Impact Evaluation of MCC Water and Sanitation Projects in El Salvador Baseline Results

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Executive Summary

Background

In November of 2006, the Millennium Challenge Corporation (MCC) signed a five-year, $461 million Compact with the Government of El Salvador (GOES) to improve the lives of Salvadorans through strategic investments in education, public services, agricultural production, rural business development, and transportation infrastructure. The Government of El Salvador has set up a management unit called FOMILENIO to implement the five-year Compact from September 2007 to September 2012. Social Impact (SI) has been contracted by MCC to conduct an impact evaluation of the water and sanitation activities of the Compact.

The goal of the water and sanitation component of the Compact is to enhance access to water systems and to improve sanitation services to the poorest inhabitants in the Northern Zone of El Salvador. The component is designed to provide piped water or (in a few cases) public taps for households that previously did not have access to this level of service and latrines to all water project participants who do not already have improved sanitation.

MCC expects the water and sanitation interventions to:

- Increase household income by at least 10%;
- Reduce morbidity from water-related illnesses; and,
- Reduce the time and cost spent on seeking or purchasing water.

Reductions in water-related disease and time spent collecting water are in turn expected to lead to reduced expenditures on health care and increased attendance at school and work. In the economic analysis prepared for the water and sanitation component of the Compact, three-quarters of the expected benefits are attributed to reductions in "coping costs", specifically the time costs associated with collecting water and the monetary cost of relying on alternative water sources (such as vendors) and storage systems.

Scope

The impact evaluation is designed to better understand the effect of the MCC water and sanitation interventions on beneficiary households, so as to inform policy issues related to water and sanitation. The evaluation objective is to quantify the benefits of this kind of intervention and contrast those benefits with the costs they entail. In turn, the rigorous evaluation of this program will shed light on the effectiveness of water and sanitation access as a tool to alleviate poverty and improve health outcomes. This report summarizes the baseline survey conducted as part of the impact evaluation.

The major themes addressed in this report are:

- Overall conditions in the beneficiary areas
- Water access, costs and quality
- Sanitation access
- Health
- Productive and income generating activities

Methods

The principal objective of the research design is to quantify the combined impact of the full set of water and sanitation projects on the incomes, health and time use of participant households. The key to measuring the impacts caused by the water and sanitation interventions is to compare conditions with the interventions to conditions that would have prevailed without them. However, this counterfactual state is not naturally observable – we can never know what change would have occurred in program participants (the treatment group) if the program were not implemented. As it was not possible to apply randomization in the selection of water and sanitation projects in this case, the benefits of the water and sanitation projects will be measured with a rigorous quasi-experimental design that incorporates propensity score matching, pre- and post-implementation data collection, difference-in-difference estimation, and econometric analysis to estimate the counterfactual and address selection and other biases.

We estimate the propensity scores using data from the 2007 census to match the treatment communities to comparable communities before program implementation. This procedure identifies control communities that have a similar probability of receiving the treatment and are similar to the treatment communities in terms of observable characteristics. We measure the impacts of the program as the difference between (1) the changes in indicators before and after the program for treatment recipients, and (2) the changes in indicators before and after the program for control units.

To implement the difference-in-differences estimator, we will conduct a panel survey in which the same households are interviewed in 2011 (this baseline study), 2012 and 2013. The baseline evaluation utilizes a household level survey and a community survey. The household level survey includes 3,284 households in the departments of Cabañas, Chalatenango, Cuscatlán, La Unión, Morazán, San Miguel and Santa Ana. The sample includes 1,027 female-headed households and 2,257 male-headed households, representing 14,626 individuals in the treatment and control areas. The survey consists of sections that characterize the water access situation of households, household demographics, consumption, income/productive activities and time allocation of women and children. The community level survey includes 130 census segments representing 196 caseríos (neighborhoods). Treatment segments comprise 65 segments with 1,637 households and control segments comprise 65 segments with 1,647 households.

Main findings

The characteristics of the households in the sample. More than 40 percent of the sample households live in houses with concrete walls. Over 25 percent have earth floors, which increase the probability of disease transmission. Female-headed households account for just over 30 percent of the sample, and over 65 percent of the sample have children present. The presence (and number) of children aged 3 to 16 who carry water is statistically significant difference between the control and treatment groups; 11.5 percent of the households in the treatment group having children who help to bring water to the household, relative to 7.6 percent in the control group.

There are few differences in Energy/Electricity consumption between the control and treatment groups in the baseline study; the majority of households are connected to the electrical grid and use propane or wood as their principal source of fuel for cooking.

Access to water sources. Around 45 percent of the households in the treatment segments use untreated water sources such as wells and springs to obtain water. However, we find that a high proportion of households use tap water (their own connection or a neighbor's) for drinking, cooking and doing laundry. In addition, we find significant differences in water sources used for drinking, cooking and doing laundry and in the difference in time spent carrying water. These results highlight the importance of controlling for covariates and the advantages of using multiple data points in the final evaluation.

On average, public taps are located 200 meters away from households, public wells and taps are on average within 6 to 8 minutes, and springs and rivers are around 12 minutes. The amount of time spent by beneficiary households collecting water is, on average, 1.6 hours per week. It is, on average, 2.4 hours per week in the control group.

Payments and costs related to water consumption. Households connected to a tap pay on average $3.67 per month in the control group and $3.17 in the treatment group. The difference in payment for monthly and annual payments is statistically different from zero; however, the difference is small - around fifty cents per month. Many households do not pay regularly (or at all) for to access water. The costs to use the public taps is significantly lower, under $2 (per month) for both groups. Costs to install water delivery systems are moderate, except for well systems. Because of their higher up-front costs, however, well systems are less likely to be abandoned after program implementation.

Water consumption for households connected to the tap systems stands at 18 cubic meters per month (some 600 liters per household/day or 130 liters per person/day). We use this water consumption measure to estimate a price per cubic meter of water; we do this by calculating monthly expenses for water consumption for households with a tap connection and imputing median payment amounts by segment for households that are not connected, then a similar procedure is done for water consumption in cubic meters. The result is a weighted average of the median prices for cubic meters of water across the segments. Estimated average price per cubic meter of water is 37 cents and ranges from one cent to 3 dollars.

Water risk perceptions. The percent of households who perceive water from natural sources to be unsafe are very high for both groups. The source that is perceived as being the safest is water from trucks. Private and public wells are perceived to pose the greater health hazards, with treatment households perceiving them as more unsafe than control households. In spite of these risk perceptions, most households do not treat their drinking water. This suggests that access to potable water from taps may improve considerably the quality of the water people drink.

Sanitary services and health. Over 40 percent of households have unimproved sanitary services (i.e., nonexistent services, communal or hole latrines). Treatment segments tend to have lower sanitary access, and there are significant differences in sanitary services access between treatment and control groups.

The baseline survey attempts to measure health outcomes in the area that could be affected by improved access to potable water. We calculate diarrhea rates using a 15-day recall period. However, diarrhea rates in El Salvador are very low and the survey was conducted during the dry season. As such, we do not find many cases of diarrhea in the sample. We find only 190 cases of diarrhea in 158 households using a 15-day reference period. The incidence of diarrhea is higher among the younger individuals in the sample, with the highest number of cases reported for children aged 0 to 5. The costs related to the diarrhea episodes are low; out-of-pocket expenses on medicines and laboratory work are on average $12 and $6.50, respectively. On average only 1 day of work or school is lost due to illness or taking care of an ill person.

Productive activities, income and expenditures. Eighty percent of the sample participates in agriculture, including rearing of livestock. Agricultural and salaried workers tend to be younger than individuals who participate in informal and entrepreneurial activities. Median net income in the sample is $1,656 and average income is $2,626. Most household income is derived from salaried work (both agricultural and non-farm).

Median total consumption in the sample is $2,747 and average total consumption is $2,835. Total consumption is disaggregated into food, non-food items (non-durable), education expenses, and housing expenditures. Small differences in mean expenditures are observed between control and treatment households; however, the only statistically significant difference is in non-food expenditures. In the full sample, food expenditures comprise around 55 percent of total expenditures, non-food 31 percent and housing the remaining 14 percent.

Poverty in relation to water sources and gender. To gauge poverty levels of the households in the sample, we calculate daily consumption per capita. The distribution is concentrated in the range of $1 to $2 per day with over 25 percent of individuals living on under $1.25 per day, and over 75 percent living on less than $3 per person per day. There are no significant differences between control and treatment households. This confirms that the majority of households who will receive interventions are indeed poor and that the control group selected by the matching procedure is comparable to the treatment group before the interventions take place.

We explore differences in consumption expenditures depending on the water sources a household uses. As expected, households who use improved water sources (for example, households with in-house tap connections) have higher consumption expenditures. Expenditures across water sources are consistent with the intuition that households that have a tap connection, wells or poliducts are likely to be relatively well-off because of the fixed costs that these systems entail.

Finally, we compare differences in consumption and income by gender and treatment status. Across treatment status there are very small differences between female and male-headed households, meaning that females in the control groups seem to be a good comparison group for females in the treatment group. The differences across gender are important for food and non-food expenditures, with female-headed households having lower expenditures. This highlights the importance of exploring differential effects by gender in the final evaluation.

Table E-1: Summary of Principal Indicators at Baseline

	Treatment	Control	Total Sample
Income Measures			
Mean			
Gross Income	2,909.30	3,053.10	2,980.83
Net Income	2,560.68	2,693.47	2,626.75
Median			
Gross Income	1,857	1,908	1,884
Net Income	1,638	1,676	1,656
Cost of water (US$ per m_3)	0.37	0.36	0.37
Domestic water consumption (m_3)			
Household recall	18.08	19.00	18.32
From utility bill	13.57	15.62	14.90
Time collecting water (hrs/week per household)	1.61	2.37	1.99
Incidence of water-borne diseases			
Average days of diarrhea episodes	3.2	3.1	3.1
Working days lost due to diarrhea	0.7	0.6	0.6
School days lost due to diarrhea	0.8	0.7	0.7

Source: Water and Sanitation Baseline Survey II (2011)

Conclusions

The results from the baseline analysis show that the research design appears to be appropriate, as the treatment and control groups are very similar across a large number of observable characteristics. The differences that remain can be easily controlled for using regression-adjusted difference-in-differences.

Lastly, the evidence suggest that it is important to explore the possibility of using a continuous treatment effect (time with improved water access) and to further identify treatment households, in contrast to treatment segments. Identifying treatment households will likely increase the number of control households in the sample and thus the possibility of finding better matches for the treatment households

I. Introduction

In November of 2006, the Millennium Challenge Corporation (MCC) signed a five-year, $461 million Compact with the Government of El Salvador (GOES) to improve the lives of Salvadorans through strategic investments in education, public services, agricultural production, rural business development, and transportation infrastructure. The Government of El Salvador has set up a management unit called FOMILENIO to implement the five-year Compact from September 2007 to September 2012. Social Impact (SI) has been contracted by MCC to conduct an impact evaluation of the water and sanitation activities of the Compact.

The goal of the water and sanitation component of the Compact is to enhance access to water systems and to improve sanitation services to the poorest inhabitants in the Northern Zone of El Salvador. The component is designed to provide piped water or (in a few cases) public taps for households that previously did not have access to this level of service and latrines to all water project participants[4] who do not already have improved sanitation.

MCC expects the water and sanitation interventions to:

- Increase household income by at least 10%;
- Reduce morbidity from water-related illnesses[5]; and,
- Reduce the time and cost spent on seeking or purchasing water[6].

Reductions in water-related disease and time spent collecting water are in turn expected to lead to reduced expenditures on health care and increased attendance at school and work. In the economic analysis prepared for the water and sanitation component of the Compact, three-quarters of the expected benefits are attributed to reductions in "coping costs", specifically the time costs associated with collecting water and the monetary cost of relying on alternative water sources (such as vendors) and storage systems.

This document lays out the results of the baseline survey administered from March to April 2011, for the impact evaluation of the water and sanitation program. The benefits of the water and sanitation projects will be measured with a rigorous non-experimental design that incorporates matching, a panel survey, difference-in-difference estimation, and other econometric methods. The sample size for the panel survey was powered to measure changes in one primary indicator of household welfare (household expenditure). The evaluation will also examine changes, albeit not necessarily with the same degree of precision, in coping costs, productive time use, diarrheal disease, school attendance, and access to and use of water and sanitation infrastructure. To the extent possible, the distribution of benefits and

[4] In this report, 'participant' is used to indicate any individual in a treated household or treated community.
[5] Ex-ante project modeling projected that the number of times that a person is sick per year would decrease by 1.5.
[6] Ex-ante project modeling projected that the number of hours per week that a household spends collecting water would decrease from 30 to 14 and the cost of water per cubic meter would decrease from $3.00 to $0.43.

outcomes across gender and socio-economic groups will be examined to supply evaluation stakeholders with information about differential effects. Data collection for the survey was conducted by DIGESTYC, the Dirección General de Estadísticas y Censos (General Directorate for Statistics and Census) of El Salvador.

Evaluation Design for the Water and Sanitation Intervention

Sixty-two municipalities in the Northern Zone, classified as either "Extrema Pobreza Moderada" or "Extrema Pobreza Alta" (extreme moderate poverty or extreme high poverty, respectively) by the national poverty map, were invited to submit proposals for water and sanitation projects. To be considered eligible for the program, the proposals had to meet four criteria: (1) the municipality had to be eligible to participate, (2) both the community and municipality had to be willing to make a financial commitment to the project, (3) the community had to be organized and willing to work with the municipality, and (4) the estimated cost of the project could not exceed $850 per beneficiary. After projects that did not meet the eligibility criteria were excluded, a list of 68 projects remained. These were cleared to enter the feasibility stage. As implementation of the first round of feasibility studies progressed, a new set of challenges to the evaluation surfaced: the cost of some projects was higher than expected, the water sources were not viable and/or the number of participants was lower than expected. These factors resulted in some projects being dropped, while others were expanded. We took these changes into account and adjusted the sample frame accordingly to be able to correctly identify treatment segments in the sample, maintain the power of the design and to measure the outcome indicators prior to the finalization of the projects. To date, 46 projects are being (or have been) executed. These projects are expected to be finalized[7] by the time follow-up (2012) and final (2013) surveys are implemented. As of January 2012, 31 water systems projects have been finalized.

In the original economic analysis for the water and sanitation component of the Compact, it was assumed that all water projects would involve providing water to households that did not previously have improved services. However, the project application, selection process, and feasibility studies generated a more diverse set of projects. Just under half (21) of the projects being executed install water in communities that did not previously have improved water services. The rest will either extend an existing water system to additional households, improve an existing system, or both improve and extend an existing deficient system. At this stage 12 projects[8] will include latrine construction or sanitation improvement.

The water and sanitation program poses some particular challenges for evaluating the impact of the investments:

- First, the program includes different types of projects, which will benefit households in

[7] Projects started being finalized in April 2011.

[8] The number of projects that include sanitation or latrine construction will be confirmed with FOMILENIO

different ways. For example, it is not obvious that projects that provide a new service option to a household without piped water service should be expected to have the same impact as projects that help households with connections get more out of a service they already have. It could be very useful to understand the differential impacts of different types of projects; however, the current survey sample size does not allow the precise estimation of these effects. To the extent possible, we will explore this possibility during the final evaluation.

- Second, not all of the expected benefits of the water and sanitation program are relevant for all households. Whereas increases in income or reduction in water collection costs might be seen in all households, increased school attendance rates relate primarily to households with school age children, and changes in morbidity and health expenditures from water and sanitation-related illnesses are expected to arise disproportionally in households with young children. This again has implications for sample design and sample size.
- Third, the benefits of water and sanitation investments have a seasonal character – households experience the benefits of service improvements in different ways at different times of year. Impacts on disease are most visible during the rainy season when diarrhea rates are highest. Conversely, impacts on coping costs (cash and time expenditure on water provisioning) are highest during the dry season, when deficient pipe systems and shallow wells or streams are likely to experience water shortage problems.

We give priority to the measurement of changes in household welfare and coping costs, over health impacts in this report. There are two reasons for this. First, coping costs accounted for the bulk of the expected benefits of water supply interventions in the economic analysis underlying the program. Second, diarrhea rates in El Salvador have dropped substantially in recent years due to a variety of public health interventions. This makes measuring changes in rates more difficult and more costly, and also is likely to mean lower than expected benefits from health improvements in these projects.

The principal objective of the research design is to quantify the combined impact of the full set of water and sanitation projects on the expenditures of the participant households. After the projects are finalized, we will assess to what extent it will be possible to compare impacts across project types with the existing sample.

Econometrics: The Quasi-Experimental Design

The key to measuring the impacts caused by the water and sanitation interventions is to compare conditions with the interventions to conditions that would have prevailed without them. The counterfactual state is not naturally observable – we can never know what change would have occurred in program participants (the treatment group) if the program were not implemented. As it was not possible to apply randomization in the selection of water and sanitation projects in this case, the benefits of the water and sanitation projects will be measured with a rigorous quasi-

experimental design that incorporates matching, pre- and post-implementation data collection, difference-in-difference estimation, and econometric analysis to estimate the counterfactual and address selection and other biases.

Matching represents a credible non-experimental option for identifying comparison groups. We use propensity score matching (PSM) [(Dehejia & Wahba, 1994) (Rosenbaum & Rubin, 1983) (Heckman, et al., 1997) (Heckman, et al., 1998) (Heckman, et al., 1998)] using data from the 2007 census to match the treatment communities to comparable communities before program implementation. PSM identifies control communities that have a similar probability of receiving the treatment and are similar to the treatment communities in terms of observable characteristics. Accordingly, they provide measures of indicators in communities that are similar except for the treatment; thus addressing selection on observables.

