Homemade sugar/salt water	0.1%	1.9%	3.6%	0.0%	1.5%
Other	3.9%	1.1%	0.8%	0.2%	1.6%

The variable for diarrhea prevalence was constructed on the basis of several symptoms reported by a child's caregiver and not on caregiver's self-diagnosis.

The variable for diarrhea prevalence was constructed on the basis of several symptoms reported by a child's caregiver and not on caregiver's self-diagnosis. Specifically, a child was declared to have diarrhea when he presented the following symptoms: three or more loose or watery stools per day, or one or more stools with blood and/or mucus (Baqui et al. 1991).

Findings reveal that 10% of the children under the age of five presented diarrhea symptoms in the previous 48 hours, 18.4% presented symptoms in the past seven days and 20.4% in the past 14 days. Diarrhea prevalence was not lower in households with access to a handwashing station with soap and water (and an improved water source, to a smaller degree), compared to those that did not have access.

Findings reveal that 10% of the children under the age of five presented diarrhea symptoms in the previous 48 hours, 18.4% presented symptoms in the past seven days and 20.4% in the past 14 days. For all the three recall periods, the prevalence of diarrhea was noticeably higher in those households with unimproved sanitation. Diarrhea prevalence was not lower in households with access to a handwashing station with soap and water (and an improved water source, to a smaller degree), compared to those that did not have access. When disaggregating diarrhea prevalence by geographical region, we find that the situation was significantly worse for households living in the jungle, where 24% of the children presented diarrhea symptoms in the past 14 days. For households living in the mountains this figure reduced to 22% and for those living along the coast it further decreased to 15%. Finally, we observed no strong relationship between income level and diarrhea prevalence.

On average, 55.1% of caregivers with children presenting diarrhea symptoms in the previous 48 hours did not seek medical advice, while 42.7% went to visit the doctor. In almost every case, assistance was provided by a public agent (93.2%) and a high proportion of caregivers did not pay for the treatment (60%). In 37.7% of the cases no treatment was received. Pill or syrup was given as treatment in 54.2% and traditional remedies in 3.1% of the cases.

To analyze presence of parasites, stool samples are collected

TABLE 38A: ALRI PREVALENCE BY SANITARY CONDITIONS (CHILDREN <5)

	Improved Sanitation		Improved Water Source		Soap and Water at HW Station	
	Yes	No	Yes	No	Yes	No
Child had ALRI symptoms in previous 48 hours (% children)	2.6%	5.8%	3.8%	5.7%	4.5%	4.1%
Child had ALRI symptoms in previous week (% children)	3.5%	7.3%	5.0%	7.1%	5.6%	5.5%

TABLE 38B: ALRI PREVALENCE BY GEOGRAPHIC AREA (CHILDREN <5)

	Geographic Area			
	Coast	Jungle	Mountain	Total
Child had ALRI symptoms in previous 48 hours (% children)	1.7%	3.3%	5.8%	4.3%
Child had ALRI symptoms in previous week (% children)	2.4%	4.4%	7.4%	5.6%

TABLE 39: ALRI TREATMENT BY INCOME QUARTILE (CHILDREN <5)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Child had ALRI symptoms in previous 48 hours (% children)	6.0%	3.5%	5.2%	2.2%	4.3%
Child had ALRI symptoms in previous week (% children)	8.0%	4.8%	6.0%	2.9%	5.6%
Caregiver did seek public care provider (% caregivers)	85.8%	81.6%	53.7%	90.3%	79.0%
Caregiver did not pay for the treatment (% caregivers)	90.5%	63.6%	28.7%	63.3%	65.4%
Caregiver Did Seek Medical Advice (% Caregivers):					
Did not seek	52.6%	62.9%	71.8%	46.5%	59.7%
Day visit to doctor	46.9%	36.5%	23.0%	53.6%	38.4%
Other	0.6%	0.7%	5.2%	0.0%	1.9%
Type of Treatment Given:					
No treatment	28.9%	30.0%	40.5%	10.3%	30.4%
Pill or Syrup	62.5%	65.0%	58.4%	63.6%	62.0%
Injection	1.3%	5.3%	4.4%	0.8%	3.0%
Traditional remedies	7.0%	0.7%	0.0%	24.4%	5.5%
Other	2.1%	4.3%	0.2%	0.6%	1.8%

In order to construct the ALRI variable, we followed the methodology provided by the World Health Organization clinical case definition (WHO 2005). Specifically, a child was identified as having ALRI when he/she presented the following symptoms: constant cough or difficulty breathing, and raised respiratory rate (>60 breaths per minute in children younger than 60 days old, >50 breaths per minute for children aged 60–364 days, >40 per minute for children aged one to five years).

The prevalence of ALRI was lower than diarrhea in our sample: only 4.3% of children had ALRI symptoms in the previous 48 hours and the seven-day prevalence is 5.6%. ALRI prevalence increased to 7.3% among children living in households with unimproved sanitation and to 7.1% in the households with unimproved

The prevalence of ALRI was lower than diarrhea in our sample. ALRI prevalence increases to 7.3% among children living in households with unimproved sanitation and to 7.1% in the households with unimproved water sources. ALRI prevalence was higher for children living in the mountains of Peru, where the effect of altitude over respiratory difficulties seemed to be driving the results.

water sources. As expected, ALRI prevalence was higher for children living in the mountains of Peru, where the effect of altitude over respiratory difficulties seemed to be driving the results. As with diarrhea, similar percentages of households presented ALRI symptoms in the previous week, despite whether or not they had a handwashing station stocked with soap and water. Of those that presented the ALRI symptoms in the previous 48 hours, 59.7% caregivers did not seek medical advice and 38.4% of them only made a day visit to the doctor. Seventy-nine percent of consulted care providers were public agents.

Again, a very high percentage of caregivers did not pay for the treatment (65.4%). In 30.4% of the cases, children presenting ALRI symptoms received no treatment. The most frequent treatment was pills or syrup (62%), followed by traditional remedies (5.5%) and injections (3%).

4.10 Anthropometric Measures and Anemia

The survey included anthropometric measures of children under the age of two: arm and head circumference, weight, and length/height. This information is important in order to assess the average growth and development of the children. To analyze these variables, z-scores were computed using WHO's estimations of population mean and standard deviation for each of the aforementioned variables (WHO 2006, 2007). The histograms of the z-scores for each anthropometric measure are presented in Figure 5.

On average, arm circumference was found to be higher than the population mean, as well as the body mass index and the weight for length/height. On the contrary, the average weight, length/height, and head circumference were found to be lower than the population mean estimated by the WHO.

On average, arm circumference was found to be higher than the population mean, as well as the body mass index and the weight for length/height. On the contrary, the average weight, length/height, and head circumference were found to be lower than the population mean estimated by the WHO.

Table 40 presents the average z-scores for the six anthropometric measures disaggregated by sanitary condition, income level, and geographical area. Children coming from households without improved sanitation, improved water source, or a handwashing station stocked with soap and water, tended to have a lower average z-score for each anthropometric measure included in the analysis. These results confirm those found in the Child Development subsection. Physical development was positively correlated with household sanitary condition, although no causal relationship can be inferred from this bivariate analysis. Again, all six measures increased with income level, which could be driven by the fact that wealthier caregivers can and actually do provide their children with better nourishment during the first years of their lives. With respect to the disaggregation by geographical area, all six measures indicate that children living in coastal areas were in a better situation than those living in the mountains and the jungle. However, this does not preclude the fact that according to three out of six measures, all children, independently of the geographical area considered, were underperforming compared to the mean value.

Children from households without improved sanitation, improved water source, or a handwashing station stocked with soap and water, tended to have a lower average z-score for each anthropometric measure included in the analysis. Physical development was positively correlated with household sanitary condition, although no causal relationship can be inferred from this bivariate analysis.

FIGURE 5: HISTOGRAMS OF ANTHROPOMETRIC MEASURES' Z-SCORES (CHILDREN <2)

