



PAKISTAN SAFE DRINKING WATER AND HYGIENE PROMOTION PROJECT

BASELINE REPORT

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Prepared by: Abt Associates Inc with assistance from AED, and AC Nielsen.

Pakistan Safe Drinking Water and Hygiene Promotion Project

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Prepared for USAID
2008



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List of Acronyms

ADB	Asian Development Bank
AED	Academy for Educational Development
AJK	Azad Jammu and Kashmir
FATA	Federally Administered Tribal Areas
GOP	Government of Pakistan
NSP	National Sanitation Policy
NWFP	North-West Frontier Province
PSDW-HPP	Pakistan Safe Drinking Water and Hygiene Promotion Project
SEC	Socio-economic class
UNDP	United Nations Development Programme
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WHO	World Health Organization
WSSD	World Summit on Sustainable Development

1. Introduction

According to the World Health Organization (WHO) and the United Nations Children’s Fund (UNICEF), approximately four billion cases of diarrhea are reported each year, resulting in 1.8 million deaths, or roughly 5,000 deaths per day. This mortality rate is responsible for 15%-18% of all deaths of children under the age of five, making diarrhea one of the biggest killers of children (WHO, 2007). Unsafe drinking water, inadequate sanitation, and poor hygiene are the main causes of diarrhea in children. Unsafe drinking water also has a disproportionate affect on the poor (ADB 2004; UNDP 2006a). The combination of unsafe water consumption with poor hygiene practices causes hardships to families, due to the high cost of treatments for waterborne illnesses and to decreased working days, and contributes to decreased educational achievement from reduced school attendance by children.

In Pakistan, the mortality rate for children under five years old is 101 deaths per 1,000 children (UNICEF 2006). Water- and sanitation-related diseases are responsible for 60% of the total child mortality cases, with diarrheal diseases estimated to kill more than 200,000 children under five years of age every year (Ahmad, et. al. 2000). The underlying causes of diarrheal diseases include inadequate access to safe water, poor household and environmental sanitation, and poor hygienic practices. Access to sanitary latrines at household levels is very low throughout the country—only 42% throughout Pakistan (65% urban and 30% rural) (Ahmad, et. al. 2000).

Access to safe drinking water is also a critical health issue in Pakistan. The projected population growth for the next ten years—from 150 million to 221 million people—will only exacerbate water demand, making access to safe water even more of a challenge. Data indicate that just 65% of the population has access to improved drinking water and that urban access to improved drinking water is significantly higher than rural access—85% urban and 55% rural.¹ Delivery of potable water supply is constrained by the inability of local governments, which are now responsible for providing drinking water according to Pakistan’s decentralization policy, to manage sustainable water systems (Ahmad, et. al. 2000).

Poor hygiene practices, such as lack of hand washing with soap at multiple critical times, are common in Pakistan. In addition, there is a lack of awareness about what “clean” water means; most believe that if water is clear and odorless it is suitable for drinking. This misconception could present a barrier for the acceptance of household water treatment methods or community water filtration plants. Until recent years, environmental health programs have not given behavior change the importance it is due. Research has shown that mere access to water and sanitation may bring little or no behavior change impact. A critical mass (more than 66%) of good water, sanitation, and hygiene behaviors can ensure that in due course, public health impacts will appear in the district, national, and international statistics (Esrey, 1999).

Even in developed urban areas, with organized administrative structures, resources, and high water coverage, the quality of water can be so poor that waterborne epidemics are common. For instance, in Lahore and Karachi, the most developed cities in Pakistan, more than 40% of the water supply is unfiltered, 60% of industrial effluents are untreated, and groundwater sources are being contaminated by human waste and pollution (UNDP 2006b). There is a mounting concern about, and response to, the rapidly accelerating crisis.

¹ It is important to note that improved drinking water, such as drinking water from running water in the house or protected well, may not always imply safe drinking water but does imply a lower likelihood of unsafe water.

Pakistan, as a signatory to the Millennium Development Goals, has committed to meet the targets set at the World Summit on Sustainable Development (WSSD). These include halving the population without access to adequate sanitation by 2015, which means increasing water and sanitation coverage to 93% and 90%, respectively, by 2015. The Government of Pakistan (GOP) has made allocations in the Medium Term Development Framework (2005-2010) to achieve these targets. Various development partners' supported programs are also being launched to complement the GOP's initiatives. Safe drinking water, sanitation, and hygiene education/promotion appear in the commitments and investments of governments as well as international agencies.

The GOP is also a signatory to the Dhaka and Islamabad Declarations on Sanitation. Pakistan's National Sanitation Policy (NSP) envisions the creation of an environment free of open defecation, with safe disposal of liquid and solid waste, and the promotion of health and hygiene practices in the country (NSP 2006). The policy's objectives include changes in attitudes and behavior regarding the use of sanitation, increased mass awareness of sanitation, and community mobilization.

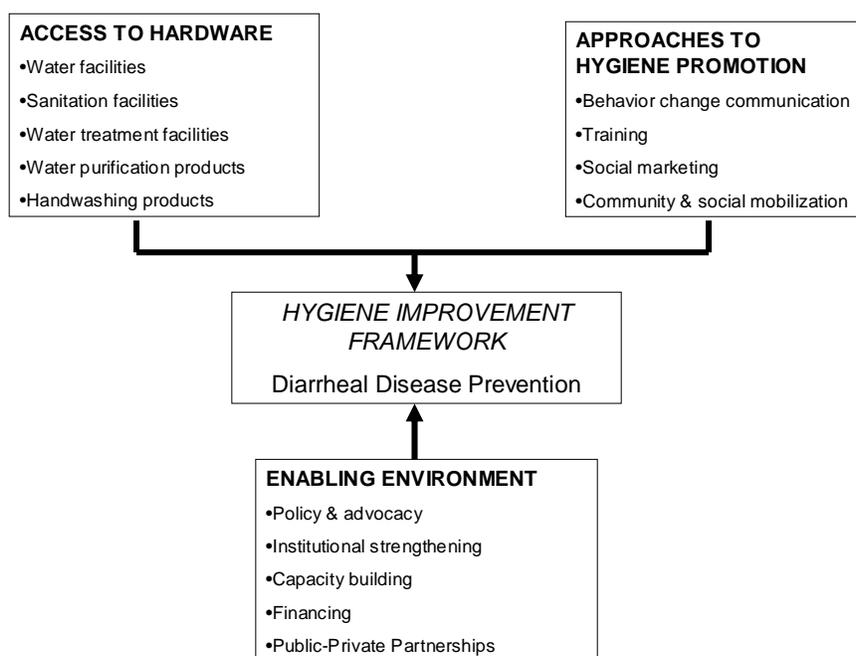
The United States Agency for International Development (USAID) is implementing the Pakistan Safe Drinking Water and Hygiene Promotion Project (PSDW-HPP) as part of its goal to improve basic health services for the Pakistani population. This is a three-year project (2006-2009) to increase the effectiveness and sustainability of the GOP's Clean Drinking Water program through complementary hygiene and sanitation promotion activities, community mobilization, and diverse capacity building activities. Specifically, the objective of the project is to improve the health of vulnerable populations and to increase the use of proven interventions to prevent waterborne infectious diseases such as diarrhea.

The PSDW-HPP will help local governments and communities to safely maintain and operate water treatment systems, as well as to promote personal and household water hygiene to maximize health benefits. The project will help Pakistan achieve the Millennium Development Goal of reducing the percentage of its population without access to safe water by 50% by 2015. The project components include:

- Strengthened local capacity to manage and operate water treatment plans in a sustainable manner
- Development, implementation, and evaluation of behavior change communications activities to improve safe water management, hand washing behaviors, and sanitation practices in households
- Development of a technical review on water testing methods and household water treatment technologies.

Figure 1- presents the hygiene improvement framework employed by the project. It details the areas required to ensure reduction and prevention of diarrheal disease, as well as to achieve improvements in hygiene. Under the hygiene promotion component, the project's technical approach targets mothers and caretakers of children under the age of five through four key channels (communities, schools, the media, and the private sector) to reach large-scale critical audiences with behavior change messages and activities that will create sustainable improved hygiene practices.

Figure 1-1: Adapted Hygiene Improvement Framework



The project will help provide technical assistance in hygiene and sanitation promotion and community mobilization along with extensive capacity building in order to complement Pakistan's substantial investments in hardware for safe drinking water. The project provides training and education on hygiene and sanitation practices, operation and maintenance of treatment facilities, and water quality testing, and also addresses water source protection to prevent water contamination. The project aims to demonstrate how social mobilization may lead to sustainability and better management of filtration plants by communities.

The project will also provide support to government agencies, nongovernmental organizations, and communities through capacity building and training in operation and management of water treatment units, hygiene and sanitation promotion, community mobilization, planning, cost recovery, and water resource management to ensure that investments in hardware and promotional activities will be sustainable in the long term.

PSDW-HPP's geographical scope covers 31 districts/agencies of four provinces of Pakistan—Sindh, Baluchistan, Punjab, and the North-West Frontier Province (NWFP)—as well as the Federally Administered Tribal Areas (FATA) and Azad Jammu and Kashmir (AJK) (including earthquake-affected areas of NWFP, FATA, and AJK) for a total population of 30 million. All union councils of the 31 program districts that are the tehsil (administrative unit of Pakistan) headquarters, each of which has a previously installed water filtration plant, will receive the intensive hygiene and sanitation promotion and community mobilization program. All union councils of the remaining program districts in Pakistan will receive less intensive hygiene promotion activities, as well as the school hygiene program for students attending Class IV government schools. All districts of Pakistan, including non-program districts, will receive hygiene promotion and safe drinking water messages via the project's radio campaign. This evaluation and baseline report focuses on the hygiene promotion activities conducted in the program districts.

2. Evaluation Design

The evaluation uses a difference-in-difference approach to measure the project's impact, which requires measuring the key project indicators in the baseline and after the program in the control and treatment areas. The impact of the project is then evaluated as the difference-in-difference of key indicators (e.g., percentage of mothers who report washing hands with soap before feeding a child) between the baseline and post-program surveys and between the control and treatment districts (more on this below). This approach ensures that any systematic differences in the control and treatment districts in the baseline are removed when measuring program impact.

The gold standard of measuring program impact involves randomizing the treatment areas so that there are no differences in the baseline across the control and treatment groups. However, randomization could not be implemented because the program districts were pre-determined. Furthermore, once a program district was chosen, the hygiene promotion activities were implemented in all the tehsils of the program district, with the intensive hygiene promotion activities being implemented in the tehsil headquarter union council, which had water filtration plants installed by another GOP program. Therefore, there was no flexibility to randomly assign the union councils that would receive the intensive hygiene promotion activities.

Consequently, a quasi-experimental approach was used where control districts were selected from districts that were similar to the treatment districts as measured by four district-level measures – drinking water access, source of drinking water, respondent's education, and incidence of diarrhea in children under the age of five. All of these measures were expected to have a significant impact on the program outcomes. Control tehsils from these districts were chosen to be in close geographical proximity (although not adjoining tehsils to avoid cross over affects of the project), similar rural/urban status, and similar population density. Since the analysis uses a difference-in-difference approach to measure the program impact, any remaining differences in control and treatment will be removed by taking the difference of differences. Further, in the final evaluation report, a sensitivity analysis of the results will be conducted using propensity score matching to identify the common support of control and treatment groups so that all households/districts are equally likely to have been selected for the project.

This program evaluation measures the impact of the hygiene promotion program, including the impact of the intensive hygiene promotion activities in the union councils with the water treatment plants (tehsil headquarters), the school program, and the less intensive hygiene promotion activities conducted throughout the program districts. Accordingly, information on the treatment districts was collected from the union councils with the intensive hygiene promotion activities that will also receive the school program and other programs conducted throughout the districts. The control districts were chosen from non-program districts that will not receive any of these programs other than the nationwide radio programs. It is important to note that the baseline survey was conducted in the treatment area from late March through the end of April 2008, by which time the school and community programs had started in some treatment districts (see Appendix A).² To account for this effect, we will use dummies to identify and control for these districts in the final impact evaluation. In the control districts, the baseline survey was conducted between late April and mid-May 2008, and the radio programs had started on March 1, 2008. This suggests that we may not be able to fully measure the impact of radio programs.

² The sampling in treatment areas began on April 21, 2008, while the school and community programs had begun in Rawalpindi, Lahore, Dadu, Manshera, Battagram, Shangla, Lasbella, Muzzafarabad, and Muhammad Agency (100 schools only) before this time. The nationwide mass media campaign also began on March 1, 2008.

However, we will be able to measure the impact of the duration of the radio program on program outcomes.

Once the post-program survey is conducted, average program impact will be measured using household-level data collected for the treatment and control groups both before and after the program for the following key program indicators:

- Increase in percentage of mothers/caretakers who wash hands with soap after defecation
- Increase in percentage of mothers/caretakers who wash hands with soap after cleaning a child's bottom
- Increase in percentage of mothers/caretakers who wash hands with soap before eating
- Increase in percentage of mothers/caretakers who wash hands with soap before feeding a child
- Increase in percentage of mothers/caretakers who wash hands with soap at at least two critical times
- Increase in percentage of households with soap located at one or more desirable locations (i.e., soap near or inside the kitchen and soap near or inside the toilet)
- Increase in percentage of households with desirable hand washing practices (mothers/caretakers wash hands with soap at least two critical times, and soap is located at one or more desirable locations)
- Increase in percentage of households covering their drinking water
- Increase in percentage of households storing drinking water in a raised area
- Increase in percentage of households that safely take out drinking water
- Increase in percentage of households that treat drinking water using project-promoted methods
- Decrease in percentage of households with the belief that clear, odorless water is safe to drink

The program impact will be measured using the double-difference method (i.e., difference-in-difference) that is described in Table 2-1. The columns in Table 2-1 distinguish between the baseline (round 1) and post-program intervention (round 2), and the rows distinguish between the treatment (T) and control (C) groups. Without random assignment, there could be significant differences in the key indicators across the treatment and control groups ($X_{1T}/Y_{1T} - X_{1C}/Y_{1C}$) in the baseline. Therefore, a robust measure of program intervention first takes the difference between the control and treatment groups' indicators after the intervention and removes from it the difference between the control and treatment groups in the baseline. Thus, the double-difference estimator removes the pre-existing differences in the treatment and control groups (difference in the control and treatment groups in the baseline) from the differences after the program intervention ($X_{2T}/Y_{2T} - X_{2C}/Y_{2C} - X_{1T}/Y_{1T} - X_{1C}/Y_{1C}$). This estimator controls for characteristics that do not change over time within the treatment and control groups, as well as characteristics that change over time but are common across the treatment and control groups (Maluccio and Flores 2004; Ravallion 2001; and Skoufias 2001).

The double-difference estimator will be presented along with the Pearson's chi-square group adjusted statistic and t-test statistic that adjusts for clustering. For more details on the calculation of these statistics, see Appendix B.

Table 2-1: Calculation of Program Impact Evaluation

Group	Program Indicators		
	Before Intervention	After Intervention	Difference
Treatment	X_{1T}/Y_{1T}	X_{2T}/Y_{2T}	$X_{1T}/Y_{1T} - X_{2T}/Y_{2T}$
Control	X_{1C}/Y_{1C}	X_{2C}/Y_{2C}	$X_{1C}/Y_{1C} - X_{2C}/Y_{2C}$
Difference	$X_{1T}/Y_{1T} - X_{1C}/Y_{1C}$	$X_{2T}/Y_{2T} - X_{2C}/Y_{2C}$	$(X_{2T}/Y_{2T} - X_{2C}/Y_{2C}) - (X_{1T}/Y_{1T} - X_{1C}/Y_{1C})$

X_{ij} — indicator (e.g., number of households that cover their drinking water) in period (pre- or post-program) i and group (control or treatment) j

Y_{ij} — number of households in period i and group j .

3. Data Collection and Sampling

The survey was conducted in each of the control and treatment districts during the spring of 2008. The survey population was 2,000 households that had children between the ages of 0-59 months and that belonged to lower socio-economic classes—socio-economic classes C, D, and E (see Appendix D for more details). Households that had a fixed water filter or that purchased bottled water were excluded from the survey, as these served as indicators of a higher socio-economic class. In the treatment districts, data could not be collected in two tehsils from high-risk areas in NWFP. Therefore, data were collected from only 1,937 households in the treatment districts. In the control districts, data were collected from 2,000 households and resulted in a total usable sample of 1,997 households (Table 3-1). Provinces were treated as a stratum, and union councils were the primary sampling units. They were sampled using population proportioned sampling so that no sampling weights were required. Households were secondary sampling units. The details of the sampling methodology are provided in Appendix B.

Table 3-1: Distribution of Sample Households by Province, Treatment, and Control Areas

Province Name	Treatment	Control	Total
Punjab	540	536	1,076
Sindh	616	615	1,231
NWFP	239	322	561
Baluchistan	251	253	504
AJK	291	271	562
Total	1,937	1,997	3,934

Table 3-2 provides a breakdown of the sample across rural and urban areas. Rural and urban areas are designated according to the Pakistan Census Organization, which specifies that urban areas have at least a town committee, municipal corporation, or metropolitan administrative structure irrespective of any other characteristics such as population. Rural areas, on the other hand, are areas where there is no administrative structure (e.g., town committee). The majority of the households in the treatment districts were selected from urban areas, with 89% of the sample in the treatment districts coming from urban areas. The sample's high percentage of households in urban areas is due to the GOP's definition of urban areas, which does not take population into account.

Table 3-2: Distribution of Sample Households by Province and Rural/Urban Areas

Province Name	Treatment			Control	
	Urban (%)	Rural (%)	Total	Urban (%)	Total
Punjab	78%	22%	540	100%	536
Sindh	100%	0%	616	100%	615
NWFP	88%	12%	239	100%	322
Baluchistan	100%	0%	251	100%	253
AJK	77%	23%	291	100%	271
Total	89%	11%	1,937	100%	1,997

Data source: 2008 PSDW Baseline Survey

In the control areas, 100% of the households came from urban areas. This was due to two reasons. First, once control districts were identified based on four district-level measures – drinking water access, source of drinking water, respondent’s education, and incidence of diarrhea in children under five – the tehsils were chosen based on geographical proximity and population density and rural/urban status. However, once the tehsils were chosen, the union council was always the tehsil headquarters. Therefore, even though the project tried to match on the rural/urban factors, often the tehsil headquarters were urban areas as defined by the Pakistan Census Organization. Secondly, since the project used the 1998 census data to match on rural/urban status, in some cases the chosen tehsils that were earlier classified as rural were later reclassified as urban due to changes over time.

4. Baseline Results

This section presents the results from the baseline survey. Each section presents a comparison of the results across the control and treatment areas to assess whether the control and treatment areas have any systematic differences in the baseline. For the key program indicators, the adjusted t-test statistic for comparison of means and an adjusted chi-square statistic is also presented to test if the difference between the control and treatment averages is significant. The details of the test statistics are provided in Appendix C. As mentioned above, the final evaluation will estimate the difference-in-difference estimator so that any differences across the control and treatment districts are separated out in evaluating the program impact. A sensitivity analysis will be conducted in which the control and treatment areas will be adjusted after propensity score matching (to weed out control groups that do not have a good match with the treatment groups).

In what follows, section 4.1 presents the basic socio-economic characteristics of the sample, section 4.2 presents the drinking water access of the households and the extent to which households treat their drinking water, section 4.3 presents the hygiene practices of the mothers/caretakers, section 4.4 presents the households’ knowledge of and attitudes toward safe drinking water, section 4.5 presents the extent to which the households use water filtration system, section 4.6 presents the access to media and exposure to any community hygiene program and/or media announcements (spots) about hand washing and/or water purification, and section 4.7 presents the impact of community hygiene programs and media spots on hygiene practices and on knowledge and attitudes toward drinking water and hygiene behaviors.

4.1 Basic Characteristics

The following tables describe the sample based on the household's socio-economic classification and the education level of the respondent – the mother or caretaker of the child(ren). It is expected that these two factors would have an impact on hygiene, sanitation, and safe drinking water practices. Later in the report, we present the results from the preliminary regression analysis that tests these hypotheses. Unless otherwise noted, the data from the all tables are from the 2008 household survey conducted by AC Nielsen.

Urban and rural households (based on Government of Pakistan criteria) were each classified into socio-economic classes (SECs) based on different criteria. The urban households were classified into five SECs based on the education and occupation of the chief wage earner, while the rural households were classified based on the structure of the house and education of the head of the household (see Appendix D for a more detailed description of the classification).

For the rural households the classification was based on four types of houses (*pukka* upper, *pukka* lower, *semi-pukka* and *kuchha*)³ and seven levels of education ranging from illiterate to post-graduate (illiterate, up to primary – less than 5 years, 6-9 years of school, matriculation – 10 years, intermediate – 12 years, graduate, and post-graduate). Details on the types of houses and the level of education are provided in more detail in Appendix D. Rural households were classified into five SEC categories from the highest (A) to the lowest (E), based on the following criteria:

- A The education of the head of household is at least intermediate, and the structure of the house is either *pukka* lower or *pukka* upper.
- B The education of the head of household is up to matriculation level (10 years of education), and the structure of the house is any of the four types.
- C The education of the head of household is less than matriculation level, and the structure of the house is any of the four types. This is the middle class of rural Pakistan.
- D The head of household is illiterate (which is very common). The structure of the house is either *semi-pukka* or *pukka* lower.
- E The head of household has no formal education. The structure of the house is *kuchha*.