By collecting data before and after program implementation, we can apply a 'difference-in-difference' (DID) estimator [(Heckman, et al., 1998)]. This estimator measures the treatment effect as the difference between the changes in indicators before and after the program among treatment recipients, on the one hand, and the changes in indicators before and after the program among control units, on the other. DID estimation helps control for residual confounding due to imperfect matches and selection bias from time-invariant unobservable factors which differ between treatment and control communities and which may have an influence on the impact variables of interest.

To implement the DID estimator, we have planned for a panel survey in which the same households are interviewed in 2011 (this baseline study[9]), 2012 and 2013. Implementing a baseline and two follow-up surveys has a number of advantages over an evaluation design utilizing only two data points. The longer one waits to conduct the follow-up survey, the greater the risk that the measured impacts will be due (at least in part) to changes that are unrelated to the program under study and that household will forget key details about project implementation. There is also the risk that some control communities will receive water and sanitation services from a different funding agency or program. Also, having multiple data points allows us to adjust the sample frame to unexpected changes in projects and provides us with an interim and longer-term view of project impacts. With a follow-up survey conducted both one and two years after the baseline we both minimize risk of contamination of controls and gain a view of longer-term impacts[10].

We will employ regression-adjusted DID estimation in order to control for individual and household level covariates, with adjustments for intra-cluster correlation due to design effects. Information on the covariates is collected in the survey instrument.

[9] There was a baseline survey done in 2009 and we are evaluating the possible comparisons with this and the future follow-up surveys.

[10] In addition, we expect a wide range in the timing that the projects will be finalized. This opens the opportunity to exploit this variation to estimate a continuous treatment effect ("months with improved water").

For the baseline survey, the list of segments that are expected to receive treatment was updated and the propensity scores were recalculated. Accordingly, the segments do not necessarily overlap with the 2009 baseline sample, except for treatment segments where projects were expected to be implemented in 2009 and are still expecting the intervention. In reality, the resampling of segments due to projects being dropped did not change the sample frame as considerably as expected; many of the segments with dropped projects were selected as controls by the propensity score procedure.

Overview of Household and Community Survey

The baseline evaluation utilizes a household level survey and a community survey. The household level survey includes 3,291 households[11] in the departments of Cabañas, Chalatenango, Cuscatlán, La Unión, Morazán, San Miguel and Santa Ana. The survey is composed of a set of sections to characterize the water access situation of households, household demographics, consumption, income/productive activities and time allocation of women and children. The community level survey includes 130 census segments representing 196 caseríos[12]. The information is obtained from interviews of key informants from the communities. Key informants include health workers/promoters, members of the water boards and other community leaders.

Table I-1 describes the survey and the main indicators used to measure changes in wellbeing after improvement of water and sanitation services. The water access modules characterize the ways households obtained water at the time of the survey; it provides information on the types of systems the household use to obtain water, their perception of the risk of using the water, the cost of obtaining it and the availability/reliability of the water source. The household characteristics modules elicit information on the education of the household members and the characteristics/state of the infrastructure of the home. The labor modules provide information on the types of activities people engage in (agricultural and non-agricultural, salaried and non-salaried) as well as the income earned by the household. The labor, farm production, income, and inputs modules allows for the measurement of changes in income and household expenditures resulting from improved water and sanitation access. The time allocation module provides information about how household women and children allocate their time, which allows for measurement of the indicators related to hours spent working, taking care of children, carrying water and doing other household chores.

[11] 3,284 households excluding one census segment in the Municipality of Nueva Trinidad because the Mayor refused to allow the survey activities to proceed. The sample includes 1,027 female headed households and 2,257 male-headed households. These households represent 14,626 individuals.

[12] Throughout this report caseríos will be referred as neighborhoods. There is no consistent relationship between a caserío and a census segment. Segments can include more than one caserío or include only a part of a caserío. Segments will be referred as such or as communities.

TABLE I-1 HOUSEHOLD AND COMMUNITY SURVEY OUTLINE

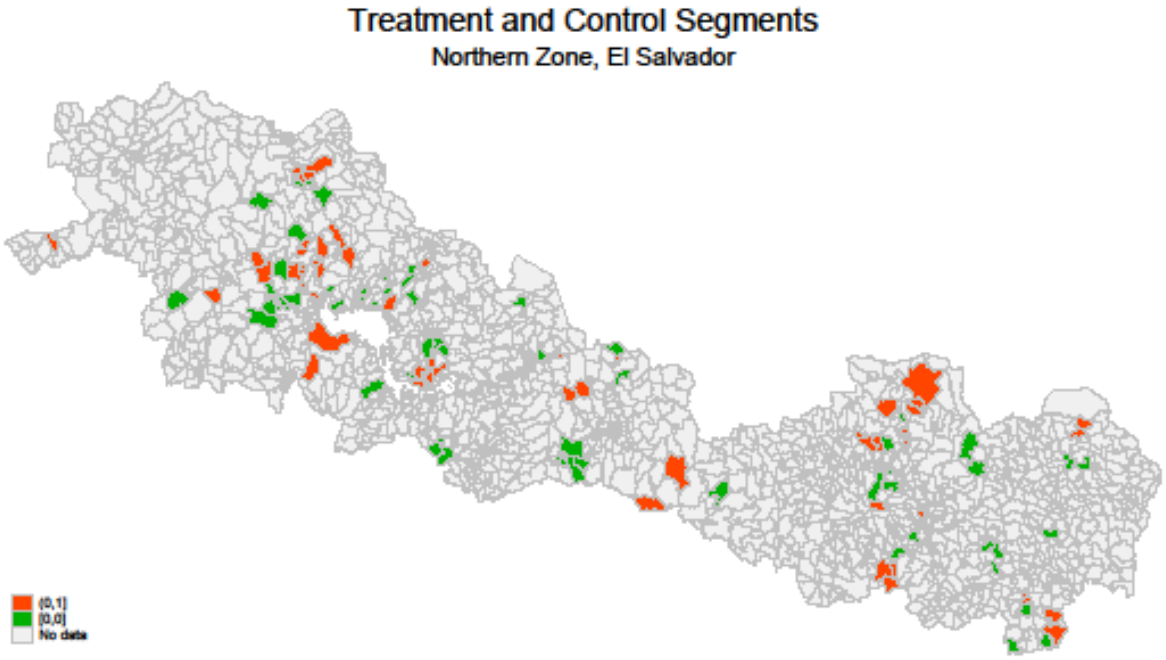
Survey	Modules		Outcomes/Indicators
Household and Individual	Water access through poliducts, public and private taps, wells, natural sources, etc.		Quality, availability of water and coping costs of obtaining water
	Household Characteristics		Time spent collecting water
	Salaried, Independent, Agricultural Labor		
	Agricultural Production and Income		Changes in income and expenditures
	Time allocation		
	Health and Sanitation		Incidence of water related illnesses
Community	Prices and events in the community		
	Water, Sanitation, Electricity and services		Water Consumption, Reduction in days of school or work missed as a result of water-borne diseases

Geographical Distribution of Census Segments

The geographical distribution of treatment and control segments are presented in Figure I-1 for the entire Northern Zone. Treatment segments (in orange) comprise 65 segments with 1,637 households and control segments (in green) comprise 65 segments[13] with 1,647 households.

[13] Most segments have between 24 and 27 observations.

FIGURE I-1 GEOGRAPHICAL DISTRIBUTION OF TREATMENT AND CONTROL SEGMENTS



II. Comparing Treatment and Control at Baseline

Matching Variables

The control group was determined by matching the chosen treatment census segments with control census segments located within the municipalities that were eligible for the water and sanitation program. Propensity score matching was used to identify the control segments that were most similar to treatment segments on observable variables thought to predict likelihood of being chosen for inclusion in a water and sanitation project area. The variables used to predict the propensity score were:

1) Indicators of location
    a. Average temperature
    b. Dummy variables for department
2) Characteristics of population and location
    a. Population of municipality in which segment is located
    b. Density of settlement
    c. Percent of surface area occupied by water bodies (an indicator of access to surface water)
    d. % of households in segment relying on private well for water
    e. Average household size (which is highly correlated with “rural area”)
    f. Average number of household members who had emigrated (an indicator of external resources available to the community)

g. % of households in segment with in-home business (an indicator of economic diversity and non-residential demand for water services)

3) Indicators of inadequate water and/or sanitation
   a. % of households in segment relying on unimproved water source
   b. % of households in segment with piped water, but not receiving water every day
   c. % of households in segment with no improved sanitation facilities
   d. % of households in segment with composting latrines

While we do not have information on all these variables (as measured in the census), we show a comparison of similar variables within our sample. Table II-1 shows these variables and the p-value associated with the test that the means/proportions are the *same* across treatment status. The results show that the matching procedure balances these observables very well. The only variable that is significantly different between control and treatment is our proxy[14] for the population of the municipality.

[14] The proxy is the number of individuals in the sample in that municipality.

TABLE II-1 EX-ANTE MATCHING VARIABLES

	Control		Treatment			
	Mean	SE	Mean	SE	Difference	p-value
Departments						
SANTA ANA	-	-	0.031	0.022	-	0.496
CHALATENANGO	0.477	0.062	0.477	0.062	-	1.000
CUSCATLAN	0.015	0.015	0.062	0.030	-	0.365
CABAÑAS	0.185	0.048	0.077	0.033	-	0.117
SAN MIGUEL	0.015	0.015	-	-	-	1.000
MORAZAN	0.200	0.050	0.246	0.054	-	0.674
LA UNION	0.108	0.039	0.108	0.039	-	1.000
Unimproved	0.017	0.004	0.018	0.004	-0.001	0.889
Natural Sources	0.139	0.021	0.137	0.020	0.002	0.937
Poliducts, Wells	0.294	0.038	0.298	0.035	-0.003	0.946
Public Taps	0.021	0.007	0.030	0.009	-0.009	0.462
Backyard Tap, Neighbors	0.389	0.039	0.399	0.033	-0.010	0.840
In house Tap	0.139	0.017	0.118	0.015	0.021	0.363
Unimproved, Open Air	0.123	0.017	0.088	0.014	0.035	0.105
Latrine, Common or Neighbor	0.041	0.005	0.050	0.006	-0.009	0.256
Backyard Latrine, Hole	0.296	0.027	0.269	0.025	0.027	0.461
Backyard Latrine, Compost/Solar	0.312	0.033	0.323	0.033	-0.011	0.814
Inside Latrine, Hole	0.016	0.004	0.023	0.005	-0.008	0.193
Inside Latrine, Compost/Solar	0.012	0.005	0.020	0.004	-0.008	0.192
Backyard Toilet	0.086	0.012	0.086	0.011	0.001	0.962
Inside Toilet	0.114	0.014	0.141	0.019	-0.027	0.255
HH Size	4.267	0.082	4.189	0.076	0.078	0.483
Avg. No. members abroad	0.452	0.043	0.376	0.035	0.076	0.173
Municipality Pop. (Proxy)	477.09	31.23	604.28	45.16	-127.18	0.02**

* p<0.1 ** p<0.05 ***p<0.01
Observations : 130 Segments

Community-Level Characteristics

Water and Sanitary Services

In the community survey we have included several indicators of the situation/environment where the households live and how they obtain water, administer the water system, etc. Table II-2 show some characteristics of the institutional situation in the community that are related to water. There are no significant[15] differences in the administrative institutions set-up or that manage the water systems, both ADESCO (Community Development Associations) and water committees; only the distribution of the number of neighborhoods covered by water committees differs significantly across treatment groups.

Both treatment and control communities have had improvements since January 2009. In absolute terms, controls have had more improvements in water services, and essentially all these improvements have been to increase access. In the treatment group, improvements have been fewer but include improvement in the quality of water as well as expanding access. Most of the communities, charge for water consumption and are able to cover their operating costs and small improvements. However, communities have fixed charges per households for the most part; this is something we will need to monitor, as all the new water projects are expected to require that household have a meter and we expect that the water consumption behavior of households could change because the presence of the meter[16].

Table II-3 shows the number of communities that have benefited from improved sanitation projects across treatment status and the payments that household made for latrines, as reported by key informants. There are no significant differences between treatment and control across these indicators. The average payment[17] for latrines among the households that did not get latrines for free is around $40.

[15] Throughout the report categorical variables are tested for differences between control and treatment groups using a Pearson Chi squared test or Fisher's exact test for smaller contingency table counts. These test that the distribution of counts across categories in the control group is independent of that in the treatment group.

[16] For example, water consumption might decrease after the projects are implemented if households reallocated their water consumption across other source, i.e. use the tap water for drinking, cooking, etc., and use existing well for doing laundry, cleaning, etc.

[17] Throughout the report all money figures represent US dollars, which is the currency of El Salvador.

TABLE II-2 COMMUNITY CHARACTERISTICS: INSTITUTIONS

Community Characteristics	Control		Treatment		Total		
	Number	%	Number	%	Number	%	Exact Fisher
Is there an ADESCO?							1.00
Yes	55	84.62	56	86.15	111	85.38	
No	10	15.38	9	13.85	19	14.62	
How many caserios ADESCO covers?							0.38
1	32	58.18	34	60.71	66	59.46	
2	8	14.55	9	16.07	17	15.32	
3	9	16.36	3	5.36	12	10.81	
4	3	5.45	7	12.50	10	9.01	
5	1	1.82	0	-	1	0.90	
6	1	1.82	2	3.57	3	2.70	
7	1	1.82	1	1.79	2	1.80	
Is there a water committee?							0.38
Yes	29	44.62	35	53.85	64	49.23	
No	36	55.38	30	46.15	66	50.77	
How many caserios water committee covers?							0.09 *
1	15	51.72	18	51.43	33	51.56	
2	6	20.69	5	14.29	11	17.19	
3	5	17.24	3	8.57	8	12.50	
4	1	3.45	8	22.86	9	14.06	
5	2	6.90	0	-	2	3.13	
6	0	-	1	2.86	1	1.56	
Improvements in the water system since January 2009?							0.48
Yes	14	33.33	10	25.64	24	29.63	
No	28	66.67	29	74.36	57	70.37	
Improvements in the water service since 2009?							0.17
Expand the system to other houses	10	71.43	5	50.00	15	62.50	
Improve quality of water	1	7.14	3	30.00	4	16.67	
Increase frequency	0	-	1	10.00	1	4.17	
Treat with Chlorine	0	-	1	10.00	1	4.17	
Changing the Pipes	2	14.29	0	-	2	8.33	
Cantareras Construction	1	7.14	0	-	1	4.17	
Is the water treated with chlorine?							0.77
Yes	34	80.95	33	84.62	67	82.72	
No	8	19.05	6	15.38	14	17.28	
Is there a charge for water consumption?							
Yes, Regular payment	40	95.24	33	84.62	73	90.12	0.15
Yes, Irregular when there are expenses	1	2.38	1	2.56	2	2.47	
No	1	2.38	5	12.82	6	7.41	
How are Households charged?							
By quantity consumed (metered)	5	12.50	7	21.21	12	16.44	0.48
Monthly fixed charge per tap/house	26	65.00	20	60.61	46	63.01	
Monthly fixed charge per person	9	22.50	5	15.15	14	19.18	
Annual fixed payment	0	-	1	3.03	1	1.37	
Can HH payments cover operation costs?							0.58
Yes	32	80.00	24	72.73	56	76.71	
No	8	20.00	9	27.27	17	23.29	
Can HH payments cover improvements costs?							0.33
Yes	27	84.38	17	70.83	44	78.57	
No	5	15.63	7	29.17	12	21.43	

* p<0.1 ** p<0.05 ***p<0.01

TABLE II-3 SANITATION PROJECTS IN COMMUNITIES

Sanitation Projects	Control		Treatment		Total		Fisher p-value
	Number	%	Number	%	Number	%	
Improve Drainage of gray waters							
Yes	3	4.62	1	1.54	4	3.08	0.62
No	62	95.38	64	98.46	126	96.92	
Build Latrines							0.85
Yes	45	69.23	43	66.15	88	67.69	
No	20	30.77	22	33.85	42	32.31	

How much did HH pay for the Latrines?	Mean	SE	Mean	SE	Mean	SE	Difference	p-value
Overall Mean	7.45	3.78	7.95	3.07	7.70	2.43	-0.50	0.92
Mean if payment>0	46.86	18.32	38.00	9.69	41.88	9.39	8.86	0.66

* p<0.1 ** p<0.05 ***p<0.01

Prices and Shocks

We also asked the community informants about the shocks that have affected the community in the year before the survey. Figure II-1 shows the proportion of communities that have experienced considerable changes. The main events that are reported are increases in agricultural prices, pests and floods[18]. The significance tests in

Table II-4 reveal that only floods and other contagious diseases are significantly different between treatment and control.