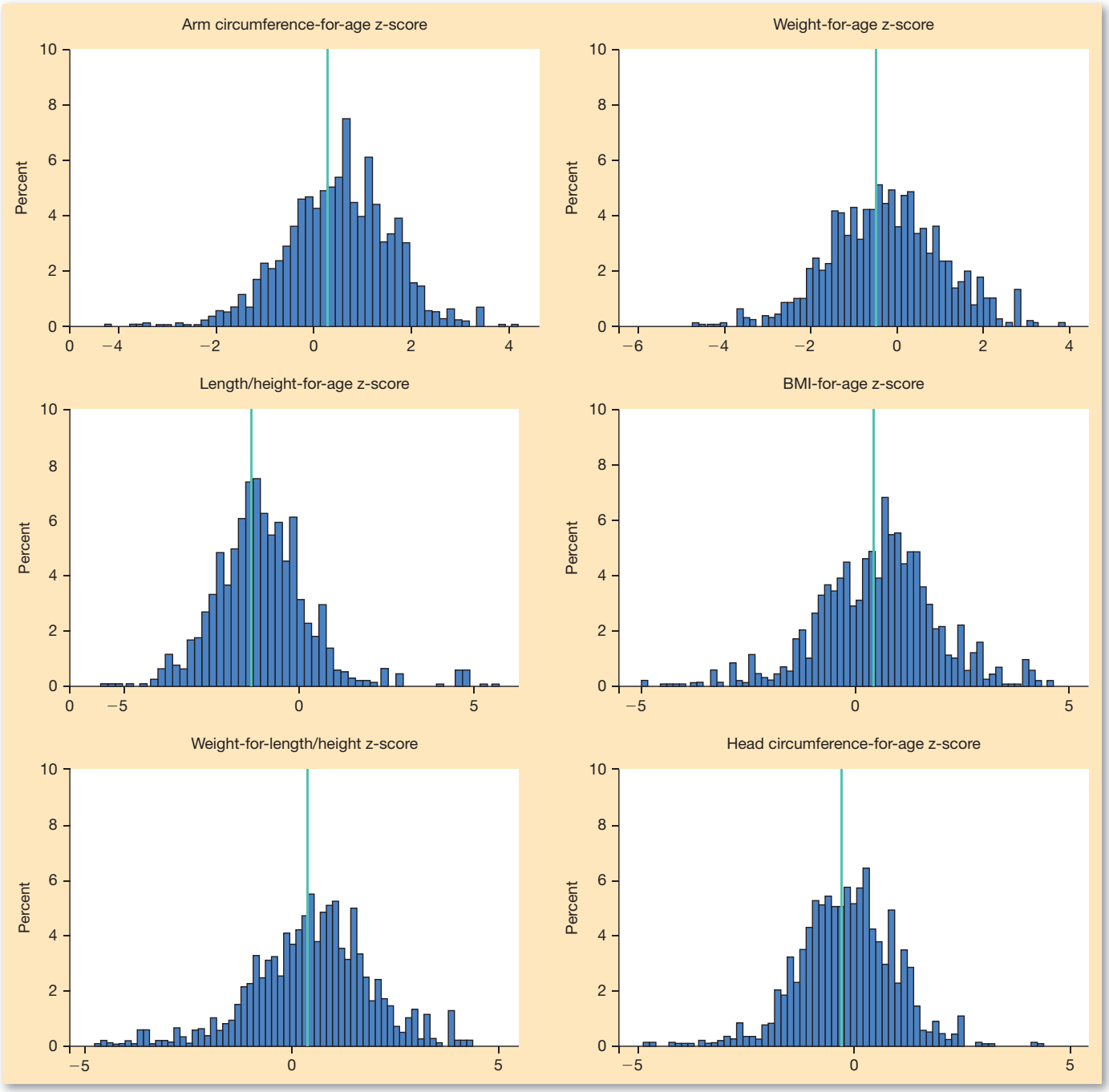


TABLE 40A: ANTHROPOMETRIC MEASURES' Z-SCORES BY SANITARY CONDITIONS (CHILDREN <2)

	Improved Sanitation		Improved Water Source		Soap and Water at HW Station	
	Yes	No	Yes	No	Yes	No
Average arm circumference-for-age z-score	0.69	0.35	0.57	0.33	0.60	0.35
Average weight-for-age z-score	−0.10	−0.44	−0.23	−0.43	−0.19	−0.45
Average length/height-for-age z-score	−1.00	−1.24	−1.11	−1.19	−1.02	−1.32
Average BMI-for-age z-score	0.67	0.36	0.54	0.42	0.56	0.40
Average weight-for-length/height z-score	0.59	0.34	0.48	0.40	0.53	0.32
Average head circumference-for-age z-score	−0.06	−0.30	−0.12	−0.40	−0.17	−0.21

TABLE 40B: ANTHROPOMETRIC MEASURES' Z-SCORES BY INCOME QUARTILE (CHILDREN <2)

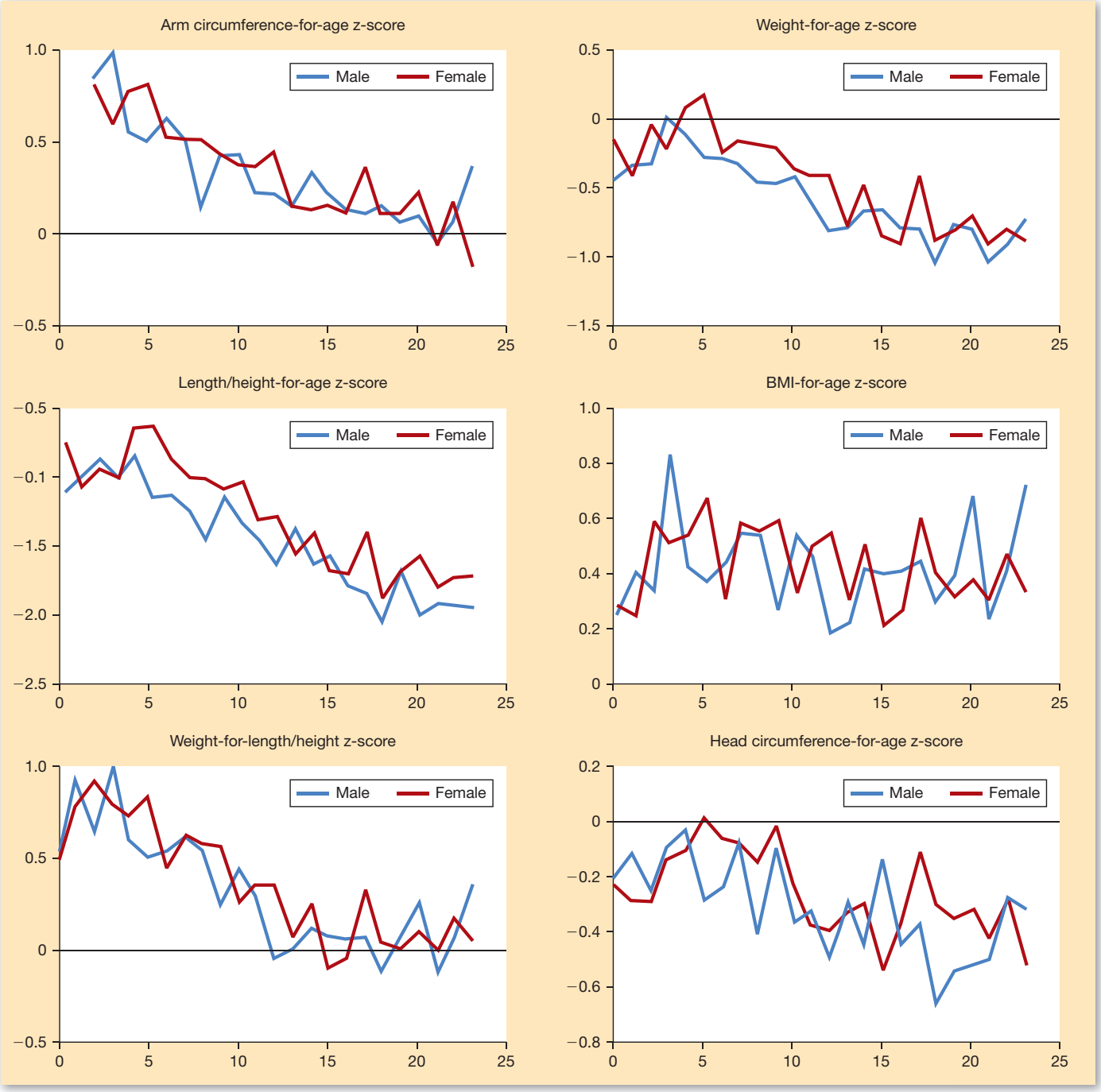
	Income Quartile				
	1st	2nd	3rd	4th	Total
Average arm circumference-for-age z-score	0.20	0.41	0.55	0.85	0.51
Average weight-for-age z-score	−0.65	−0.40	−0.22	0.16	−0.28
Average length/height-for-age z-score	−1.44	−1.24	−0.95	−0.88	−1.13
Average BMI-for-age z-score	0.28	0.45	0.48	0.83	0.51
Average weight-for-length/height z-score	0.25	0.41	0.42	0.77	0.46
Average head circumference-for-age z-score	−0.40	−0.31	−0.04	0.00	−0.19

TABLE 40C: ANTHROPOMETRIC MEASURES' Z-SCORES BY GEOGRAPHIC AREA (CHILDREN <2)

	Geographic Area			
	Coast	Jungle	Mountain	Total
Average arm circumference-for-age z-score	0.72	0.18	0.46	0.51
Average weight-for-age z-score	−0.06	−0.55	−0.35	−0.28
Average length/height-for-age z-score	−1.01	−1.27	−1.16	−1.13
Average BMI-for-age z-score	0.72	0.28	0.44	0.51
Average weight-for-length/height z-score	0.64	0.22	0.41	0.46
Average head circumference-for-age z-score	−0.09	−0.47	−0.19	−0.19

Figure 6 presents the average z-score corresponding to each variable disaggregated by age and sex. Since this survey is a cross section of households, we cannot observe the evolution over time of the anthropometrics variables for the children under the age of two. Nevertheless, we can analyze the average z-score for the different groups of children arranged according to their age (in months), which gives us an approximation of the anthropometric measures' evolution over early child development. A very striking result is that, with the exception of the evolution of the average body mass index-to age z-score, the evolution of the averages of the rest of the variables decreased with age, indicating two possible explanations. The first is that the gap between the sample mean and the population mean widens during child's growth, in which case this evidence could be interpreted as a worsening of child's physical development. The second explanation that can be derived is that the standard deviation of each variable could be decreasing with age, which makes the situation more severe if the first explanation is correct.

FIGURE 6: ANTHROPOMETRIC MEASURES' Z-SCORES BY SEX AND MONTHS OF AGE (CHILDREN <2)



Almost three-quarters of the samples taken indicate the presence of anemia. This proportion is lower for households with improved sanitation but higher for households with improved water source. A surprising result is that the percentage of individuals suffering from anemia increases with income level.

Hemoglobin concentrations were obtained from children under the age of two in order to estimate the percentage suffering from anemia, and results are reported in Table 41. For households living in the mountains, the results were adjusted to account for differences in altitude, since hemoglobin concentrations increase as an adaptive response to the lower partial pressure of oxygen and reduced oxygen saturation of blood (Nestel 2002). Almost three-quarters of the samples taken indicated the presence of anemia. This proportion was lower for households with improved sanitation, but higher for households with improved water source. The proportion was also higher among children living in the mountains. An unexpected result is that the percentage of individuals suffering from anemia increased with income level. A partial plausible explanation, consistent with the results shown in Table 30 could be that, on average, children in poor households were more likely to receive iron supplements, which could be a consequence of government and/or NGO programs targeting low-income families.