The urban households were divided into five SECs based on the education of the head of household and the occupation of the chief earner. The households were classified based on 11 occupation categories, and as with the rural areas, on five education categories (see Appendix D for a detailed description of the occupation categories). Urban households were classified into five SEC categories from the highest (A) to the lowest (E), based on the following criteria:

- A Well-educated, self-employed/employed professionals, senior-level executives/officers in public/private limited organizations, well-educated small- to large-scale businessmen, and supervisors.
- B Relatively less well-educated lower/mid-level executives and officers, well-educated small businessmen, and supervisors.
- C Predominantly small retailers/businessmen, supervisors, and lower-level executives who have 5-10 years of schooling.

³ Kuccha means houses that are not very permanent and are made of mud or similar materials. Pukka means permanent houses made of concrete, bricks, or other durable materials.

- D Relatively well-educated skilled workers; not so well-educated small retailers, and non-executive staff members.
- E Skilled/unskilled workers, petty traders, and non-executive staff members with no more than 10 years of schooling.

This project and therefore the evaluation focuses on households in the lowest SECs – classes C, D, and E.

As illustrated in Table 4-1, approximately 34% (36%) of the sample is in the lowest SEC, class E, in the treatment (control) districts.⁴ Among the provinces, Baluchistan had the largest percentage of households in the lowest SEC, with as many as 47% (60%) of the households in this class in the treatment (control) group (see Appendix D for a detailed description of the SEC classifications).

Table 4-1: Distribution of Households by Province and Socio-Economic Class

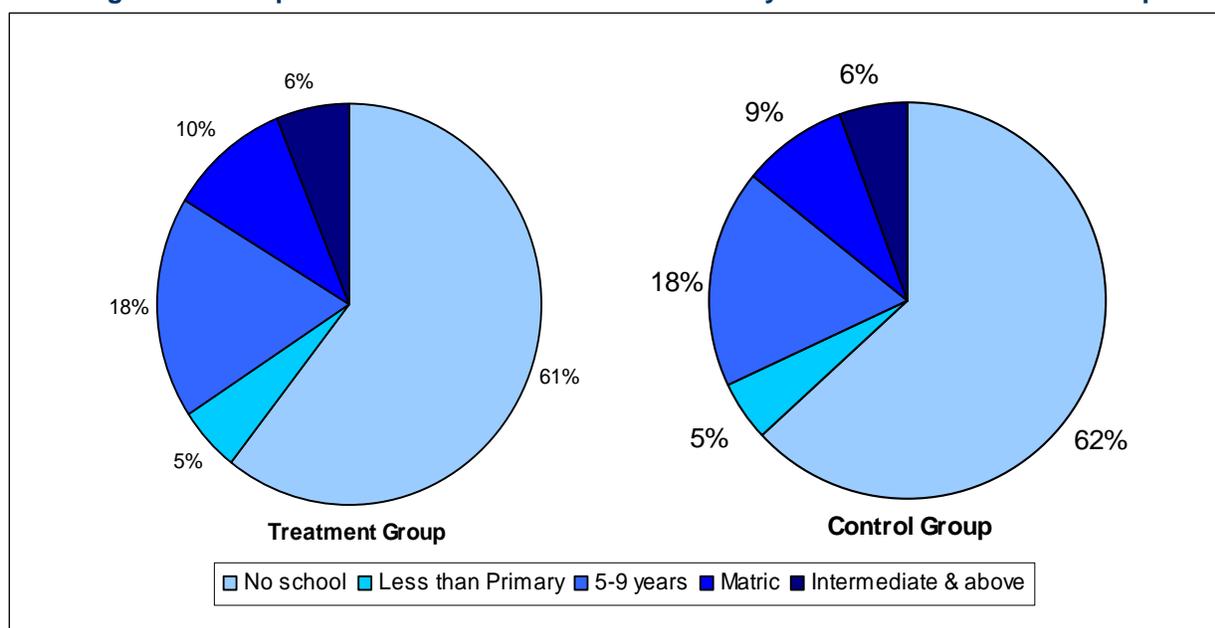
Province Name	Treatment				Control			
	Socio-Economic Class				Socio-Economic Class			
	C	D	E	Total	C	D	E	Total
Punjab	42%	36%	22%	540	42%	30%	28%	536
Sindh	38%	22%	40%	616	33%	25%	42%	615
NWFP	35%	25%	40%	239	49%	17%	34%	322
Baluchistan	33%	20%	47%	251	19%	22%	59%	253
AJK	44%	30%	26%	291	38%	42%	20%	271
Total	39%	27%	34%	1,937	37%	27%	36%	1,997

Data source: 2008 PSDW Baseline Survey

Figure 4-1 presents the distribution of households by the education of the mother or caretaker. The results indicate that the majority of the mothers or caretakers, 61% (62%) of the respondents in the treatment (control) districts, have had no schooling.

⁴ Throughout this report the results in the parenthesis are for control districts while those outside are for treatment districts.

Figure 4-1: Respondent's Level of Formal Education by Control and Treatment Group



4.2 Drinking Water Access and Treatment

One important factor that can affect diarrhea outcomes in children is access to safe drinking water and treatment of drinking water at home. The baseline data indicate that in the treatment (control) districts, 71% (79%) of the households have their main source of drinking water inside the house (Table 4-2). In the treatment districts, Sindh was the province with the highest percentage of households (85%) reporting that their main source of drinking water was inside the house.

Table 4-2: Distribution of Households by Main Source of Drinking Water

Province Name	Treatment			Control		
	Inside House	Outside House	Total	Inside House	Outside House	Total
Punjab	80%	20%	540	89%	11%	536
Sindh	85%	15%	616	84%	16%	615
NWFP	57%	43%	239	89%	11%	322
Baluchistan	73%	27%	251	52%	48%	253
AJK	35%	65%	291	60%	40%	271
Total	71%	29%	1,937	79%	21%	1,997

Adjusted t-test of difference in means: $-1.0618, p > |t| = 0.2930$

Group adjusted chi-square: $1.1377, Pr = 0.2861$

Data source: 2008 PSDW Baseline Survey

The World Health Organization defines *improved* drinking water sources as tap water inside the house (household connections) and outside the house (public standpipes), protected dug well, boreholes (includes tube wells), protected springs, and rainwater collection (WHO 2007). It is important to note that these sources only reflect improved water sources and do not guarantee

safe water (WHO 2007). Table 4-3 presents the main sources of drinking water inside the house, for households that reported that their main source of drinking water was inside the house. The baseline data indicate that 48% (44%) of all households in the treatment (control) districts have access to tap water inside the house. Approximately 69% (78%) of households in the treatment (control) districts have access to drinking water via improved sources inside the house (tap water, protected dug well, bore wells and tube wells), and 2% (0.3%) of the households reported using unprotected or unsafe sources of drinking water as their main source of water.

Table 4-3: Distribution of Households by Main Drinking Water Source Inside the House

	Province Name	Tap	Tube Well/Boring	Protected Dug Well	Total Improved Sources	Unprotected Dug Well	Total Inside House
Treatment	Punjab	57.0%	17.0%	5.2%	79.3%	0.6%	540
	Sindh	51.8%	33.1%	0.0%	84.9%	0.0%	616
	NWFP	33.1%	3.8%	18.4%	55.2%	2.1%	239
	Baluchistan	55.4%	7.6%	2.0%	64.9%	8.4%	251
	AJK	31.6%	0.7%	0.3%	32.6%	2.4%	291
	Sub-Total	48.4%	16.8%	4.0%	69.2%	1.9%	1,937
Control	Punjab	54.1%	31.2%	3.4%	88.6%	0.0%	536
	Sindh	29.6%	52.2%	2.1%	83.9%	0.0%	615
	NWFP	61.2%	19.6%	6.5%	87.3%	1.6%	322
	Baluchistan	50.2%	1.2%	0.4%	51.8%	0.0%	253
	AJK	32.8%	19.9%	7.0%	59.8%	0.4%	271
	Sub-Total	44.3%	30.4%	3.6%	78.4%	0.3%	1,997

Data source: 2008 PSDW Baseline Survey

Approximately 29% (21%) of the households in the treatment (control) districts reported that their main source of water is outside the house (Table 4-2). The results indicate that approximately 20% (16%) of the households in treatment (control) districts have access to improved sources of drinking water outside the house and that 7% (4%) of the households in treatment (control) districts use sources that are considered unsafe as their main source of drinking water (Table 4-4).

Table 4-4: Distribution of Households by Main Drinking Water Source Outside the House

	Province Name	Tap	Tube Well	Protected Well/Spring	Rain water	Tanker Truck	Filtration Plant	Total Improved Sources	Unprotected Well/Spring	Surface Water	Total Unsafe Sources	Other	Total Outside House
		Improved Sources							Unsafe Sources				
Treatment	Punjab	4.3%	1.3%	5.6%	0.0%	0.9%	0.9%	13.0%	3.5%	0.0%	3.5%	3.7%	540
	Sindh	4.2%	2.6%	0.0%	0.6%	6.0%	0.3%	13.8%	0.0%	0.2%	0.2%	1.1%	616
	NWFP	6.7%	3.8%	22.2%	0.0%	0.0%	0.0%	32.6%	5.9%	1.3%	7.1%	2.9%	239
	Baluchistan	3.2%	0.8%	0.0%	0.0%	12.4%	3.2%	19.5%	3.2%	0.4%	3.6%	3.6%	251
	AJK	5.2%	0.0%	27.1%	0.0%	0.0%	1.0%	33.3%	30.6%	0.7%	31.3%	0.3%	291
	Sub-Total	4.5%	1.8%	8.4%	0.2%	3.8%	0.9%	19.6%	6.7%	0.4%	7.1%	2.3%	1,937
Control	Punjab	3.9%	1.3%	2.1%	0.0%	1.5%	0.2%	9.0%	0.0%	1.9%	1.9%	0.6%	536
	Sindh	7.6%	3.4%	0.2%	0.2%	2.4%	0.0%	13.8%	0.0%	1.6%	1.6%	0.7%	615
	NWFP	5.0%	0.3%	3.7%	0.0%	0.6%	0.0%	9.6%	1.2%	0.0%	1.2%	0.3%	322
	Baluchistan	2.4%	23.7%	0.8%	3.2%	6.7%	0.4%	37.2%	0.4%	10.7%	11.1%	0.0%	253
	AJK	1.5%	3.0%	19.2%	0.0%	0.0%	0.0%	23.6%	12.5%	0.4%	12.9%	3.3%	271
	Sub-Total	4.7%	4.9%	3.9%	0.5%	2.1%	0.1%	16.1%	2.0%	2.4%	4.4%	0.9%	1,997

Data source: 2008 PSDW Baseline Survey

4.2.1 Treatment and Storage of Drinking Water

One of the areas in which the project is hoping to make a change is to increase the extent to which households treat their drinking water safely. Table 4-5 lists the percentage of households that treated their drinking water effectively, where effective methods include boiling, bleaching, tablets, sachets, packet, and solar disinfection. The project hopes to increase the percentage of households that report safe treatment of drinking water. The results indicate that a small minority of the households in the treatment (control) districts treat drinking water correctly; only 6.7% (4.7%) of the households in the treatment (control) districts treat drinking water effectively using either boiling, bleaching, tablets, sachets, packet, or solar disinfection. The adjusted t-test and chi-square test suggest that the sample is balanced and there are no significant differences between the control and treatment groups.

Table 4-5: Treatment of Drinking Water by Province

	Province Name	Boil	Bleach	Tablets	Sachet	Solar	Packet	Total-Safe Treatment	Ceramic Filter	Cloth	Alm	No Treatment	Total - Unsafe Treatment	Total
		Safe Treatment							Unsafe/No Treatment					
Treatment	Punjab	8.5%	0.2%	0.0%	0.6%	0.2%	0.0%	9.4%	0.0%	1.1%	0.0%	89.4%	90.6%	540
	Sindh	5.5%	0.2%	0.5%	0.0%	0.0%	0.2%	6.3%	0.0%	11.7%	6.8%	75.2%	93.7%	616
	NWFP	4.6%	0.4%	0.0%	0.0%	0.0%	0.0%	5.0%	0.0%	0.4%	0.0%	94.6%	95.0%	239
	Baluchistan	2.4%	0.4%	0.0%	0.0%	0.0%	0.0%	2.8%	0.0%	16.3%	1.2%	79.7%	97.2%	251
	AJK	6.9%	0.3%	0.0%	0.0%	0.0%	0.0%	7.2%	0.0%	1.7%	0.0%	91.1%	92.8%	291
	Sub-Total	6.0%	0.3%	0.2%	0.2%	0.1%	0.1%	6.7%	0.0%	6.5%	2.3%	84.5%	93.3%	1,937
Control	Punjab	5.6%	0.2%	0.0%	2.1%	0.0%	0.0%	7.8%	0.0%	0.2%	0.0%	92.0%	92.2%	536
	Sindh	3.7%	0.0%	0.0%	0.0%	0.0%	0.0%	3.7%	0.2%	2.8%	0.8%	92.5%	96.3%	615
	NWFP	3.7%	0.3%	0.0%	0.0%	0.0%	0.0%	4.0%	0.0%	0.3%	0.0%	95.7%	96.0%	322
	Baluchistan	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	7.1%	0.0%	92.5%	100.0%	253
	AJK	4.4%	0.0%	0.0%	0.0%	0.0%	1.1%	5.5%	0.0%	3.0%	0.4%	91.1%	94.5%	271
	Sub-Total	3.9%	0.1%	0.0%	0.6%	0.0%	0.2%	4.7%	0.1%	2.3%	0.3%	92.7%	95.3%	1,997

Adjusted t-test of difference in means: 1.6011, $p > |t| = 0.1151$

Group adjusted chi-square: 2.4793, $Pr = 0.1154$

Data source: 2008 PSDW Baseline Survey

Another factor that affects the safety of drinking water is how the drinking water is stored (i.e., whether the containers are covered and kept in a raised area and whether individuals take out water safely from the containers). Approximately 73% (65%) of households in the treatment (control) area use containers in the house to store their drinking water (Table 4-6).

Table 4-6: Distribution of Households by Type of Water Storage

Province Name	Treatment				Control			
	Containers	Roof/Cistern	No Storage	Total	Containers	Roof/Cistern	No Storage	Total
Punjab	61%	20%	19%	540	50%	16%	34%	536
Sindh	86%	6%	8%	616	88%	3%	10%	615
NWFP	79%	13%	8%	239	74%	16%	10%	322
Baluchistan	41%	42%	17%	251	13%	62%	26%	253
AJK	89%	8%	4%	291	80%	13%	7%	271
Total	73%	16%	11%	1,937	65%	17%	18%	1,997

Data source: 2008 PSDW Baseline Survey

Table 4-7 through Table 4-10 report the storage and use practices of households that store drinking water in containers inside the house. Increasing the percentage of households that safely cover their drinking water is another target of the project. Table 4-7 provides the distribution of households by the types of water cover used among the households that store drinking water in containers. Hard covers are considered the safest method of covering drinking water; approximately 58% (62%) of the households in the treatment (control) districts that use containers to store drinking water reported using hard covers on all their water containers. Only 1% (1%) of the households in the treatment (control) districts that store water in containers inside the house reported using no covers.

Table 4-7: Distribution of Households by Covers for Water Containers

Province Name	Treatment					Control				
	All Hard	Some Hard	Soft	No Cover	Total with Containers	All Hard	Some Hard	Soft	No Cover	Total with Containers
Punjab	58%	40%	1%	1%	274	68%	30%	1%	0%	227
Sindh	42%	53%	5%	0%	513	53%	46%	2%	0%	534
NWFP	90%	8%	0%	3%	184	78%	18%	2%	2%	235
Baluchistan	49%	48%	2%	0%	85	25%	56%	0%	19%	16
AJK	67%	21%	9%	3%	256	64%	28%	6%	1%	216
Total	58%	37%	4%	1%	1,312	62%	35%	2%	1%	1,228

Notes: The total number of households with containers is less than that reported in Table 4-6 because data were missing for 165 households on the covers used.

Data source: 2008 PSDW Baseline Survey

Approximately 72% (75%) of the households in the treatment (control) districts that store water in containers inside the house store their water in a refrigerator or a raised area (Table 4-8). The t-test and chi-square test suggest that the difference between the treatment and control districts is not significant. Safe storage is more prevalent in NWFP and Punjab, with 86% of the households in NWFP and 79% of the households in Punjab reporting storing drinking water in a raised area or in a refrigerator.

Table 4-8: Percentage of Households That Store Water in a Raised Area or Refrigerator

Province Name	Treatment			Control		
	Not Raised (%)	Raised/Refrigerator (%)	Total	Not Raised (%)	Raised/Refrigerator (%)	Total
Punjab	21%	79%	275	22%	78%	227
Sindh	32%	68%	513	23%	77%	534
NWFP	14%	86%	184	31%	69%	235
Baluchistan	36%	64%	85	6%	94%	16
AJK	35%	65%	256	29%	71%	216
Total	28%	72%	1,313	25%	75%	1,228

Adjusted t-test of difference in means: -0.6887 , $p > |t| = 0.4941$

Group adjusted chi-square: 0.4847 , $Pr = 0.4863$

Data source: 2008 PSDW Baseline Survey

Among the households that store drinking water in containers, approximately 71% (74%) of the households cover the drinking water and store it in a raised area or refrigerator (Table 4-9). The adjusted t-test and chi-square test suggest that there is no significant difference between the control and treatment groups.

Table 4-9: Percentage of Households That Store Water in a Raised Area or Refrigerator and Covered Containers

Province Name	Treatment		Control	
	Raised/Refrigerator and Covered	Total	Raised/Refrigerator and Covered	Total
Punjab	77%	274	78%	227
Sindh	68%	513	77%	534
NWFP	83%	184	66%	235
Baluchistan	64%	85	75%	16
AJK	63%	256	69%	216
Total	71%	1,312	74%	1,228

Adjusted t-test of difference in means: -0.7258 , $p > |t| = 0.4712$

Group adjusted chi-square: 0.5374 , $Pr = 0.4635$

Data source: 2008 PSDW Baseline Survey

Drinking water can become contaminated if it is not properly taken out from containers by either using a long-handled scoop, using a tap attached to the container, or pouring from a narrow-necked container. Approximately 54% (58%) of households in the treatment (control) groups safely remove drinking water from the containers, as measured by either using a long-handled scoop, using a tap attached to the container, or pouring from a narrow-necked container (Table 4-10). If a household reported even one instance of using an unsafe method to take water out of the container, that household was counted as taking out water unsafely. The incidence of safe use of water was the highest in Punjab and AJK, with approximately 78% of the households in

Punjab and 72% of the households in AJK reporting safe practices for removing drinking water from containers. The adjusted t-test and chi-square test suggest that there are no significant differences between the control and treatment groups.

Table 4-10: Distribution of Households by Method of Taking Out Water

	Province Name	Safe Methods			Unsafe Methods			Total	
		Long-Handled Scoop	Tap	Pour from Narrow-Necked Container	Total Safe Methods	Pour from Wide-Necked Container	Take out with a Vessel		Total Unsafe Methods
Treatment	Punjab	2%	45%	31%	78%	4%	18%	22%	275
	Sindh	6%	19%	6%	31%	14%	55%	69%	513
	NWFP	0%	43%	10%	54%	28%	18%	46%	184
	Baluchistan	19%	24%	13%	55%	1%	44%	45%	85
	AJK	5%	41%	27%	72%	25%	3%	28%	256
	Total		5%	32%	16%	54%	15%	31%	46%
Control	Punjab	0%	35%	47%	82%	12%	6%	18%	227
	Sindh	6%	24%	6%	37%	10%	53%	63%	534
	NWFP	0%	60%	11%	72%	18%	9%	28%	235
	Baluchistan	13%	25%	25%	63%	19%	19%	38%	16
	AJK	0%	30%	38%	68%	28%	4%	32%	216
	Total		3%	34%	20%	58%	15%	27%	42%

Adjusted t-test of difference in means: -0.5105 , $p > |t| = 0.6119$

Group adjusted chi-square: 0.2695 , $Pr = 0.6036$

Notes: ¹ Households provided multiple responses to the question. If in even one instance a household reported taking out water unsafely, that household was counted as taking out water unsafely. Taking water out safely is defined as using a long-handled scoop, using a tap, or pouring from a narrow-necked container. Taking water out unsafely is defined as using a drinking cup (vessel), pouring from a wide-mouthed container, or other inappropriate method.

Data source: 2008 PSDW Baseline Survey

4.3 Hygiene Practices

Households were asked about their toilet facility because the project addresses sanitation by promoting practices that lead to decreased open defecation. Approximately 69% (72%) of the households in treatment (control) districts reported having a flush system, while another 9% (10%) reported having a pit latrine (Table 4-11). Among the provinces, in Punjab 83% of the households in the treatment area reported having a flush system. In Sindh only 59% of the households reported having a flush system.

Table 4-11: Type of Toilet Facility by Province

Province Name	Treatment						Control					
	Flush System	Pit Latrine	Cover or Bury	Open Defecation	Traditional Toilet	Total	Flush System	Pit Latrine	Cover or Bury	Open Defecation	Traditional Toilet	Total
Punjab	83%	9%	0%	6%	1%	540	95%	1%	0%	4%	1%	536
Sindh	59%	11%	2%	4%	24%	616	60%	6%	2%	4%	27%	615
NWFP	75%	3%	0%	13%	9%	239	89%	2%	0%	0%	9%	322
Baluchistan	62%	21%	0%	14%	3%	251	17%	53%	1%	28%	1%	253
AJK	67%	3%	0%	22%	8%	291	85%	5%	0%	8%	2%	271
Total	69%	9%	1%	10%	11%	1,937	72%	10%	1%	7%	10%	1,997

Data source: 2008 PSDW Baseline Survey

The results indicate that in the treatment (control) districts, when asked if they had washed their hands in the last 24 hours, 12% (21%) of mothers/caretakers reported not using soap to wash either their hands or their children’s hands at any time within 24 hours of the interview. In the treatment (control) districts, 64% (54%) of mothers/caretakers reported washing both their hands and their children’s hands with soap at some time within 24 hours of the interview (Figure 4-2).