FIGURE II-1 EVENTS AFFECTING COMMUNITIES

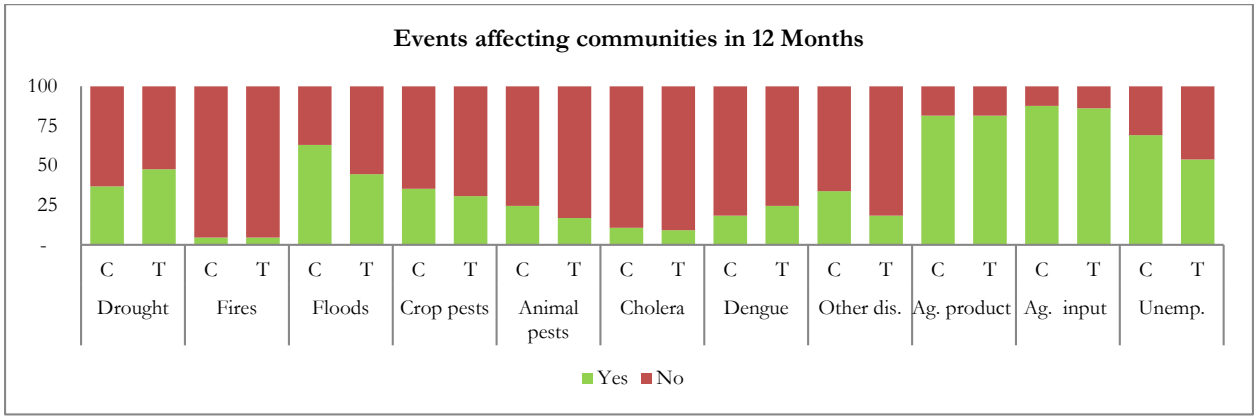


TABLE II-4 EVENTS IN THE COMMUNITY: TESTS

	Fisher p-value	
Drought	0.29	
Fires	1.00	
Too much rain / floods	0.05	*
Pests that affect the crops	0.71	
Pests / sickness that affected the animals	0.39	
Many cases of cholera or diarrhea, etc.	1.00	
Many cases of dengue, diarrhea, etc.	0.52	
Other contagious disease of habitants	0.07	*
Change in prices of agricultural products	1.00	
Change in prices of agricultural inputs	1.00	
Less work than before	0.10	

* p<0.1 ** p<0.05 ***p<0.01

Recent floods in El Salvador have not caused major delays in the expected finishing dates of the water projects; however, if shocks, like floods, differentially affect the treatment groups this can introduce bias in the impact estimates[19]; it is important to keep track of shocks that affect

[18] Contingency tables in appendix B(Table B-1)

[19] For example, if the controls are affected by more floods in period 1, they will have an bigger increase in say, income, from period 1 to 2 (to get to their normal income growth) because of the absence of the shock in period 2,

the communities so we can adjust our expectations of the level of impact and the kind of robustness checks that should be performed.

Household Characteristics, Levels of Access and Outcome Measures

To allow for measurement of any changes in water and sanitation quality, several indicators were used; for example, water consumption, expenditure on water treatment, health measures and other coping costs. We start by describing the characteristics of households in the matched treatment and control segments. This baseline comparison serves to gauge how well the matching procedure served to balance observable characteristics.

Household Characteristics

Table II-5 through Table II-8describes the characteristics of the houses where individuals in the sample live. The materials from which the walls and floors are made are (jointly) significantly different across treatment groups. Individually the classifications are well balanced across treatments and controls; more than 40 percent of the sample lives in houses with concrete walls, while over 25 percent have earth floors which increase the probability of transmission of diseases.

TABLE II-5 MATERIAL ON THE WALLS

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Concrete	689	41.8	785	48.0	1474	44.9
Bahareque (Straw+Clay)	69	4.2	55	3.4	124	3.8
Adobe	804	48.8	728	44.5	1532	46.7
Wood	12	0.7	11	0.7	23	0.7
Metal plate (good)	22	1.3	16	1.0	38	1.2
Metal plate (bad)	12	0.7	13	0.8	25	0.8
Straw or palm	14	0.9	22	1.3	36	1.1
Discarded materials	19	1.2	6	0.4	25	0.8
Playbol or bamboo	6	0.4	1	0.1	7	0.2
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	24.71	0.00	***

which will bias the impact estimated downward. It could also be the case that the shock decreases the rate of growth in the controls, which would bias the impact estimates upwards.

TABLE II-6 MATERIALS ON FLOOR

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Ceramic bricks	156	9.5	158	9.7	314	9.6
Cement bricks	415	25.2	513	31.3	928	28.3
Clay bricks	49	3.0	47	2.9	96	2.9
Cement	580	35.2	504	30.8	1084	33.0
Earth	447	27.1	415	25.4	862	26.2
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	16.89	0.00	***

Energy/Electricity show few differences between the control and treatment groups in the baseline study; the majority of households are connected to the electrical grid and use propane or wood as their principal source of fuel for cooking.

TABLE II-7 LIGHTING/ ENERGY SOURCE TYPE

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
None/Daylight	4	0.2	9	0.5	13	0.4
Own Electricity connection	1362	82.7	1332	81.4	2694	82.0
Neighbor's electricity connection	103	6.3	97	5.9	200	6.1
Kerosene	105	6.4	95	5.8	200	6.1
Candles	35	2.1	60	3.7	95	2.9
Solar Panel	28	1.7	28	1.7	56	1.7
Electric generator	1	0.1	1	0.1	2	0.1
Wood	3	0.2	6	0.4	9	0.3
Car battery	1	0.1	2	0.1	3	0.1
Handheld lamp	5	0.3	7	0.4	12	0.4
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value
	11.15	0.27

TABLE II-8 PRINCIPAL FUEL SOURCE

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Gas (propane)	860	52.22	866	52.90	1726	52.56
Electricity	1	0.06	0	0.00	1	0.03
Coal	0	0.00	1	0.06	1	0.03
Wood	768	46.63	741	45.27	1509	45.95
Does not cook	18	1.09	29	1.77	47	1.43
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value
	5.05	0.28

The majority of sample households live in rural areas, increasing travel times to institutions that provide public services, health services and access to non-farm productive activities.

Table II-9 gives the mean travel times to these kinds of institutions; most of the differences between groups are significant but, with the exception of travel time to markets, are of negligible magnitudes.

TABLE II-9 AVERAGE TRAVEL TIME IN MINUTES

	Control			Treatment			Total					
	Mean	SE	Obs	Mean	SE	Obs	Mean	SE	Obs	Difference	p-value	
Center of the Canton	16.2	0.5	1277	17.5	0.6	1419	16.9	0.4	2696	-1.3	0.083	*
City hall	34.9	0.7	1482	37.7	0.8	1523	36.4	0.6	3005	-2.8	0.012	**
Bus stop	14.6	0.5	1458	16.4	0.6	1482	15.5	0.4	2940	-1.8	0.018	**
Health unit	30.8	0.6	1505	31.7	0.7	1509	31.2	0.5	3014	-0.9	0.342	
3rd grade school	15.5	0.5	847	14.1	0.4	915	14.8	0.3	1762	1.3	0.042	**
3rd cycle school	17.9	0.6	856	18.4	0.6	876	18.1	0.4	1732	-0.6	0.491	
Market	41.9	1.0	856	50.0	1.3	854	46.0	0.8	1710	-8.1	0.000	***

* p<0.1 ** p<0.05 ***p<0.01

To gage the productive capabilities of households it is necessary to analyze household composition to better understand possible intra-household dynamics in the allocation of resources. Table II-10 and Table II-11 show some important characteristics of households and their corresponding significance tests for differences across groups. Female-headed households account for just over 30 percent of the sample and over 65 percent of the sample have children present. The only significant difference between the control and treatment groups is the presence (and number) of children aged 3 to 16 that carry water in the households, with the treatment group having a higher proportion, with 11.5 percent of the households in the treatment group having children that help to bring water to the household, relative to 7.6 percent in the comparisons.

TABLE II-10 HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS

	Control		Treatment		Total	
	Mean	SE	Mean	SE	Mean	SE
Female Headed HH	31.0%	1.1%	31.6%	1.1%	31.3%	0.8%
Children 0-16 present	66.9%	1.2%	68.0%	1.2%	67.5%	0.8%
No. Children 0-16	1.56	0.04	1.49	0.04	1.52	0.03
Child under 5 present	32.6%	1.2%	32.3%	1.2%	32.5%	0.8%
No. Child under 5	0.40	0.02	0.40	0.02	0.40	0.01
Male, Child under 5 present	17.6%	0.9%	19.3%	1.0%	18.4%	0.7%
No. Male, Child under 5	0.19	0.01	0.21	0.01	0.20	0.01
Female, Child under 5 present	18.7%	1.0%	17.2%	0.9%	18.0%	0.7%
No. Female, Child under 5	0.20	0.01	0.19	0.01	0.20	0.01
Child 3-16 Carry Water present	7.6%	0.7%	11.5%	0.8%	9.5%	0.5%
No. Child 3-16 Carry Water	0.11	0.01	0.18	0.01	0.15	0.01

TABLE II-11 TESTS: HOUSEHOLD DEMOGRAPHIC CHARACTERISTICS

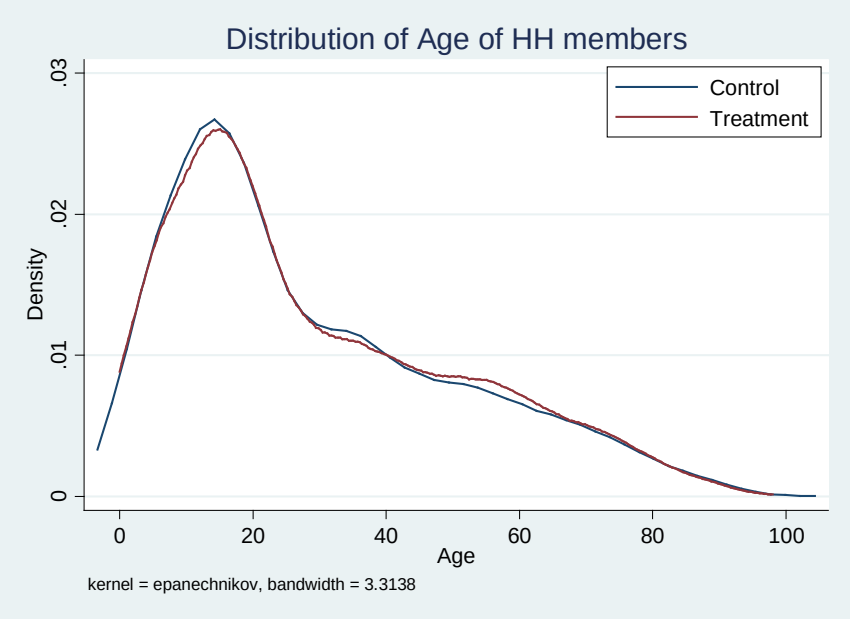
	Difference	p-value
Children 0-16	0.069	0.187
Child under 5	-0.007	0.767
Male, Child under 5	-0.021	0.179
Female, Child under 5	0.014	0.345
Child 3-16 Carry Water	-0.065	0.000 ***

	Fisher p-value
Female Headed HH	0.707
Indicator, Children 0-16	0.527
Indicator, Child under 5	0.823
Indicator, Male, Child under 5	0.209
Indicator, Female, Child under 5	0.276
Indicator, Child 3-16 Carry Water	0.000 ***

* p<0.1 ** p<0.05 ***p<0.01

The age distribution of the individuals in the sample can be seen in Figure II-2. No discernible differences between treatment and controls are observed. The individuals in the sample tend to be young, though there is a considerable senior (over 60) population, as many of the individuals live in extended family households.

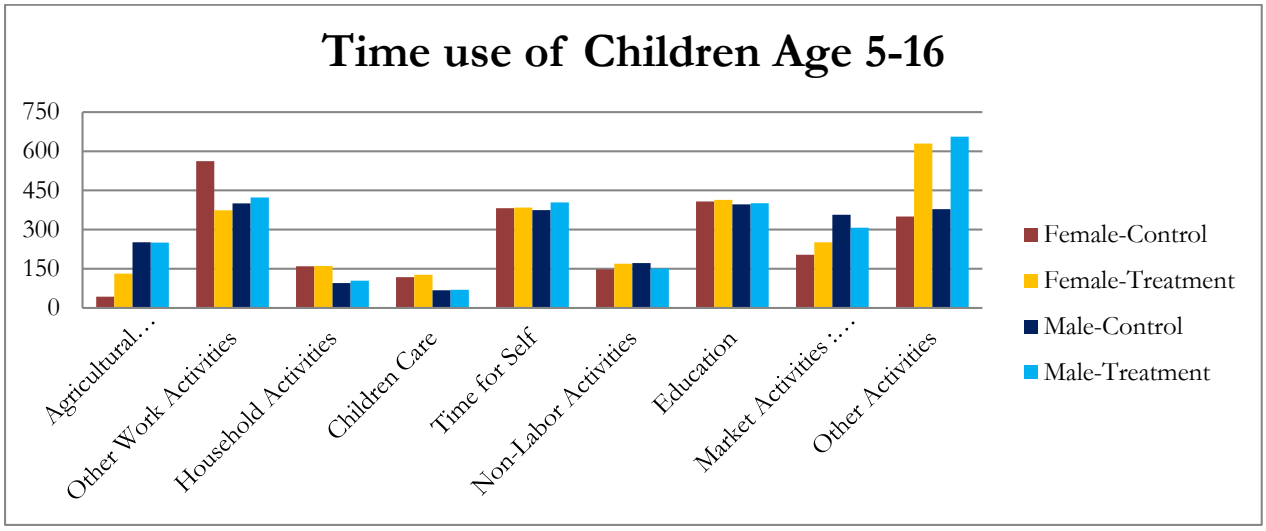
FIGURE II-2 AGE DISTRIBUTION



Furthermore, we are interested in the activities of children and youth in the household; one of the potential benefits of increases in water availability is that school age children/youth will be able to devote more time to studying (or leisure). We use the information from the time use section of the survey, which collects information on the activities recorded during one day for children age five to sixteen and women (head of household or spouse of head of household). This sample consists of 3038 women over 16 years of age, 903 girls and 1028 boys between age 5 and 16.

Figure II-3 presents the time use of school age children for a broad range of categories and is disaggregated by sex. On average, the time use section accounts for 14 hours of activities during the day. The observations that emerge from the figure and Table II-12 are that for girls and boys (marginally) there are significant differences across treatment status only for the 'Other Activities' categories[20], which include travelling, sewing, landscaping and other. For boys there are also significant differences in time use for self, which includes reading, grooming, eating, sleeping, etc., also there are marginally significant differences for non-labor activities (social and religious events mostly). We note that the mean calculations exclude individuals that do not report spending time in a given category. Thus, the small size of some cells when they are disaggregated, for example agricultural production and other work activities; in addition, this sample is comprised of children, so we should not expect work cells to be very populated. Comparing across gender within treatment and control groups there are significant differences for time spent in agricultural production and household activities, with boys spending more time in agricultural activities and girls more time in household activities. Lastly, for the categories that are most important for the evaluation, namely education, work and leisure-related categories, both groups are well balanced.

FIGURE II-3 TIME USE OF CHILDREN IN MINUTES



[20] The differences in time spent in other activities we take with a grain of salt. The means are calculated with very few observations and the difference between treatment and control is very large (almost double).

TABLE II-12 TIME USE OF CHILDREN AGE 5-16 IN MINUTES

Comparing Across Treatment Status

	Female							Male						
	Control		Treatment		Difference	p-value		Control		Treatment		Difference	p-value	
	Mean	Obs	Mean	Obs				Mean	Obs	Mean	Obs			
Agricultural Production	43.33	6	131.36	11	-88.03	0.23		251.25	60	250.20	74	1.05	0.97	
Other Work Activities	562.14	7	373.75	8	188.39	0.23		400.50	30	423.18	28	-22.68	0.68	
Household Activities	159.63	241	161.11	212	-1.48	0.90		95.47	128	104.58	143	-9.11	0.36	
Children Care	117.90	31	126.92	39	-9.02	0.78		67.78	18	69.69	16	-1.91	0.89	
Time for Self	381.72	458	384.32	442	-2.60	0.79		374.77	509	404.05	517	-29.28	0.00	***
Non-Labor Activities	148.06	121	169.13	134	-21.08	0.12		172.17	205	150.75	201	21.42	0.05	*
Education	407.80	356	413.76	334	-5.96	0.53		396.93	409	400.96	390	-4.03	0.62	
Market Activities: Selling	204.00	10	251.25	8	-47.25	0.60		356.67	3	307.50	4	49.17	0.78	
Other Activities	350.00	12	629.55	11	-279.55	0.01	***	378.33	15	655.83	6	-277.50	0.06	*
Total Time Use	851.34	459	864.97	444	-13.63	0.00	***	855.94	509	861.71	519	-5.77	0.20	
Market Activities: Buying	285.00	1	210.00	4	75.00	.								

Comparing Across Gender

	Control							Treatment						
	Male		Female		Difference	p-value		Male		Female		Difference	p-value	
	Mean	Obs	Mean	Obs				Mean	Obs	Mean	Obs			
Agricultural Production	251.25	60	43.33	6	207.92	0.00	***	250.20	74	131.36	11	118.84	0.04	**
Other Work Activities	400.50	30	562.14	7	-161.64	0.12		423.18	28	373.75	8	49.43	0.55	
Household Activities	95.47	128	159.63	241	-64.16	0.00	***	104.58	143	161.11	212	-56.53	0.00	***
Children Care	67.78	18	117.90	31	-50.13	0.12		69.69	16	126.92	39	-57.24	0.10	*
Time for Self	374.77	509	381.72	458	-6.94	0.45		404.05	517	384.32	442	19.73	0.04	**
Non-Labor Activities	172.17	205	148.06	121	24.11	0.07	*	150.75	201	169.13	134	-18.39	0.12	
Education	396.93	409	407.80	356	-10.87	0.19		400.96	390	413.76	334	-12.80	0.16	
Market Activities: Selling	356.67	3	204.00	10	152.67	0.16		307.50	4	251.25	8	56.25	0.70	
Other Activities	378.33	15	350.00	12	28.33	0.79		655.83	6	629.55	11	26.29	0.82	
Total Time Use	855.94	509	851.34	459	4.60	0.35		861.71	519	864.97	444	-3.25	0.45	
Market Activities: Buying								60.00	1	210.00	4	-150.00	.	