TABLE 41: ANEMIA PREVALENCE (Hb <110 g/L) IN CHILDREN <2

	% of HHs
By Income Quartile:	
1st	73.80%
2nd	72.10%
3rd	74.90%
4th	78.40%
By Geographic Area:	
Coast	74.50%
Jungle	69.50%
Mountain	75.90%
Overall	74.80%

Hemoglobin concentrations are measured to test for anemia

4.11 Environmental Contamination and Parasitical Prevalence

The survey also collected stool and environmental contamination samples on a subsample of 160 households to examine the presence of parasites and bacteria.

To examine the presence of parasites and bacteria, the survey also collected stool and environmental contamination samples on a subsample of 160 households. Baseline data on the presence of bacteria and parasites in the household may allow us in the future to better understand the mechanism by which our treatment operates, whether it is through the mother or the child. Also, data related to bacteria and parasites presence in household objects and water serves as a control for factors not related to our treatment that could also affect the output variable that we are interested in. In particular, the focus is set in the presence of bacteria such as *E. coli*, and parasites such as *Giardia*, *Ascaris*, and *Blastocystis*.

Some kinds of *E. coli* can cause diarrhea, while others cause urinary tract infections, respiratory illness and pneumonia, and other diseases. . . . Consistent with previous findings, households with access to improved sanitation presented lower counts of the bacteria in each of the four samples taken, but households with access to an improved water source showed higher levels of water contamination.

Some kinds of *E. coli* can cause diarrhea, while others cause urinary tract infections, respiratory illness and pneumonia, and other diseases. Still, other kinds of *E. coli* are used as markers for water contamination. Table 42 presents

TABLE 42A: MEAN *ESCHERICHIA COLI* CONCENTRATIONS BY SANITARY CONDITIONS

	Improved Sanitation		Improved Water Source		Soap and Water at HW Station	
	Yes	No	Yes	No	Yes	No
Log10 *E. coli*, PN/100ml:						
Mother	0.72	1.06	0.91	0.76	0.80	1.01
Child	0.55	0.56	0.61	0.36	0.60	0.47
Object	0.44	0.48	0.55	0.09	0.52	0.34
Water	0.42	0.79	0.63	0.45	0.55	0.66

TABLE 42B: MEAN *ESCHERICHIA COLI* CONCENTRATIONS BY INCOME QUARTILE

	Income Quartile				
	1st	2nd	3rd	4th	Total
Log10 *E. coli*, MPN/100ml:					
Mother	1.21	0.65	0.90	0.72	0.88
Child	0.48	0.67	0.63	0.35	0.56
Object	0.94	0.50	0.17	0.16	0.46
Water	1.16	0.25	0.55	0.36	0.59

TABLE 42C: MEAN *ESCHERICHIA COLI* CONCENTRATIONS BY GEOGRAPHIC AREA

	Geographic Area			
	Coast	Jungle	Mountain	Total
Log10 *E. coli*, MPN/100ml:				
Mother	0.90	0.76	0.82	0.88
Child	0.57	0.56	0.50	0.56
Object	0.43	1.39	0.30	0.46
Water	0.60	1.26	0.34	0.59

the logarithm of *E. coli* counts disaggregated by sanitation condition, income level and geographic area. Consistent with previous findings, households with access to improved sanitation presented lower counts of the bacteria in each of the four samples taken, but households with access to an improved water source showed higher levels of water contamination. Samples collected from caregivers' hands and drinking water coming from households with a handwashing station stocked with soap and water had lower counts of the bacteria, but the counts coming from the child and objects seemed to be higher. When taking into account income levels, there was a declining trend of *E. coli* counts with income, though the counts were also low for the sample taken from the child coming from the poorest households. Finally, households living in coastal areas presented the highest *E. coli* counts in the samples taken from the mother, while in the jungle the highest *E. coli* counts were found in samples taken from objects and water.

The parasitical analysis focused on three types of parasites: *Giardia*, a parasite that colonizes and reproduces in the small intestine, causing giardiasis; *Ascaris*, a genus of parasitic worms, which provokes an infection called ascariasis; and *Blastocystis*, which can produce the disease blastocystsis, for which the most frequently described symptoms are abdominal pain, constipation, and diarrhea. Table 43A, 43B, and 43C summarize the results for these three parasites.

TABLE 43A: PARASITES PREVALENCE IN STOOL SAMPLES BY SANITARY CONDITIONS (CHILDREN <2)

	Improved Sanitation		Improved Water Source		Soap and Water at HW Station	
	Yes	No	Yes	No	Yes	No
Any parasites detected in stool samples (% HHs)	6.7%	17.5%	8.4%	25.0%	2.7%	29.2%
Giardia detected in stool samples (% HHs)	1.5%	12.1%	4.3%	14.6%	1.3%	16.3%
Ascaris detected in stool samples (% HHs)	0.2%	0.1%	0.2%	0.0%	0.2%	0.0%
Blastocystis detected in stool samples (% HHs)	5.3%	8.1%	4.3%	15.5%	1.5%	16.4%

TABLE 43B: PARASITES PREVALENCE IN STOOL SAMPLES BY INCOME QUARTILE (CHILDREN <2)

	Income Quartile				
	1st	2nd	3rd	4th	Total
Any parasites detected in stool samples (% HHs)	22.9%	3.3%	16.2%	1.5%	11.7%
Giardia detected in stool samples (% HHs)	9.7%	0.3%	12.6%	1.3%	6.4%
Ascaris detected in stool samples (% HHs)	0.4%	0.2%	0.0%	0.0%	0.2%
Blastocystis detected in stool samples (% HHs)	13.8%	3.1%	7.2%	0.2%	6.6%

TABLE 43C: PARASITES PREVALENCE IN STOOL SAMPLES BY GEOGRAPHIC AREA (CHILDREN <2)

	Geographic Area			
	Coast	Jungle	Mountain	Total
Any parasites detected in stool samples (% HHs)	9.2%	11.4%	21.5%	11.7%
Giardia detected in stool samples (% HHs)	6.5%	4.4%	6.8%	6.4%
Ascaris detected in stool samples (% HHs)	0.0%	1.5%	0.2%	0.2%
Blastocystis detected in stool samples (% HHs)	2.7%	7.0%	21.0%	6.6%

Caregiver's hands are tested for presence of *Escherichia coli*

Parasites were detected in 12% of the stool samples, and the most frequent parasites found were *Giardia* and *Blastocystis* (*Ascaris* affects only a minor percentage of households). Prevalence of parasites was lower among households with access to improved sanitation (7%) than those with unimproved sanitation (18%). Similarly, parasitical prevalence was lower among households with access to improved water sources (8%) than those with unimproved water (25%). The lowest prevalence of parasites was found among households with a handwashing station stocked with soap and water (3%) and the highest in those without such (29%). The poorest households had the highest prevalence of parasites, although there was a high and unexpected parasite presence in households located in the 3rd quartile of the income distribution. However, the prevalence of the different kinds of parasites was not homogeneous across income levels (poorest households display higher presence of *Ascaris* and *Blastocystis*, while those located in the 3rd quartile have a higher presence of *Giardia*). If the figures are disaggregated by geographical location, we observe the prevalence of parasites was twice as high in the mountains (22%) than in the jungle (11%) or the coast (9%). This is consistent with previous findings, as households in the mountains had the lowest access to improved water sources, improved sanitation, and a handwashing station with soap and water.

Parasites were detected in 12% of the stool samples, and the most frequent parasites found were *Giardia* and *Blastocystis* (*Ascaris* affects only a minor percentage of households). The lowest prevalence of parasites was found among households with a handwashing station stocked with soap and water (3%) and the highest in those without such (29%).

V. Future Directions

The data presented in the Findings section provides a snapshot of important human development indicators for a subsample of the Peruvian population. In addition, these data will be used in conjunction with endline data to achieve the primary goal of assessing the impacts of the handwashing project.

As explained in the previous sections, the impact evaluation comprises a series of surveys, which include baseline, longitudinal, and post-intervention questionnaires. At the time of this report's publication, the gathering of longitudinal data is ongoing. The collection of post-intervention data is expected to begin by the end of 2010.

Data analysis and impact assessments will be conducted during 2011, and a full impact evaluation report will be published by the end of the year.

Data analysis and impact assessments will be conducted during 2011, and a full impact evaluation report will be published by the end of the year.

An enumerator conducts a household survey

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Annex 1: List of Districts Included in WSP Sample

TABLE 44A: LIST OF DISTRICTS SELECTED TO RECEIVE TREATMENT 1 (MASS MEDIA)

Treatment 1 Districts				
No.	Region	Province	District	Population
1	Amazonas	Luya	Santa Catalina	1,630
2	Amazonas	Luya	Santo Tomas	4,008
3	Ancash	Bolognesi	Cajacay	1,748
4	Ancash	Bolognesi	Huallanca	6,353
5	Ancash	C. F. Fitzcarrald	San Nicolas	3,762
6	Ancash	Carhuaz	Tinco	3,145
7	Ancash	Huaylas	Pamparomas	8,487
8	Ancash	Sihuas	Acobamba	1,773
9	Ancash	Yungay	Cascapara	1,872
10	Arequipa	Arequipa	San Juan de Siguas	1,633
11	Arequipa	Arequipa	Alto Selva Alegre	72,818
12	Arequipa	Arequipa	Cayma	75,908
13	Cajamarca	San Miguel	Bolivar	1,636
14	Cajamarca	San Miguel	Calquis	4,694
15	Cajamarca	San Miguel	San S. de Cochan	4,813
16	Cusco	Acomayo	Acomayo	5,062
17	Huanuco	Ambo	Colpas	2,872
18	Huanuco	Ambo	San Francisco	3,673
19	Huanuco	Ambo	Cayna	4,136
20	Huanuco	Ambo	Conchamarca	5,139
21	Huanuco	Ambo	Huacar	8,464
22	Huanuco	Huanuco	San F. de Cayran	5,056
23	Huanuco	Lauricocha	Jivia	1,928
24	Ica	Chincha	El Carmen	11,607