Figure 4-2: Percentage of Mothers/Caretakers Reporting Washing Hands with Soap at Any Time within 24 Hours of the Interview

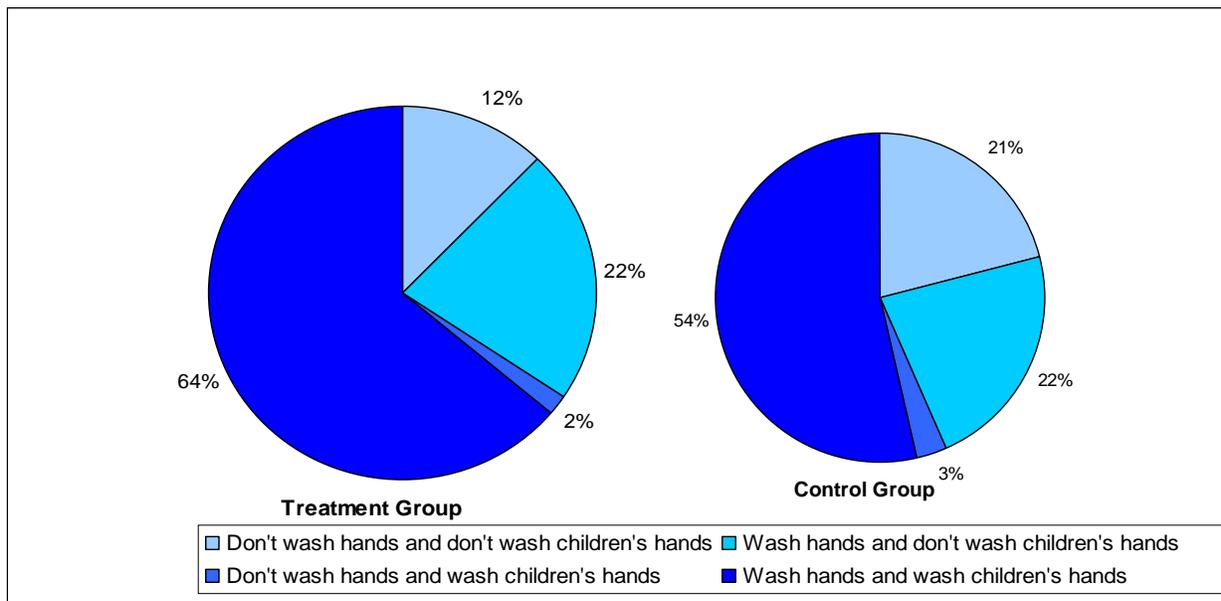


Table 4-12 presents the percentage of mothers/caretakers who reported washing their hands with soap at four critical times: (1) after cleaning a child’s bottom, (2) after defecating, (3) before feeding a child, and (4) before eating. The results indicate that approximately 72% (61%) of the mothers/caretakers in the treatment (control) districts reported washing their hands with soap after cleaning a child’s bottom, and 74% (67%) of the mothers/caretakers in the treatment (control) districts reported washing their hands with soap after defecating. A relatively smaller percentage of mothers/caretakers reported washing their hands with soap before either feeding a child or eating: 55% (49%) of the mothers/caretakers in the treatment (control) districts reported washing their hands with soap before feeding a child, and only 46% (43%) of the mothers/caretakers reported washing their hands with soap before eating themselves. The adjusted t-test and chi-square test suggest that there is no significant difference between the control and treatment groups for all hand washing practices, except that we observe a significant difference between the control and treatment districts in the percentage of mothers/caretakers who wash their hands after cleaning a child’s bottom.

Table 4-12: Distribution of Households by Hand Washing with Soap at Critical Times

	Province Name	Mothers/ Caretakers Wash Hands after Cleaning Child's Bottom (%)	Mothers/ Caretakers Wash Hands after Defecating (%)	Mothers/ Caretakers Wash Hands before Feeding Child (%)	Mothers/ Caretakers Wash Hands before Eating (%)	Total
Treatment	Punjab	72%	83%	62%	59%	540
	Sindh	80%	81%	62%	48%	616
	NWFP	60%	54%	34%	23%	239
	Baluchistan	64%	63%	31%	26%	251
	AJK	69%	71%	62%	56%	291
	Sub-Total	72%	74%	55%	46%	1,937
Control	Punjab	73%	80%	63%	66%	536
	Sindh	70%	66%	62%	43%	615
	NWFP	68%	70%	57%	39%	322
	Baluchistan	33%	45%	5%	7%	253
	AJK	34%	63%	22%	35%	271
	Sub-Total	61%	67%	49%	43%	1,997
<i>Adjusted t-test difference in means</i>						
	<i>p > t </i>	1.7580	1.1872	0.7593	0.4482	
		0.0843	0.2402	0.4509	0.6558	
<i>Group Adjusted chi-square</i>						
	<i>Pr</i>	2.9705	1.4087	0.5889	0.2069	
		0.0848	0.2353	0.4428	0.6492	

Table 4-13 presents the percentage of households by the number of times that mothers/caretakers reported washing their hands with soap at critical times. Approximately 76% (68%) of the mothers/caretakers reported washing hands with soap at two or more critical times in the treatment (control) districts, and 15% (22%) of the mothers/caretakers in the treatment (control) districts reported not washing hands with soap at any of the four critical times.

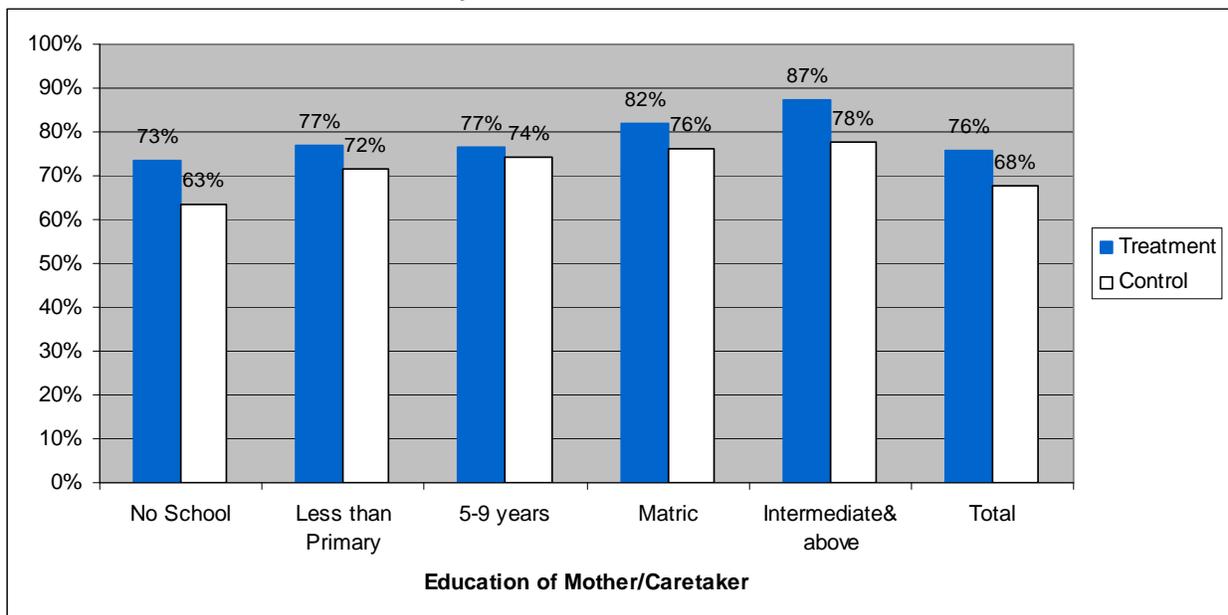
Table 4-13: Distribution of Households by the Number of Times Mothers/Caretakers Report Washing Hands with Soap at Critical Times

	Province Name	Hand Washing with Soap at Critical Times						Total
		0	1	2	3	4	2 or more critical times	
Treatment	Punjab	6%	14%	20%	16%	43%	80%	540
	Sindh	15%	3%	20%	19%	43%	82%	616
	NWFP	25%	15%	33%	18%	9%	60%	239
	Baluchistan	33%	6%	31%	6%	24%	62%	251
	AJK	8%	10%	32%	14%	35%	81%	291
	Sub-Total	15%	9%	25%	16%	35%	76%	1,937
Control	Punjab	12%	9%	15%	13%	51%	79%	536
	Sindh	25%	2%	17%	18%	38%	73%	615
	NWFP	13%	7%	30%	31%	18%	80%	322
	Baluchistan	49%	20%	25%	4%	3%	31%	253
	AJK	23%	24%	36%	11%	6%	53%	271
	Sub-Total	22%	10%	22%	16%	29%	68%	1,997

Data source: 2008 PSDW Baseline Survey

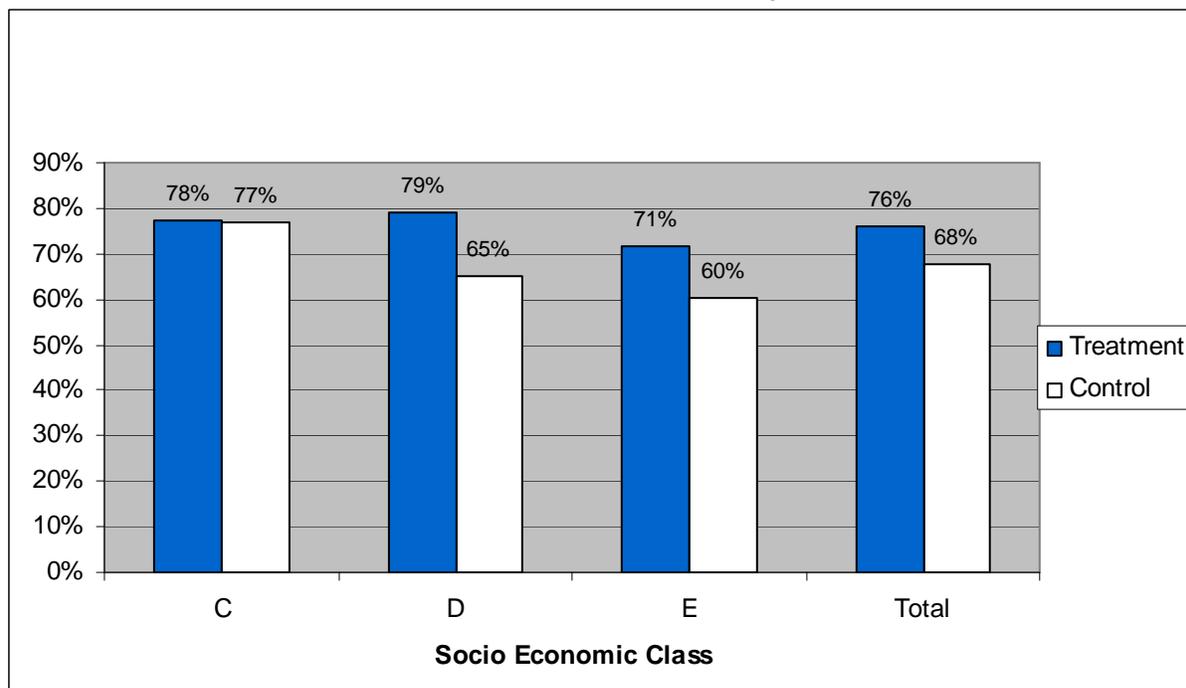
The level of education of the mother or the immediate caretaker of the child may affect the hygiene practices and the treatment of drinking water by households. The baseline survey results presented in Figure 4-3 indicate that the percentage of mothers/caretakers who report washing their hands with soap at two or more critical times increases with the level of education and is the largest for households where the mother/caretaker has a higher than intermediate level education. The ideal way to assess if the mother's/caretaker's education has a significant impact is to control for other factors that might confound this relationship by performing a regression analysis. The results of the regression analysis are discussed later in section 4.

Figure 4-3: Percentage of Mothers/Caretakers Who Wash Hands with Soap at Two or More Critical Times by Mother's/Caretaker's Education



Another factor that is likely to have an impact on the hygiene practices is the socio-economic class of the households. One would expect that households from higher SECs would use better hygiene practices. The results in Figure 4-4 indicate that a slightly lower percentage of mothers/caretakers in households in the lowest SEC category (E) in the treatment (control) districts wash their hands with soap at two or more critical times 71% (60%) as compared to 78% (77%) in households in SEC category C.

Figure 4-4: Percentage of Mothers/Caretakers Who Wash their Hands with Soap at Two or More Critical Times after Defecation by SEC



Even after proper washing of hands with soap, there can be a chance of contamination if hands are not dried in a safe manner (either using a clean towel or air drying). Although using a clean towel would normally be considered safe, the definition of “clean” can be confounded by a cloth that looks clean but is not actually clean or by a different understanding of what clean actually is. Therefore, one of the goals of the project is to promote the practice of air drying hands. The baseline survey results indicate that in the treatment (control) districts, only 10% (8%) of the mothers/caretakers air dry their hands after washing (Table 4-14). The incidence of air drying is the smallest in Punjab and NWFP. The adjusted t-test and chi-square test suggest that the sample is balanced and there are no significant differences between the control and treatment groups..

Table 4-14: Percentage of Respondents Who Report Air Drying Hands

Province Name	Treatment			Control		
	Other methods (%)	Air Dry (%)	Total	Other methods (%)	Air Dry (%)	Total
Punjab	93%	7%	540	95%	5%	536
Sindh	88%	12%	616	88%	12%	615
NWFP	94%	6%	239	99%	1%	322
Baluchistan	92%	8%	251	90%	10%	253
AJK	81%	19%	291	89%	11%	271
Total	90%	10%	1,937	92%	8%	1,997

Adjusted t-test of difference in means: 1.0070, $p > |t| = 0.3183$

Group adjusted chi-square: 1.0198, $Pr = 0.3126$

Data source: 2008 PSDW Baseline Survey

Figure 4-5 and Figure 4-6 present the percentage of respondents who air dry by mother's/caretaker's education and SEC. The results indicate that the practice of air drying hands varies only marginally by the mother/caretaker's education level and does not vary by socio-economic class of the household. While the percentage of respondents who air dried their hands is 10% among the households where the mother is illiterate, it is 12% among the households where the mother's level of education is intermediate or higher. Across the socio-economic classes, there is not much difference, with 11% of the respondents reporting air drying their hands for SECs E and C, and 10% for SEC D. As mentioned above, the impact of SEC and mother's/caretaker's education is best measured after controlling for all other factors that might affect hygiene practices.

Figure 4-5: Percentage of Households that Air Dry Hands by Mother's/Caretaker's Education

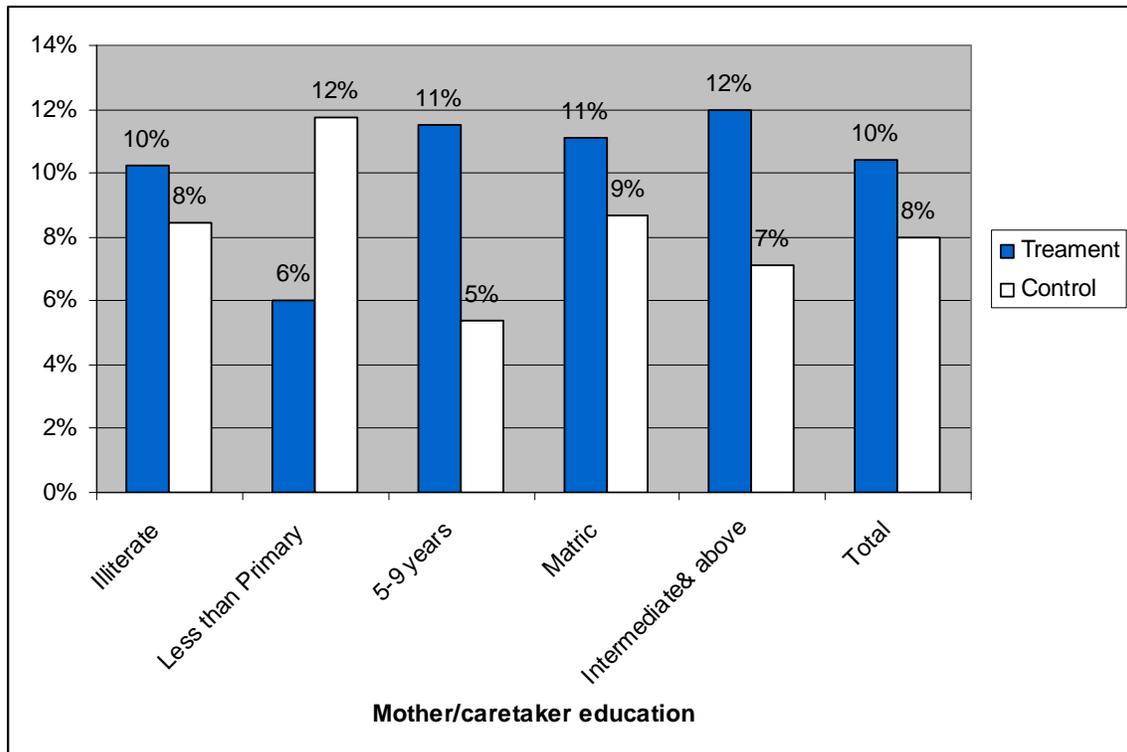
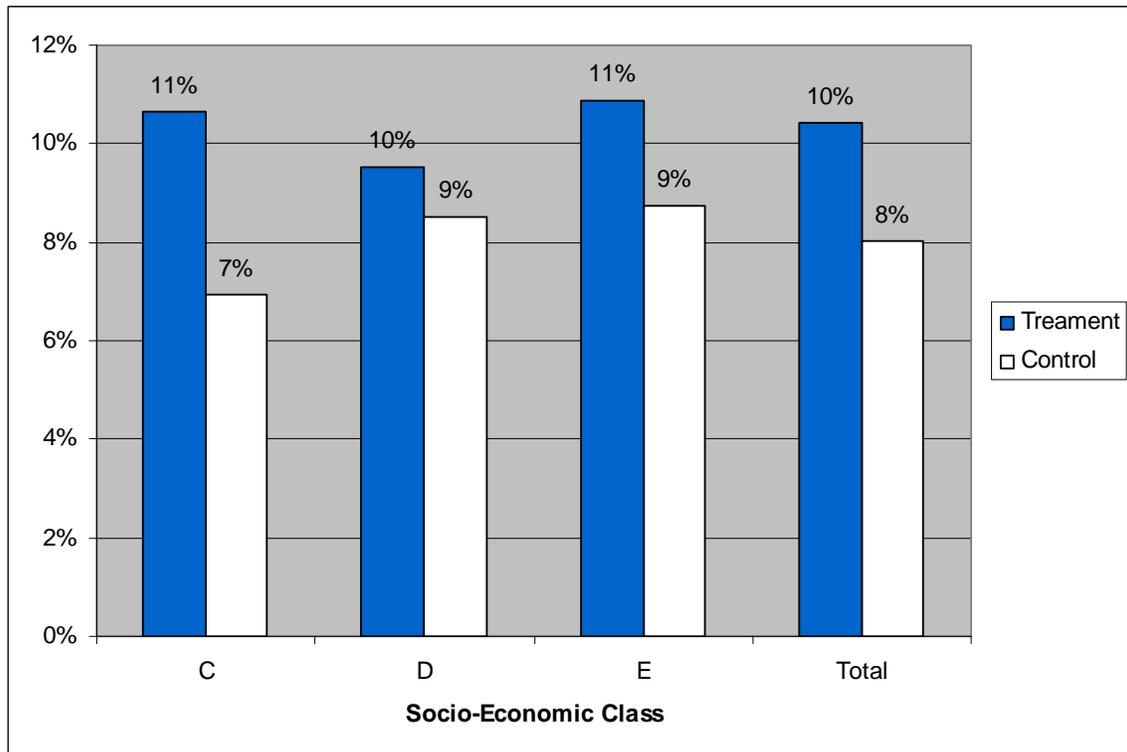


Figure 4-6: Percentage of Households that Air Dry Hands by SEC



As part of the survey, the interviewers observed where the soap was kept in the household and if there was soap in desirable locations (i.e., soap near or inside the kitchen and soap near or inside the toilet). The results indicate that 48% (54%) of the households in the treatment (control) districts keep soap in or near the toilet and 5% (7%) keep soap in or near the kitchen (Table 4-15). Fifty-one percent (57%) of the households in the treatment (control) districts were observed to have soap available in one or more desirable locations. It is interesting to note that although only 48% of the households in treatment districts had soap in or near the toilet, as many as 74% of the mothers reported washing their hands after defecation (Table 4-12). It is possible that households that do not keep soap in or near the toilet keep soap either in the kitchen or in the yard, but observations of soap near the kitchen were low (5% in the treatment districts). It is also likely that there was over reporting of hand washing because of the stigma associated with mothers/caretakers reporting that they do not wash hands.