* p<0.1 ** p<0.05 ***p<0.01

We explore the characteristics of children in our sample further. Table II-13 tells us that the majority of the school age population knows how to read and is currently attending school; there are no significant differences across groups. Table II-14 shows the mean years of education of the household head is below 5 years for both groups. It is somewhat encouraging that a high proportion of school age children are attending school despite the low level of education of the head of household.

TABLE II-13 EDUCATION CHARACTERISTICS FOR CHILDREN/YOUTH 6 TO 18

	Control		Treatment		Total		Fisher
	Number	%	Number	%	Number	%	p-value
Knows how to read?							0.960
Yes	1714	88.1	1579	88.1	3293	88.1	
No	231	11.9	214	11.9	445	11.9	
Total	1945	100	1793	100	3738	100	
School Attendance							0.380
Attending	1685	86.6	1571	87.6	3256	87.1	
Does not attend	260	13.4	222	12.4	482	12.9	
Total	1945	100	1793	100	3738	100	
Level for those Attending							0.190
Kindergarten (1ª a 3ª)	69	4.1	77	4.9	146	4.5	
Basic (1ª a 9)	1533	91.0	1396	88.9	2929	90.0	
High School (10ª a 12ª)	82	4.9	97	6.2	179	5.5	
University (1ª a 15)	1	0.1	1	0.1	2	0.1	
Total	1685	100	1571	100	3256	100	

* p<0.1 ** p<0.05 ***p<0.01

TABLE II-14 MEAN YEARS OF EDUCATION OF HEAD OF HOUSEHOLD

	Mean	SE	Obs
Control	4.80	0.10	1006
Treatment	4.70	0.09	1107
Total	4.75	0.07	2113
Difference	0.10		
p-value	0.47		

* p<0.1 ** p<0.05 ***p<0.01

To conclude our description of household characteristics we present the time use of head of household women and the spouses of head of households in our sample. Table II-15 and Figure II-4 present our calculations. Time spent across activities is well balanced, with no significant differences across categories. We note that women seem to spend little time in agricultural production activities, with most time spent in other productive activities and household activities. The only significant difference is for total time use reported, with this difference being small, only 7 minutes higher in treatment group[21].

FIGURE II-4 TIME USE OF WOMEN OVER AGE 16

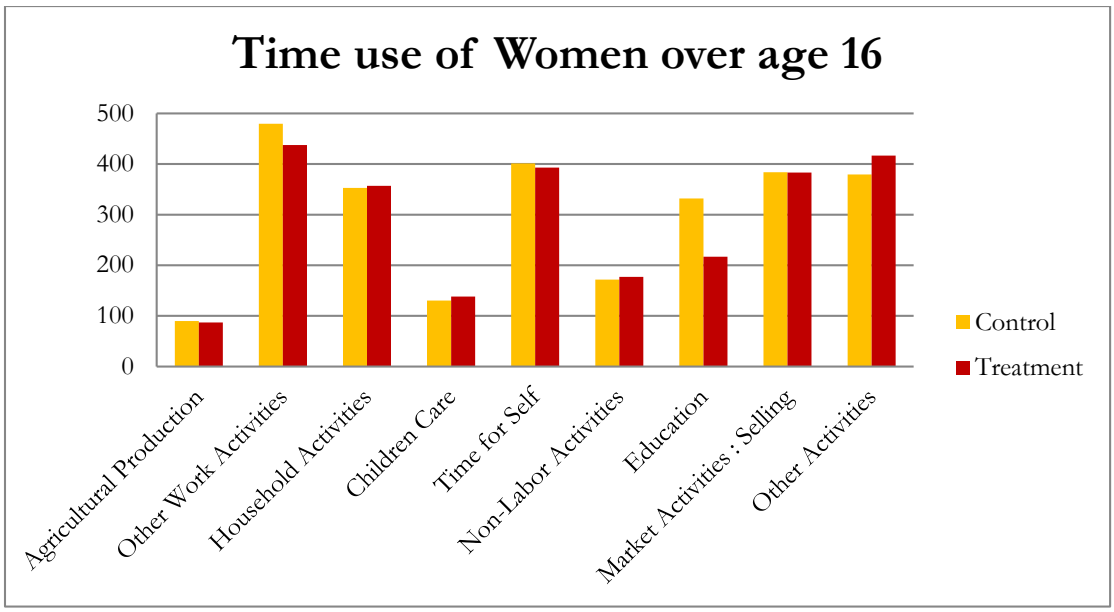


TABLE II-15 TIME USE OF WOMEN OVER AGE 16

	Control		Treatment		Difference	p-value	
	Mean	Obs	Mean	Obs			
Agricultural Production	89.83	144	86.94	124	2.89	0.82	
Other Work Activities	479.61	130	437.56	176	42.05	0.11	
Household Activities	352.80	1466	356.97	1449	-4.17	0.47	
Children Care	130.36	193	138.09	194	-7.73	0.49	
Time for Self	401.27	1519	392.93	1508	8.34	0.14	
Non-Labor Activities	171.76	299	177.07	311	-5.32	0.59	
Education	331.88	24	217.00	16	114.88	0.17	
Market Activities : Selling	383.73	93	383.18	121	0.55	0.98	
Other Activities	379.44	116	416.76	91	-37.32	0.28	
Total Time Use	897.83	1525	905.20	1513	-7.37	0.01	***
Market Activities: Buying	130.65	23	131.94	18	-1.29	0.96	

* p<0.1 ** p<0.05 ***p<0.01

[21] See figures under the heading Figure A-18 in the appendix for the distribution of time use for selected categories for children and women.

Water Access and Use

The survey allows households to report multiple ways in which they obtain water and satisfy their sanitary needs. To deal with the possibility of overlap across water sources we created an "Improved Water Access Score," where households were assigned a number between 0 and 5 to reflect the most improved water source they use; for example, if a household reported using public taps and the tap of a neighbor this household would get a score of 4, because getting water from a neighbor is more convenient that walking to the public tap of the community[22]. We call a 'tap connection' a water source that derives from a formal water distribution system, and permits households to connect their internal (house) water system to the distribution system. Figure II-5 shows the proportion of households in the sample that fall in each category (score). It shows that more than 50 percent of the households in the sample have water through a tap connection in their home, backyard or neighbor's connection. There are no significant differences in the distribution of scores between treatment and controls. Around 45 percent of the households in the treatment segments use untreated water sources like wells and springs to obtain water. We expect changes in the water source use to be reflected in the scores after the intervention, as the score will reflect the households that have access to potable/tap connections even if they do not abandon their use of unimproved water sources.

FIGURE II-5 WATER ACCESS SCORES DISTRIBUTION

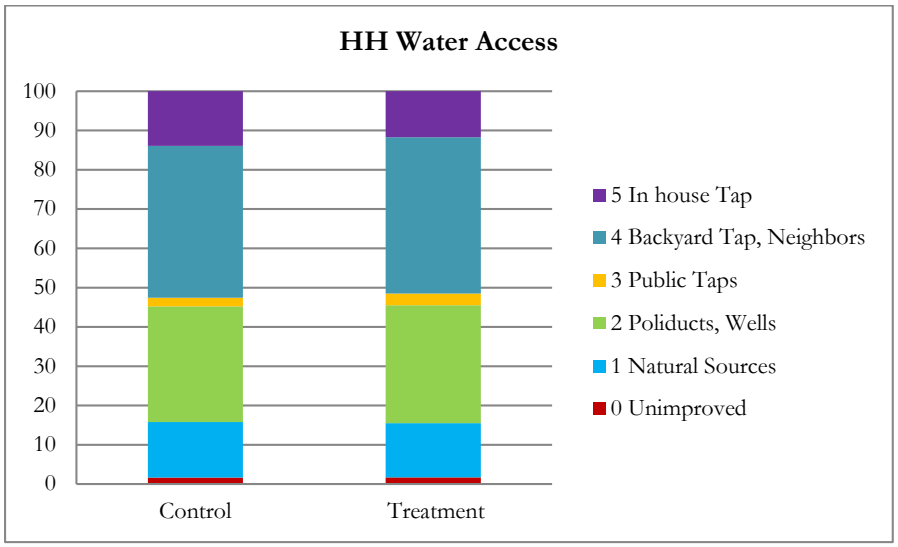
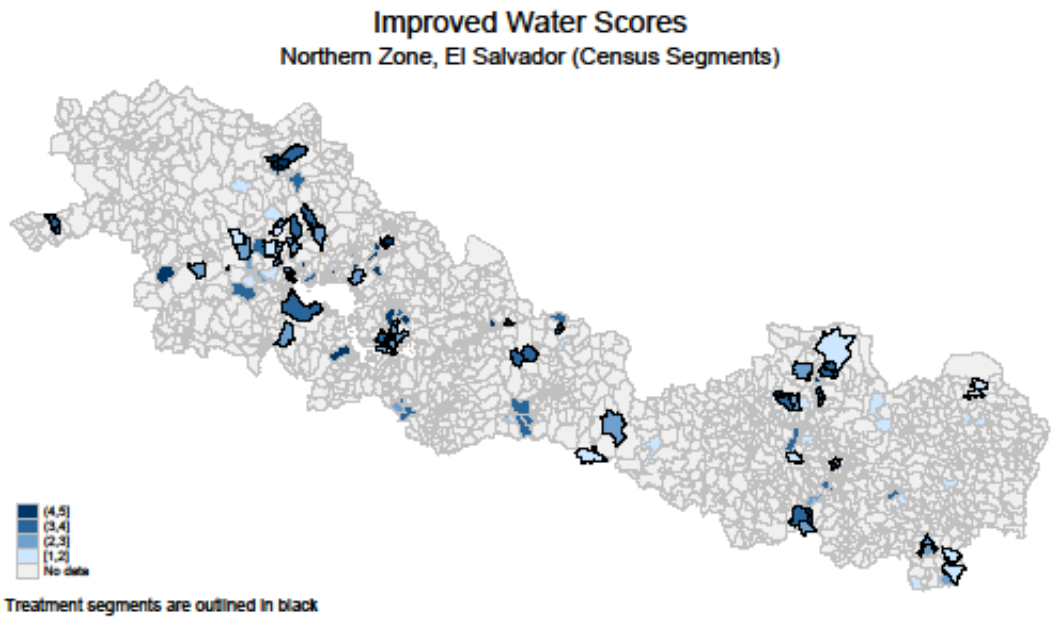


Figure II-6 shows the average score in each segment. Darker blues represent higher average values, thus households in darker segments have more access to improved water sources. The figure highlights that treatment segments (outlined in black) in the northeast tend to have lower scores than those in the northwest.

[22] Table B-10 shows the contingency table for the improved water and sanitation scores. Scores range from 0 (for unimproved/no information) to 5 (for in-house tap water connection).

FIGURE II-6 GEOGRAPHIC DISTRIBUTION OF MEAN IMPROVED WATER SCORES



Households that have access to a tap use it as a principal source of water for drinking, cooking and doing laundry. This and the fact that that households use many non-potable water sources for cooking and drinking are illustrated in Figure II-7. The distribution across sources is significantly different across treatment status for cooking, drinking and water for laundry[23].

[23] Table B-2, Table B-3, Table B-4

FIGURE II-7 SOURCES OF WATER FOR DRINKING, COOKING AND DOING LAUNDRY

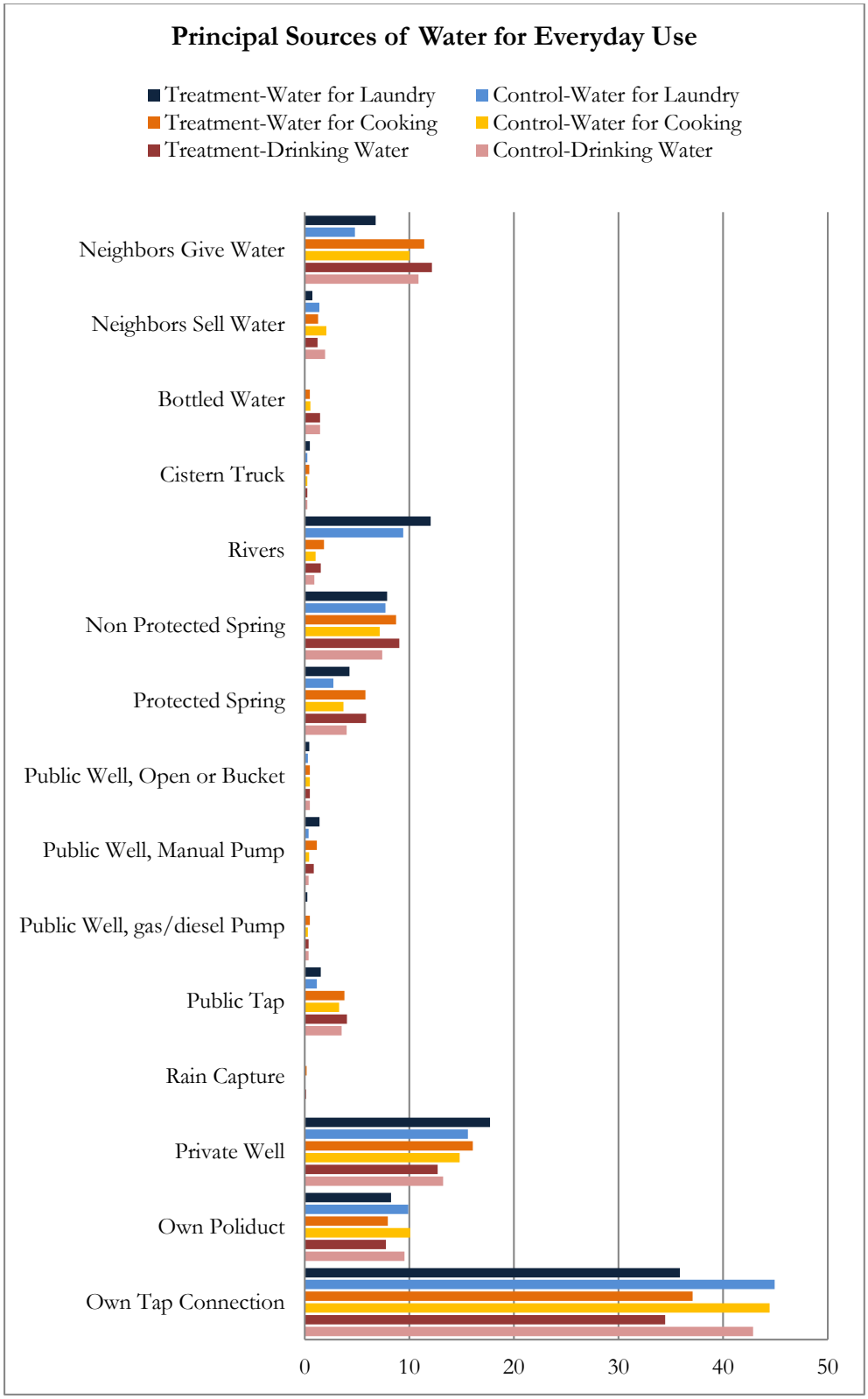


Table II-16 shows that treatment households spend more time than control households carrying water; spending 2.37 hours per week. Time spent doing laundry is on average 2.2 hours per week with no significant differences between treatment and controls.

The significant differences found in water sources used for drinking, cooking and doing laundry and the difference in time spent carrying water, highlight the importance of controlling for covariates and the advantages of using multiple data points in the final evaluation.

TABLE II-16 MEAN HOURS PER HOUSEHOLD SPENT CARRYING WATER AND LAUNDRY

	Control		Treatment		Total			
	Mean	SE	Mean	SE	Mean	SE	Difference	p-value
Time spent carrying water, hrs/week	1.61	0.11	2.37	0.14	1.99	0.09	-0.77	0.00 ***
Time spent doing laundry, hrs/week	2.07	0.16	2.36	0.14	2.21	0.11	-0.30	0.17

* p<0.1 ** p<0.05 ***p<0.01

Table II-17 shows the average number of minutes it takes to travel to different water sources. On average, public taps are 200 meters away from households, public wells and taps are on average within 6 to 8 minutes, and springs and rivers are around 12 minutes. The only statistically significant differences are for public wells and other sources at the 10 percent level. The difference is less than two minutes between treatment and control groups and thus not economically significant.

TABLE II-17 AVERAGE TRAVEL TIME AND DISTANCE TO WATER SOURCES

	Control			Treatment			Total					
	Mean	SE	Obs	Mean	SE	Obs	Mean	SE	Obs	Difference	p-value	
Distance to Public Tap (Meters)	219.0	17.4	256	184.3	14.9	240	202.2	11.6	496	34.68	0.13	
Minutes Walking, One way												
Public Tap	6.4	0.4	259	6.0	0.4	240	6.2	0.3	499	0.44	0.42	
Other Sources	11.9	0.4	881	12.9	0.5	848	12.4	0.3	1729	-1.06	0.08	*
Public Well	9.0	0.8	95	7.3	0.5	170	7.9	0.4	265	1.68	0.06	*
Springs	11.4	0.5	568	11.5	0.4	711	11.5	0.3	1279	-0.18	0.77	

* p<0.1 ** p<0.05 ***p<0.01

Figure II-8 shows a more nuanced picture of travel times to water sources. First, most households that report the presence of these water sources in the neighborhood, are less than 15 minutes from the sources, with only natural water sources having travel times above 30 minutes. In addition, we test for differences in the travel times to each type of source between

treatment and control groups using the Kolmogorov-Smirnov two sample test[24] and find no significant differences in any of the water sources.