(*Continued*)

TABLE 44A: (Continued)

Treatment 1 Districts

No.	Region	Province	District	Population
25	Ica	Chincha	Grocio Prado	18,658
26	Junín	Huancayo	Huacrapuquio	1,589
27	Junín	Huancayo	Chupuro	2,494
28	Junín	Jauja	Parco	1,623
29	Junín	Jauja	Pancan	1,647
30	Junín	Jauja	Paca	1,658
31	Junín	Jauja	Pomacancha	2,244
32	Junín	Jauja	Marco	2,526
33	La Libertad	S. de Chuco	Santa Cruz de Chuca	3,478
34	La Libertad	S. de Chuco	Sitabamba	3,610
35	La Libertad	S. de Chuco	Santiago de Chuco	21,190
36	Madre de Dios	Manu	Huepetuhe	8,130
37	Moquegua	Gral. Sanchez Cerro	La Capilla	1,525
38	Moquegua	Gral. Sanchez Cerro	Ichuña	3,782
39	Pasco	Oxapampa	Palcazu	8,887
40	Tacna	Tacna	Pocollay	15,503
	Total			340,761

TABLE 44B: LIST OF DISTRICTS SELECTED TO RECEIVE TREATMENT 2 (COMMUNITY AND SCHOOL)

Treatment 2 Districts

No.	Region	Province	District	Population
1	Amazonas	Utcubamba	Jamalca	8,137
2	Ancash	A. Raymondi	Chaccho	2,137
3	Ancash	A. Raymondi	Aczo	2,340
4	Apurímac	Aymaraes	Toraya	1,684
5	Arequipa	Castilla	Chachas	1,992
6	Arequipa	Caylloma	Huanca	1,919
7	Arequipa	Caylloma	Tisco	2,249
8	Arequipa	Caylloma	Caylloma	4,101
9	Ayacucho	Huamanga	S. de Pischa	1,643
10	Ayacucho	Victor Fajardo	Huancaraylla	1,796
11	Ayacucho	Victor Fajardo	Alcamenca	1,974
12	Cajamarca	Jaen	Chontali	10,344

(*Continued*)

TABLE 44B: (Continued)

Treatment 2 Districts

No.	Region	Province	District	Population
13	Cajamarca	Jaen	Santa Rosa	12,025
14	Huancavelica	Huancavelica	Moya	1,706
15	Huancavelica	Huancavelica	Nuevo Occoro	2,638
16	Huancavelica	Huaytara	Laramarca	1,845
17	Huancavelica	Huaytara	Huaytara	2,435
18	Huancavelica	Huaytara	Pilpichaca	5,410
19	Junín	Chanchamayo	Vitoc	2,301
20	Junín	Chanchamayo	San Ramon	24,663
21	Junín	Chanchamayo	Chanchamayo	25,565
22	Junín	Chanchamayo	Pichanaqui	40,625
23	La Libertad	Pataz	Ongon	1,574
24	La Libertad	Pataz	Pias	1,725
25	La Libertad	Pataz	S. de Challas	2,925
26	La Libertad	Pataz	Pataz	4,364
27	Lima	Barranca	Supe	21,693
28	Lima	Cañete	Asia	6,037
29	Lima	Huaral	Huaral	86,844
30	Loreto	Requena	Alto Tapiche	1,908
31	Piura	Huancabamba	Huarmaca	38,209
32	Piura	Paita	Colan	12,298
33	Piura	Piura	La Union	34,540
34	Piura	Sechura	Cristo Nos Valga	3,185
35	Puno	Moho	Moho	16,847
36	Puno	Puno	Chucuito	9,366
37	San Martin	Huallaga	El Eslabon	1,729
38	San Martin	Huallaga	Alto Saposoa	2,156
39	Tacna	Jorge Basadre	Locumba	1,692
40	Tacna	Jorge Basadre	Ite	1,763
	Total			408,384

TABLE 44C: LIST OF DISTRICTS SELECTED TO SERVE AS CONTROL

Control Districts

No.	Region	Province	District	Population
1	Amazonas	Chachapoyas	Soloco	1,613
2	Amazonas	Chachapoyas	Chuquibamba	1,983
3	Amazonas	Condorcanqui	El Cenepa	11,236
4	Ancash	A. Raymondi	San Juan de Rontoy	1,605
5	Ancash	A. Raymondi	Chingas	2,071

(*Continued*)

TABLE 44C: (Continued)

Control Districts				
No.	Region	Province	District	Population
6	Apurímac	Aymaraes	Lucre	2,391
7	Apurímac	Aymaraes	Tapairihua	2,770
8	Apurímac	Aymaraes	Chalhuanca	4,658
9	Apurímac	Grau	Curasco	1,742
10	Apurímac	Grau	Huayllati	1,915
11	Apurímac	Grau	Curpahuasi	2,540
12	Apurímac	Grau	Chuquibambilla	6,041
13	Arequipa	Castilla	Huancarqui	1,682
14	Arequipa	Castilla	Viraco	1,956
15	Arequipa	Caylloma	Lluta	1,859
16	Ayacucho	Cangallo	Chuschi	8,917
17	Ayacucho	Huamanga	San Jose de Ticllas	2,325
18	Ayacucho	Huamanga	Jesus Nazareno	15,248
19	Cajamarca	San Ignacio	Tabaconas	15,927
20	Cusco	Chumbivilcas	Chamaca	6,993
21	Cusco	Chumbivilcas	Llusco	7,325
22	Cusco	Chumbivilcas	Livitaca	11,403
23	Cusco	Chumbivilcas	Santo Tomas	24,614
24	Cusco	Paucartambo	Kosñipata	4,610
25	Huancavelica	Huancavelica	Huayllahuara	1,613
26	Huancavelica	Huancavelica	Huachocolpa	3,255
27	Huancavelica	Huaytara	San A. de Cusicancha	2,138
28	Huancavelica	Huaytara	Cordova	2,404
29	Junín	Chanchamayo	San Luis de Shuaro	7,193
30	Lambayeque	Ferreñafe	M. A. Mesones Muro	4,211
31	Lima	Cañete	Pacaran	1,588
32	Lima	Cañete	Calango	2,559
33	Lima	Cañete	San Antonio	3,460
34	Lima	Cañete	Mala	25,269
35	Lima	Canta	Santa Rosa de Quives	5,855
36	Loreto	Alto Amazonas	Balsapuerto	12,730
37	Loreto	Requena	Requena	26,969
38	Piura	Huancabamba	San M. de El Faique	9,430
39	Piura	Paita	Paita	69,401
40	Tumbes	Tumbes	La Cruz	8,092
	Total			329,591

Annex 2: Findings from Structured Observations of Handwashing Behavior[1]

Structured five-hour observations were completed in 159 households in Peru (see Table 45). These observations yielded 2,234 events of interest during which the observer recorded the nature of the event, whether hands were washed, and whether hands were washed with soap. There were 341 fecal contact events, 444 eating events, 273 feeding events, 368 food preparation events, and 125 water contact events. Overall, soap use was observed in 361 (16%) of the 2,234 events, with soap use in 20% of fecal contact events, 25% of eating events, and just 2% of water contact events.

At least one fecal contact event was observed in 139 (88%) of 159 households. One or more eating events were observed in 141 (89%), feeding events in 132 (83%), food preparation events in 148 (93%), and water contact events in 64 (40%) households. Soap use was observed at least once in 116 (73%) of households.

We analyzed self-report and rapid observation data to identify factors associated with observation of soap use in the structured observation. Complete data were available for this analysis for 115 households. The following factors were significantly associated with observation of soap use at a fecal contact event: self-report of usually having soap and water at a handwashing place near the kitchen, observed presence of soap and water together at a handwashing station, and observed presence of soap and water together at a handwashing station in or near the toilet (Table 46).

TABLE 45: SOAP USE BY EVENT TYPE AS MEASURED BY STRUCTURED OBSERVATION

	No. Events Observed (N=2,234, %)	No. Events Accompanied by Soap Use (%)	No. Households Observed with At Least One Event (N=159)	No. Households in Which Soap Use Was Observed At Least Once
All types	2234	361 (16%)	159	116 (73%)
Fecal contact[2]	341 (15%)	68 (20%)	139 (88%)	58 (42%)
Before eating	444 (20%)	111 (25%)	141 (89%)	65 (46%)
Before feeding a child	273 (12%)	16 (6%)	132 (83%)	16 (12%)
Before preparing or serving food	368 (16%)	38 (10%)	148 (93%)	34 (23%)
Water contact	12 (6%)	3 (2%)	64 (40%)	3 (5%)

[1] Analysis conducted by Pavani Ram.
[2] Fecal contact includes defecation, toileting of any kind, and cleaning a child who has defecated.

TABLE 46: BIVARIATE ANALYSIS OF FACTORS ASSOCIATED WITH OBSERVATION OF SOAP USE AT LEAST ONCE DURING FECAL CONTACT

Factors Associated with Observation of Soap During Fecal Contact					
Explanatory Variable	HH Observed to Use Soap At Least Once During Fecal-Contact Event (%) (N=45)	HH Observed NOT to Use Soap At Least Once During Fecal-Contact Event (%) (N=70)	P-Value	Odds Ratio	95% Confidence Interval
Self-report of usually having soap and water at a handwashing place near the kitchen	84%	66%	0.03	2.0	1.0–4.0
Observed soap and water together at a handwashing station	76%	56%	0.03	1.8	1.0–3.1
Observed soap and water together at a handwashing station specifically in or near the toilet	76%	53%	0.01	2.8	1.2–6.3

Annex 3: Test of Baseline Balance

As mentioned in Section II: Methodology, a critical requirement of the IE methodology is to create an appropriate counterfactual for the treatment group. This section presents the mean comparison tests[1] across treatment and control groups for an exhaustive group of variables included in the baseline survey.

Surveyed households possess many unobserved characteristics not included in the database, and thus cannot be evaluated to see if they are balanced. However, if a sufficiently large amount of observed variables are balanced across the different treatment groups, then there would be little reason to believe that the unobserved variables are not balanced.