Table 4-15: Distribution of Households by Observed Location of Soap

Province Name	Treatment					Control				
	Soap inside/near Toilet	Soap inside/near Kitchen	Soap in the Yard or in no Specific Place	Soap in One or More Desirable Locations	Total	Soap inside/near Toilet	Soap inside/near Kitchen	Soap in the Yard or in no Specific Place	Soap in One or More Desirable Locations	Total
	(%)	(%)	(%)	(%)		(%)	(%)	(%)	(%)	
Punjab	47%	4%	39%	50%	540	70%	1%	26%	71%	536
Sindh	62%	8%	36%	66%	616	55%	13%	35%	59%	615
NWFP	25%	5%	59%	28%	239	39%	10%	73%	43%	322
Baluchistan	46%	2%	32%	47%	251	35%	2%	34%	36%	253
AJK	42%	4%	38%	44%	291	56%	3%	30%	59%	271
Total	48%	5%	39%	51%	1937	54%	7%	38%	57%	1997

Soap in/near toilet:

Adjusted t-test of difference in means: -0.8501, $p > |t| = 0.3990$

Group adjusted chi-square: 0.7348, $Pr = 0.3913$

Soap in/near kitchen:

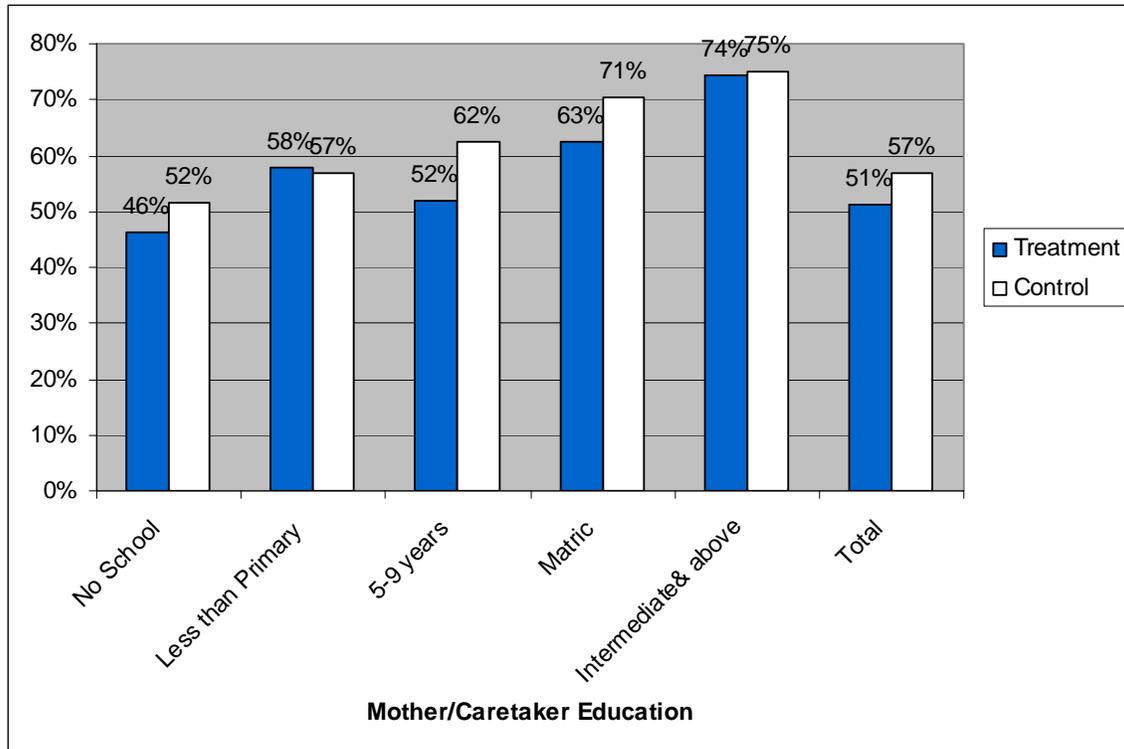
Adjusted t-test of difference in means: 1.0070, $p > |t| = 0.3183$

Group adjusted chi-square: 1.0198, $Pr = 0.3126$

Data source: 2008 PSDW Baseline Survey

Figure 4-7 and Figure 4-8 present the distribution of households with soap in one or more desirable locations by mother's/caretaker's education and SEC. The results indicate that the percentage of households that keep soap in one or more desirable locations increases significantly with the mother's/caretaker's education level. Approximately 74% (75%) of the households in the treatment (control) districts with mothers/caretakers who have an intermediate and above level of education keep soap in one or more desirable locations, while only 46% (52%) of the households with mothers/caretakers who have no schooling keep soap in one or more desirable locations.

Figure 4-7: Distribution of Households with Soap in One or More Locations by Mother's/Caretaker's Education Level



Similarly, a higher percentage of households in a higher socio-economic class, class C, keep soap in one or more desirable locations: 59% (65%) of the class C households in the treatment (control) districts keep soap in one or more desirable locations as compared to 43% (48%) in the lowest class, class E (Figure 4-8).

Figure 4-8: Distribution of Households with Soap in One or More Locations by SEC

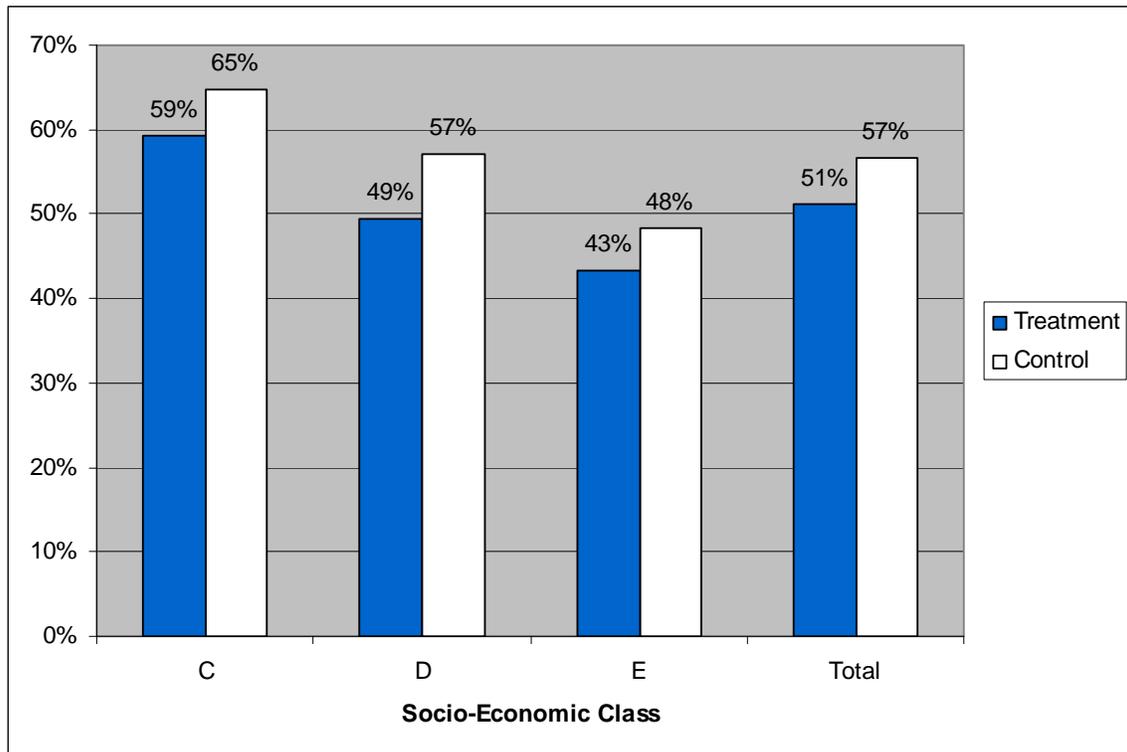


Table 4-16 presents the percentage of mothers/caretakers who report practicing hand washing at critical times by households that keep soap in or near the kitchen or toilet, and those that do not keep soap in those locations. The results demonstrate that there may be an upwards bias in the self-reported hand washing results, as a very large percentage of mothers/caretakers report washing hands with soap in households where no soap was observed in the kitchen or toilet. Among the households where no soap was observed in the kitchen or toilet, as many as 69% (55%) of the mothers/caretakers in the treatment (control) districts reported washing hands with soap after defecation.

We can also see from this analysis that soap kept in or near desirable hand washing locations may facilitate good hand washing practices. An example of this is that 80% (78%) of mothers/caretakers who did keep soap in or near the toilet reported washing their hands with soap after defecation, while only 69% (55%) of the mothers/caretakers who did not keep soap in the toilet or the kitchen reported washing their hands with soap after defecation.

Table 4-16: Hand Washing Practices by Location of Soap

	Households by Location of Soap	Mothers/Caretakers Reporting Washing Hands after Cleaning Child's Bottom (%)	Mothers/Caretakers Reporting Washing Hands after Defecating (%)	Mothers/Caretakers Reporting Washing Hands before Feeding Child (%)	Mothers/Caretakers Reporting Washing Hands before Eating (%)	Total
Treatment	No soap in/near toilet or kitchen	66%	69%	50%	40%	1,937
	No soap in/near toilet	68%	69%	50%	40%	
	No soap in/near kitchen	71%	74%	54%	46%	
	Soap in/near toilet	76%	80%	60%	53%	
	Soap in/near kitchen	83%	77%	59%	54%	
Control	No soap in/near toilet or kitchen	50%	54%	37%	32%	1,997
	No soap in/near toilet	51%	55%	39%	33%	
	No soap in/near kitchen	60%	66%	47%	42%	
	Soap in/near toilet	69%	78%	57%	52%	
	Soap in/near kitchen	80%	80%	76%	64%	

Data source: 2008 PSDW Baseline Survey

Finally, Table 4-17 presents the percentage of households that demonstrate desirable hand washing practices, as measured by households that keep soap at least one desirable location *and* mothers/caretakers who reported washing hands with soap at two or more critical times. The results indicate that 42% (44%) of the households in the treatment (control) districts use improved hand washing practices. The results also suggest that the difference is not significant across the treatment and control groups.

Table 4-17: Percentage of Respondents with Desirable Hand Washing Practices

Province Name	Treatment		Control	
	Households with Desirable Hand Washing (%)	Total	Households with Desirable Hand Washing (%)	Total
Punjab	43%	540	61%	536
Sindh	55%	616	49%	615
NWFP	16%	239	35%	322
Baluchistan	37%	251	16%	253
AJK	36%	291	33%	271
Total	42%	1,937	44%	1,997

Soap in/near toilet:

Adjusted t-test of difference in means: $-0.2705, p > |t| = 0.7878$

Group adjusted chi-square: $0.0756, Pr = 0.7833$

Notes: Percentage of households with mothers/caretakers who wash hands with soap at two or more critical times and keep soap in at least one desirable location.

Data source: 2008 PSDW Baseline Survey

4.4 Knowledge of and Attitudes toward Safe Drinking Water

A large percentage, 71% (72%) of households in the treatment (control) districts, have the belief that clear, odorless water is safe to drink (Table 4-18). The adjusted t-test and chi-square test suggest that the sample is balanced and there are no significant differences between the control and treatment groups.

Table 4-18: Belief about Clear, Odorless Water

Province Name	Do you agree or disagree that water that is clear and has no smell is safe to drink?							
	Treatment				Control			
	Clear is safe	Not Safe	Don't Know	Total	Clear is safe	Not safe	Don't Know	Total
Punjab	73%	25%	2%	540	86%	12%	2%	536
Sindh	74%	24%	1%	616	72%	24%	4%	615
NWFP	82%	15%	2%	239	79%	15%	6%	322
Baluchistan	45%	18%	37%	251	28%	28%	43%	253
AJK	74%	25%	0%	291	77%	16%	7%	271
Total	71%	23%	6%	1,937	72%	19%	9%	1,997

Difference in percentage that believe clear is safe:

Adjusted t-test of difference in means: $-0.1292, p > |t| = 0.8977$

Group adjusted chi-square: $0.0173, Pr = 0.8954$

Data source: 2008 PSDW Baseline Survey

A comparison of these percentages across households by SEC (Figure 4-9) and by mother's/caretaker's education (Figure 4-10) indicates that while the mother's/caretaker's

education may have a slight impact, the effect of socio-economic class in fact is the reverse. While 73% (75%) of the households from the highest SEC, class C, in the treatment (control) districts have the belief that clear, odorless water is safe to drink, 69% (69%) of the households in the lowest SEC, class E, believe this to be the case. The percentage of households with the belief that clear, odorless water is safe to drink is 71% (70%) among the households in treatment (control) districts where the mother had no schooling, while only 61% (65%) of households with mothers with an intermediate or higher level of education had this belief. Surprisingly, the percentage was higher for households where mothers had a less than primary, 5-9 years, and matriculation (10 years of school) level of education.

Figure 4-9: Percentage of Households with the Belief that Clear, Odorless Water Is Safe by SEC

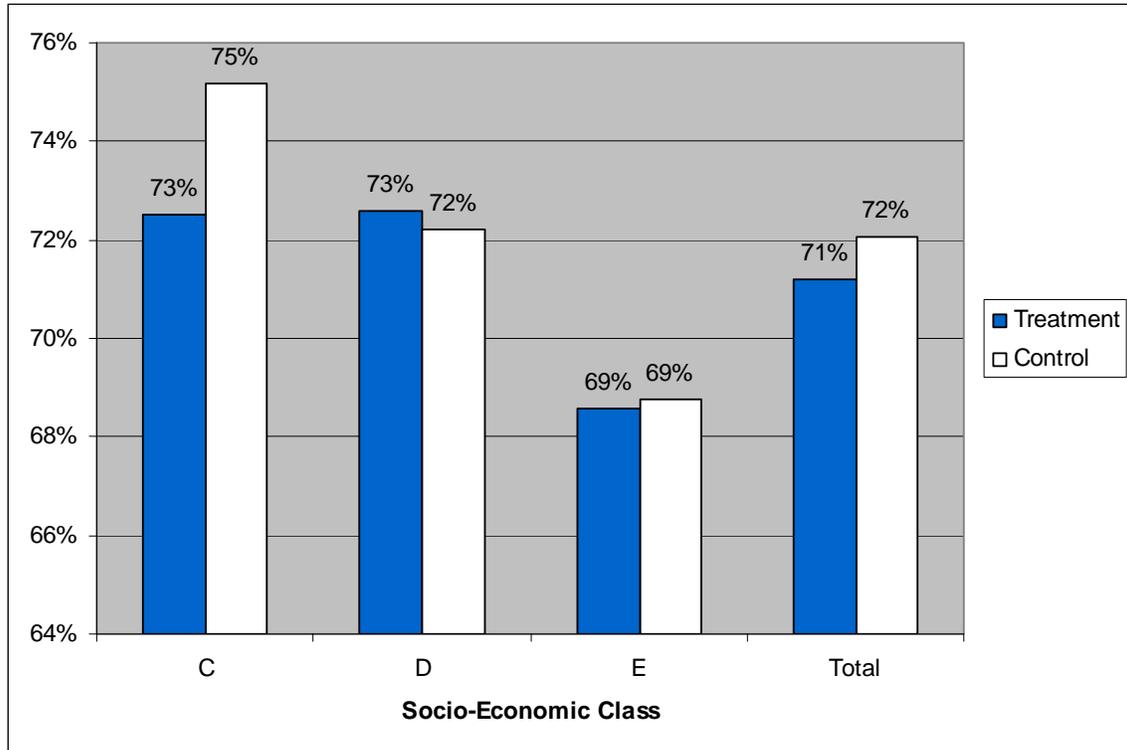
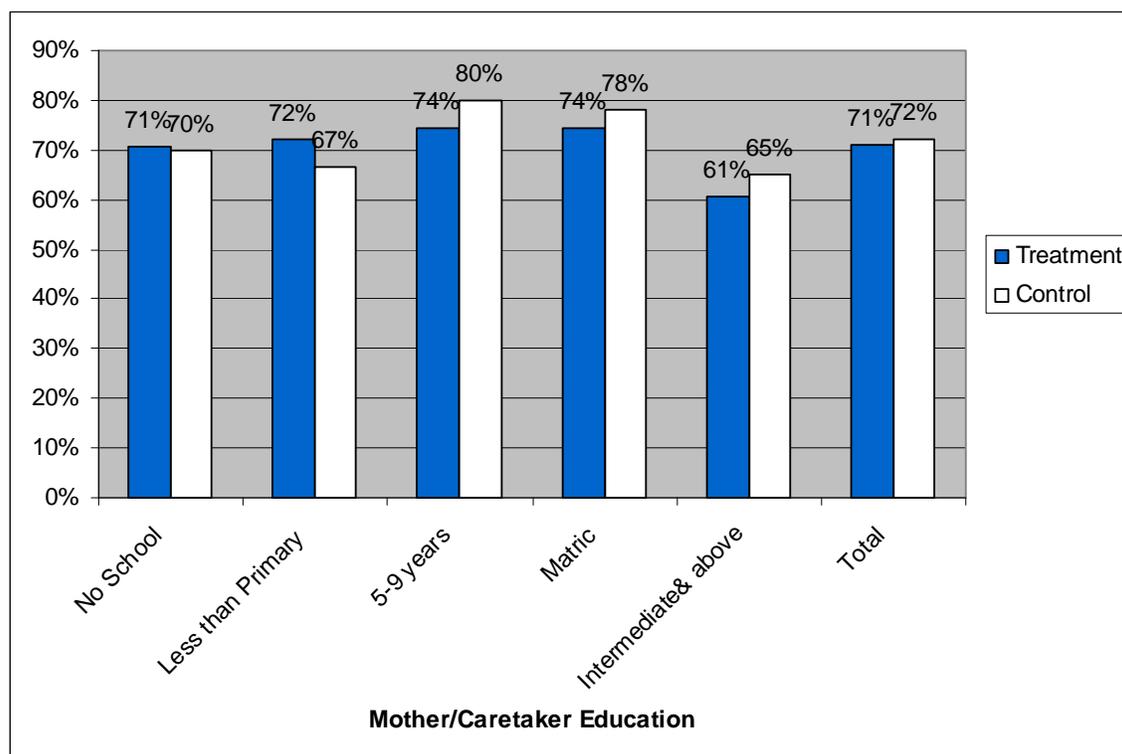


Figure 4-10: Percentage of Households with the Belief that Clear, Odorless Water Is Safe by Mother's/Caretaker's Education



The survey also asked respondents about the reasons children under the age of five get diarrhea. The results reveal that 44% (34%) of respondents in the treatment districts reported a belief that dirty water causes diarrhea, 34% (22%) reported a belief that germs cause diarrhea, 23% (33%) reported a belief that unclean hands can cause diarrhea, and only a small percentage of households reported beliefs that all three of these reasons can cause diarrhea (Table 4-19).

Table 4-19: Distribution of Households by Reported Key Causes of Diarrhea by Province¹

Province Name	Treatment				Control			
	Dirty Water	Germs/Bacteria	Unclean Hands	All Three	Dirty Water	Germs/Bacteria	Unclean Hands	All Three
Punjab	52%	38%	36%	14%	38%	29%	43%	10%
Sindh	50%	37%	15%	1%	37%	22%	26%	1%
NWFP	23%	39%	9%	3%	39%	17%	22%	5%
Baluchistan	33%	21%	13%	2%	21%	10%	18%	1%
AJK	42%	28%	40%	15%	28%	27%	50%	3%
Total	44%	34%	23%	7%	34%	22%	33%	4%

Notes: ¹ Respondents provided more than one response. Any instance of a correct response was recorded as a positive response.

Data source: 2008 PSDW Baseline Survey

Table 4-20 provides the detailed responses by the households about their beliefs on the causes of diarrhea. The results indicate that a relatively significant percentage of households attribute diarrhea to causes such as change of weather (14%) and poor diet (16%), including a small percentage of households with beliefs that diarrhea is just bad luck (2%) or from teething (1%).

Table 4-20: Distribution of Households by Beliefs about Causes of Diarrhea – All

Perceived Causes of Diarrhea	Treatment Group (%)	Control Group (%)
Dirty water	44	34
Unclean hands	33	26
Houseflies	23	25
Germs/Bacteria	23	22
Spoiled food	24	19
Poor diet	16	14
Change of weather	14	15
Unclean environment	13	10
Unwashed fruit/vegetable	10	6
Poor personal hygiene	8	7
Bottle milk	7	6
Open defecation	5	4
Due to dirt	3	2
Due to bad luck	2	3
Teething	2	2
Due to eating dirty food	1	1
Due to sunstroke/hot		1
Total	1,937	1,997

Data source: 2008 PSDW Baseline Survey

4.5 Use of Water Filtration System

In the treatment (control) districts, 16% (7%) of the households reported knowledge of a water filtration system in their area, 44% (56%) reported that there was no water filtration system, and the remaining 40% (37%) did not know if there was one. Of the households with knowledge of the water filtration system (303 in treatment districts and 149 in control districts), only 18% (28%) used the system in the treatment (control) districts. Although in the treatment districts there is a water filtration system in all the tehsil headquarters, the results in Table 4-22 indicate that households did not use the system because the filtration system was either not working (23%) or was too far (27%), or because there was no one in the household to fetch the water (37%).