FIGURE II-8 DISTRIBUTION OF TRAVEL TIME TO WATER SOURCES

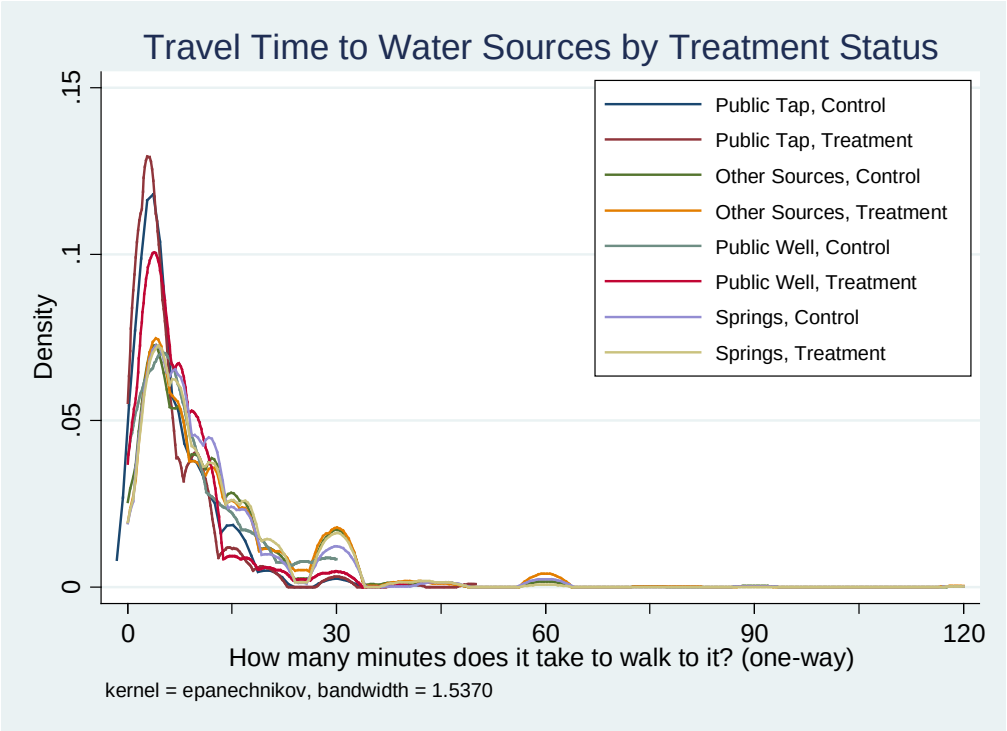
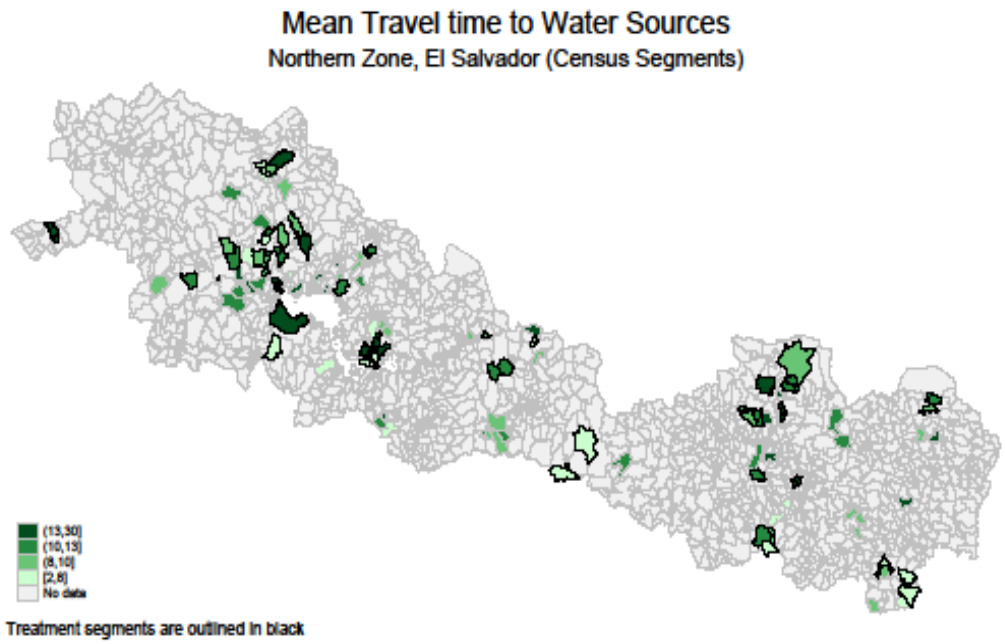


Figure II-9 shows mean travel time to water sources for each segment. Darker colors imply that households would have to travel longer to obtain water from sources available to them. We observe no discernible differences across treatment and control groups.

[24] Table B-22 shows the results of the tests.

FIGURE II-9 GEOGRAPHIC DISTRIBUTION OF MEAN TRAVEL TIME TO WATER SOURCES



Water Costs

We also collected information on what households pay to get water into their home and treat it to make it "safe" for human consumption; for example, consumption costs for those that have a tap connection, fees for those that use public taps, wells and other protected sources. In addition, we have information on the investment costs the household incurred to set up their water collection systems. Table II-18 shows the average payments for different costs related to water consumption. Households connected to a tap connection pay on average $3.67 in the control group and $3.17 in the treatment group. The difference in payment for monthly and annual payments is statistically different from zero; however, the difference is small - around fifty cents per month. Note that some cells have a small number of observations; this is because many households do not pay regularly (or at all) to access water. The costs to use the public taps is lower, under $2 for both groups.

TABLE II-18 COSTS/CHARGES/FEES FOR WATER ACCESS

	Control			Treatment				
Charges HH tap water	Mean	SE	Obs	Mean	SE	Obs	Difference	p-value
Annual fee	17.84	0.89	128	14.95	0.81	145	2.89	0.02 **
Monthly fee	3.67	0.13	314	3.17	0.17	353	0.50	0.02 **
Fixed amount per HH/Month	3.87	0.30	196	3.22	0.21	128	0.64	0.12
Fixed amount every six months	18.56	3.28	3					
Charges for Public tap water								
Annual fee	8.13	1.24	8	6.25	3.25	2	1.88	0.54
Monthly fee	1.63	0.09	48	1.38	0.09	23	0.25	0.08 *
Depends on Quantity	2.50 .		1	1.77	0.34	25		

* p<0.1 ** p<0.05 ***p<0.01

Table II-19 present various costs related to water as reported by the households[25]. Only costs to access public taps and springs in the seven days before the survey are significantly different and the differences are small in magnitude. Costs to install water delivery systems are moderate, except for well systems; these wells systems will be the ones that will be less likely to be abandoned after program implementation because of their higher up-front costs.

Water consumption for household connected to the tap systems stands at 18 cubic meters per month (some 600 liters per household/day or 130 liter per person/day). We use this water consumption measure to estimate a price per cubic meter of water; we do this by calculating monthly expenses for water consumption for households with a tap connection and imputing median payment amounts by segment for households that are not connected, then a similar procedure is done for water consumption in cubic meters. The result is a weighted average of the median prices for cubic meters of water across the segments. Table II-20 shows the estimated average price per cubic meter of water is 37 cents and ranges from one penny to 3 dollars.

[25] Tabulations of the water sources used by households are found in Table B-5. For example, we have 206 households that bought water (in the previous 30 days) of the 856 households that were asked the question.

TABLE II-19 WATER CONSUMPTION, TREATMENT, SYSTEMS AND OTHER WATER RELATED COSTS

	Control			Treatment			Total					
	Mean	SE	Obs	Mean	SE	Obs	Mean	SE	Obs	Difference	p-value	
Chlorine	0.40	0.08	99	0.51	0.08	147	0.47	0.06	246	-0.11	0.33	
Filters	16.00	11.66	5	44.89	22.71	18	38.61	17.99	23	-28.89	0.52	
Payments to Neighbors	0.84	0.24	64	0.59	0.18	71	0.71	0.15	135	0.25	0.40	
Shared tap payments	3.35	0.12	745	2.78	0.13	695	3.08	0.09	1440	0.57	0.00	***
System installation costs												
Poliduct system	61.03	12.22	22	35.82	13.61	13	51.67	9.30	35	25.21	0.19	
Hose	25.00	6.45	4	15.67	2.33	3	21.00	4.03	7	9.33	0.29	
Rain capture system	19.78	2.80	118	22.15	3.13	159	21.14	2.15	277	-2.38	0.59	
Wells system	588.15	62.92	198	503.96	64.78	218	544.03	45.26	416	84.19	0.35	
Well Pump	249.91	37.31	170	225.12	23.84	150	238.29	22.73	320	24.78	0.59	
Payments in the last 7 days												
Truck	5.08	0.59	56	4.24	0.24	142	4.48	0.24	198	0.84	0.12	
Public tap	0.54	0.23	63	0.07	0.02	86	0.27	0.10	149	0.47	0.02	**
Public tap transport	0.00	0.00	64	0.08	0.06	87	0.05	0.03	151	-0.08	0.23	
Other sources	0.03	0.02	58	0.00	0.00	85	0.01	0.01	143	0.03	0.09	*
Other sources transport	0.00	0.00	58	0.18	0.11	85	0.11	0.07	143	-0.18	0.19	
Public well	0.01	0.01	25	0.08	0.08	62	0.06	0.06	87	-0.07	0.56	
Public well transport	0.27	0.21	24	0.07	0.04	63	0.12	0.07	87	0.20	0.17	
Springs	0.00	0.00	227	0.04	0.01	300	0.02	0.01	527	-0.04	0.02	**
Springs transport	0.05	0.03	227	0.14	0.05	300	0.10	0.03	527	-0.09	0.16	
Consumption volumes												
Cubic mts. consumption - Bill	18.08	2.84	84	19.00	3.57	29	18.32	2.29	113	-0.92	0.86	
Cubic mts. consumption - HH	13.57	2.46	7	15.62	2.35	13	14.90	1.73	20	-2.04	0.59	

* p<0.1 ** p<0.05 ***p<0.01

TABLE II-20 PRICE PER CUBIC METER OF WATER

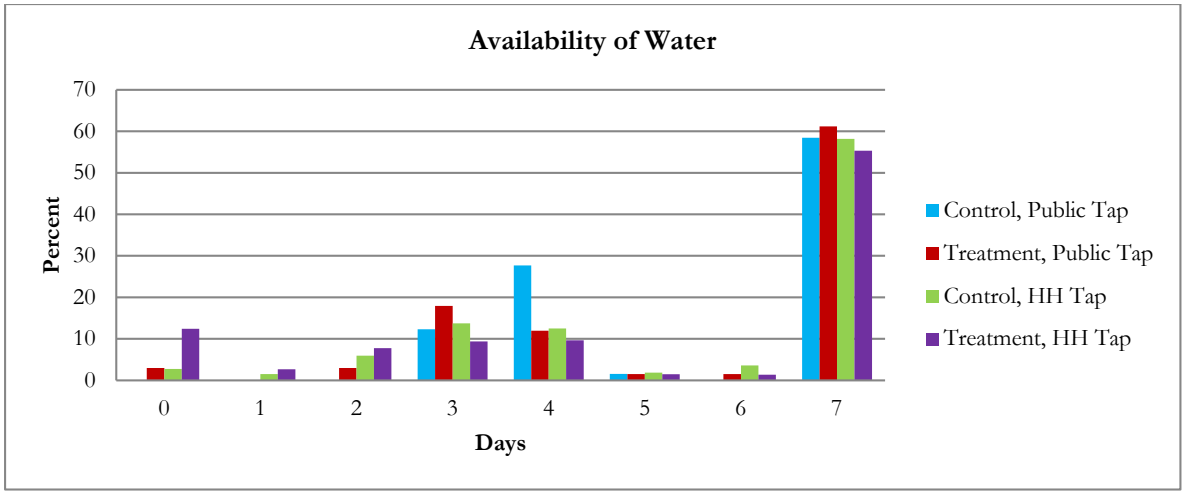
	Mean	SE	Min	Max	Obs
Control	0.37	0.024	0.01	3.00	256
Treatment	0.36	0.050	0.02	1.67	145
Total	0.37	0.023	0.01	3.00	401
Difference	0.009				
p-val	0.861				

* p<0.1 ** p<0.05 ***p<0.01

Water Quality and Risks Perceptions

Figure II-10 shows the reported availability of water by days. Over 50 percent of households report that water from public taps and house connections are available during the entire week. Significance tests reveal no systematic differences between treatment and control on days of availability[26].

FIGURE II-10 DAILY A+VAILABILITY OF WATER FROM TAPS



Perceptions of the riskiness of consuming water without treating were also measured for the two groups. Figure II-11 shows the percentage of households that perceive the risk is high, low or null. The percentage of households that perceive water from natural water sources to be unsafe are very high for both groups. The source that is perceived as being the safest is water from trucks. Some differences across groups appear significant[27] for the public system, private wells and public wells, with treatment households perceiving them as more unsafe than control households. Figure II-12 shows the results from in-house chlorine tests performed by the enumerators; the levels of chlorine are low for both groups, but more so for the treatment

26 Tabulations in Table B-9
27 Tabulations in Table B-15

group. The tests were performed on the water from containers use for drinking. The World Health Organization recommends residual chlorine of at least 0.5 mg/L [(World Health Organization, 1997)]. However, this level is most likely not adequate to maintain the quality of the water when this water is stored in the home. In addition, Figure II-13 shows that most households do not treat their drinking water. This suggests that access to potable water from taps can considerably improve the quality of the water people drink.