The following tables present the mean comparison test across three different groups:

- Comparison 1: Treatment 1 vs. Control
- Comparison 2: Treatment 2 vs. Control
- Comparison 3: Treatment 2/Schools vs. Control/Schools

For the first comparison group—Treatment 1 vs. Control—the null hypothesis of mean equality at the 10% level was rejected in 14.5% of the answers (40 out of 272 answers); for the second comparison group—Treatment 2 vs. Control—the null hypothesis of mean equality at the 10% level was rejected in 11.4% of the answers (31 out of 280 answers); and for the last comparison group—Treatment 2/Schools vs. Control/Schools—the null hypothesis of mean equality at the 10% level was rejected in 11.8% of the answers (33 out of 280 answers).

Test of balance for the key variables included in the IE baseline are presented in the following tables.

[1] The standard errors used in those tests were clustered at the district level, allowing the possibility of intra-district correlation.

INDIVIDUAL CHARACTERISTICS

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/ Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Number of children under five years of age (per HH)	717	1.399	707	1.460	0.101	763	1.409	0.159	705	1.435	684	1.493	0.154
HH size	717	5.36	707	5.00	**0.009**	763	5.05	0.724	705	6.04	684	6.26	0.170
HH head is male	717	0.898	707	0.908	0.515	763	0.927	0.201	705	0.929	684	0.905	0.179
Age of HH head	713	37.964	706	35.392	**0.006**	762	35.757	0.673	702	38.470	683	38.269	0.752
HH heads attended school (over all HH heads)	710	0.952	706	0.955	0.836	763	0.969	0.203	704	0.970	682	0.959	0.262
Educational Attainment of HH Head													
Primary	674	0.445	672	0.382	0.218	735	0.410	0.558	677	0.411	649	0.473	0.210
Secondary	674	0.439	672	0.522	**0.042**	735	0.490	0.398	677	0.484	649	0.414	**0.075**
Trade school	674	0.052	672	0.052	0.993	735	0.061	0.538	677	0.040	649	0.049	0.494
University	674	0.064	672	0.043	0.185	735	0.039	0.740	677	0.065	649	0.062	0.848
Other HH member is male	3126	0.383	2831	0.371	0.266	3092	0.379	0.467	3555	0.416	3600	0.406	0.388
Age of other HH members	3123	15.004	2827	14.184	**0.094**	3088	14.776	0.216	3549	13.689	3594	13.609	0.819
Other HH members attended school (over all other HH members)	2106	0.936	1783	0.934	0.875	1993	0.963	**0.012**	2515	0.957	2557	0.958	0.891
Educational Attainment of Other HH Members													
Kindergarten	1941	0.062	1652	0.078	**0.063**	1911	0.061	**0.057**	2391	0.081	2434	0.096	0.136
Primary	1941	0.536	1652	0.518	0.637	1911	0.507	0.744	2391	0.622	2434	0.605	0.434
Secondary	1941	0.347	1652	0.350	0.920	1911	0.380	0.359	2391	0.269	2434	0.272	0.889
Trade school	1941	0.029	1652	0.039	0.260	1911	0.038	0.909	2391	0.018	2434	0.014	0.445
University	1941	0.025	1652	0.014	**0.044**	1911	0.015	0.878	2391	0.010	2434	0.014	0.492
Teenager Spent Time On													
School	819	0.928	710	0.962	0.372	695	0.965	0.814	1375	0.974	1393	0.933	0.229
Studying	815	0.958	710	0.973	0.229	695	0.967	0.559	1375	0.978	1393	0.953	0.258
Children care	815	0.710	711	0.729	0.541	695	0.683	0.189	1375	0.723	1395	0.720	0.941
Homework	815	0.752	711	0.713	0.266	695	0.722	0.818	1375	0.699	1395	0.691	0.832
Paid work	816	0.020	711	0.017	0.736	695	0.010	0.330	1375	0.007	1395	0.014	0.146
Unpaid work	815	0.189	711	0.091	**0.012**	695	0.056	0.207	1375	0.094	1395	0.080	0.648

INDIVIDUAL CHARACTERISTICS (Continued)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
HH head is employed (over all HH heads)	714	0.948	707	0.945	0.808	762	0.963	0.174	705	0.956	682	0.965	0.419
Last Week Activity, HH Head													
Looking for work	37	0.135	39	0.231	0.269	28	0.286	0.603	31	0.226	24	0.167	0.627
Looking after the home	37	0.324	39	0.462	0.203	28	0.357	0.355	31	0.484	24	0.542	0.680
Not working and not looking for job	37	0.216	39	0.128	0.349	28	0.250	0.215	31	0.161	24	0.208	0.659
Other	37	0.324	39	0.179	0.164	28	0.107	0.380	31	0.129	24	0.083	0.626
Other HH member is employed (over all other HH members)	1273	0.346	1055	0.344	0.941	1289	0.380	0.318	1119	0.350	1151	0.381	0.400
Last Week Activity, Other HH Members													
Looking for work	832	0.006	692	0.010	0.502	799	0.005	0.401	727	0.003	713	0.011	**0.068**
Studying	832	0.137	692	0.136	0.951	799	0.140	0.858	727	0.169	713	0.181	0.646
Looking after the home	832	0.802	692	0.803	0.943	799	0.801	0.932	727	0.779	713	0.750	0.356
Not working and not looking for job	832	0.038	692	0.040	0.900	799	0.038	0.868	727	0.030	713	0.046	0.410
Other	832	0.017	692	0.010	0.319	799	0.016	0.263	727	0.019	713	0.011	0.283
Primary Employment Status (over all employed individuals)													
Self-employed	1421	0.550	1290	0.557	0.825	1462	0.538	0.539	1294	0.590	1325	0.546	0.127
Employee	1421	0.265	1290	0.302	0.389	1462	0.325	0.507	1294	0.268	1325	0.303	0.330
Employer or boss	1421	0.001	1290	0.003	0.148	1462	0.005	0.425	1294	0.003	1325	0.004	0.807
Worker with no remuneration	1421	0.165	1290	0.123	0.224	1462	0.126	0.934	1294	0.134	1325	0.137	0.932
Day laborer	1421	0.018	1290	0.015	0.722	1462	0.005	0.234	1294	0.005	1325	0.008	0.630
Other	1421	0.001	1290	0.001	0.945	1462	0.000	0.309	1294	0.000	1325	0.002	0.145
Monthly salary	1148	334.22	1082	369.64	0.422	1245	391.42	0.617	1087	336.88	1101	351.01	0.634
Hours worked per week	1404	42.551	1287	42.933	0.795	1448	41.823	0.395	1287	42.045	1322	40.735	0.260
Months worked in last 12 months	1405	9.731	1279	9.177	0.081	1446	9.577	0.177	1271	9.862	1307	9.431	0.174

HOUSEHOLD ASSETS

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
HH non-labor income	240	106.01	312	110.37	0.717	205	106.13	0.742	191	129.89	315	111.45	0.375
HH Assets													
Radio, CD, cassette	717	0.815	706	0.813	0.961	762	0.745	**0.059**	705	0.750	682	0.812	**0.080**
TV	717	0.513	707	0.532	0.780	762	0.552	0.720	705	0.609	682	0.595	0.832
VCR	717	0.197	707	0.248	0.189	762	0.241	0.867	705	0.254	682	0.224	0.452
Computer	717	0.015	707	0.020	0.509	762	0.012	0.276	705	0.016	682	0.025	0.239
Bicycle	716	0.196	707	0.184	0.773	762	0.213	0.459	705	0.240	682	0.217	0.579
Motorbike	717	0.032	707	0.025	0.568	762	0.039	0.200	705	0.035	682	0.032	0.786
Car or tractor	717	0.018	707	0.014	0.645	762	0.021	0.418	705	0.007	682	0.015	0.239
Refrigerator	717	0.075	707	0.107	0.240	762	0.079	0.250	705	0.118	682	0.087	0.227
Gas stove	717	0.329	707	0.383	0.451	762	0.419	0.604	705	0.445	682	0.346	0.178
Other type of stove	717	0.079	706	0.153	**0.047**	762	0.083	**0.049**	705	0.092	682	0.150	**0.079**
Blender	717	0.170	707	0.209	0.356	762	0.220	0.780	705	0.248	682	0.214	0.428
Toaster	717	0.013	707	0.004	0.146	762	0.007	0.518	705	0.010	682	0.007	0.663
Microwave	717	0.007	707	0.011	0.495	762	0.005	0.328	705	0.013	682	0.010	0.697
Washing machine	717	0.003	707	0.006	0.380	762	0.007	0.830	705	0.011	682	0.009	0.646
Water boiler	717	0.018	707	0.028	0.376	762	0.016	0.179	705	0.026	682	0.018	0.422
Other houses/properties	717	0.035	707	0.109	**0.052**	762	0.171	0.242	704	0.182	682	0.104	0.150
Machinery, equipment for family business	717	0.031	707	0.023	0.507	761	0.021	0.859	703	0.020	682	0.015	0.578
HH owns other piece of land (over all HHs)	716	0.369	707	0.475	0.131	763	0.383	0.184	705	0.430	684	0.477	0.545
HH owns farm equipment (over all HHs)	716	0.260	707	0.201	0.252	763	0.215	0.779	705	0.214	684	0.200	0.794
HH has animals (over all HHs)	717	0.826	707	0.754	0.182	763	0.742	0.812	705	0.729	684	0.775	0.420
Number of livestock owned per HH (over all HHs)	717	2.787	707	2.337	0.162	763	1.992	0.192	705	2.009	684	2.401	0.203