Table 4-21: Distribution of Households with Knowledge and Use of a Water Filtration System

	Province Name	Households with Knowledge of a Water Filtration System				Households without Knowledge of a System	Don't Know	Total
		Households with Knowledge of a System (%)	Households with Knowledge of a System (Number)	Percentage of Those with Knowledge That Have Ever Used the System	Percentage of Those with Knowledge That Have Used the System in Last 2 Weeks			
Treatment	Punjab	18%	98	16%	3%	59%	23%	540
	Sindh	17%	106	22%	4%	31%	52%	616
	NWFP	19%	45	4%	1%	49%	33%	239
	Baluchistan	13%	33	15%	2%	14%	73%	251
	AJK	7%	21	43%	3%	66%	27%	291
	Total	16%	303	18%	3%	44%	40%	1,937
Control	Punjab	19%	104	29%	6%	52%	29%	536
	Sindh	7%	40	25%	2%	56%	38%	615
	NWFP	0%	1	100%	0%	61%	39%	322
	Baluchistan	0%	1	0%	0%	27%	73%	253
	AJK	1%	3	0%	0%	84%	15%	271
	Total	7%	149	28%	2%	56%	37%	1,997

Data source: 2008 PSDW Baseline Survey

Table 4-22: Distribution of Households by Reasons for Not Using a Water Filtration System

	Province Name	Plant Not Working	No Transport	Expensive	Poor Quality	Too Far	No one to Fetch	Odd Timings	Too Many People	No Need	Total
Treatment	Punjab	7.3%	2.4%	1.2%	0.0%	48.8%	34.1%	0.0%	1.2%	4.9%	82
	Sindh	26.5%	1.2%	1.2%	1.2%	16.9%	44.6%	1.2%	1.2%	6.0%	83
	NWFP	51.2%	0%	2.3%	4.7%	2.3%	37.2%	0.0%	0.0%	2.3%	43
	Baluchistan	28.6%	0%	0%	3.6%	32.1%	25.0%	0.0%	3.6%	7.1%	28
	AJK	0%	16.7%	0%	8.3%	33.3%	25.0%	16.7%	0%	0%	12
	Total	23.4%	2.0%	1.2%	2.0%	27.4%	36.7%	1.2%	1.2%	4.8%	248
Control	Punjab	1.4%	1.4%	0%	13.5%	14.9%	62.2%	2.7%	1.4%	2.7%	74
	Sindh	0%	16.7%	0%	0%	6.7%	66.7%	0%	3.3%	6.7%	30
	NWFP	0%	0%	0%	0%	0%	0%	0%	0%	0%	0
	Baluchistan	0%	0%	0%	0%	100.0%	0%	0%	0%	0%	1
	AJK	33.3%	0%	0%	0%	0%	33.3%	0%	0%	33.3%	3
	Total	1.9%	5.6%	0%	9.3%	13.0%	62.0%	1.9%	1.9%	4.6%	108

Data source: 2008 PSDW Baseline Survey

4.6 Access to Media and Hygiene Spots

This section presents the extent to which households have access to media (radio or TV) to help focus the project's radio programming. The results indicate that 24% (21%) of households own a working radio. The information on radio listenership was also collected from mothers or caretakers of children. Radio listenership among mothers/caretakers was reported at 13% (9%), with a small fraction of those not owning a working radio reporting listening to a radio (perhaps in other households, in the community, on public transport, etc). Four percent (2%) of the mothers/caretakers in the treatment (control) districts reported hearing radio spots about hand washing and water purification within two weeks of the survey (Table 4-23).

Table 4-23: Distribution of Households by Radio Ownership, Listenership, and Exposure to Radio Spots

Province Name	Treatment				Control			
	Households That Own a Radio (%)	Mothers/Caretakers Who Listen to Radio (%)	Mothers/Caretakers Who Have Heard a Hygiene Spot (%)	Total	Households That Own a Radio (%)	Mothers/Caretakers Who Listen to Radio (%)	Mothers/Caretakers Who Have Heard a Hygiene Spot (%)	Total
Punjab	23%	14%	4%	540	15%	9%	1%	536
Sindh	13%	8%	2%	616	9%	5%	2%	615
NWFP	36%	16%	5%	239	33%	10%	3%	322
Baluchistan	21%	8%	1%	251	21%	8%	0%	253
AJK	41%	23%	10%	291	49%	20%	6%	271
Total	24%	13%	4%	1,937	21%	9%	2%	1,997

Data source: 2008 PSDW Baseline Survey

A higher percentage of households reported owning a TV: 67% (68%) of the households in the treatment (control) districts reported owning a TV, and 64% (65%) of the households in the treatment (control) districts reported watching TV. Twenty percent (23%) of the mothers/caretakers in the treatment (control) districts reported seeing a TV spot on hand washing and water purification within two weeks of the survey (Table 4-24). Many of these spots may be from commercial advertisers.

It is important to note that while TV ownership and viewership is higher than reported radio ownership and listenership in this baseline report, TV programming is limited by project resources due to the high expense associated with developing and airing quality spots. The cost of running TV spots is prohibitive to long campaigns with high frequency/message exposure. Factors related to satellite TV viewing versus local stations' viewership and electricity outages in Pakistan also influence a project's ability to successfully reach its target audience with this medium.

Table 4-24: Distribution of Households by TV Ownership, Viewership, and Exposure to TV Spots

Province Name	Treatment				Control			
	Households That Own a TV (%)	Mothers/ Caretakers Who Watch TV (%)	Mothers/ Caretakers Who Have Seen a Hygiene Spot (%)	Total	Mothers/ Caretakers Who Own a TV (%)	Mothers/ Caretakers Who Watch TV (%)	Mothers/ Caretakers Who Have Seen a Hygiene Spot (%)	Total
Punjab	75%	72%	19%	540	79%	77%	17%	536
Sindh	77%	75%	23%	616	69%	69%	37%	615
NWFP	33%	26%	8%	239	61%	48%	15%	322
Baluchistan	51%	49%	14%	251	41%	43%	2%	253
AJK	70%	69%	29%	291	80%	72%	30%	271
Total	67%	64%	20%	1,937	68%	65%	23%	1,997

Data source: 2008 PSDW Baseline Survey

As expected, ownership of a radio and TV by a household's socio-economic class decreases with declining SEC. Approximately 75% (76%) of the households in the treatment (control) districts in the highest SEC, class C, own a TV, and 29% (23%) own a radio. Only 60% (61%) of the households in the treatment (control) districts in the lowest SEC, class E, own a TV, and 19% (16%) own a radio.

Table 4-25: Ownership of TV and Radio by SEC

	TV/ Radio Ownership	Socio-Economic Class			Total
		C	D	E	
Treatment	TV	75%	63%	60%	67%
	Radio	29%	22%	19%	24%
	Total	760	525	652	1,937
Control	TV	76%	69%	61%	68%
	Radio	23%	26%	16%	21%
	Total	737	540	720	1,997

Data source: 2008 PSDW Baseline Survey

4.7 Impact of Media Programs and Community Hygiene Programs on Hygiene Practices and Knowledge

A small percentage of the mothers/caretakers reported having already listened to radio or TV spots on hand washing and water purification and/or participated in hygiene promotion activities. As mentioned earlier, the survey was conducted in the treatment area from late March through the end of April 2008, and in the control districts, the survey was conducted between late April and mid-May. Project radio programs started on March 1, and community and school hygiene promotion activities began in early March in some locations, so some of the radio spots or activities reported could be those implemented by this project. Other organizations are also running hygiene campaigns, which may account for some of these data. Recall of spots (particularly TV spots) may also reflect private-sector product advertising.

Approximately 4% (2%) of the mothers/caretakers in the treatment (control) districts have heard radio spots, and 20% (23%) of the mothers/caretakers in the treatment (control) districts have

seen TV spots (see Table 4-23 and Table 4-24) related to hygiene promotion or water purification. In addition, approximately 4% (2%) of the mothers/caretakers in the treatment (control) districts have participated in hygiene promotion activities such as group discussions, plays, or fairs, or have received hygiene counseling within a month of the interview (Table 4-26).

Table 4-26: Participation in Hygiene Promotion Activities in the Last Month

Province Name	Treatment		Control	
	Participated in Activities	Total	Participated in Activities	Total
Punjab	9%	540	3%	536
Sindh	2%	616	1%	615
NWFP	2%	239	3%	322
Baluchistan	2%	251	0%	253
AJK	4%	291	1%	271
Total	4%	1,937	2%	1,997

Data source: 2008 PSDW Baseline Survey

Overall, 25% (25%) of the mothers/caretakers in the treatment (control) districts had either participated in community hygiene promotion activities within a month of the interview or had seen or heard radio or TV spots on hygiene or water purification within two weeks of the interview (Table 4-27). Using these observations it is possible to assess the impact of such programs within the baseline itself. A simple tabulation of hygiene practices across the households where the mother/caretakers have seen TV spots or heard radio spots on hygiene or water purification, or have participated in hygiene promotion activities, suggests that the percentage of households that have improved hygiene practices and knowledge of drinking water safety is greater among the households that have had exposure to community hygiene programs and mass media spots. For example, the percentage of households in the treatment (control) districts that treat water correctly is 7% (5%) overall, but 10% (7%) within households with mothers/caretakers who have had exposure to community hygiene programs and/or mass media spots and only 6% (4%) within households with mothers/caretakers who have had no exposure. While 69% (69%) of the households with mothers/caretakers who have had exposure to hygiene programs and/or mass media spots in the treatment (control) districts have the belief that clear water is safe to drink, 72% (73%) of the households with mothers/caretakers that have had no exposure to hygiene programs and/or mass media spots shared the same belief as compared to the overall average of 71% (72%). In fact, for all the key program indicators except the practice of air drying hands, the percentage was greater within households with mothers/caretakers who have had exposure to hygiene programs (Table 4-27).

Table 4-27: Exposure to Hygiene Promotion Activities or TV /Radio Spots¹

Project Indicators	Treatment			Control		
	Households with Mothers/Caretakers Who Have Seen/Heard a TV/Radio Spot or Participated in Hygiene Program (%)	Households with Mothers/Caretakers Who Have NOT Seen/Heard a TV/Radio Spot or Participated in Hygiene Program (%)	Total	Households with Mothers/Caretakers Who Have Seen/Heard a TV/Radio Spot or Participated in Hygiene Program (%)	Households with Mothers/Caretakers Who Have NOT Seen/Heard a TV/Radio Spot or Participated in Hygiene Program (%)	Total
Percentage of households	25%	75%	1,937	25%	75%	1,997
Percentage that treat drinking water correctly	10%	6%	7%	7%	4%	5%
Percentage that cover drinking water	80%	63%	67%	56%	43%	61%
Percentage that store water in a raised area	58%	45%	49%	56%	43%	46%
Percentage that take out water safely	44%	34%	36%	38%	35%	36%
Percentage who wash hands at two or more critical times	81%	74%	76%	82%	63%	68%
Percentage who air dry hands	8%	11%	10%	9%	8%	8%
Percentage that keep soap at one or more locations	60%	48%	51%	67%	63%	57%
Percentage that keep soap at one or more locations and who wash hands at two or more critical times	49%	39%	42%	57%	39%	44%
Percentage with the belief that clear water is safe to drink	69%	72%	71%	69%	73%	72%

Note: ¹ Includes households that have participated in a community hygiene program, or seen a spot on TV or heard a spot on the radio.

Although the tabulations provide some initial insight into the impact of mass media spots and community programs on households, it is important to control for other factors such as mother's/caretaker's education and the socio-economic class of the households, which could also affect the knowledge and prevalence of hygiene practices. Further, it is possible that these practices are systematically different across provinces because of cultural differences. To account for all these factors, a regression analysis was conducted with each of the program indicators as dependent variables and SEC, mother's/caretaker's education, provinces, exposure to hygiene program (either participation or exposure to mass media spots) and information on whether the household is in a treatment or control district as the independent variables (Table 4-28).

The results of the regression analysis suggest that exposure to community hygiene programs and/or mass media spots has a significant positive effect on correctly treating drinking water, storing drinking water in a raised area, washing hands after cleaning a child's bottom, washing hands after defecating, washing hands before eating, washing hands at at least two critical times, and storing soap at one or more locations. Exposure to hygiene programs or media spots has not had a significant impact on the incidence of washing hands before eating. Households that had exposure to community hygiene programs and/or mass media spots are less likely to have the belief that clear water is safe to drink and are more likely to safely take water out of containers, although this effect is marginally insignificant. Only in the case of air drying is the prevalence of the practice in fact lower among households that had exposure to community hygiene programs and/or mass media spots. This is not surprising given that only 4% of the households reported recalling messages on air drying on TV and 8% reported recalling messages on radio. The recall rate for other hygiene practices and knowledge about clear water is much higher.

It is interesting to note that the treatment dummy is significant in many regressions. This suggests that it would be useful to conduct a sensitivity analysis of the difference-in-difference estimation after using propensity score matching to further balance the control and treatment groups.

Table 4-28: Determinants of Key Program Variables: Probit Estimates

Dependent Variable	Dprobit Result	Socio-Economic Class		Mother's/Caretaker's Education				Provinces				Exposure to Hygiene Program and/or Media Spots	Treatment
		SEC C	SEC D	No School	Up to primary	5-9 Yrs	Matric (10 years)	Punjab	Sindh	NWFP	Baluchistan		
Correct treatment of water	Coeff	0.02*	-0.01	-0.02	0.02	0.04*	0.05*	0.02*	0.01	0.003	-0.03*	0.02*	-0.02*
	T-Stat	2.30	-0.65	-1.12	1.43	2.01	2.35	2.32	0.67	0.27	-2.15	2.55	-2.79
Store water in a raised area	Coeff	0.004	0.06*	-0.001	0.01	0.004	-0.03	-0.19*	0.06*	0.03	-0.40*	0.08*	-0.04*
	T-Stat	0.19	2.64	-0.02	0.22	0.10	-0.51	-7.47	2.28	0.91	-13.10	4.30	-2.22
Take out drinking water safely	Coeff	0.03	0.02	-0.05	-0.02	0.04	0.01	-0.18*	-0.24*	-0.08*	-0.35*	0.03 [€]	-0.01
	T-Stat	1.38	0.80	-1.52	-0.50	0.82	0.23	-7.91	-10.44	-2.75	-14.04	1.64	-0.73
Wash hands with soap after cleaning child's bottom	Coeff	0.05*	0.03	-0.08*	-0.07	-0.04	0.00	0.20*	0.24*	0.15*	0.02	0.10*	-0.11*
	T-Stat	2.41	1.48	-2.16	-1.64	-0.86	-0.06	8.81	10.18	5.62	0.83	5.56	-7.04
Wash hands with soap after defecating	Coeff	0.05*	0.01	-0.02	0.01	0.003	0.02	0.16*	0.08*	0.00	-0.06*	0.10*	-0.07*
	T-Stat	2.97	0.77	-0.61	0.30	-0.07	0.42	7.01	3.52	0.06	-2.21	5.79	-4.62
Wash hands with soap before feeding child	Coeff	0.06*	0.03	-0.08*	-0.07 [€]	-0.07	-0.06	0.23*	0.26*	0.12*	0.06 [€]	0.11*	-0.11*
	T-Stat	3.02	1.61	-2.27	-1.79	-1.58	-1.17	9.25	10.66	4.07	1.89	5.61	-6.65
Wash hands with soap before eating	Coeff	0.06*	0.05*	-0.01	-0.026	0.09*	0.04	0.18*	0.02	-0.12*	-0.28*	0.01	-0.03
	T-Stat	3.13	2.38	-0.24	-0.63	2.08	0.83	6.66	0.63	-4.01	-8.97	0.64	-1.64
Wash hands with soap at least two critical times	Coeff	0.07*	0.03	-0.03	-0.01	0.02	0.06	0.13*	0.12*	0.07*	-0.14*	0.10*	-0.08*
	T-Stat	3.64	1.53	-0.85	-0.14	0.47	1.42	5.80	5.29	2.76	-4.50	5.68	-5.54

Table 4-28: Determinants of Key Program Variables: Probit Estimates

Dependent Variable	Dprobit Result	Socio-Economic Class		Mother's/Caretaker's Education				Provinces				Exposure to Hygiene Program and/or Media Spots	Treatment
		SEC C	SEC D	No School	Up to primary	5-9 Yrs	Matric (10 years)	Punjab	Sindh	NWFP	Baluchistan		
Air dry hands after washing	Coeff	-0.01	-0.01	-0.003	-0.01	0.01	-0.001	-0.07	-0.02*	-0.09*	-0.04*	-0.02 [€]	-0.02*
	T-Stat	-0.60	-0.60	-0.16	-0.62	0.23	-0.05	-6.05	-1.99	-6.95	-3.15	-1.68	-2.36
Soap in one or more desirable locations	Coeff	0.12*	0.05*	-0.07 [€]	-0.03	0.06	0.146*	0.12*	0.17*	-0.11*	0.00	0.09*	0.07*
	T-Stat	5.81	2.17	-1.93	-0.62	1.42	2.96	4.58	6.50	-3.47	0.06	4.54	4.30
Have belief that clear water is safe	Coeff	0.023	0.00	0.04	0.05	0.03	-0.11*	0.03	-0.04 [€]	0.02	-0.42*	-0.08*	0.01
	T-Stat	1.27	-0.09	1.34	1.50	0.70	-2.45	1.34	-1.67	0.88	-13.22	-4.44	0.66

Notes: [€] Significant at 5% level

* Significant at 10% level

5. Conclusions

In summary, the baseline survey results indicate that 69% of households in the treatment districts have access to improved sources of water inside the house, including tap and protected springs, and 20% of the households in the treatment districts have access to improved sources outside the house. However, only a small fraction of the households in the treatment districts treat the drinking water effectively (7%). The results indicate that 58% of the households that store water in containers inside the house cover all the drinking water with a hard cover. Approximately 72% of households in treatment districts store drinking water in a raised area or refrigerator, and 71% of the households in treatment districts store water in a raised area or a refrigerator *and* cover the containers (with soft or hard covers); only 54% of the households take out drinking water using safe methods. This suggests that even households that treat drinking water effectively may be contaminating the water because of unsafe drinking water storage and use practices, and that these practices may be a cause of diarrhea in children in these households.

Another cause of diarrhea is poor hygiene practices. In approximately 76% of the households in the treatment districts, mothers/caretakers reported washing their hands with soap at two or more critical times. The practice of washing hands with soap is more prevalent after using the toilet and less so before eating or feeding a child. Although air drying is considered the safest method of drying hands to prevent recontamination after washing, only 10% of the households in the treatment district reported air drying of hands. Further, only 51% of the households were observed to keep soap in one or more desirable locations (in or near the kitchen or toilet). When looking at the data on reported hand washing practices in conjunction with the observed location of soap, we see that a high percentage of mothers/caretakers reported hand washing at key critical times even when no soap was observed in or near the toilet. These findings may suggest an upwards bias in the self-reported hand washing data. The results also indicate that hand washing practices of mothers/caretakers are better in households that keep soap in one or more desirable locations and that keeping soap in these locations may facilitate the behavior. For example, the percentage of mothers/caretakers who reported washing their hands with soap after cleaning a child's bottom in the treatment (control) districts was 76% (69%) in households that keep soap in or near the toilet but only 68% (51%) in households that do not keep soap in or near the toilet and 66% (50%) among households that do not keep soap in or near the kitchen or toilet.

The baseline survey results indicate that as many as 71% of the households in the treatment area have the belief that clear, odorless drinking water is safe to drink. These results suggest that the hygiene promotion program can have a considerable impact on these households' knowledge of and attitudes toward safe drinking water. A preliminary regression analysis of households with exposure to hygiene programs and or media spots on hand washing and water purification suggests that exposure to sanitation programs and media spots has a significant impact on improving hygiene practices and knowledge about safe drinking water.

Finally, the adjusted t-test and chi-square test suggest that the control and treatment sample are balanced and that the difference in the means of the key indicator variables across the control and treatment groups is not significant. The regression results, which control for provinces and other factors such as mother's/caretaker's education and SEC, however, find that the treatment and control districts could be different from each other. Although the control and treatment areas were balanced at the overall level and not at the province level, to further balance the control and treatment samples, the final impact evaluation will use propensity score matching.

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Appendix A Baseline Survey

PSDW-HPP **BASELINE QUESTIONNAIRE**

FOR OFFICE USE	
Serial No: _____	City Code: _____
Supervisor: _____	Date: _____
Coded By: _____	Entered By: _____
Back-checked By: _____	Edited By: _____

FOR SURVEYOR'S USE	
Starting Time: _____	Date: _____ Contact No: _____
Surveyors Recruitment Name: _____	City: _____
Respondent Name: _____	Phone No: _____
Address: _____	
Ending Time: _____	

Province/Agency:

Punjab	[1]	Sindh	[2]	NWFP	[3]
Baluchistan	[4]	AJK	[5]		

Please write down the appropriate number []

District Name: _____
 Tehsil/Taluka: _____
 Union Council: _____
 Village/Settlement: _____

Introduction:

Respondent should be the mother of children under 5 years, or if mother is dead or away from the household for an extended period of time, then whomever is in charge of ensuring that the children in the household are fed and cared for. If mother or substitute is not at home, make three attempts to interview then move on to next house.

Assalam-o-Alaikum!

My name is _____. I am from the Nielsen Company, which is a big research company here in Pakistan. I am not here to sell or promote anything. We conduct surveys on services so that on basis of which organizations can improve their services or develop programs which serve people better. These days also we are conducting a household survey on health and water usage which is being funded by USAID. All the information we collect will be used

only for the purposes of understanding these practices. Your information will remain confidential and no one will see their responses other than the study team including the Pakistani Government.

Your participation in this study is completely voluntary, and you may withdraw from the study at any time without penalty. You may withdraw by informing the interviewer that you no longer wish to participate (no questions will be asked) and the interview will end. You may request that any or all sections of the survey you have already answered be destroyed. Otherwise they will be kept.

Kindly let us know if you are willing to spare some time for this interview, it should only take approximately 40 minutes.

Instruction to the interviewer! In case of respondent consent proceed with the interview otherwise move to the next household.

SCREENER QUESTIONS (All Respondents)

S-1. Do you have a child of age between 0-59 months i.e. less than 5 years in the household?