FIGURE II-11 PERCEPTIONS OF HEALTH RISKINESS OF WATER SOURCES

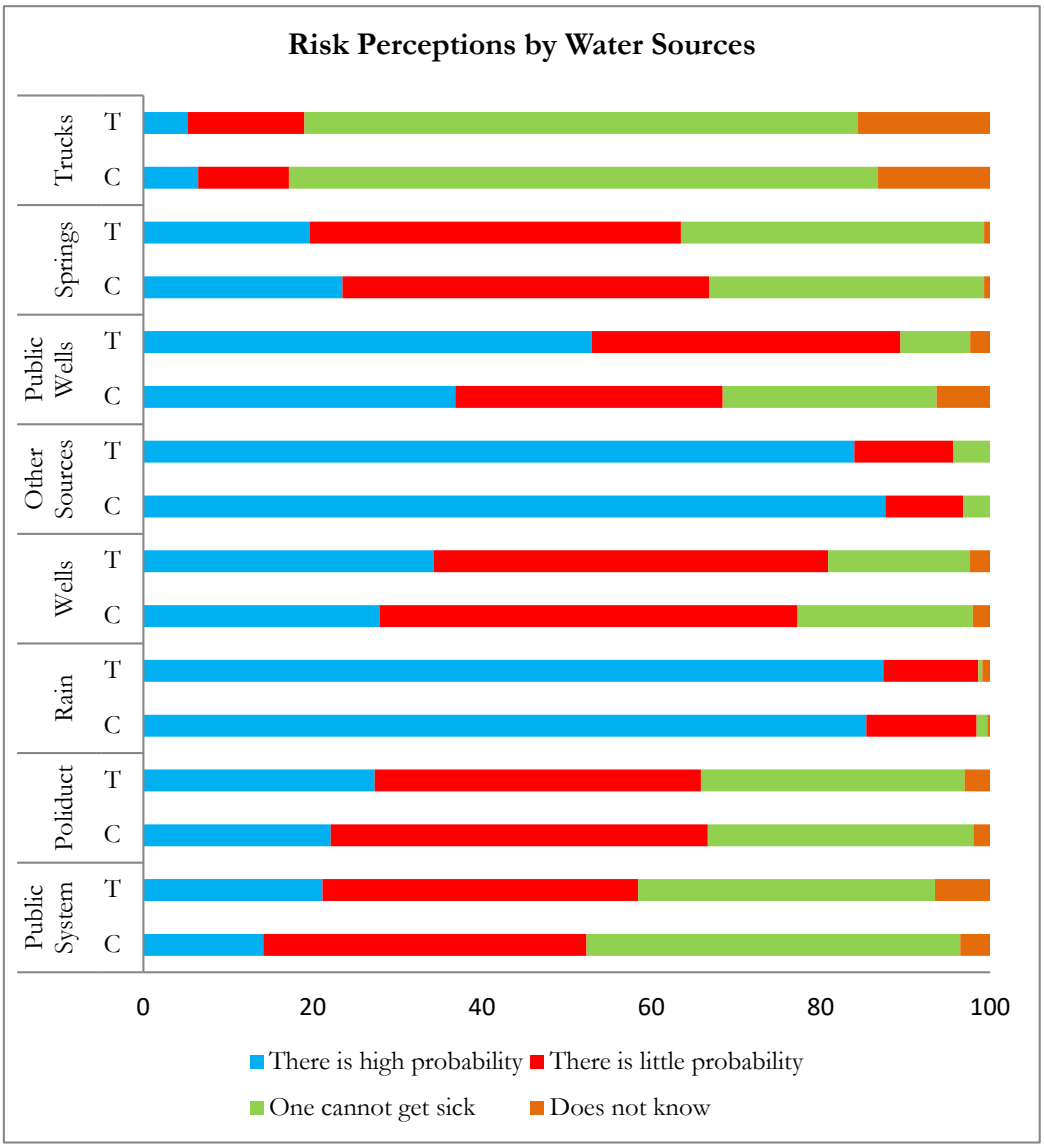


FIGURE II-12 RESIDUAL CHLORINE TEST

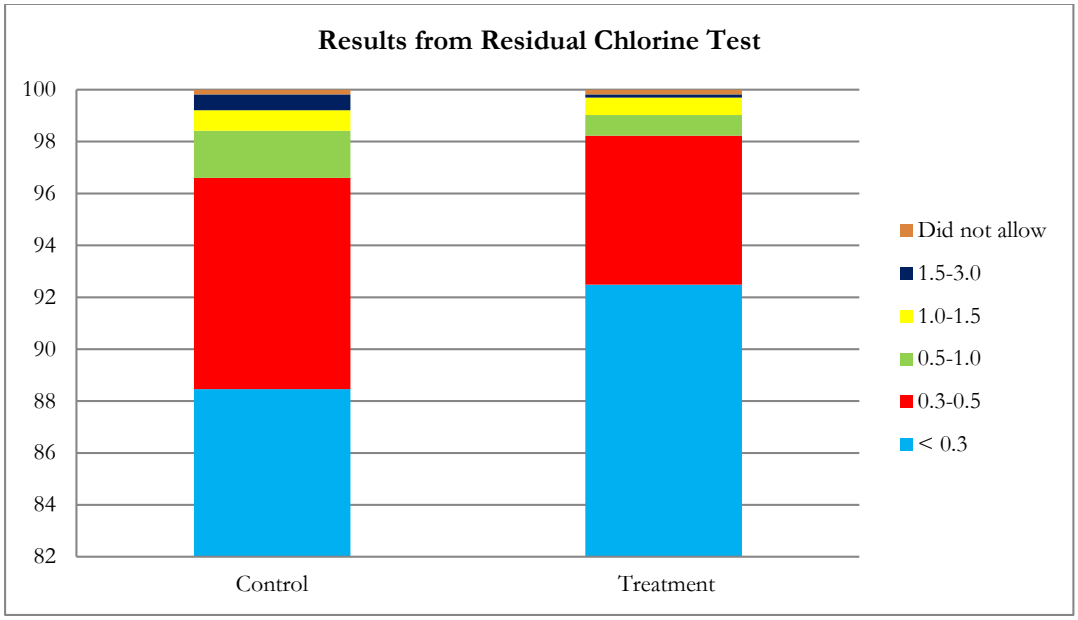
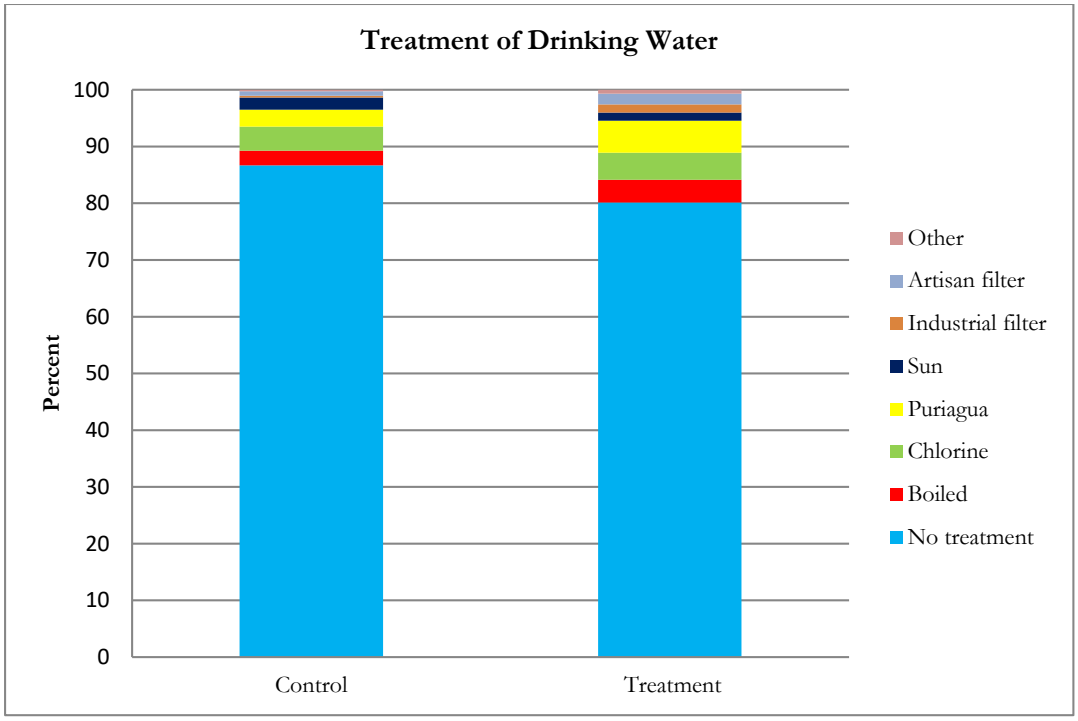


FIGURE II-13 TREATMENT OF DRINKING WATER

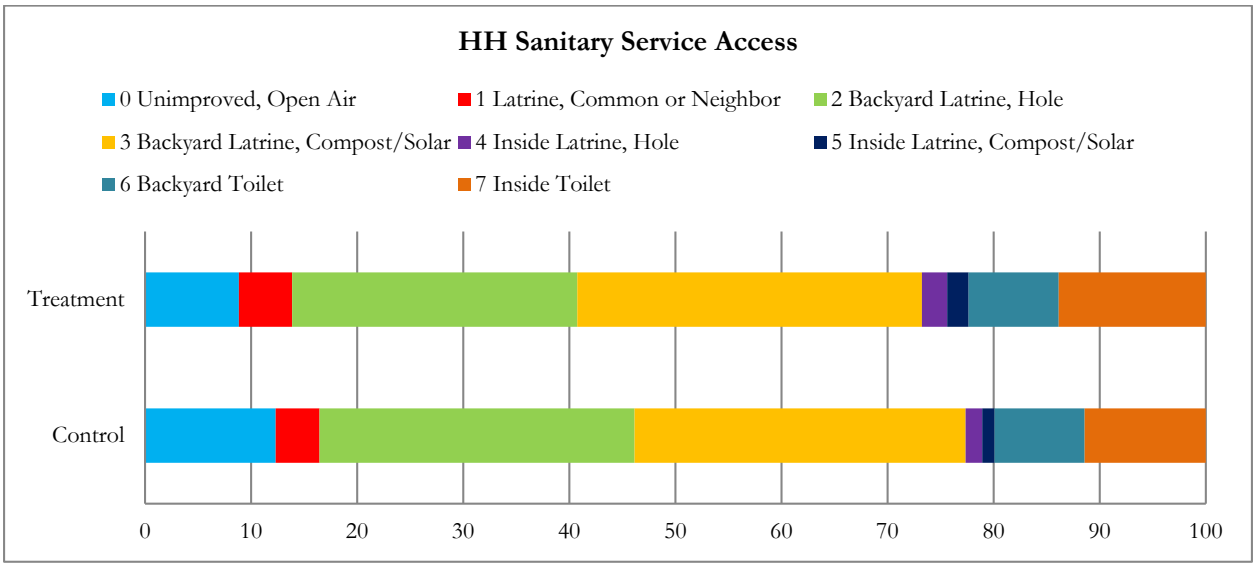


Sanitation Access and Use

The interventions also include the provision of latrines to households that do not have one or that have hole latrines[28]. From Figure II-14 we can see that over 40 percent have unimproved sanitary services, namely nonexistent, communal and hole latrines.

Figure II-15 uses a similar procedure to score the sanitary access in each segment as was done for water access. Treatment segments tend to have lower sanitary access scores (light colors) and there seem to be significant[29] differences in sanitary services access across the groups.

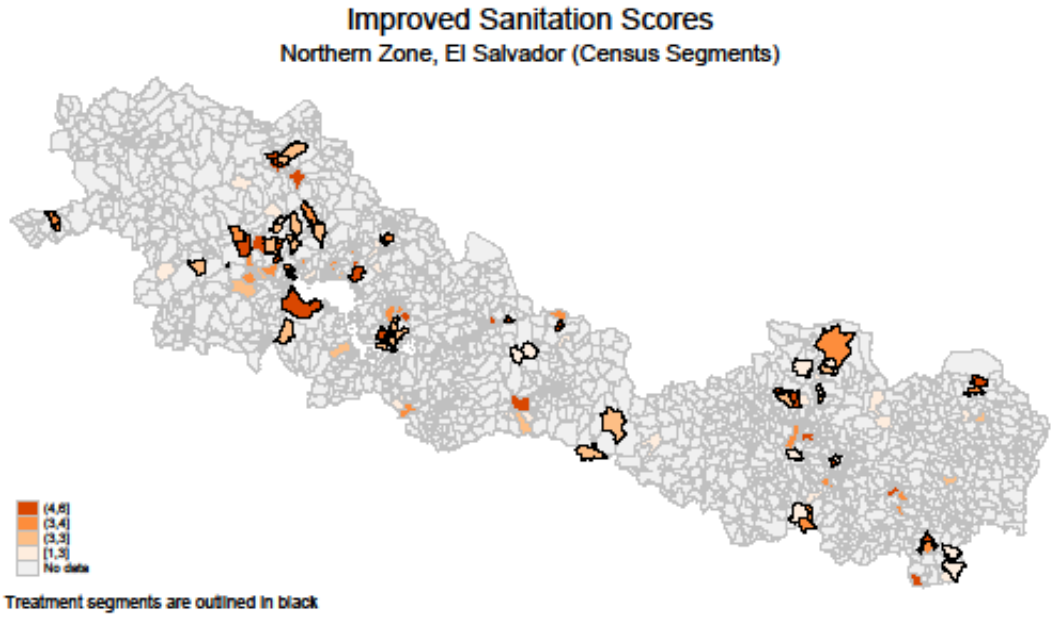
FIGURE II-14 HH SANITARY SERVICE ACCESS SCORES



[28] At this point it is still not clear how wide the distribution of latrines will be or what households (which of the treatment segments) are benefiting from this part of the project. Segments that are or have received latrines will be confirmed with FOMILENIO.

[29] Table B-10

FIGURE II-15 GEOGRAPHIC DISTRIBUTION OF MEAN IMPROVED SANITATION SCORES



Health

The survey also measures the incidence of diarrhea. The fact that diarrhea rates in El Salvador are very low is compounded by the fact that the survey was conducted in the dry season. As such, we do not find many cases of diarrhea in the sample. We only find 190 cases of diarrhea in 158 households for a 15-day reference period. Figure II-16 (smoothed) and Figure II-17 (5 year binwidth) present the distribution of diarrhea cases by age. We can see that the incidence is higher among the younger individuals in the sample, with the highest number of cases reported for children aged 0 to 5.

FIGURE II-16 DISTRIBUTION OF DIARRHEA CASES BY AGE

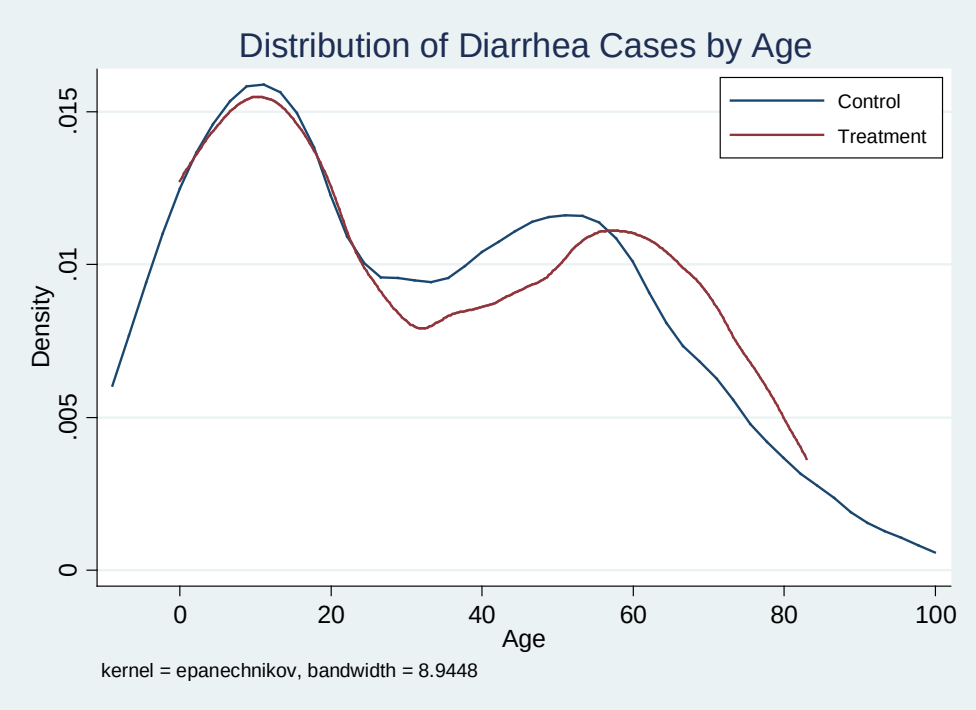


FIGURE II-17 DIARRHEA CASES BY AGE

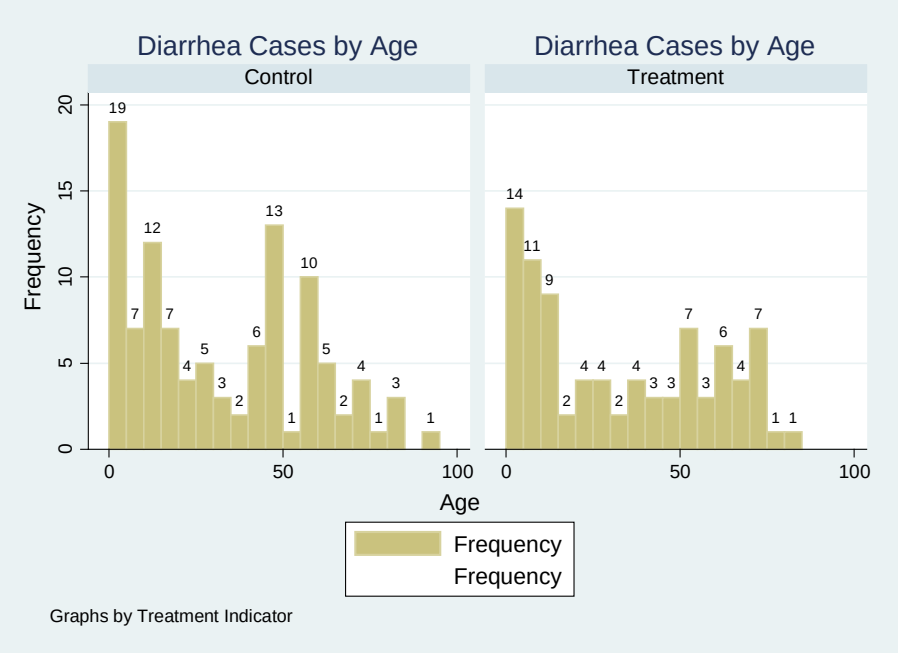


Table II-21 shows the average number of days of productive activities lost by the person who was ill and for the person who took care of them during their illness. There are no significant differences between groups. Average days lost is very low, with most people reporting one day

of school or work lost, if any. There are no significant differences in the out of pocket expenses of the household due to a diarrhea episode. On average, household spend $10 on transport, $12 on medicines and 6.50 on laboratory work due to a diarrhea episode. We note that these expenses are calculated from the sample that reports positive amounts; most households report zero expenses.

TABLE II-21 TIME AND MONEY COSTS DUE TO DIARRHEA

Individual Level

	Control			Treatment			Total				
	Mean	SE	Obs	Mean	SE	Obs	Mean	SE	Obs	Difference	p-value
How many days did it last?	3.2	0.3	105	3.1	0.3	85	3.1	0.2	190	0.09	0.81
How many working days where lost?	0.7	0.3	74	0.6	0.2	51	0.6	0.2	125	0.09	0.81
How many school days where lost?	0.8	0.2	74	0.7	0.2	51	0.7	0.2	125	0.09	0.77
Caregiver 1 -Work days lost	0.8	0.3	15	2.5	1.3	11	1.5	0.6	26	-1.65	0.16
Caregiver 1 -School days lost	0.6	0.5	15	0.1	0.1	11	0.4	0.3	26	0.51	0.38

* p<0.1 ** p<0.05 ***p<0.01

Household Level

	Control			Treatment			Total				
	Mean	SE	Obs	Mean	SE	Obs	Mean	SE	Obs	Difference	p-value
How many days did it last?	3.9	0.4	84	3.5	0.4	74	3.7	0.3	158	0.43	0.46
How many working days where lost?	0.6	0.3	84	0.4	0.1	74	0.5	0.1	158	0.19	0.53
How many school days where lost?	0.7	0.2	84	0.5	0.2	74	0.6	0.2	158	0.21	0.50
Caregiver 1 -Work days lost	0.1	0.1	84	0.4	0.2	74	0.2	0.1	158	-0.22	0.30
Caregiver 1 -School days lost	0.1	0.1	84	0.0	0.0	74	0.1	0.0	158	0.09	0.32
Money Spent in ...											
Transport for Consult	8.20	1.92	27	13.40	6.88	22	10.54	3.25	49	-5.20	0.43
Medicines/treatment	13.66	6.09	49	9.65	1.75	46	11.72	3.24	95	4.01	0.54
Laboratory work	7.43	1.15	11	5.36	2.07	9	6.50	1.12	20	2.07	0.37

* p<0.1 ** p<0.05 ***p<0.01

Household Production, Income and Expenditure

Next we present results from comparing indicators of household economic well-being for treatments and controls. We present the measures of household income from different sources and expenditures across different categories, including food and non-food expenditures. The section on income depicts the sources from which households derive their income and indicates the relative importance of different sources, e.g., from agricultural, salary and entrepreneurial income. As is well known, income measures tend to be understated and the consensus is that they are unreliable; thus we focus on the consumption expenditures of households, which more faithfully reflect economic well-being.