DWELLING CHARACTERISTICS

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/ Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Dwelling Ownership (over all HHs)													
HH member, still paying	716	0.038	707	0.018	0.141	762	0.026	0.430	705	0.027	683	0.041	0.275
HH member, fully paid	716	0.536	707	0.454	**0.072**	762	0.459	0.908	705	0.482	683	0.515	0.550
Rented	716	0.084	707	0.130	0.131	762	0.118	0.701	705	0.150	683	0.111	0.264
Family/friend loan	716	0.226	707	0.198	0.362	762	0.277	**0.006**	705	0.197	683	0.145	**0.072**
Other	716	0.116	707	0.199	**0.042**	762	0.119	**0.063**	705	0.143	683	0.187	0.303
Type of Dwelling (over all HHs)													
Detached house	715	0.959	699	0.930	0.153	755	0.926	0.866	700	0.933	679	0.981	**0.009**
Room in other dwelling	715	0.027	699	0.027	0.958	755	0.050	0.164	700	0.034	679	0.009	**0.055**
Other	715	0.014	699	0.043	**0.046**	755	0.024	0.161	700	0.033	679	0.010	**0.062**
Dwelling Light Source (over all HHs)													
No lighting	714	0.000	703	0.001	0.312	761	0.011	**0.025**	699	0.016	683	0.004	**0.064**
Electricity	714	0.576	703	0.686	0.139	761	0.748	0.331	699	0.785	683	0.717	0.230
Kerosene	714	0.154	703	0.159	0.926	761	0.059	**0.037**	699	0.059	683	0.127	**0.093**
Candles	714	0.227	703	0.137	**0.061**	761	0.146	0.770	699	0.112	683	0.138	0.407
Other	714	0.043	703	0.017	0.216	761	0.037	0.261	699	0.029	683	0.013	0.192
Dwelling Cooking Fuel (over all HHs)													
Gas	714	0.237	703	0.296	0.416	761	0.293	0.967	699	0.313	683	0.233	0.281
Wood	714	0.718	703	0.587	0.120	761	0.618	0.694	699	0.568	683	0.672	0.198
Peat/manure	714	0.001	703	0.090	**0.045**	761	0.045	0.351	699	0.060	683	0.073	0.784
Other	714	0.043	703	0.027	0.478	761	0.045	0.522	699	0.059	683	0.022	0.148
Dwelling Heating Fuel (over all HHs)													
Do not heat dwelling	717	0.897	706	0.969	**0.001**	763	0.971	0.886	705	0.989	683	0.968	**0.033**
Wood stove	717	0.095	706	0.020	**0.000**	763	0.025	0.637	705	0.006	683	0.023	**0.018**
Other	717	0.008	706	0.011	0.708	763	0.004	0.327	705	0.006	683	0.009	0.576

DWELLING CHARACTERISTICS (Continued)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Walling Materials (over all HHs)													
Esteras	715	0.042	699	0.029	0.567	755	0.032	0.860	700	0.024	679	0.034	0.626
Brick	715	0.062	699	0.094	0.374	755	0.127	0.347	700	0.123	679	0.090	0.344
Concrete	715	0.014	699	0.054	**0.013**	755	0.057	0.911	700	0.070	679	0.019	**0.026**
Unbaked brick, adobe	715	0.664	699	0.584	0.393	755	0.576	0.928	700	0.543	679	0.580	0.683
Wood, logs	715	0.088	699	0.103	0.807	755	0.044	0.182	700	0.051	679	0.138	0.110
Other	715	0.130	699	0.136	0.909	755	0.164	0.564	700	0.189	679	0.138	0.369
Roofing Materials (over all HHs)													
Esteras	715	0.056	699	0.040	0.576	755	0.045	0.825	700	0.054	679	0.050	0.894
Brick	715	0.038	699	0.023	0.552	755	0.019	0.670	700	0.024	679	0.029	0.657
Concrete	715	0.017	699	0.052	**0.074**	755	0.038	0.549	700	0.053	679	0.024	**0.069**
Wood, logs	715	0.007	699	0.019	0.140	755	0.009	0.255	700	0.020	679	0.012	0.583
Tin, zinc sheeting	715	0.470	699	0.534	0.432	755	0.668	**0.067**	700	0.636	679	0.571	0.368
Bamboo	715	0.007	699	0.006	0.840	755	0.028	0.127	700	0.023	679	0.010	0.331
Other	715	0.406	699	0.328	0.342	755	0.193	**0.039**	700	0.190	679	0.303	**0.060**
Flooring Materials (over all HHs)													
Painted wood	713	0.004	699	0.009	0.495	753	0.009	0.937	700	0.017	679	0.013	0.708
Concrete	713	0.111	699	0.156	0.199	753	0.159	0.921	700	0.217	679	0.138	**0.055**
Clay, earthen floor	713	0.749	699	0.701	0.447	753	0.699	0.963	700	0.636	679	0.698	0.292
Unpolished concrete	713	0.093	699	0.076	0.563	753	0.098	0.366	700	0.091	679	0.082	0.709
Other	713	0.043	699	0.059	0.611	753	0.035	0.309	700	0.039	679	0.068	0.266
HH keeps food uncovered (over all HHs)	651	0.257	685	0.225	0.404	704	0.207	0.616	658	0.240	663	0.270	0.487
HH is clean (over all HHs)	687	0.518	682	0.543	0.599	715	0.593	0.215	669	0.538	663	0.508	0.520
HH has garbage in kitchen or house (over all HHs)	677	0.589	686	0.541	0.261	717	0.488	0.208	666	0.568	668	0.581	0.740

TOILET FACILITIES

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
HH Main Toilet Facility (over all HHs)													
No facilities	717	0.240	707	0.221	0.709	763	0.239	0.722	704	0.203	683	0.218	0.755
Hanging toilet, latrine	717	0.010	707	0.017	0.561	763	0.001	0.178	704	0.003	683	0.018	0.397
Flush, to piped sewer system	717	0.132	707	0.226	**0.082**	763	0.229	0.955	704	0.339	683	0.217	**0.052**
Flush, to other place	717	0.047	707	0.095	**0.042**	763	0.101	0.853	704	0.101	683	0.088	0.699
Ventilated improved pit latrine	717	0.073	707	0.042	0.309	763	0.069	0.366	704	0.061	683	0.028	0.276
Pit latrine with slab	717	0.033	707	0.034	0.978	763	0.060	0.203	704	0.044	683	0.023	0.239
Pit latrine without slab	717	0.411	707	0.325	0.162	763	0.263	0.210	704	0.217	683	0.381	**0.001**
Other	717	0.053	707	0.040	0.553	763	0.037	0.888	704	0.031	683	0.028	0.765
Public toilet facilities (over all HHs)	544	0.121	548	0.144	0.581	581	0.129	0.738	553	0.105	532	0.092	0.669
Location of Main Toilet Facility													
Inside dwelling	717	0.156	707	0.202	0.364	763	0.224	0.669	705	0.278	684	0.211	0.200
In own yard	717	0.392	707	0.382	0.832	763	0.391	0.860	705	0.403	684	0.405	0.966
Less than 10-min. walk	717	0.340	707	0.291	0.254	763	0.248	0.262	705	0.213	684	0.269	0.199
More than 10-min. walk	717	0.071	707	0.088	0.432	763	0.110	0.388	705	0.077	684	0.076	0.979
No designated area	717	0.038	707	0.035	0.884	763	0.025	0.467	705	0.026	684	0.037	0.424
Other	717	0.003	707	0.001	0.567	763	0.003	0.683	705	0.004	684	0.003	0.752
Toilet facility is shared with other HHs (over all HHs)	717	0.254	707	0.263	0.827	763	0.304	0.349	705	0.271	684	0.230	0.289
Toilet facility is safe during night (over all HHs)	715	0.738	707	0.745	0.849	763	0.773	0.424	704	0.781	683	0.761	0.601
Disposal of Child Feces													
Bushes, ground	717	0.279	707	0.337	0.196	763	0.266	0.103	705	0.173	684	0.303	**0.002**
Pit, hole in the ground	717	0.100	707	0.092	0.716	763	0.087	0.799	705	0.096	684	0.076	0.364
Open sewer, drain	717	0.025	707	0.048	0.316	763	0.045	0.893	705	0.065	684	0.047	0.411
Toilet, latrine	717	0.209	707	0.163	0.128	763	0.215	0.126	705	0.237	684	0.209	0.486
Garbage	717	0.301	707	0.301	1.000	763	0.307	0.929	705	0.340	684	0.308	0.636
River	717	0.121	707	0.120	0.973	763	0.092	0.357	705	0.098	684	0.110	0.710
Basin, sink	717	0.114	707	0.098	0.622	763	0.060	0.164	705	0.062	684	0.104	0.129
Other	717	0.064	707	0.071	0.732	763	0.041	**0.064**	705	0.045	684	0.064	0.358