Yes 1
No 2

[If no, thank the respondent and explain that we are focusing on households with small children and move on to next household.]

S1-a. Do you have a water filter at your home or do you purchase bottled water?

Yes, have a water filter at home	1	Terminate interview.
Yes, purchase bottled water	2	Terminate interview.
None of the above	3	Continue with interview.

S1b. For which group are you filling the questionnaire

Treatment group	1
Control group	2

Socio Economic Classification (SEC) –Urban

S-2 Who is the economic head of the household? By economic head I mean the person who bears the most expenses of the household.

- Interviewer himself/herself..... [1]
- Some other member of the household [2]
- What’s the relationship with the respondent..... [3]

S-3 What is the nature of work, employment, or business of the finance head of your household

Extract all the details from the respondent in and write them in his/her own words

Name of the organization:

Designation (Job title)/grade:

Nature of work:

Interviewers please with the help of the code list circle the correct response from the 15 codes

- Unskilled worker [1]
- Petty trader [2]
- Skilled worker [3]
- Non-executive staff [4]
- Supervisor [5]
- Small shopkeeper/Businessman [6]
- Lower/middle officer/Executive [7] Go to (S-5)
- Professionals (self employed or in service} [08]
- Medium Businessman [9]
- Senior Executive [10]
- Large Businessman/Factory Owner [11]
- Retired [12] go to (S-4a)
- Student [13] Go to (S-4b)
- Housewife [14] Go to (S-4b)
- Unemployed [15] Go to (S-4b)
- Farmer [16]
- Day laborer [17]

S-4a What was the occupation of the finance head of your house before his/her retirement?

Write the detailed response in the space under S-3, circle the relevant code and then move to S-5.

S-4b How do you cover household expenses? Do you get income from house/building rent, profit on the money in bank, or agricultural/cultivated land?

Rent/profit.....1 (Go to S 4c)
Land.....2 (Go to S 4d)

S-4c Who was the finance head of your household who left land or money in the bank for the rest of the household? What was his/her occupation/designation etc.

Note the detailed response in the space under S-4, circle the relevant code then go to S-6. In this ask the educational qualification of the person who left behind property or money in the bank for the rest of the household

S-4d You told that household expenses are covered by income coming from agricultural land. Can you tell how much cultivable land you possess?

Less than 12 ½ acre.....[1] (in this case the occupation of finance head should be considered “unskilled worker”)

Between 12 ½ to 49 acre..... [2] (in this case the occupation of finance head should be considered “skilled worker”)

50 acre or more[3] (in this case the occupation of finance head should be considered “middle officer”)

S-5 What is the educational qualification of the finance head of your household?

Illiterate	1
Less than primary	2
School 5-9	3
Metric	4
Intermediate	5
Graduate	6
Post Graduate	7

With the help of responses from S-3 and S-5 circle the relevant section in S-6 grid and also circle the code in S7.

S-6

Occupation of Chief Earner	Education of Chief						
	Illiterate	Less than 5 classes	5-9 classes	Metric	Intermediate	Graduate	Post Graduate
Unskilled Worker	E2	E2	E1	E1	D	D	C
Petty Trader	E2	E2	E1	E1	D	C	C

Skilled Worker	E2	E2	E1	D	D	C	C
Non-Executive Staff	E2	E2	D	D	D	C	C
Supervisor	D	D	C	C	B	B	B
Small/Shopkeeper/B usinessman	D	D	C	C	B	B	A2
Lower/Middle Officer/ Executive Professionals (Self Employed or in Service	D	D	C	C	B	B	A2
Medium Businessman	A1	A1	A2	A2	A2	B	A2
Senior Executive/Officer	B	A2	A2	A2	A2	A1	A1
Large Businessman/ Factory Owner	B	A2	A2	A2	A1	A1	A1
	A2	A2	A2	A1	A1	A1	A1

In the shaded SECs the interviews will not be conducted...

S-7 Note the class SEC of the respondent

D [1]
E1 [2]
E2 [3]

Socio Economic Classification (SEC) –Rural

R-1 Who is the economic head of the household? By economic head I mean the person who makes the decisions of most of the household matters.

Interviewer himself/herself..... [1]
 Some other member of the household (please note)_____ [2]

R-2 What is the educational qualification of the finance head of your household?

Illiterate	1
Less than primary	2
School 5-9	3
Metric	4
Intermediate	5
Graduate	6
Post Graduate	7

R-3. Please tell me what is the material of most of the roofs in your household.

Pakki	Codes	Kuchi	Codes
Concrete	1	Made from mud	7
Iron guard, bricks and stones	2	Made from wood and mud	8
Made from iron sheets	3	Wood and bamboos	9
Made with mud and stones	4	Grass, leaves and straws	10
Readymade roof of concrete	5		
Guard, T.R. and bricks	6		

R-4. Please tell me what is the material of most of the walls in your household.

Pakki	Codes	Kuchi	Codes
Bricks and cement	1	Made from mud	6
Bricks and mud	2	Made from wood	7
Wood, mud and stones	3	Grass, leaves and straws	8
Iron or other metallic sheet	4		
Concrete	5		

Check from R3 and R4, if roofs and walls are both “pakki” then go to next questions otherwise go to R-7

R-5. Do you have a proper place or room which is kitchen, means a specific room to cook food?

Yes [1]
 No [2]

R-6. Do you have a latrine in you house.

Yes [1]

No

[2]

R-7. Please note the type of the house in the grid below based on the responses in R3, R4, R5, and R6.

Type of the house	Code	Definition
Kuchha	1	Roof and walls both are "Kuchi"
Semi Pukka	2	Among the roof and walls one is "Kuchi" and other is "Pakki"
Pukka lower	3	Both the roof and walls are "Pakki" but both kitchen or latrine or any one of these is not available
Pukka Upper	4	Both the roof and walls are "Pakki" and both kitchen or latrine are available

With the help of R2 and R7, note the SEC of the respondent and then note in R8 too.

Education	Structure of House			
	Kuchha	Semi Pukka	Pukka lower	Pukka Upper
Illiterate	E	D	D	C
Upto Primary	E	D	C	C
School 6-9 years	D	C	C	B
Matric	D	C	B	B
Intermediate	C	C	B	A
Graduate	C	C	A	A
Post Graduate	B	B	A	A

In the shaded SECs the interviews will not be conducted...

S-8 Note the class SEC of the respondent

C [1]
D [2]
E [3]

Drinking Water Access and Treatment

#	Questions	Code	Skip To:
1)	Please tell me the main source from where you acquire drinking water for your family. (Single answer.)		

	Column 1 Inside House	Column 2 Outside House
Tap	1	1
Tube well or borehole	2	2
Protected dug well	3	3
Unprotected dug well	4	4
Water from protected spring		5
Water from unprotected spring		6
Rainwater		7
Tanker truck		8
Cart with small tank		9
Surface water (river/ dam/ lake/ ponds/ stream/ canal/ irrigation channel)		10
Filtration plant		11
Other (specify)		

If most of the water is acquired from outside the house i.e. the response is noted in column 2, then ask Q3 otherwise go to Q4

2)	How much time does it take you or another member of your household to fetch drinking water? (I am talking about the two way trip)	5 minutes or less.....1 6 to 15 minutes2 16 to 60 minutes.....3 2 to 4 hours.....4 4 hours or more.....5	
3)	How many times a day do you fetch drinking water to	Less than once a day (Means do not bring daily)1	

	the house?	Once.....2 Twice.....3 More than two times a day.....4	
4)	Do you treat (clean) your water to make it safer to drink?	Yes.....1 No.....2	Q5 Q6

5)	What do you usually do to treat your drinking water? Anything else? (Do not read answers and circle all mentioned)	Boil.....1 Add Bleach.....2 Use Tablets3 Use Sachet4 Use Ceramic Filter.....5 Solar Disinfection (SUN).....6 Use cloth to sieve it.....7 Use Packet.....8 Alm.....9 Other (specify) _____ (note for enumerators: tablets are like aquatab or pura and chlorine sachet is pur packet is Musaffa	
6)	How do you store drinking water? (Enumerator note: if the respondent tells you the name of any container, then circle code 1 and do not note in others)	In containers11 Roof tank or cistern22 No water stored.....3 Any other _____ ()	Q12 Q12 Q12
Ask Q7 from only those who said code 1 in Q6 or named a container. Otherwise go to Q12			
7)	May I see the containers, please?	No.....1 Yes.....2	Q12
8)	What types of containers are these? (Observe and check all that apply. A narrow mouth is opening 3 cms or less.)		

Container	Code	Name of container
Narrow mouthed	1	
Wide mouthed	2	
Both types	3	
Other	4	

9)	Are the containers covered? (Observe and check on the basis of how most of the containers are placed)	All covered with hard cover.....1 Some covered with hard cover.....2 All covered with a cloth3 All covered with soft cover.....4 None.....5 Other(Specify) _____ ()	
10)	Are the containers raised above the ground? (if the containers are raised 2 inches above the ground, circle code 1)	Some are raised1 All are raised.....2 Inside the fridge 3 None are raised.....4	
11)	How do you get water out of the containers? (Have respondent demonstrate. Check all that apply.)	Drinking cup.....1 Long handled scoop.....2 Tap attached to the container3 Pour from narrow neck container by tilting...4 Pour from wide neck container.....5 Other (specify) _____	

Hygiene Practices of the Households

#	Questions	Code	Skip To:
12)	What kind of toilet facility do members of your household usually use?	Flush system1 Pit latrine.....2 Cover or bury feces.....3 No facility/ bush/ field.....4 Traditional toilet inside house.....5	
13)	Do you have soap in your house?	Yes.....1 No.....2	Q 14 Q16
14)	Have you used soap today or yesterday?	Yes.....1 No.....2	Q15 Q16
15)	Did you use soap today or yesterday (Do not read the answers)	Washing my hands1 Washing my children's hands 2 Washing clothes 3 Washing my body.....4 Washing utensils5 Washing Floor6 Other (specify) _____ ()	Q 15a Q15a Q16 Q16 Q16 Q16 Q16
If 'for washing my or my children's hands' is mentioned in Q15 (code 1 or 2), probe what was the occasion, but do not read the answers. If she talks about washing child's hands, then note in others.			
a)	When you used soap today or yesterday, what did you use it for? (Do not read options, ask to be specific. Encourage 'what else' until nothing further is mentioned and check all that apply.)	After washing child's bottom.....1 Washing hands after defecating2 Washing hands before preparing food.....3 Washing hands before feeding child4 Washing hands after feeding child8 Washing hands before eating6 Washing hands after eating7 Other (specify) _____()	
16)	How do you dry your hands after you wash them? (Do not read options. Single answer)	My shirt/Dupatta.....1 Use a clean towel/cloth2 Air dry them4 Other (Specify) _____ ()	
17)	Can you show me where you usually wash your hands?	Yes 1 No 2	Q 17a Q 19
a)	Can you show me where you usually wash your hands? (Ask to see and observe. Check all that apply.)	Inside toilet1 Near the toilet2 Inside/near kitchen/cooking place3	

		In yard4 No specific place5	
--	--	---	--

Note answers in Q18 for each code circled in Q17a

18)	Observation only: At the hand washing location please observe if there is soap there. Circle the cleaning agent observed at that location in the table below.		
------------	--	--	--

		Soap	Detergent	Ash	Mud/Sand	Other	None
1	Inside toilet	1	2	3	4	8	9
2	Near the toilet	1	2	3	4	8	9
3	Inside/Near kitchen/cooking place	1	2	3	4	8	9
4	In yard	1	2	3	4	8	9
5	No specific place	1	2	3	4	8	9

Information on Household Use and Maintenance of Water Filtration Systems

#	Questions	Code	Skip To:
21)	Do you know if there is a water filtration system within in your area?	Yes.....1 No.....2 Don't Know 3	21a Q26 Q26
22)	Have you or your family member ever taken water from the plant?	Yes.....1 No.....2	Q 24 Q 23
23)	If no, why not? (Do not read list but probe for multiple reasons and check all that apply.)	Plant not working1 No transport.....2 Expensive3 Poor quality.....4 Too far.....5 No one to fetch water 6 Odd timings of the plant 7 Rush/Too many people 8 Other (specify) ()	
After asking Q23 go to Q25			
24)	How many times did you or your family member take water from the plant in the past two weeks?	_____ <i>number of times</i>	
25)	Is there any specific committee working in the area to manage the water filtration plant?	Yes.....1 No.....2 Don't Know3	

Media Habits

#	Questions	Code	Skip To:
26)	Do you have a working radio?	Yes.....1 No.....2	
27)	Please tell me do you listen to the radio during the day or night time (whether at your home or somewhere else).	Yes.....1 No.....2	Q27a Q32
a)	Please tell me the names of the channels you mostly listen to? (Multiple Answer)	_____ _____	
b)	Please tell me during what time of the day do you most often listen to radio:	_____ write down to the time or range	
c)	Is there another time that that you often listen? Y/N	Yes [1] specify time or range _____ No [2]	
28)	During the seven days of a week, how many days do you listen to radio?	One day a week.....1 Two days a week.....2 Three days a week.....3 Four days a week.....4 Five days a week.....5 Six days a week.....6 Daily.....7	
29)	Now tell me, during a week's time about how many hours do you listen to the radio? (Read all 4 response categories.)	Not much (less than an hour week).....1 Sometimes (between an hour and three hours a	

		week).....2 Regularly (between three hours and seven hours a week).....3 Frequently (over seven hours a week).....4 Other (specify).....5	
30)	Have you ever heard of any radio spots about hand washing and purifying water in the past two weeks?	Yes.....1 No.....2	Q31 Q32
31)	Can you please tell me the messages that were conveyed in it? (Multiple responses. Do not read answers and probe to get as many answers as possible.)	Use soap when washing hands.....1 Wash hands wit soap after toilet..... 2 Wash hands with soap after cleaning baby 3 Wash hands with soap before eating.....4 Wash hands with soap before preparing food.....5 Teach your children to wash hand with soap.....6 Develop washing places near the latrine and kitchen.....7 Air dry hands.....8 Don't use clothes or towel to dry hands.....9 Drinking water that is clear and does not smell isn't always safe.....10 always purify all drinking water.....11 Purify drinking water through solar heating 12 Purify drinking water through boiling 13 Purify drinking water through tablets 14 Purify drinking water through ceramic filter 15 Dirty hands cause diarrhea.....16 Diarrhea is dangerous.....17 Other (specify)_	
32)	Do you have a working TV?	Yes.....1 No.....2	Q33
33)	Please tell me do you watch TV during the day or night	Yes.....1 No.....2	Q33a Q38

	time.(whether at your home or some place else)		
34)	During the seven days of a week, how often do you watch TV?	One day a week.....1 Two days a week.....2 Three days a week.....3 Four days a week.....4 Five days a week.....5 Six days a week.....6 Daily.....7	
35)	Now tell me, during a week's time how many hours do you watch TV? (Read all 4 response categories.)	Not much (less than an hour week).....1 Sometimes (between an hour and three hours a week).....2 Regularly (between three hours and seven hours a week).....3 Frequently (over seven hours a week).....4 Other (specify).....5	
36)	Have you ever watched any TV spots about hand washing and purifying water in the past two weeks?	Yes.....1 No.....2	Q38
37)	Can you please tell me the messages that were conveyed in it? (Multiple responses. Do not read answers and probe to get as many answers as possible.)	Use soap when washing hands.....1 Wash hands wit soap after toilet..... 2 Wash hands with soap after cleaning baby 3 Wash hands with soap before eating.....4 Wash hands with soap before preparing food.....5 Teach your children to wash hand with soap.....6 Develop washing places near the latrine and kitchen.....7 Air dry hands.....8 Don't use clothes or towel to dry hands.....9	

		Drinking water that is clear and does not smell isn't always safe.....10 always purify all drinking water.....11 Purify drinking water through solar heating 12 Purify drinking water through boiling 13 Purify drinking water through tablets 14 Purify drinking water through ceramic filter 15 Dirty hands cause diarrhea.....16 Diarrhea is dangerous.....17 Other (specify)_	
--	--	---	--

Additional Questions

#	Questions	Code	Skip To:
38)	Have you participated in any hygiene promotion activities such as group discussions, plays, melas, or received any hygiene counseling by health workers in the past month?	Yes.....1 No.....2	Q39 Go to Demographics
39)	Please tell me about what type of activity, how long it lasted, the topic, if you received any materials and what they were. (Probe if there were any other activities. Write answers in table below.)		

Type of Activity	Length (in minutes)	Topic	Materials		Describe Material (Type)
			Yes	No	
Group Discussion			1	2	
Drama			1	2	
Melas			1	2	
Advice from Health worker			1	2	
			1	2	
			1	2	
			1	2	
			1	2	

Demographic Characteristics of the Household Members

D1. Age: _____

D2. Level of formal education

Never Attended School	1	
Less than primary	2	
Completed Primary (5–9 class)	3	
Matric (Class 10)	4	
Intermediate (completed 12 years of education)	5	
Graduate (completed 14 years of education)	6	
Post graduate (completed 16 years of education and above)	7	

D3. Caste

Punjabi	1	
Pathan	2	
Siraiki	3	
Sindhi	4	
Baluchi	5	
Other (Specify)	6	

Only for the respondents of Treatment Group

D4. Do you have any child studying in 4th class of primary government school?

Yes	1	D4a
No	2	D5

D4a. Please tell me their number and ages

_____ number of children

Serial Number	Gender	Age
1	Boy [1]Girl [2]	_____ years
2	Boy [1]Girl [2]	_____ years
3	Refused [98]	

D5. Area Type

Urban	1
Rural	2

D6. Details of the household members

Sr. No.	Name (Fictitious)	Age	Education	Gender		Relation with respondent
				Boy	Girl	
1	ABC			1	2	
2	XYZ			1	2	
3	JKL			1	2	
4	MNO			1	2	
5	PQR			1	2	
6	STU			1	2	
7	WXY			1	2	
8	UVW			1	2	
9	CDE			1	2	
10	LMN			1	2	
11	TUV			1	2	
12	RST			1	2	
13	OPQ			1	2	
14	LMN			1	2	

Appendix B

Sampling Methodology and Data Collection

This appendix provides the details of the sampling methodology and the sampling performance, particularly in high risk areas.

Sampling Frame for the Survey

As per the program, there were total 31 treatment districts and within these 31 districts a total of 126 union councils (UCs). Therefore, the treatment sample was drawn from these districts. If one uses an overlap of approximately 70% when conducting the end line (post-program) survey, a relatively conservative assumption on the correlation across the control and treatment sample in the absence of information on it of 0.4, the total number of observations that would detect a 5% difference in percentage points for key indicators is 1237. To allow for response rate, a sample size of 2000 was targeted for each of the control and treatment areas.

Sample Selection – Treatment Group

Provinces were treated as a stratum in this design. This allowed independent selection of the sample in each province. Then the total sample for UCs was selected in proportion to the population of the stratum. This was implemented by sorting the UCs by district and tehsil. Next, a random number between 0 and 1 was generated which was multiplied by the sampling interval. The sampling interval was obtained by taking the total population size in the province and divided by the number of UCs we wanted to select. To this number, the sampling interval was added successively until we obtained the target number of UCs. Each random number was associated with the cumulative total number associated with that UC. If the random number was smaller than the cumulative total associated with the UC but was larger than the previous cumulative total, then that UC was selected.

In each UC that had a probability of selection less than one, 28 households were selected; and for UCs where the probability of the selection was greater than one, a maximum of 60 households were selected.

Sample Selection – Control Group

To serve as control for the treatment districts, control districts were selected that were most similar to each other using the five key indicators that were expected to affect program outcomes and for which secondary data was available. In rough order of priority the five key indicators are:

1. Adult female literacy
2. Diarrhea outcomes
3. Access to tap water
4. Presence of flush toilets
5. Enrollment in primary government schools

Some control districts were naturally a better match than others, and these were graded based on how closely they matched with the treatment district on the abovementioned variables. When picking tehsils from control districts, tehsils were chosen that were geographically the most proximate, although not immediately contiguous to avoid contamination. Once the tehsil was chosen, the UC council that was the tehsil headquarters was chosen since all treatment UCs are by design tehsil headquarters where the water filtration systems have been built. For each

treatment UC/tehsil in the sample, we picked at least three possible tehsils from the best-matched control districts using information on rural/urban UC.

Geographical Coverage and Sample Size

A total of 4,000 interviews were conducted, spread throughout the four provinces and AJK and FATA region with an equal split between the test and comparison group.

The sample split for the test and comparison group is provided in Tables A-1 and A-2 below. Districts highlighted in red are those that could not be sampled because of high risk conditions.