In addition, we provide a view of the household expenditures by gender. Empowerment of women is an important aspect of water and sanitation interventions; since, if water coping costs are disproportionally borne by women, higher benefits could potentially accrue to female-headed households. Lowering coping costs could increase the time women allocate to productive activities, childcare and leisure. If the expected increases in income are realized

among female-headed households, the literature suggests that we can expect greater spillovers into child health and education for these households.

We conclude the section by exploring differences in expenditures between treatments and controls for each of the classifications identified in our improved water access score procedure.

Productive Activities

Table II-22 shows the level of participation of household members in productive activities. Eighty percent of the sample participates in agricultural activities, as a farmer or rearer of livestock. The difference in agricultural participation is statistically significant, and lower in the treatment group. Further disaggregation reveals that the difference stems from differences in participation in livestock rearing. The proportions are relatively high as most of the survey area is rural. Business/independent activities include work in the informal sector. We observe no significant differences across groups. The same can be said for the proportion of households that have small gardens with agricultural production.

TABLE II-22 HOUSEHOLD PARTICIPATION IN PRODUCTIVE ACTIVITIES

	Control		Treatment		Total		Fisher p-value	
	Mean	SE	Mean	SE	Mean	SE		
Participate in Ag. activities	81.7%	1.0%	78.9%	1.0%	80.3%	0.7%	0.044	**
Agriculture	55.6%	1.2%	54.0%	1.2%	54.8%	0.9%	0.362	
Livestock	72.4%	1.1%	69.6%	1.1%	71.0%	0.8%	0.084	*
Participates in Business/Independent	30.8%	1.1%	32.3%	1.2%	31.5%	0.8%	0.388	
Participates in HH Ag. Production	45.7%	1.2%	46.2%	1.2%	45.9%	0.9%	0.807	

* p<0.1 ** p<0.05 ***p<0.01

In Table II-23 we disaggregate the household participation in household activities by sex of the head of household. Comparing across treatment status the only significant difference (at conventional levels) is for participation in independent/business activities among female-headed households, with the treatment groups having a larger proportion of females participating in independent/business activities, a difference of 5.8 percent. The comparison across gender within groups, show significant differences as expected. Female-headed households have a lower likelihood of participating in agricultural activities; the tests suggest that the difference comes from differences in agricultural production and not from differences in livestock rearing.

TABLE II-23 HH PARTICIPATION IN PRODUCTIVE ACTIVITIES BY GENDER

Comparing Across Treatment Status

	Female							Male						
	Control		Treatment		Difference	p-value		Control		Treatment		Difference	p-value	
	Mean	Obs	Mean	Obs				Mean	Obs	Mean	Obs			
Participate in Ag. activities	76.6%	513	72.0%	518	4.6%	0.09	*	84.0%	1141	82.0%	1119	1.9%	0.22	
Agriculture	34.5%	513	32.4%	518	2.1%	0.48		65.1%	1141	64.0%	1119	1.1%	0.57	
Livestock	71.3%	513	69.9%	518	1.5%	0.61		72.9%	1141	69.5%	1119	3.4%	0.07	*
Participates in Business/Independent	24.0%	513	29.7%	518	-5.8%	0.04	**	33.9%	1141	33.4%	1119	0.5%	0.80	
Participates in HH Ag. Production	43.5%	513	40.7%	518	2.7%	0.37		46.7%	1141	48.7%	1119	-2.0%	0.34	

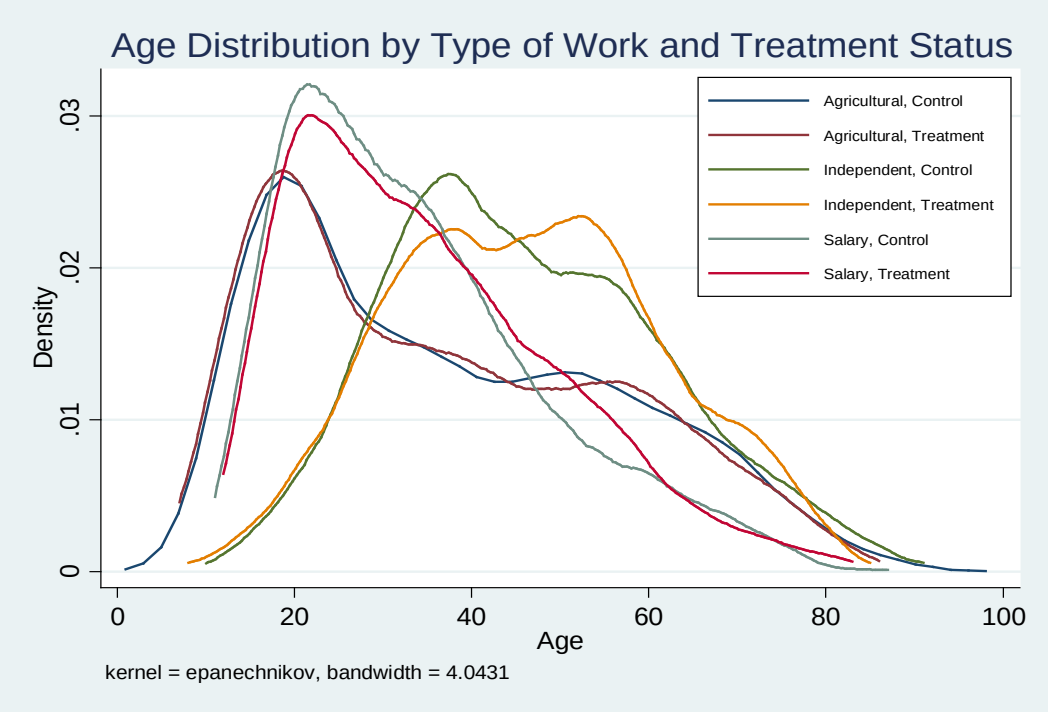
Comparing Across Gender

	Control							Treatment						
	Male		Female		Difference	p-value		Male		Female		Difference	p-value	
	Mean	Obs	Mean	Obs				Mean	Obs	Mean	Obs			
Participate in Ag. activities	84.0%	1141	76.6%	513	7.4%	0.00	***	82.0%	1119	72.0%	518	10.0%	0.00	***
Agriculture	65.1%	1141	34.5%	513	30.6%	0.00	***	64.0%	1119	32.4%	518	31.6%	0.00	***
Livestock	72.9%	1141	71.3%	513	1.6%	0.51		69.5%	1119	69.9%	518	-0.4%	0.88	
Participates in Business/Independent	33.9%	1141	24.0%	513	9.9%	0.00	***	33.4%	1119	29.7%	518	3.7%	0.14	
Participates in HH Ag. Production	46.7%	1141	43.5%	513	3.2%	0.22		48.7%	1119	40.7%	518	8.0%	0.00	***

* p<0.1 ** p<0.05 ***p<0.01

Figure II-18 shows the age distribution of the people that participate in these different activities. We see that agricultural and salaried workers tend to be younger than the individuals who participate in informal and entrepreneurial activities. The implication for programs in the area in general and for the water projects in particular is that those programs that have youth inclusion in productive activities as a goal are better directed to improving the agricultural sector opportunities for these youths. For the water interventions the implication is that if greater access to water increases agricultural productivity in the area, then we can hope to find impacts in the younger population. If greater access to potable water promotes the creation of businesses by decreasing fixed set-up costs, we can expect this to impact individuals towards the middle of the age distribution.

FIGURE II-18 AGE DISTRIBUTION OF WORKERS BY TYPE OF WORK



We disaggregate the age distribution of the workers in the sample by sex and type of work. Figure II-19 shows the age distribution for males and Figure II-20 for females. Male workers in the agricultural sector and who are wage earners tend to be younger and independent workers are more towards the middle of the age distribution. In comparison, female workers are older across all types of work.

FIGURE II-19 AGE DISTRIBUTION OF MALE WORKERS

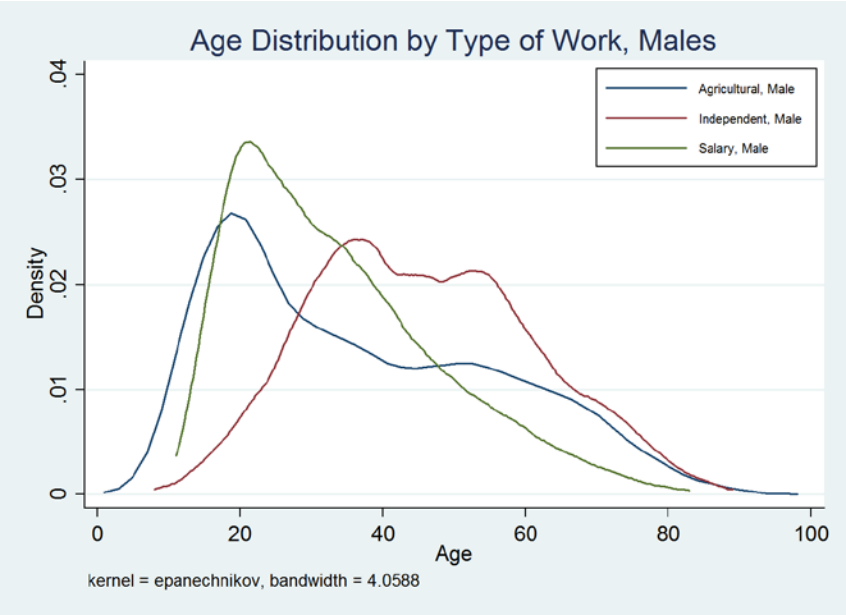
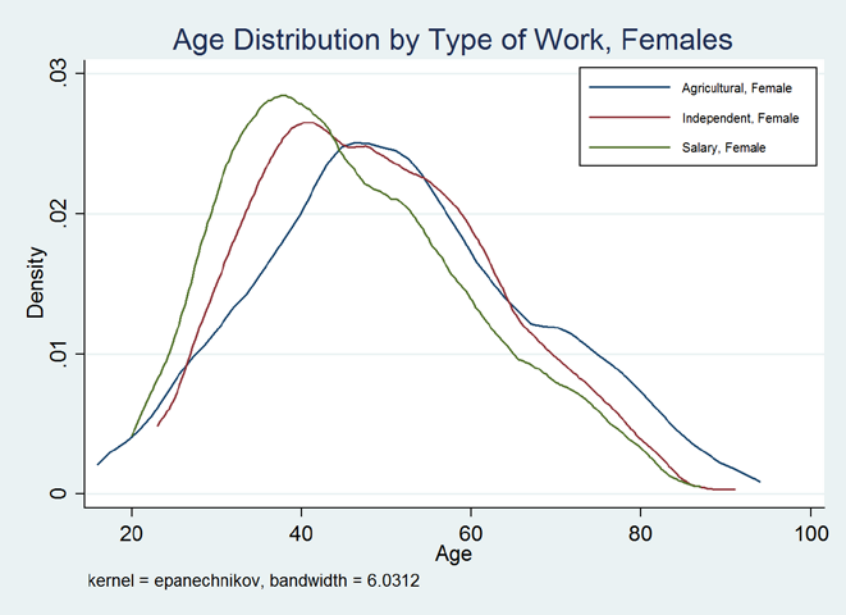


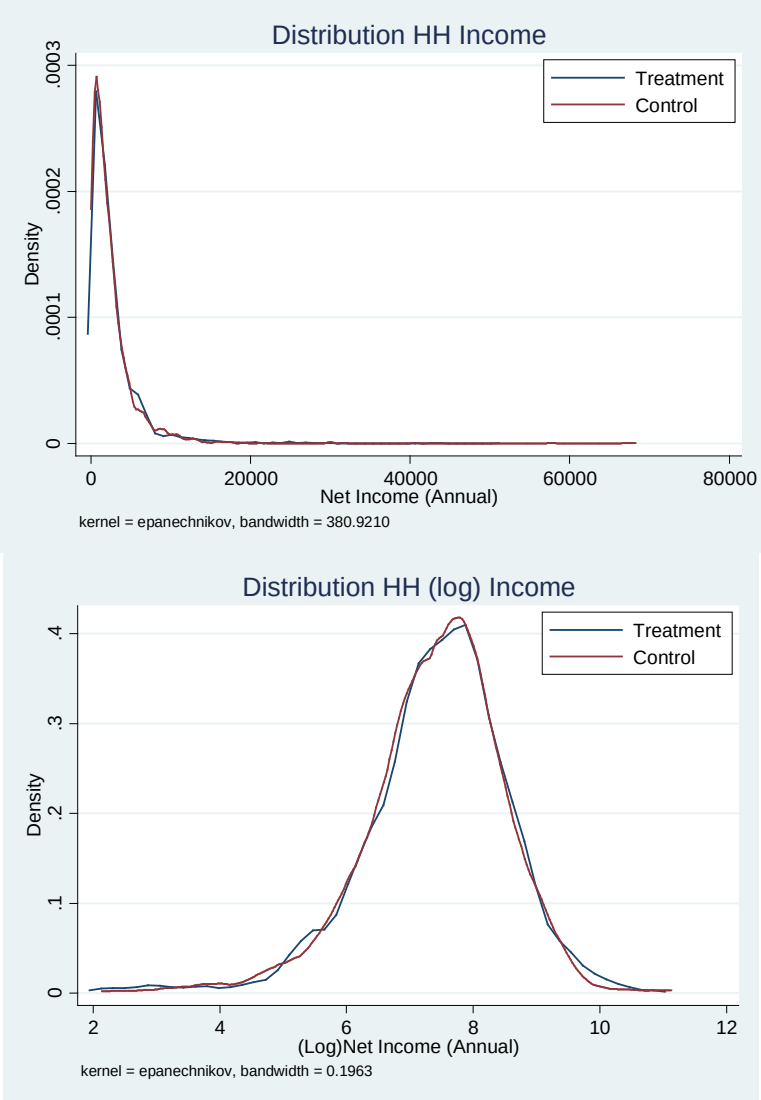
FIGURE II-20 AGE DISTRIBUTION OF FEMALE WORKERS



Income

Figure II-21 presents the distribution of annual household income and the logarithm (log) of income. Gross income[30] includes income from salaries, independent work, agricultural production, livestock and derived products, in-kind payments and transfers (remittances). Net income is gross income minus transfers to people outside the household and agricultural input costs. As expected, the income distribution is fairly skewed and the log transformation looks normal; Kolmogorov-Smirnov tests for differences in the distribution across groups reveal no significant differences[31].

FIGURE II-21 DISTRIBUTION OF HOUSEHOLD INCOME



[30] Figure A-1 and Figure A-2 show the corresponding figures for brute income

[31] Table B-22 shows the tests results.

Table II-24 disaggregates income by source. Small differences are observed but none are statistically significant, confirming previous results. Median net income in the sample is $1,656 and average income is $2,626, considerably higher than the median due to the skewness of the distribution. A graphical representation of Table II-24 is given in Figure II-22 where few differences between treatment and control groups are observed.