WATER SOURCE

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
HH uses same sources all year (over all HHs)	717	0.974	707	0.970	0.806	763	0.988	0.152	705	0.989	683	0.990	0.909
HH Source of Drinking Water (over all HH)													
Tanker truck	717	0.026	707	0.000	**0.062**	763	0.004	0.180	705	0.007	683	0.015	0.579
Surface water	717	0.081	707	0.055	0.407	763	0.031	0.325	705	0.044	683	0.064	0.470
Piped water, into dwelling	717	0.233	707	0.223	0.870	763	0.249	0.667	705	0.250	683	0.228	0.724
Piped water, into yard, plot	717	0.201	707	0.160	0.370	763	0.232	0.159	705	0.247	683	0.170	0.173
Piped water, public tap, standpipe	717	0.095	707	0.051	0.280	763	0.043	0.749	705	0.045	683	0.053	0.784
Tube well, bore hole	717	0.013	707	0.024	0.447	763	0.010	0.366	705	0.013	683	0.004	0.262
Dug well, protected	717	0.026	707	0.017	0.672	763	0.008	0.316	705	0.010	683	0.006	0.576
Dug well, unprotected	717	0.004	707	0.040	0.132	763	0.007	0.163	705	0.009	683	0.026	0.271
Spring water, protected	717	0.121	707	0.262	**0.062**	763	0.257	0.957	705	0.230	683	0.261	0.731
Spring water, unprotected	717	0.077	707	0.041	0.176	763	0.031	0.623	705	0.023	683	0.038	0.398
Other	717	0.123	707	0.127	0.937	763	0.127	0.998	705	0.123	683	0.135	0.854
Source Location (over all HH)													
In own dwelling	406	0.074	436	0.128	0.346	396	0.278	0.123	355	0.282	411	0.148	0.173
In own yard, plot	406	0.355	436	0.431	0.361	396	0.313	0.210	355	0.287	411	0.372	0.335
Elsewhere	406	0.571	436	0.440	0.149	396	0.409	0.728	355	0.431	411	0.479	0.618
Covered Source (over all HH)													
Covered	404	0.597	433	0.607	0.913	393	0.687	0.462	355	0.645	407	0.582	0.569
Open	404	0.389	433	0.372	0.869	393	0.303	0.527	355	0.352	407	0.388	0.744
Both covered and open	404	0.015	433	0.021	0.659	393	0.010	0.394	355	0.003	407	0.029	0.186
HH Member Who Collects Water from Source													
Adult woman	405	0.847	436	0.846	0.990	396	0.886	0.372	355	0.865	411	0.820	0.285
Adult man	405	0.114	436	0.115	0.978	396	0.086	0.481	355	0.101	411	0.117	0.676
Girl (<15 years)	405	0.017	436	0.023	0.596	396	0.015	0.429	355	0.014	411	0.027	0.250
Boy (<15 years)	405	0.020	436	0.014	0.542	396	0.013	0.896	355	0.020	411	0.022	0.845
Other	405	0.002	436	0.002	0.958	396	0.000	0.322	355	0.000	411	0.015	**0.075**

WATER SOURCE (Continued)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/ Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
HH is satisfied with water quantity (over all HHs)	715	0.734	704	0.724	0.806	763	0.738	0.767	702	0.708	681	0.686	0.642
HH pays for water (over all HHs)	716	0.603	706	0.564	0.564	761	0.662	0.140	705	0.674	683	0.698	0.723
HH obtains fixed water quantity for the payment (over all HHs)	428	0.339	389	0.524	**0.017**	495	0.442	0.359	465	0.447	466	0.470	0.801
Water Treatment (Past 7 Days)													
Boiling treatment	603	0.954	649	0.948	0.816	689	0.972	0.314	635	0.980	618	0.963	0.338
Chlorine treatment	603	0.060	649	0.034	0.245	689	0.026	0.526	635	0.020	618	0.026	0.619
Let stand and settle	603	0.060	649	0.032	0.317	689	0.022	0.629	635	0.022	618	0.026	0.810
Other	603	0.015	649	0.015	0.969	689	0.000	0.121	635	0.002	618	0.010	0.242
HH has improved water source	717	0.690	707	0.737	0.533	763	0.801	0.360	705	0.804	683	0.722	0.269
HH has improved sanitation	717	0.278	707	0.386	**0.075**	763	0.461	0.195	704	0.544	683	0.335	**0.001**
HH has soap and water at HW station	717	0.562	707	0.588	0.598	763	0.598	0.836	705	0.603	684	0.639	0.405

HANDWASHING FACILITIES

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
HH handwashing after using toilet (over all HHs)	707	0.993	698	0.986	0.258	738	0.985	0.945	674	0.987	675	0.994	0.198
Location of Handwashing Device													
Inside toilet facility	685	0.058	683	0.104	**0.080**	718	0.113	0.775	659	0.118	667	0.100	0.557
Inside cooking place	685	0.067	683	0.105	0.153	718	0.131	0.426	659	0.082	667	0.112	0.306
In yard less than 3 feet away from toilet	685	0.194	683	0.193	0.980	718	0.132	**0.050**	659	0.185	667	0.219	0.344
Between 10 feet and 3 feet away from toilet	685	0.155	683	0.142	0.629	718	0.117	0.283	659	0.141	667	0.148	0.777
More than 10 feet away from toilet	685	0.352	683	0.335	0.743	718	0.373	0.451	659	0.340	667	0.315	0.631
No specific place	685	0.174	683	0.120	0.109	718	0.134	0.638	659	0.134	667	0.105	0.308
Handwashing Device, Toilet													
Tap, faucet	563	0.584	600	0.643	0.381	620	0.655	0.862	570	0.695	597	0.631	0.367
Basin, bucket	563	0.352	600	0.335	0.806	620	0.319	0.813	570	0.295	597	0.337	0.548
Other	563	0.064	600	0.022	**0.019**	620	0.026	0.686	570	0.011	597	0.032	**0.033**
Water is available at handwashing station (over all HHs)	561	0.850	599	0.871	0.531	619	0.889	0.601	570	0.854	594	0.877	0.510
Soaps Available at Hand-washing Station													
Multipurpose bar soap	567	0.254	601	0.095	**0.001**	622	0.127	0.281	571	0.128	597	0.134	0.832
Beauty, toilet bar soap	567	0.224	601	0.245	0.645	622	0.241	0.941	571	0.254	597	0.214	0.361
Powder soap, detergent	567	0.347	601	0.486	**0.003**	622	0.471	0.729	571	0.478	597	0.524	0.256
No soap observed	567	0.275	601	0.306	0.483	622	0.273	0.422	571	0.282	597	0.295	0.725
Ash, Mud at Handwashing Station													
Ash	553	0.016	595	0.012	0.612	614	0.010	0.790	566	0.004	590	0.005	0.730
Mud	553	0.195	595	0.245	0.374	614	0.238	0.897	566	0.221	590	0.237	0.762
Ash and mud	553	0.045	595	0.034	0.542	614	0.024	0.511	566	0.037	590	0.049	0.524
Neither observed	553	0.743	595	0.709	0.617	614	0.728	0.766	566	0.739	590	0.708	0.615

HANDWASHING FACILITIES (Continued)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
HH handwashing before/after cooking, feeding a child (over all HHs)	706	0.993	697	0.996	0.529	738	0.996	0.951	674	0.987	675	0.996	0.135
Usual Handwashing Station													
Inside toilet facility	631	0.014	647	0.028	0.204	700	0.011	0.117	636	0.017	635	0.020	0.715
Inside cooking place	631	0.361	647	0.396	0.535	700	0.434	0.493	636	0.414	635	0.413	0.988
In yard less than 3 feet away from kitchen	631	0.195	647	0.207	0.720	700	0.164	0.190	636	0.165	635	0.170	0.880
Between 10 feet and 3 feet away from kitchen	631	0.189	647	0.162	0.388	700	0.154	0.757	636	0.173	635	0.191	0.567
More than 10 feet away from kitchen	631	0.127	647	0.124	0.913	700	0.139	0.602	636	0.170	635	0.131	0.242
No specific place	631	0.114	647	0.083	0.184	700	0.097	0.555	636	0.061	635	0.076	0.416
Handwashing Device													
Tap, faucet	245	0.208	243	0.263	0.389	283	0.314	0.407	288	0.299	237	0.283	0.807
Water (pouring) container	245	0.780	243	0.716	0.325	283	0.678	0.545	288	0.688	237	0.696	0.895
Other	245	0.012	243	0.021	0.494	283	0.007	0.229	288	0.014	237	0.021	0.637
Water is available at handwashing station (over all HHs)	246	0.785	244	0.750	0.555	283	0.837	**0.086**	288	0.792	237	0.819	0.492
Soaps Available at Handwashing Station													
Multipurpose bar soap	246	0.138	244	0.070	0.142	283	0.078	0.796	288	0.049	237	0.097	0.134
Beauty, toilet soap	246	0.081	244	0.107	0.478	283	0.110	0.933	288	0.101	237	0.114	0.703
Powder or laundry soap, detergent	246	0.472	244	0.561	0.282	283	0.509	0.507	288	0.573	237	0.612	0.624
No soap observed	246	0.341	244	0.352	0.874	283	0.385	0.648	288	0.365	237	0.287	0.292
Ash, Mud at Handwashing Station													
Ash	241	0.008	240	0.038	0.176	282	0.000	**0.071**	284	0.007	232	0.013	0.572
Mud	241	0.124	240	0.150	0.612	282	0.078	**0.091**	284	0.123	232	0.168	0.307
Ash and mud	241	0.087	240	0.058	0.439	282	0.025	0.140	284	0.053	232	0.069	0.611
Neither observed	241	0.780	240	0.754	0.766	282	0.897	**0.037**	284	0.817	232	0.750	0.308