Table A-1: Union Council Sample for Treatment Group

Province	District	Tehsil	Union Council	Sample
NWFP	Batagram District	Allai	2.Alai	28
	Buner District	Daggar Tehsil	Dagar	28
	Kohistan District	Pallas	3. Pallas	28
	Mansehra District	Bala kot Tehsil	2. Bale(Balakot)	28
		Mansehra Tehsil	3. Mansehra	43
	Shangla District	Oghi Tehsil	1.Oghi	28
		Alpuri tehs	3.Alpuri	28
		Chakisar Tehsil	1.Chakesar	28
	Swat District	Matta Tehsil	2.UC Matta -02	28
	Upper dir District	1.urban dir	1.Urban Dir	28
2.wari		2.Main Wari	28	
BALUCHISTAN	Jaffarabad District	Usta Muhammad	4.UC 1 Usta Muhammad	28
		Subatpur	5.UC Subatpur	28
	Kech District	Turbat	6/A.UC Upsar Turbat City	28
		Zamarun	6/B.UC Kolwahi Bazar	28
	Lasbela District	Dureji	5. UC Dureji	28
		Hub	3. UC Hub	55
		Uttal	2/A. UC Uttal	28
	Zhob district	Zhob Sub-Division	2/B. UC Liari Bazar	28
			UC Zhob	28
	PUNJAB	Rawalpindi District	Gujar Khan	55/1 Urban
Kahuta			Shumali Urban	28
Kotli Satian			UC 70	28
Taxila			UC55/2	28
.Kallar Sayyedana			47 Choha khalsa	28
Okara District		.Depalpur	UC Depalpur	28
		Renala Khurd	UC1&2	28
Khushab District		Khushab	25 Johar Abad	28
Khanewal District		.Jahanian	Urban 26	28
		Kabirwala	Kabirwala City	28
Dera ghazi khan District		Tribal Area	Tribal Area	118
		Tunsa Sharif	Tehsil 13 H/Q	28
Gujrat District		Gujrat	UC56	28
		Kharian	Kharian	28
Lahore District		Wagha	Uc# 12 Naseer abad	28
	Nishtar	Uc#135 Ismail Nagar	28	
A.J.K.	Bagh District	Bagh	UC Bagh	28
	Muzaffarabad District	Garhi Dupatta	Hatian Dupatta	28
		Hatian Bala	Mera Kala	65
		Muzaffarabad	Domail Spring	65

Table A-1: Union Council Sample for Treatment Group

SINDH	Neelum District	Sharda	UC Sharda	28
	Poonch District	Rawalakot	CMH Rawlakot	28
		Hajera	UC Hajera	28
		Abbass pur	Darra	30
		Manjhand	Manjhand	28
	Jamshoro District	Kotri	Kotri UC1	28
		Sehwan Sharif	Sehwan Sharif 1	28
		Dadu	Dadu UC Two	28
	Dadu District	Johi	Johi UC One	28
		K.N. Shah	K.N. Shah	28
		Mehar	Mehar UC	28
		Gambat	Gambat UC2	28
	Khairpur District	Kingri	Pir Goth	28
		Kot Digi	Kot Digi	28
		Nara	Nara UC Imam Bargah	28
		Dokri Taluka	Badah	28
	Larkana District	Larkana Taluka	UC 5	28
		Ratodero Taluka	Rato dero	28
		Rohri Taluka	Rohri UC21	28
	Sukkur District	Salehpat Taluka	Saleh Pat	28
		Old Sukkur Taluka	Sukkur UC4	28
		Jati Taluka	Jatti UC1	28
	Thatta District	Keti Bunder Taluka	Ketti Bandar	28
		Mirpur Bathoro Taluka	Mirpur Bathoro	28
		Shah Bunder Taluka	Chuhar Jamali	28
		Sujawal Taluka	Sajawal UC1	28

Table A-2: Union Council Sample for Control Group

Province	District	Tehsil	Union Council	Sample
NWFP	Mardan	Takht bai	Makori	28
	Malakand Protected Area	Sam rani zai sub-division		28
	Charsadda District	Tangi	Uc tangi	28
	Swabi District	Lahor tehsil		28
		Swabi tehsil		43
	Abbottabad district	Abbottabad tehsil		28
	Chitral District	Chitral sub-division		28
		Mastuj sub-division		28
	Haripur District	Ghazi	Ghazi	28
	Lower Dir District	Temergara sub-division		28
		Jandool sub-division		28
BALUCHISTAN	Bolan District	Bhag	Jalal Khan	28
		Dhadar	Dhadar	28
	Gwadar District	Gwadar Sub-Division		28
		Pasni Sub-Division		28
	Khuzdar District	Wadh	2 Gazgi	28

Table A-2: Union Council Sample for Control Group

Province	District	Tehsil	Union Council	Sample
		Khuzdar	1 Ferozabad	55
	Kharan District	Kharan sub-Division		28
	Musakhel District	Musakhel subdivision		28
AJK	Sudhnati district	Pallandari	Pallandari	28
	Kotli district	Fatehpur	Uc fateh pur	28
		Sehnsa	Uc sehnsa	65
		Kotli	Uc kotli	65
	Bhimber district	Samahni	Uc samahni	28
	Mirpur district	Mirpur	Uc 2	28
Dudyal		Uc dudyal	30	
PUNJAB	Chakwal District	Chakwal Tehsil		28
		Choa saidan shah		28
		Tala gang Tehsil		28
	Jhelum District	Jhelum Tehsil		28
		Pind dadan khan		28
	Kasur District	Kasur	Kasur No. 1	28
		Pattoki	Pattoki No. 2	28
	Mianwali District	Mianwali Tehsil		28
	Layyah District	Karor lal esan Tehsil		28
		Layyah Tehsil		28
	Muzaffargarh District	Muzaffargarh	Muzaffargarh City - 4	118
		Jatoi	Shaher Sultan	28
	Mandi Bahauddin District	Malakwal	UC No. 49	28
		Mandi Bahauddin	UC No. 5	28
	Gujranwala District	Gujranwala city Tehsil		28
Wazirabad Tehsil			28	
SINDH		Digri taluka		28
	Mirpur khas District	Kot Ghulam		28
		Mohammad taluka		28
		Mirpur khas taluka		28
	Nawabshah District	Nawab shah	Nawab shah 1	28
		Daulat pur	kazi Ahmed 1	28
		Sakrand	Sakrand 1	28
		Daur	Jam Sahib	28
	Jacobabad District	Garhi khairo taluka		28
		Jacobabad taluka		28
		Kandhkot taluka		28
		Kashmore taluka		28
	Shikarpur Ddstrict	Shikarpur	M C Shikarpur - 1	28
		Khanpur	U C Khanpur	28
		Lakhi	U C Lakhi	28
	Ghotki District	Daharki	Daharki (Urban)	28
		Ubauro	Ubauro (Urban)	28
		Ghotki	Ghotki 1 (Urban)	28
	Badin District	Badin	Badin 1	28
		Talhar	Talhar	28
		Matli	Matli 1	28

Table A-2: Union Council Sample for Control Group

Province	District	Tehsil	Union Council	Sample
		Tando bago	Tando Bago	28
		Golarchi	Golarchi	28

Sampling Performance

The total is given below and table A-3 below provides detailed break up among both treatment/control groups. In the NWFP provinces two districts that were under a civil war situation and the situation worsened during the survey period and could not be covered. Shangla and Swat districts in NWFP could not be covered that accounted for 84 households (4 % of the sample).

Table A-3: Achieved versus Planned Sample

Province	Treatment		Control	
	Planned	Achieved	Planned	Achieved
Baluchistan	251	251	251	253
NWFP	323	239	323	323
Punjab	538	538	538	537
Sindh	616	616	616	616
AJK	300	272	272	271
Total	2028	1916	2000	2000
Achievement (%)	NA	95%	NA	100%

Data Collection and Fieldwork

The UCs selected in the survey were mostly located in urban areas. However, there were some UCs in the treatment districts which were located in the rural areas also. Accordingly, some UCs in the control group were selected from the rural areas, too. Considering the differences in the geographical, demographic and socio-cultural makeup of urban and rural areas of Pakistan, different methods were adopted for collecting data in urban and rural areas. These are described in detail below.

Field Methodology – Urban

In each UC an area list was developed, next a starting point was selected in each area. Starting points were famous landmarks, market, plaza, or important place that could be considered the centre of the area. Five interviews were conducted around each starting point. This provided a maximum geographical spread within the area. Households were selected using a ballot method where numbers 1–9 were written on different pieces of paper and put in a box. The surveyor picked one piece of paper and started the interview from the house corresponding to the number on the paper. Since the target respondents for this survey were females, we would use Right Hand Rule to cover the area. This allowed a systematic procedure to minimize surveyor's bias. Further, once a household was selected, screening criteria were used and only houses with children between the ages of 0–59 months were selected. In cases where there was more than one mother in a household, the mother with the most recent birthday was selected.

Field Methodology – Rural

Each village was divided into four hypothetical quarters and starting point was selected in each quarter and total of three interviews were conducted around each starting point. Two

households were skipped after one successful interview. As with the case in the urban survey, only households with children between the ages of 0-59 months were selected.

Formal interview was conducted with the respondent only after verbal consent. The Fieldwork dates of this study were as follows:

Fieldwork start date: March 29th, 2008

Fieldwork end date: May 3rd, 2008

Response rate was: 52% (see Table A-4)

Table A-4: Response Rate

No Answer/ Nobody Home	1,107
Not Eligible/ Not the right respondent	1,852
Respondent refusals	659
Completed Interviews	3,916
Total Doors Knocked	7,534
Response Rate (%)	52

Appendix C Calculation of Test Statistics

Definitions

Based on the conventions described in *Design and Analysis of Cluster Randomization Trials in Health Research*, by Donner and Klar (1994), the following variables are defined:

$$Y_i = \sum_{j=1}^{k_i} Y_{ij} = \text{total number of successes in group } i$$

$$M_i = \sum_{j=1}^{k_i} m_{ij} = \text{total number of individuals in group } i$$

$$K = \sum_{i=1}^2 k_i = \text{total number of clusters in the study}$$

$$M = \sum_{i=1}^2 M_i = \text{total number of individuals in the study}$$

$$Y = \sum_{i=1}^2 Y_i = \text{total number of successes in the study}$$

$$\hat{P}_i = \sum_{j=1}^{k_i} Y_{ij} / \sum_{j=1}^{k_i} m_{ij} = Y_i / M_i = \text{event rate as computed over all clusters in group } i$$

$$\hat{P} = \sum_{i=1}^2 Y_i / \sum_{i=1}^2 M_i = Y / M = \text{overall event rate observed in study}$$

Furthermore,⁵ letting

$$\bar{m}_{Ai} = \sum_{j=1}^{k_i} m_{ij}^2 / M_i$$

the resulting estimator ρ may be written as

$$\hat{\rho} = \frac{MSC - MSW}{MSC + (m_0 - 1)MSW}$$

where

$$MSC = \sum_{i=1}^2 \sum_{j=1}^{k_i} m_{ij} (\hat{P}_{ij} - \hat{P}_i)^2 / (K - 2)$$

$$MSW = \sum_{i=1}^2 \sum_{j=1}^{k_i} m_{ij} \hat{P}_{ij} (1 - \hat{P}_{ij}) / (M - K)$$

and

$$m_0 = [M - \sum_{i=1}^2 \bar{m}_{Ai}] / (K - 2)$$

⁵ Please see the original paper for assumptions and additional definitions underlying these calculations.

Standard Pearson Chi-Square Test

The standard Pearson chi-square test is

$$\chi_P^2 = \sum_{i=1}^2 \frac{M_i(\hat{P}_i - \hat{P})^2}{\hat{P}(1 - \hat{P})}$$

Adjusted Chi-Square Approach

The adjusted chi-square approach results in

$$\chi_A^2 = \sum_{i=1}^2 \frac{M_i(\hat{P}_i - \hat{P})^2}{C_i \hat{P}(1 - \hat{P})}$$

with

$$C_i = \left\{ \sum_{j=1}^{k_i} m_{ij} [1 + (m_{ij} - 1)\hat{\rho}] / \sum_{j=1}^{k_i} m_{ij} = 1 + (\bar{m}_{Ai} - 1)\hat{\rho} \right\} \quad i=1,2$$

Pooled Adjustment Approach

This approach follows *Methods for Comparing Event Rates in Intervention Studies When the Unit of Allocation is a Cluster*, Donner and Klar (1994).

$$\chi_T^2 = \frac{\chi_P^2 \sum_i \sum_j m_{ij}}{\left\{ \sum_i \sum_j m_{ij} [1 + (m_{ij} - 1)\hat{\rho}\hat{\rho}_e] \right\}}$$

Assuming $\hat{\rho}_e = 1$, we may write

$$\chi_T^2 = \frac{\chi_P^2}{C}$$

with

$$C = \frac{\sum_i \sum_j m_{ij} [1 + (m_{ij} - 1)\hat{\rho}]}{\sum_i \sum_j m_{ij}} = [C_1 \sum_j m_{1j} + C_2 \sum_j m_{2j}] / \sum_i \sum_j m_{ij}$$

t-Test

Introducing

$$\bar{P}_i = \sum_{j=1}^{k_i} \hat{P}_{ij} / k_i \quad i = 1,2$$

and

$$S_i^2 = \sum_{j=1}^{k_i} (\hat{P}_{ij} - \bar{P}_i)^2 / (k_i - 1) \quad i = 1, 2$$

yields the t statistic as

$$t = (\bar{P}_1 - \bar{P}_2) / \sqrt{S^2 \left(\frac{1}{k_1} + \frac{1}{k_2} \right)}$$

where

$$S^2 = \{(k_1 - 1)S_1^2 + (k_2 - 1)S_2^2\} / (K - 2)$$

Appendix D

Socio-Economic Class⁶

This appendix presents the details of a survey conducted by AC Nielsen in 2005 to establish a method of classifying rural and urban households into socio-economic classes (SECs).

C.1 Rural SEC Classification

Pakistan covers 797,000 square kilometers accommodating 130 million people out of which 87.8 million are living in 44,464 rural locations. To study and understand rural Pakistan a scale is needed; a socio-economic status scale which would help marketers and advertisers to more effectively target particular segments of the population with known profiles. It would also help research agencies to easily identify which socio-economic class an individual belongs to through a few simple questions which would not be too demanding on the skills of the interviewer or the knowledge of the respondent.

Background

Pakistan Advertisers Society (PAS) first initiated the idea of bringing together the marketers on one platform for market classification purposes in 1998. Resultantly a large scale Establishment, Media Habits and Socio-Economic Classification (SEC) for urban Pakistan was undertaken and published through AC Nielsen Pakistan. The SEC Grid developed through this survey has become a norm and is still used as the only currency across the country by the marketers as well as the researchers.

After the success of urban survey, PAS started receiving indications for a similar kind of survey in rural Pakistan which constitutes almost two-thirds of the country's population. The only source of information available for rural Pakistan was either population census 1998 or agriculture census 1990. Both provide limited scope of information, as no data was available on durable ownership, FMCG consumption, agronomical practices, media habits or household profiling through any socio-economic classification of rural Pakistan.

On the other side, the world is becoming a global village and marketers need to understand markets in different countries, ESOMAR (European Society for Opinion and Marketing Research) is currently working toward harmonization of SEC scales throughout the world so that analysis of international research projects is more compatible and comparable.

With this purpose in mind, through the same platform of PAS and AC Nielsen, a similar kind of survey was conducted in rural areas of Pakistan in 2002. Reports of rural establishment, media habits and SEC survey are now available with the agency.

Socio-economic classification of rural Pakistan can help companies in:

- Determining current/potential market sizes for specific product categories
- Concentrating their efforts wherever a large percentage of the target market is located geographically

⁶ Based on a survey conducted by AC Nielsen in Pakistan under the aegis of the Pakistan Advertisers Society.

- Developing better advertising copy, tailor-made to the profile of the individuals in various socio-economic classes
- Developing more cost effective and efficient media plans.

Objective

The objective of conducting a socio-economic classification exercise in rural Pakistan was to establish the rural household profile, to understand media habits of 12+ year rural individuals and to segment the rural populace on the basis of the most relevant/distinguished variables for the purpose of target marketing

In addition to the above, a screening criterion was also to be established whereby the field interviewers can easily and quickly determine which rural individual/household belongs to which socio-economic class.

Research Design

The study was conducted in two steps through face-to-face interviews with the selected households of the randomly identified rural areas. First, household level data (i.e., penetration of various durables, demographic data, and other household features) were obtained through “The Establishment Survey”. As a second step, information about media habits at individual levels was sought via “The Media Habits Survey”.

To obtain household level data, our target respondent was the male head of a selected household or the chief wage earner of that household. To ascertain individual media habits, our target respondents were adult males and females over the age of 12.

For this survey, a probability based, multi-stage, disproportionate, systematic random sample design was adopted by using Probability Proportionate to Size (PPS) technique.

The universe constituted all non-institutional households in rural Pakistan. The primary sampling units (PSUs) were villages. The secondary sampling units (SSUs) were households and individuals. A household may consist of a single person living alone or a group of persons who normally live and eat together. A total of 5,998 households were selected in 500 villages across Rural Pakistan. Two interviews were conducted in each target household, one with head of household and another with a randomly selected 12+ year male or female member of that particular household. The data was analyzed using cluster and factor analysis to reach a data based classification system for urban households in Pakistan. The following pages describe the results.

COMPOSITION OF SEC GRID:

Socio-economic classes have been identified using two variables *Education of Head of Household* and *Type of House*.

Head of household is the one who is the decision-maker in majority of household matters like marriage, purchase and sale of property etc. In rural Pakistan, structure of house is also a solid indicator about the socio-economic status of the household.

Previously stated monthly household or personal income was being used as a classification method in both urban and rural Pakistan. Some companies also used to gather information on

the availability of a long list of household durables and were calculating indices to segment the target population.

However, income is not considered a suitable indicator for classification purposes. The main reasons are that income may be overstated or understated either intentionally or unintentionally and it is generally not stable over time. Another problem is non-response, as people prefer not to disclose their income for different reasons. On the other side, in contrast to urban areas where monthly household income can be stated upfront, it is almost impossible for an agriculturist household to state monthly income due to the five or six monthly nature of crops. Therefore, in case of rural households, it is impractical to use income as a suitable indicator for classification purposes.

Secondly, asking for ownership of durables, though a stable indicator, involves long lists making the job tedious for surveyors and then for analysts in calculating the indices and segmenting populations.

After various analyses, the rural SEC Grid emerged as a two-dimensional matrix constructed with the following two variables:

- Levels of head of household's education
- Type of house

The four types of house are taken on the horizontal axis whereas seven levels of education are taken on the vertical axis, thereby forming a 28 cell grid.

The four types of house are given below. These are to serve as broad guidelines for the ease of field interviews.

Type of House:

Kuchha: House where both the roof and walls are made of Kuchha material

Semi Pukka: House where EITHER the roof or the walls are made of Pukka material

Pukka Lower: House where both the roof and walls are made of Pukka material but EITHER the Kitchen, Toilet or both are not present.

Pukka Upper: House where both the roof and walls are made of Pukka material, and both Kitchen and Toilet are present.

For classifying any rural household among the above mentioned types of house, the surveyors would need to ask about the material used for construction of walls and roof of the rooms. The material which categorizes pukka and kuchha is mentioned below:

Table C-1: House Structure and Materials Used

Structure	Material used for construction
Pukka Walls	Burnt Bricks, Plastered Walls, Bricks-Mud, Wood-Stone, Galvanised Iron or other Metal Sheets, Concrete
Kuchha Walls	Mud, Wooden, Grass, Leaves, Reeds, Wooden/Grass Fence
Pukka Roof	Concrete Slab (RCC), Iron Girder, Wooden Beams/Bricks/Stones, Iron Sheet, Mud and Stones, Prefabricated Slab
Kuchha Roof	Wood, Mud, Unburnt Bricks-Mud,

The seven levels of education and what each stands for is discussed below:

Education:

Illiterate: An individual who cannot read or write even simple/plain Urdu, and has never attended any school.

Up to primary: An individual who has not attended formal school but can read simple Urdu or has less than 5 years of formal schooling.

School 6-9 years: An individual who has attended and cleared 5 years of primary school, has obtained regular/formal religious education or has attended school for 6, 7, 8 or 9 years.

Matric: An individual who has passed/cleared matriculation / Ordinary Level GCSE examination and therefore has attended formal school for 10/11 years.

Intermediate: An individual who has attended school/college for 12 years and has passed/cleared intermediate (F.A., F.Sc., I.Com.) / Advanced Level GCSE examination.

Graduate: An individual who has attended school / college for 14 years and holds a Bachelor of Arts (B.A.) / Sciences (B.Sc.) / Commerce (B.Com.) / Business Administration (B.B.A.) / Law (LL.B.) degree.

Post-Graduate: An individual who has done a Masters in Arts (M.A.), Masters in Science (M.Sc.), Masters in Commerce (M.Com.), Masters in Computer Sciences (MCS), Masters in Business Administration (MBA), MBBS, Chartered Accountancy (CA), Bachelor of Engineering (BE), FRCS, MRCP, Ph.D. or any other higher studies within the country or abroad.

DESCRIPTION OF SOCIO-ECONOMIC CLASSES

In order to provide marketers and researchers with more tangible/concrete insight into the types of individuals to be encountered in each socio-economic class a brief description of each category has been compiled below:

A This is the most educated class in rural Pakistan where the education of the head of household is at least intermediate and the structure of house is either pukka lower or pukka upper.

B A high percentage of individuals in this class have acquired education upto matriculation level and the structure of house is any one from all four types.

C This is the middle class of rural Pakistan. Education level of heads of households is much lower than in SECs A and B.

D This is the largest SEC in terms of number of households. Illiteracy among the heads of households is very common. Structure of house is either semi pukka or pukka lower.

E Most of the heads of households in this class have not acquired any formal education. Structure of the house is kuchha.

USAGE OF SEC GRID

The seven questions, which are to be enquired from any survey respondent, are given below.

Q.1 who is the head of your household? By head of household I mean, the person who is responsible for the major decisions related to the household matters, family, etc.?

Respondent himself/herself.....[1]

Any other (note down)_____

Q.2 What is the highest level of education that you / your head of household has attained? (Single Code)

- Illiterate..... [1]
- Up to primary (1-5 classes)..... [2]
- 6-9 classes pass [3]
- Matric..... [4]
- Intermediate/I.Com/D.Com/F.A/F.Sc. [5]
- Graduate [6]
- Post Graduate [7]

Q.3 From what material is the roof of most of the rooms of your household made?