HANDWASHING BEHAVIOR

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Caregiver of child under the age of 2 washed hands with soap since yesterday	720	0.999	712	0.997	0.647	765	0.996	0.751	707	0.994	693	0.999	0.169
Last Moment of Hand Wash Since Yesterday													
Bathing a child	717	0.195	707	0.255	0.147	759	0.244	0.784	703	0.262	689	0.253	0.841
Washing child's hands	717	0.110	707	0.123	0.598	759	0.083	**0.088**	703	0.083	689	0.094	0.526
Washing dishes	717	0.459	707	0.410	0.212	759	0.348	0.109	703	0.331	689	0.437	**0.006**
Doing laundry	717	0.445	707	0.436	0.818	759	0.440	0.913	703	0.511	689	0.498	0.708
Looked dirty	717	0.066	707	0.102	**0.087**	759	0.045	**0.002**	703	0.053	689	0.115	**0.007**
Bathing oneself	717	0.153	707	0.204	0.180	759	0.219	0.696	703	0.259	689	0.224	0.367
Using toilet	717	0.389	707	0.426	0.362	759	0.397	0.484	703	0.385	689	0.356	0.427
Cleaning baby bottom	717	0.424	707	0.334	**0.021**	759	0.368	0.390	703	0.356	689	0.327	0.478
Cleaning latrine	717	0.010	707	0.021	0.152	759	0.008	**0.087**	703	0.024	689	0.015	0.219
Cleaning toilet	717	0.035	707	0.035	0.966	759	0.022	0.203	703	0.028	689	0.036	0.512
Returning home	717	0.130	707	0.123	0.768	759	0.119	0.809	703	0.134	689	0.129	0.824
Preparing food, cooking	717	0.763	707	0.717	0.129	759	0.675	0.219	703	0.643	689	0.704	0.094
Feeding children	717	0.351	707	0.369	0.611	759	0.278	**0.007**	703	0.282	689	0.335	0.168
Other	717	0.102	707	0.057	**0.008**	759	0.075	0.222	703	0.051	689	0.038	0.328
Best Way to Clean Hands													
Wipe on cloth	718	0.011	713	0.011	0.989	765	0.013	0.719	704	0.009	694	0.013	0.522
Wash with water alone	718	0.110	713	0.132	0.430	765	0.116	0.631	704	0.111	694	0.134	0.386
Wash with soap	718	0.864	713	0.847	0.591	765	0.854	0.854	704	0.865	694	0.840	0.421
Wash with ash, mud	718	0.003	713	0.000	0.157	765	0.000		704	0.000	694	0.003	0.149
Other	718	0.013	713	0.010	0.738	765	0.017	0.434	704	0.016	694	0.010	0.507
Caregiver's Fingernails Are													
Visibly dirty	719	0.303	714	0.284	0.687	767	0.210	**0.093**	703	0.225	694	0.281	0.225
Unclean in appearance	719	0.325	714	0.322	0.933	767	0.286	0.255	703	0.297	694	0.336	0.241
Clean	719	0.371	714	0.394	0.666	767	0.505	**0.038**	703	0.478	694	0.383	**0.098**

HANDWASHING BEHAVIOR (Continued)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Caregiver's Palms Are													
Visibly dirty	719	0.220	714	0.225	0.894	767	0.154	**0.095**	703	0.137	694	0.225	**0.036**
Unclean in appearance	719	0.243	714	0.252	0.767	767	0.207	0.122	703	0.272	694	0.272	0.986
Clean	719	0.537	714	0.522	0.792	767	0.639	**0.045**	703	0.592	694	0.503	0.159
Caregiver's Finger Pads Are													
Visibly dirty	719	0.224	714	0.224	0.997	767	0.147	**0.073**	702	0.140	694	0.220	**0.070**
Unclean in appearance	719	0.249	714	0.265	0.597	767	0.210	**0.068**	702	0.255	694	0.277	0.532
Clean	719	0.527	714	0.511	0.775	767	0.643	**0.026**	702	0.605	694	0.503	0.104

MASS MEDIA

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Caregiver recalls any handwashing campaign	722	0.253	714	0.245	0.854	769	0.224	0.639	711	0.226	694	0.272	0.323

FAMILY-SCHOOL RELATIONSHIP

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/ Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Caregiver Participation in School's Activities													
Parents association	389	0.2 88	296	0.176	**0.025**	301	0.256	0.150	702	0.249	688	0.196	0.280
Speeches, conferences	389	0.342	296	0.267	0.155	301	0.369	**0.062**	702	0.325	688	0.298	0.584
Kermesses	389	0.111	296	0.139	0.490	301	0.096	0.332	702	0.094	688	0.122	0.343
APAFA	389	0.584	296	0.720	**0.025**	301	0.611	**0.083**	702	0.598	688	0.670	0.145
Other	389	0.185	296	0.199	0.805	301	0.169	0.636	702	0.175	688	0.161	0.786
Does not participate	389	0.090	296	0.034	**0.015**	301	0.053	0.378	702	0.078	688	0.078	0.996
Caregiver recalls any campaign on health and hygiene promoted by the school	389	0.298	296	0.338	0.379	301	0.336	0.967	702	0.392	688	0.390	0.963

CHILD DEVELOPMENT (% OF CHILDREN <2)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Communication skills-for-age z-score	557	0.051	581	0.060	0.910	601	-0.014	0.348	554	-0.057	533	-0.043	0.878
Mobility skills-for-age z-score	556	-0.030	581	-0.011	0.818	601	0.001	0.880	554	-0.027	532	0.072	0.225
Social-personal skills-for-age z-score	554	0.070	581	-0.009	0.333	599	-0.052	0.604	553	-0.080	533	0.079	**0.054**

CHILD CARE SITUATION

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Number of times child was left at the charge of another child	735	0.707	732	0.657	0.692	786	0.641	0.877	729	1.060	717	1.024	0.799
Number of times child was left alone	735	0.405	734	0.327	0.431	786	0.314	0.885	729	0.258	717	0.211	0.418
Child has clean aspect (over all children)	955	0.625	982	0.667	0.329	1027	0.689	0.585	955	0.672	980	0.624	0.276
Child has dirty hands (over all children)	953	0.518	979	0.501	0.696	1020	0.429	0.109	951	0.449	976	0.513	0.212
Child has dirty finger nails (over all children)	948	0.584	973	0.597	0.803	1018	0.476	**0.012**	945	0.525	969	0.608	**0.068**
Child has dirty face (over all children)	955	0.452	981	0.414	0.405	1029	0.331	**0.082**	955	0.365	979	0.441	0.139
Child wears clothes (over all children)	955	0.439	976	0.411	0.510	1028	0.371	0.340	954	0.399	980	0.476	0.119
Child wears dirty clothes (over all children)	955	0.988	980	0.989	0.951	1030	0.993	0.295	956	0.985	981	0.989	0.524
Child has pot-belly (over all children)	944	0.144	979	0.153	0.783	1019	0.106	0.146	951	0.139	977	0.159	0.563
Child wears shoes or has shoes available (over all children)	956	0.844	986	0.853	0.698	1032	0.834	0.471	962	0.823	982	0.869	**0.067**

CHILD CARE SITUATION (Continued)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
Child plays with household objects (over all children)	734	0.580	733	0.673	**0.015**	784	0.626	0.157	729	0.647	718	0.636	0.739
Child plays with toys (over all children)	734	0.800	733	0.809	0.701	784	0.800	0.710	729	0.813	718	0.788	0.352
Number of children's books or pictures	736	0.255	736	0.292	0.679	788	0.208	0.322	730	0.225	718	0.230	0.940
Child attended early education programs	734	0.030	732	0.040	0.489	783	0.041	0.944	726	0.032	718	0.033	0.914
Adult reads books with child	733	0.225	731	0.274	0.113	784	0.241	0.262	729	0.263	717	0.225	0.164
Adult tells stories to child	731	0.197	732	0.265	**0.025**	784	0.227	0.170	729	0.254	717	0.247	0.824
Adult takes the child outside the house	734	0.913	733	0.943	0.163	784	0.926	0.459	729	0.918	718	0.911	0.769
Adult plays with child	734	0.869	733	0.868	0.949	784	0.857	0.659	729	0.842	718	0.831	0.660
Average daily caring time	988	4.924	1028	5.038	0.767	1062	5.704	0.141	1001	5.393	1015	4.858	0.249

ACUTE LOWER RESPIRATORY INFECTION AND DIARRHEA SYMPTOMS PREVALENCE (% OF CHILDREN <5)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
ALRI in previous 48 hrs	1003	0.103	1031	0.029	**0.001**	1074	0.049	0.252	1012	0.053	1017	0.031	0.306
ALRI in previous week	1003	0.139	1031	0.040	**0.001**	1074	0.065	0.274	1012	0.073	1017	0.043	0.272
Diarrhea in previous 48 hrs	1003	0.082	1031	0.098	0.368	1074	0.101	0.888	1012	0.084	1017	0.077	0.639
Diarrhea in previous week	1003	0.153	1031	0.167	0.586	1074	0.162	0.844	1012	0.139	1017	0.140	0.990
Household lost working hours due to child illness (over all HHs)	3832	0.063	3534	0.014	**0.001**	3852	0.019	0.507	4232	0.010	4236	0.020	0.335

ANTHROPOMETRIC MEASURES AND ANEMIA (CHILDREN <2)

	Treatment 1		Control 1		P-value	Treatment 2		P-value	Treatment 2/Schools		Control/Schools		P-value
	N	Avg.	N	Avg.		N	Avg.		N	Avg.	N	Avg.	
BMI-for-age z-score	719	0.463	709	0.361	0.263	769	0.405	0.599	709	0.471	692	0.455	0.844
Head circumference-for-age z-score	714	-0.332	707	-0.238	0.290	769	-0.310	0.454	714	-0.261	690	-0.281	0.825
Length/height-for-age z-score	722	-1.380	711	-1.314	0.559	765	-1.336	0.841	712	-1.398	690	-1.396	0.979
Arm circumference-for-age z-score	631	0.397	635	0.300	0.364	684	0.350	0.663	634	0.314	609	0.271	0.695
Weight-for-length/height z-score	718	0.374	707	0.287	0.336	768	0.342	0.519	706	0.357	690	0.392	0.674
Weight-for-age z-score	724	-0.502	713	-0.502	1.000	774	-0.515	0.900	716	-0.524	694	-0.487	0.723
Anemia (Hb <110 g/L)	652	0.701	605	0.711	0.777	632	0.731	0.503	565	0.701	596	0.711	0.744

MICROBIOLOGY AND PARASITOLOGY

	Treatment 2		Control		P-value
	N	Avg.	N	Avg.	
Log10 *E. coli*, MPN/100ml, Child	74	0.463	86	0.584	0.472
Log10 *E. coli*, MPN/100ml, Mother	74	0.829	86	0.702	0.469
Log10 *E. coli*, MPN/100ml, Object	72	0.621	82	0.595	0.902
Log10 *E. coli*, MPN/100ml, Water	74	0.814	85	0.432	**0.055**
Stool sample, *Ascaris* detected	74	0.000	86	0.023	0.134
Stool sample, *Blastocystis* detected	74	0.108	86	0.105	0.949
Stool sample, *Giardia* detected	74	0.041	86	0.105	0.115
Any parasite detected	74	0.122	86	0.186	0.311

wsp
water and
sanitation program

SANITATION
FOR ALL