Pukki

- Concrete slab (RCC)..... [1]
- Iron girder, wooden beams/bricks, stones [2]
- Iron sheets [3]
- Stones, mud [4]
- Prefabricated Slab..... [5]
- Girder, TR and bricks [6]

Kachhi

- Mud [7]
- Wood-mud [8]
- Wood/bamboo..... [9]
- Grass/leaves, straws [10]

Q.4 Now please tell me what is the type of most of the walls of your household?

Pukki

- Bricks and cement..... [1]
- Bricks..... [2]
- Wood-stone, mud [3]
- Iron or other metal sheets [4]
- Concrete..... [5]

Kachhi

- Mud [6]
- Wooden..... [7]
- Grass, leaves/grass fence [8]

Check from Q.3 and Q.4, if both roof and walls of the most of the rooms are made

of pukka material then ask next questions otherwise go to Q.7

Q.5 Is there a proper kitchen in your house i.e., a separate room which is only used for cooking purpose?

Yes [1]

No..... [2]

Q.6 Do you have a toilet in your household?

Yes [1]

No..... [2]

Q.7 (Surveyors record the type of house in the grid given below after looking at Q.3-Q.6)

Type of House	Code	Definition
Kuchha	1	Both roof and walls are made of kuchha material
Semi Pukka	2	Either the roof or walls are made of Pukka material
Pukka Lower	3	Both roof and walls are made of pukka material but either the kitchen, toilet or both are not present
Pukka Upper	4	Both roof and walls are made of pukka material and both kitchen and toilet are present

All interviewers must have the SEC Grid, list of structure of house and education codes with them before they go into the field. Without these, the interviewers will not be able to determine the SEC.

Moreover, the respondent must not be exposed to these materials. Both the questions must be discreetly asked. No cards must be shown to the respondent, as he/she is not expected to understand what kinds of houses are classified under say pukka lower category or what educational qualifications fall under 'post-graduate' category.

Don't know

If any respondent does not know what the education level of the head of household is or from what material roof of the rooms and walls of the household are made then such a respondent/household should be dropped from the sample.

The two variables which determine the SEC of any rural household i.e., Education and structure of house, are fairly stable demographic variables. The SEC system developed for rural Pakistan

is based on these variables and it is a stable system. At present many large multinationals such as Pakistan Tobacco Company, Reckitt & Colman, Procter & Gamble, etc. are using these SEC definitions in their market research.

All companies and research organizations can use these socio-economic classes to design samples and select individual respondents.

C.2 Urban SEC Classification

Introduction

Pakistan covers 797,000 square kilometers accommodating 130 million people out of which 42.4 million are living in 466 urban locations. To study and understand a diverse populace such as that of urban Pakistan a scale is needed; a socio-economic status scale whereby marketers and of course marketing researchers can easily select the segments most appropriate for their products and services.

The motivation for a uniform socio-economic classification system is derived from the need for a standard criterion for basic segmentation of markets to ensure comparability across studies from different sources and at different times. The manufacturer who commissions a U&A study that tells him that his best opportunities are with classes 'A' and 'B', for instance, will certainly want to be sure that the group discussions he carried out or intends to carry out and the media consumption data he bought from different sources all refer to the same socio-economic classes.

Background

Segmentation of any market can be done based on one or more variables, which may be demographic, social, psychographic, or economic in nature. To date, stated income is being used for segmenting the consumers in Pakistan for research as well as marketing purposes. There are, however, numerous problems in using this criterion. First, income is typically understated or overstated by respondents either intentionally or unintentionally. Second, if the respondent is a housewife many times she does not know the correct household income. The errors ensuing because of such misreporting cannot be rectified. No exact factor can be assigned to misreporting. Other issues are related to non-response, and obsolescence of the income data for tracking studies. Hence, both researchers and research users in Pakistan had felt the need for reviewing the situation and coming up with some relevant, reliable, consistent and practical criteria, which will overcome the pitfalls of income criteria.

Pakistan is not alone in facing these difficulties. Because of similar limitations, most countries of the world have moved to using a basic socio-economic classification of households for basic market segmentation. Different variables are used to define these socio-economic classes. The most commonly used variables are; occupation and/or education of the chief earner, type/number of durables present at home, type/nature/ownership of place of dwelling, number of bathrooms in the house, number of domestic servants, education of the housewife, etc.

Since the world is becoming a global village and marketers need to understand markets in different countries, ESOMAR (European Society for Opinion and Marketing Research) is currently working toward harmonization of SEC scales throughout the world so that analysis of international research projects is more compatible and comparable.

With this purpose in mind, Pakistan Advertisers Society (PAS) decided to conduct a socio-economic classification exercise for urban Pakistan. Socio-economic classification can help companies in:

- Determining current/potential market sizes for specific product categories
- Concentrating their efforts wherever a large percentage of the target market is located geographically
- Developing better advertising copy, tailor-made to the profile of the individuals in various socio-economic classes
- Developing more cost effective and efficient media plans.

Objective

The aim of conducting a socio-economic classification exercise was to first identify distinct socio-economic classes as they exist in urban Pakistan, second to determine the size of each class, and third to determine key characteristics of each class.

In addition to identifying, sizing and profiling the classes, a screening criterion was also to be established whereby the field interviewers can easily and quickly determine which individual/household belongs to which socio-economic class.

Research Design

To meet the objective first a pilot study and then a large quantitative, face-to-face survey was conducted. This survey was divided into two steps. In each sampled household two interviews were conducted, one with the housewife of the household and one with a randomly selected 12+ years male/female household member.

Probability-based, multi-stage, stratified, disproportionate sample design was used for this survey.

The primary sampling unit was clusters, which are systematic intervals in the electoral rolls as defined by the administrative structure of local Councils/Election Commission. The secondary sampling unit were households, consisting of a single person living alone or a group of persons who normally live and eat together. In this survey a total of 40,228 interviews were conducted in 20,114 households across 116 cities representing all the four provinces. The data were analyzed using cluster and factor analysis to reach a data-based classification system for urban households in Pakistan. The following pages describe the results.

Composition of SEC Grid

Socio-economic classes have been identified using the social variable of the education of the chief earner and the economic variable of the occupation of chief earner. The chief earner is the member of a household who contributes the most to the budget of the household and bears the greatest proportion of the overall household expenses. The rationale behind classifying a household on these two variables is that the consumption, income and lifestyle of a household is strongly correlated with how educated and economically sound the chief earner is. Moreover, in many households the chief earner is also the head of the household. In such cases, the behavior/opinion/attitudes of the chief earner may influence the behavior and lifestyle of all other household members.

The SEC Grid is a two-dimensional matrix constructed with the following 2 variables:

- Levels of chief earner's education

- Occupation categories of chief earner

The seven levels of education are taken on the horizontal axis and the eleven occupation categories are taken on the vertical axis, thereby forming a 77 cell grid. The seven levels of education and what each stands for is discussed below:

Education

Illiterate: An individual who cannot read or write even simple/plain Urdu, and has never attended any school.

Less than Primary: An individual who has not attended formal school but can read simple Urdu, or has less than 5 years of formal schooling.

School 5-9 years: An individual who has attended and cleared 5 years of primary school, or has obtained regular/formal religious education, or has attended school for 6/7/8/9 years in classes above the primary level.

Matric: An individual who has passed/cleared matriculation/Ordinary Level/GCSE examination and therefore has attended formal school for 10/11 years.

Intermediate: An individual, who has attended school for 12 years, is Fellow of Arts/Sciences/Commerce (F.A., F.Sc., I.Com.).

Graduate: An individual who has attended school for 14 years, i.e., is a Bachelor of Arts (B.A.)/Sciences (B.Sc.)/Commerce (B.Com.)/ Business Administration (B.B.A.)/Law (LL.B.)

Post-Graduate: An individual who has done Masters in Arts (M.A.), Masters in Science (M.Sc.), Masters in Commerce (M.Com.), Masters in Ph.D. or has done any other higher studies within the country or abroad.

The 11 broad occupation classifications and details of the kind of workers, employees and self-employed people falling in each are given in the following page. These are to serve as broad guidelines for the ease of field interviews. The occupation categories are listed such that occupational status is in line with the socio-economic status. That is households where the chief earner is an unskilled worker tend to belong to the lower stratum of the society, whereas households where the chief earner is a large businessman will belong to the upper-most stratum of the society.

Occupation Classification

Unskilled Worker: Workers who largely do not handle machinery or sophisticated instruments and do not require special training or diplomas, e.g., manual labourer, peon, doorman, fisherman, waiter, domestic servant, ward boy, messenger, helpers in shops, other establishments, loaders, cook, newsboy, agricultural labourer.

Petty Trader: Traders and persons engaged in selling petty items or personal services without having any properly constructed ('pukka') shop/establishment, e.g., hawkers, street vendors, 'pan'/cold drink shop owners, peddlers, tea/coffee/juice stall owners, etc.

Skilled Worker: Workers who handle machinery or require special training/diplomas, e.g., carpenters, chefs, electricians, drivers, mechanic, technician, tailors, armed guard, repairmen, telephone operators, computer operator, cobbler, barber, farmer, steward, typist, overseas

workers, craftsman, nurse, LHV, dispenser, moazzan, lowest designations in police/armed forces, e.g., jawans, hawaladar, sipahi, batman.

Non-Executive Staff: The category includes white-collar workers, such as clerks, salesmen.

Supervisory Level: Those in supervisory/regulatory positions who are not senior enough to be called officer/executive, e.g., head constable, station master, shop managers, primary school teachers, imam masjid/preacher, supervisors working in factories/offices.

Small Shopkeeper/Businessmen: This category encompasses people engaged in providing retail, restaurant or personal services and operate from a properly constructed (i.e., 'pukka') establishment, e.g., general/'kiryana' store owners, general merchants, butcher, all small shop owners (e.g., laundry shops, cloth merchants, shoe shops, hair dresser/beauty parlor) real estate agents, small hotel owner (e.g., small tea shops, tandoors).

Lower/Middle Executive/Officer: Employees of grade 14-17, high school/college teachers and lower managerial positions in private companies.

Self-Employed/Employed Professionals: Accountants, doctors, engineers, lawyers, architects, actors, brokers, editors, journalists, trainers, authors, university teachers/professors, players and all other professionals who are either employed or have their own private practices. 'Hakeems', homeopathic doctors are also included in this category.

Medium Businessmen: Owners of small companies/big shops/departmental stores, jewelers, car showroom owners, owners of air-conditioned hotels/restaurants, small-scale factory owners.

Senior Executive/Officers: MDs, CEOs, directors, senior government officials, employees of grade 18 and above, DG's secretaries, etc. Overseas Pakistanis working as executives, managerial positions in private companies.

Large Businessmen/Factory Owner: Landlord, industrialist, big contractors/importers/exporters, owners of factories, owners of chain of hotels/restaurants.

Description of Socio-Economic Classes

In order to provide marketers and researchers with more tangible/concrete insight into the types of individuals to be encountered in each socio-economic class a brief description of each category has been compiled.

SEC Households in which the chief earners are:

A₁ Well educated, self-employed/employed professionals, senior level executives/officers in public/private limited organizations, well-educated medium-to-large scale businessmen.

A₂ Relatively less well educated, medium-to-large scale businessmen and professionals. Well educated middle level executives, small businessmen and supervisors.

B Relatively less well-educated lower/middle level executives and officers, well educated small businessmen and supervisors.

- C Predominantly small retailers/businessmen, supervisors and lower level executives who have 5-10 years of schooling.
- D Relatively well educated skilled workers; not so well-educated small retailers and non-executive staff members.
- E₁ Skilled/unskilled workers, petty traders and non-executive staff members who have at least 5-10 years of schooling.
- E₂ Predominantly, illiterate unskilled/skilled workers and petty traders.

Usage of SEC Grid

The SEC Grid can easily be used by all fieldworkers. The two questions, which are to be enquired from any survey respondent, are given below.

Q1. Could you kindly tell me what is the occupation of the chief earner of your household, i.e., what is his/her job designation/nature of business? By chief earner, I mean the member of the household who bears the greatest percentage of the overall household expenditure.

PROBE THE RESPONDENT FOR ALL DETAILS AND NOTE THE VERBATIM.

INTERVIEWER: CODE WITH THE HELP OF 11 OCCUPATION CATEGORIES GIVEN OR PLEASE REFER TO THE NOTE.

Unskilled Worker	[1]	
Petty Trader	[2]	
Skilled Worker	[3]	
Non-Executive Staff	[4]	
Supervisor	[5]	
Small Shopkeeper/Businessman	[6]	
Lower/Middle Officer/Executive	[7]	
Professional (self employed or in service)	[8]	
Medium Businessman	[9]	
Senior Executive/Officer	[10]	
Large Businessman/Factory Owner	[11]	
Retired	[97]	→[GO TO NOTE 1]
Don't know	[98]	→[TERMINATE]
Student/housewife/unemployed	[99]	→[GO TO NOTE 3]

Q2. What is the educational qualification of the chief earner of your household?

Illiterate	[1]	
Less than Primary	[2]	
School 5-9 years	[3]	
Matric	[4]	
Intermediate	[5]	
Graduate	[6]	
Post-graduate	[7]	
Don't know	[9]	→[TERMINATE THE INTERVIEW]

All interviewers must have the SEC Grid, list of occupation and education codes with them along with the note before they go into the field. Without these, the interviewers will not be able to determine the SEC.

Moreover, the respondent must not be exposed to these materials. Both the questions must be discreetly asked. No cards must be shown to the respondent, as he/she is not expected to understand what kinds of jobs are classified under say non-executive staff category or what educational qualifications fall under 'post-graduate' category.

If the chief earner in a house has done his matriculation and is a doorman, according to the grid, that household will be classified as an E₁ class household.

Similarly, if the chief earner in a household has done an MBA and is working in a private firm as an executive, this household will be classified as a household belonging to the A₂ Class.

In this manner, each sample household/individual can be classified into one or another socio-economic class.

In case the reply of the respondent is other than the pre-coded options given then the field workers must refer to the instructions in the following note.

Note:

If the respondent states that the chief earner of his/her household is; retired, a student, housewife, unemployed or he/she does not know what the chief earner's occupation is or he/she says that income comes in from rent or land, please refer to the following instructions:

Retired:

If the respondent says that the chief earner is retired then ask the respondent what was the chief earner's occupational status immediately before retirement. After asking about the chief earner's education, using the SEC Grid determine the socio-economic class of that household.

Don't know:

If any respondent does not know what the occupation of the chief earner (C.E) is or from what source income is earned to meet household expenses and or the education of the C.E then such a respondent/household should be dropped from the sample.

Student/Housewife/Unemployed:

If the C.E of a household happens to be a student, housewife or an unemployed person then ask the survey respondent as to how the expenditures (food, clothing, rent, etc.) are being met or what their source of income is;

(a) If the source of income is rent on any kind of property and or interest on a bank account then ask the respondent as to who was the chief earner of the household. That is who left the property or money in the bank account for the descendants who are using the money. Then ask about the education and occupational status of that individual and code the appropriate SEC accordingly.

(b) If the source of income is irrigated/agricultural land then ask the respondent about the total land area the household owns. If the respondent does not know this upfront, he/she may ask another available member of the household.

(i) If the total land area is less than 12 and a half acres then the occupation category of the chief earner will be agricultural worker or "unskilled worker".

(ii) If the total land area is, 12 and a half acres or more but less than 50 acres then the occupation category of the chief earner will be farmer or "skilled worker".

If the total land area is 50 acres or more then the occupation category of the chief earner will be "large businessmen".

Occupation and education are fairly stable demographic variables. As the SEC system developed for urban Pakistan is based on these variables, it is a relatively stable system. At present many large multinationals such as Pakistan Tobacco Company, Reckitt & Colman, Procter & Gamble, Coca-Cola Export Corporation, Rafhan, etc. are using these SEC definitions in their market research.

We urge all companies and research organizations to use these socio-economic classes to design samples and select individual respondents.

Results

Urban Socio-Economic Classification (SEC)

Urban households are classified into different SEC based on the education and occupation of Chief wage earner.

Chief wage earner is the person who contributes the most to the household budget.

Table C-2: SEC Class by Occupation of Chief Earner

Occupation of Chief Earner	Education of chief earner						
	Illiterate	Less than Primary	School 5-9 years	Matric	Intermediate	Graduate	Post Graduate
Unskilled worker	E-2	E-2	E-1	E-1	D	D	C
Petty traders	E-2	E-2	E-1	E-1	D	C	C
Skilled workers	E-2	E-2	E-1	D	D	C	C
Non-executive staff	E-2	E-2	D	D	D	C	C
Supervisory level	D	D	C	C	B	B	B

Small shopkeeper/Businessmen	D	D	C	C	B	B	A-2
Lower/Middle: Executive, Officer	D	C	C	C	B	B	A-2
Self employed/Employed/Professionals	B	B	A-2	A-2	A-2	A-1	A-1
Medium Businessmen	B	A-2	A-2	A-2	A-2	A-1	A-1
Senior Executive/ Officer	B	A-2	A-2	A-2	A-1	A-1	A-1
Large Businessmen/Factory owner	A-2	A-2	A-2	A-1	A-1	A-1	A-1

Source: Based on the survey conducted by AC Nielsen Pakistan for PAS in 1998.

Description of Socio-Economic Classes

A1:

Well-educated, self-employed/employed professionals, senior level executive/officers in public/private limited organizations, well-educated medium to large-scale businessmen.

A2:

Relatively less well educated, medium to large scale businessmen and professionals. Well educated middle level executives, small businessmen and supervisors.

B:

Relatively less well-educated lower/middle level executives and officers, well-educated small businessmen and supervisors.

C:

Predominantly small retailers/businessmen, supervisors and lower level executives who have 5-10 years of schooling.

D:

Relatively well educated skilled workers; not so well educated small retailers and non-executive staff members.

E1:

Skilled/unskilled workers, petty traders and non-executive staff members who have at least 5-10 year of schooling.

E2:

Predominantly, illiterate unskilled/skilled workers and petty traders.

Table C-3: Share of SEC in Urban Households

SEC	% in Urban Pakistan (1998)	Avg. Household Income Rs. (1998)	*Avg. Income \$ (1998)	% in Urban Pakistan (2005)	Avg. Household Income Rs. (2005)	*Avg. Income \$ (2005)
A1	2.8	16,561	368	4.3	25,217	422
A2	3.8	10,134	225	5.5	17,485	292
B	10.0	9,418	210	12.4	12,475	209
C	18.5	6,873	153	20.0	9,508	159
D	21.6	5,789	129	22.4	8,019	134
E1	19.4	4,385	98	15.0	6,490	109
E2	23.9	4,007	89	20.4	5,779	97

Source: Based on survey conducted by AC Nielsen Pakistan for PAS in 1998 and 2005.

Table C-4: Urban Households by SEC by Province (2005)

Classes	Punjab	Sindh	NWFP	Baluchistan	Total
A1	166,349	103,143	22,567	14,503	306,562
A2	222,661	116,604	37,319	14,538	391,123
B	461,777	340,603	58,907	28,813	890,099
C	854,977	457,665	76,115	40,435	1,429,191
D	895,853	562,455	92,547	53,421	1,604,277
E1	650,610	339,153	58,461	24,228	1,072,451
E2	765,741	527,556	98,924	65,630	1,457,851
Total	4,017,967	2,447,178	444,840	241,569	7,151,553

Source: Based on survey conducted by AC Nielsen Pakistan in 2005.

Rural Socio-Economic Classification

Rural SEC is based on two socio-economic variables: Education of the Head of household and Structure of the house.

Table C-5: Rural SEC Classification

Education	Structure of House			
	Kuchha	Semi Pukka	Pukka lower	Pukka Upper
Illiterate	E	D	D	C
Upto Primary	E	D	C	C
School 6-9 years	D	C	C	B
Matric	D	C	B	B
Intermediate	C	C	B	A
Graduate	C	C	A	A
Post Graduate	B	B	A	A

Source: Household numbers are based on Pakistan 1998 Census Report of Pakistan. EC shares are based on the survey conducted by AC Nielsen Pakistan for PAS in 2002.

Definitions of Type of Houses

Kuchha:

House where both the roof and walls are made of kuchha material.

Semi Pukka:

House where EITHER the roof or the walls is made of pukka material.

Pukka Lower:

House where both the roof and walls are made of pukka material, but the kitchen, toilet, or both are not present.

Pukka Upper:

House where both the roof and walls are made of pukka material, and both kitchen and toilet are present.

Table C-6: Share of SEC in Rural Households

SEC	% in Rural Pakistan	Household	Avg. Income Rs.	*Avg. Income \$
A	4.2	533,362	9,841	165
B	10.3	1,328,049	6,629	111
C	24.9	3,198,027	5,417	91
D	31.6	4,054,833	3,801	64
E	29.1	3,733,531	3,321	56

Source: Based on Survey conducted by AC Nielsen Pakistan for PAS 2002.

Table C-7: Rural Households by SEC and Province

Classes	Punjab	Sindh	NWFP	Baluchistan	Total
A	255,537	190,066	78,994	8,550	533,362
B	931,960	166,575	211,363	19,239	1,328,049
C	2,061,477	600,096	448,346	87,642	3,198,027
D	2,647,710	600,096	638,359	168,872	4,054,833
E	1,481,687	1,294,157	465,426	491,651	3,733,531
Total	7,378,371	2,850,990	1,842,488	775,954	12,847,802

Source: Household numbers are based on Pakistan 1998 Census Report of Pakistan. SEC shares are based on the survey conducted by AC Nielsen Pakistan for PAS in 2002.