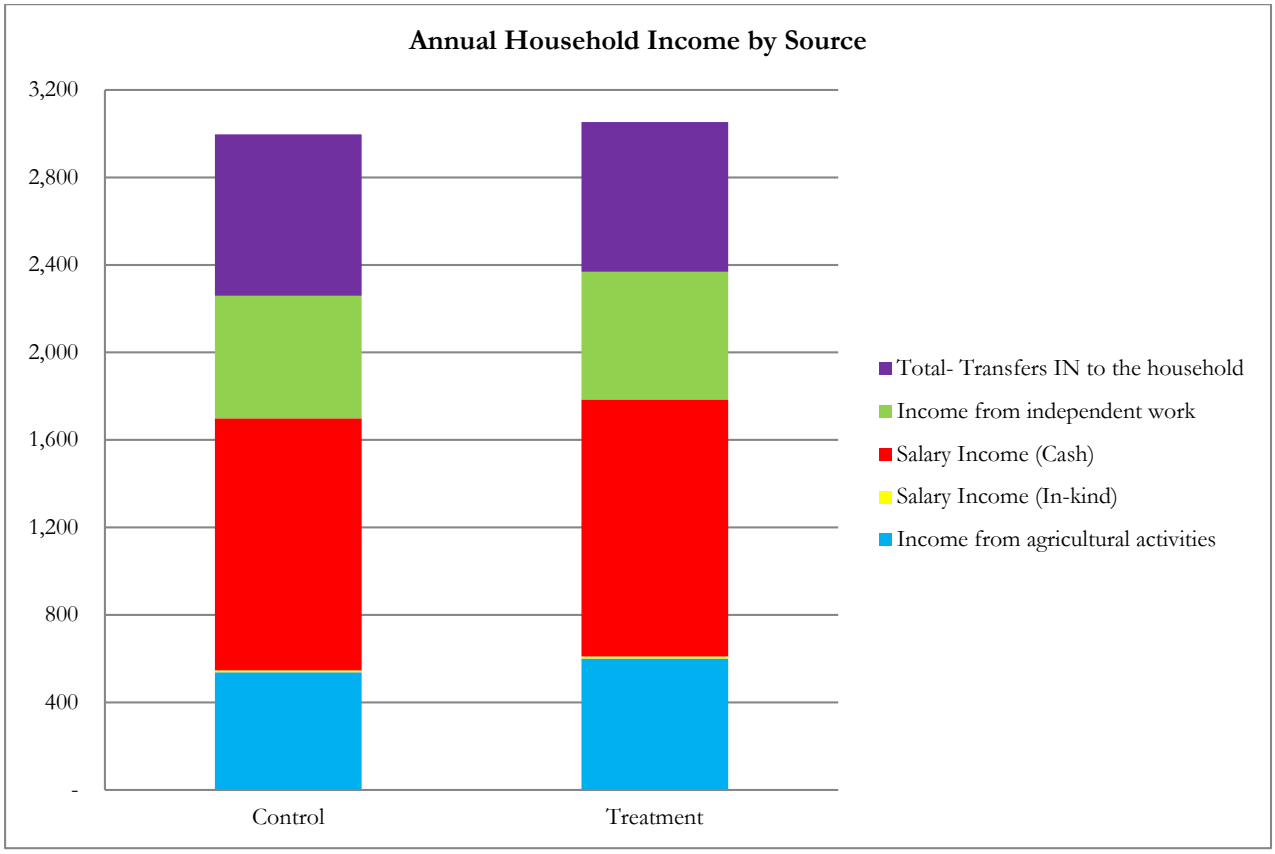
TABLE II-24 HOUSEHOLD INCOME BY SOURCE

Household Income by Source

	Control			Treatment			Total				
	Mean	SE	Median	Mean	SE	Median	Mean	SE	Median	Difference	p-value
Monthly											
Income from agricultural activities	44.85	7.03	0	50.07	6.63	0	47.45	4.83	0	-5.22	0.59
Salary (In-kind)	1.01	0.26	0	1.04	0.30	0	1.02	0.20	0	-0.04	0.92
Salary (Cash)	135.97	4.93	72	137.23	5.04	80	136.60	3.52	80	-1.27	0.86
Income from independent work	50.15	6.32	0	52.96	4.26	0	51.54	3.82	0	-2.81	0.71
Income from All Sources	231.97	12.26	144	241.31	9.45	150	236.61	7.75	146.5	-9.34	0.55
Annual											
Income from agricultural activities	538.25	84.33	0	600.88	79.62	0	569.40	58.00	0	-62.63	0.59
Salary Income (In-kind)	8.68	2.59	0	9.79	3.19	0	9.24	2.05	0	-1.11	0.79
Salary Income (Cash)	1,151.64	50.24	280	1,174.25	50.28	288	1,162.89	35.54	288	-22.61	0.75
Income from independent work	560.65	74.66	0	583.82	48.33	0	572.17	44.56	0	-23.17	0.79
Income from All Sources	2,259.22	144.70	1145	2,368.75	108.23	1200	2,313.70	90.47	1160	-109.52	0.55
Brute Income	2,909.30	104.31	1857	3,053.10	109.43	1908	2,980.83	75.57	1884	-143.80	0.34
Net Income	2,560.68	98.14	1638	2,693.47	92.74	1676	2,626.75	67.53	1656.2	-132.79	0.33

* p<0.1 ** p<0.05 ***p<0.01

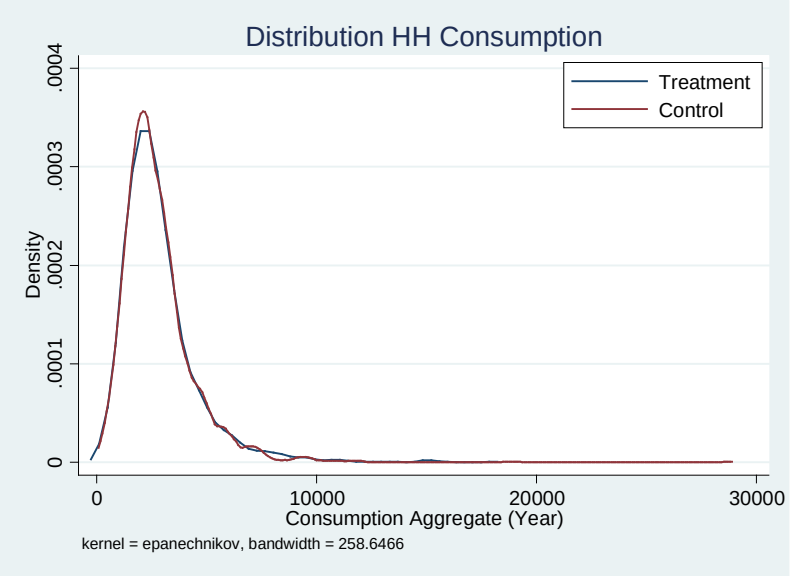
FIGURE II-22 DISTRIBUTION OF MEAN HOUSEHOLD INCOME BY SOURCE



Consumption Expenditures

Figure II-23 presents the distribution of annual household expenditures and the logarithm (log) of expenditures. Total consumption is composed of the following items: food, including food purchased, food consumed out of the household and self-supplied food products; non-food items, including transportation, non-durable household products, education expenses, clothes, shoes, travel expenses, utility payments, and fuel expenses. Housing expenditures include rent for renters and expected rental value for owners. Taxes and durables are excluded. As expected, the expenditure distribution is fairly skewed and the log transformation looks normal. Kolmogorov-Smirnov tests for differences in the distributions across groups for each category of expenditures reveal no significant differences.

FIGURE II-23 DISTRIBUTION OF ANNUAL HOUSEHOLD CONSUMPTION



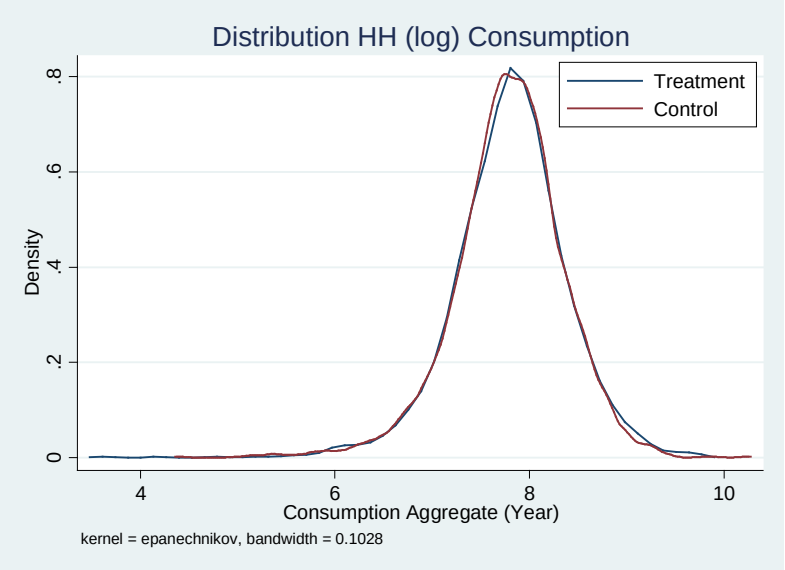


Table II-25 disaggregates expenditures by the categories mentioned above. Small differences in mean expenditures are observed; however, the only statistically significant difference is in non-food expenditures. This difference is only marginally significant, and coupled with the result of the Kolmogorov-Smirnov tests leads us to conclude that there are no systematic differences between treatment and control groups for the disaggregated expenditure measures. Median total consumption in the sample is $2,747 and average total consumption is $2,835, higher than the median due to the skewness of the distribution, but less so than that observed for the income distribution. The inter-quartile[32] range for the sample is $1,651 which is 60 percent of the median total expenditures, implying small levels of inequality in the lower part of the expenditure distribution. Note that across the quartiles the differences are moderate, except for the non-food expenditures. This is expected as households in the top quartile of the distribution have more resources to spend on leisure activities, which are accounted for in the non-food expenditure measure.

TABLE II-25 ANNUAL CONSUMPTION/EXPENDITURE BY TYPE OF EXPENDITURE

			Percentiles			
	Mean	SE	25	50	75	Obs
Control						
Food	1,558.25	22.60	1,003.60	1,409.20	1,934.40	1654
Non-Food	863.58	22.84	348.24	605.20	1,033.60	1654
Housing	382.57	9.77	180.00	360.00	480.00	1654
Total Consumption	2,804.40	42.24	1,770.20	2,458.06	3,367.68	1654
Treatment						
Food	1,554.56	20.63	1,014.00	1,404.00	1,944.80	1637
Non-Food	920.83	25.70	374.00	631.44	1,098.00	1637
Housing	390.84	9.08	180.00	360.00	480.00	1637
Total Consumption	2,866.23	44.15	1,758.92	2,486.10	3,462.20	1637
Total						
Food	1,556.41	15.31	1,011.40	1,406.60	1,939.60	3291
Non-Food	892.06	17.19	360.40	619.16	1,059.80	3291
Housing	386.69	6.67	180.00	360.00	480.00	3291
Total Consumption	2,835.16	30.54	1,763.20	2,474.00	3,414.52	3291
Difference		p-value				
Food	3.69	0.90				
Non-Food	-57.25	0.10	*			
Housing	-8.27	0.54				
Total Consumption	-61.83	0.31				

* p<0.1 ** p<0.05 ***p<0.01

[32] The interquartile range is the difference between the 75th percentile and the 25th percentile.

Figure II-24 presents mean annual expenditures for each of the categories. Little difference between treatment and control groups is observed across categories. In the full sample, food expenditures comprise around 55 percent of total expenditures, non-food 31 percent and housing the remaining 14 percent. Food expenditures are the largest share of total expenditures and are fairly constant across the distribution.

FIGURE II-24 DISTRIBUTION OF MEAN HOUSEHOLD CONSUMPTION/EXPENDITURES

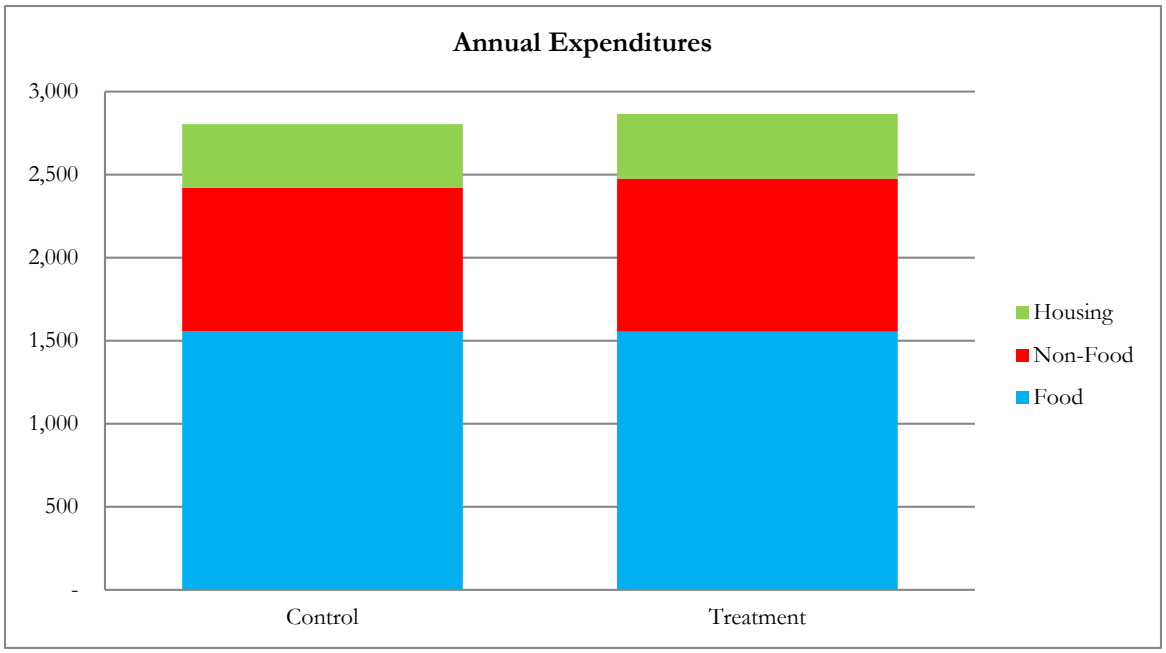
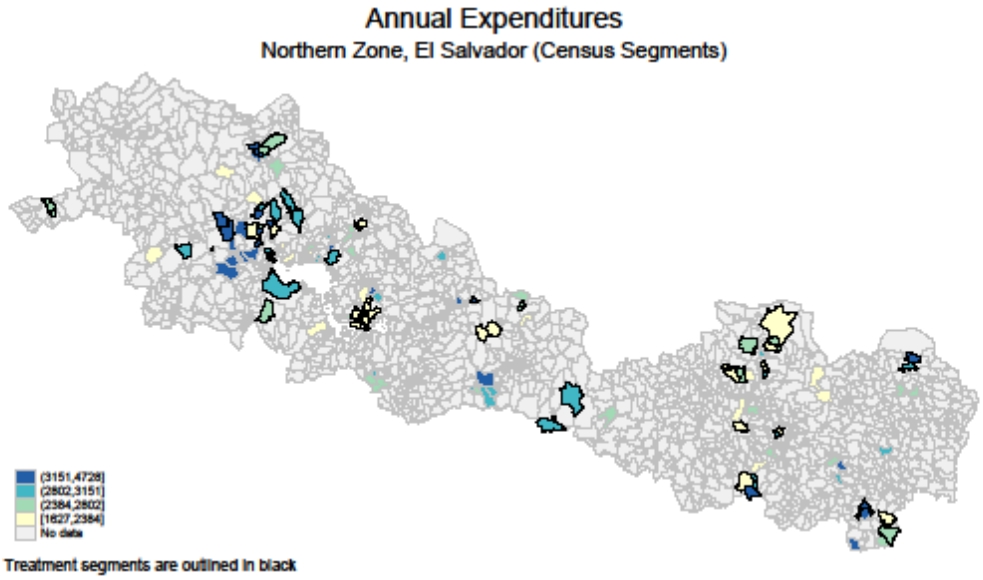


Figure II-25 shows the geographical distribution of mean total expenditures. Treatment and control segments assume similar values. We note that segments in the Northwest tend to have higher expenditures. This dissimilarity across geography will be explored in the future by comparing impacts across the two regions.

FIGURE II-25 GEOGRAPHIC DISTRIBUTION OF MEAN HOUSEHOLD EXPENDITURE



Poverty

We previously mentioned that the projects target the poorest communities in the Northern Zone. To gauge poverty levels of the households in the sample, we calculated daily consumption per capita. Figure II-26 shows the distribution of consumption per capita per day. The lines represent the 25th, 50th and 75th percentiles. We have truncated the distribution at $5 per day for ease of exposition. The figure and Table II-26 show that there are no significant differences between control and treatment households, and that the distribution is concentrated in the range of $1 to $2 per day. Over 25 percent of the individuals live on under $1.25 per day. Furthermore, we note that over 75 percent of households live on less than $3 per person per day. This confirms that the majority of households who will benefit from the interventions are indeed poor and that the control group selected by the matching procedure is comparable to the treatment group before the interventions take place.

FIGURE II-26 DISTRIBUTION OF PER CAPITA/DAY CONSUMPTION

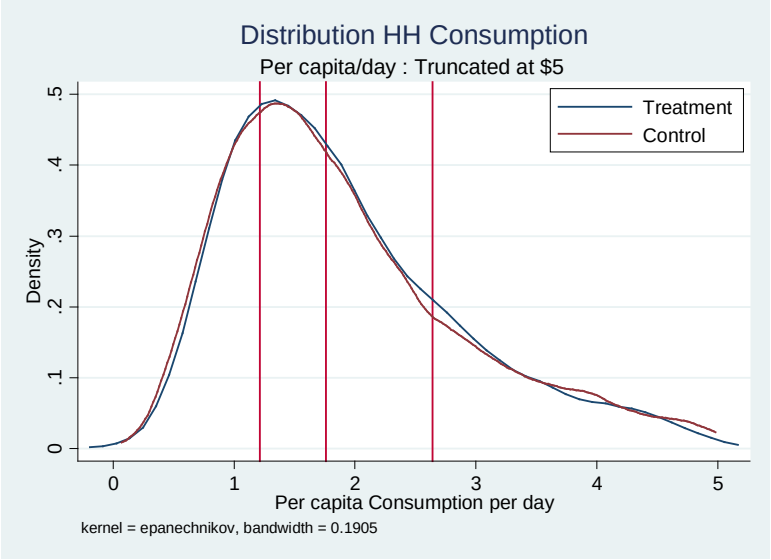


TABLE II-26 MEAN PER CAPITA/DAY CONSUMPTION/EXPENDITURES

			Percentiles			
	Mean	SE	25	50	75	Obs
Control	2.19	0.04	1.20	1.74	2.62	1654
Treatment	2.25	0.04	1.23	1.78	2.67	1637
Total	2.22	0.03	1.21	1.76	2.64	3291
Difference	-0.07					
p-value	0.28					

* p<0.1 ** p<0.05 ***p<0.01

Further, we explore differences in consumption depending on the water sources households use. Figure II-27 and Figure II-28 show the distribution of the logarithm of total consumption for households who use treated and untreated water sources, respectively. Few differences are observed between treatments and controls in each water source classification. . As expected, households who use improved water sources are to the right of the distribution, with households who have in-house tap connections having higher expenditures.

For households who use untreated water sources the distributions across treatment groups are very similar. Households who use natural water sources seem to differ in the figure. This is confirmed in Table II-27, where the only significant difference between treatments and controls is for natural water sources. Expenditures across water sources are consistent with our intuition that households who have a tap connection, wells or poliducts are likely to be relatively well-off because of the fixed costs that setting up these systems entail.

FIGURE II-27 LOG-CONSUMPTION DISTRIBUTION BY TREATED WATER SOURCES

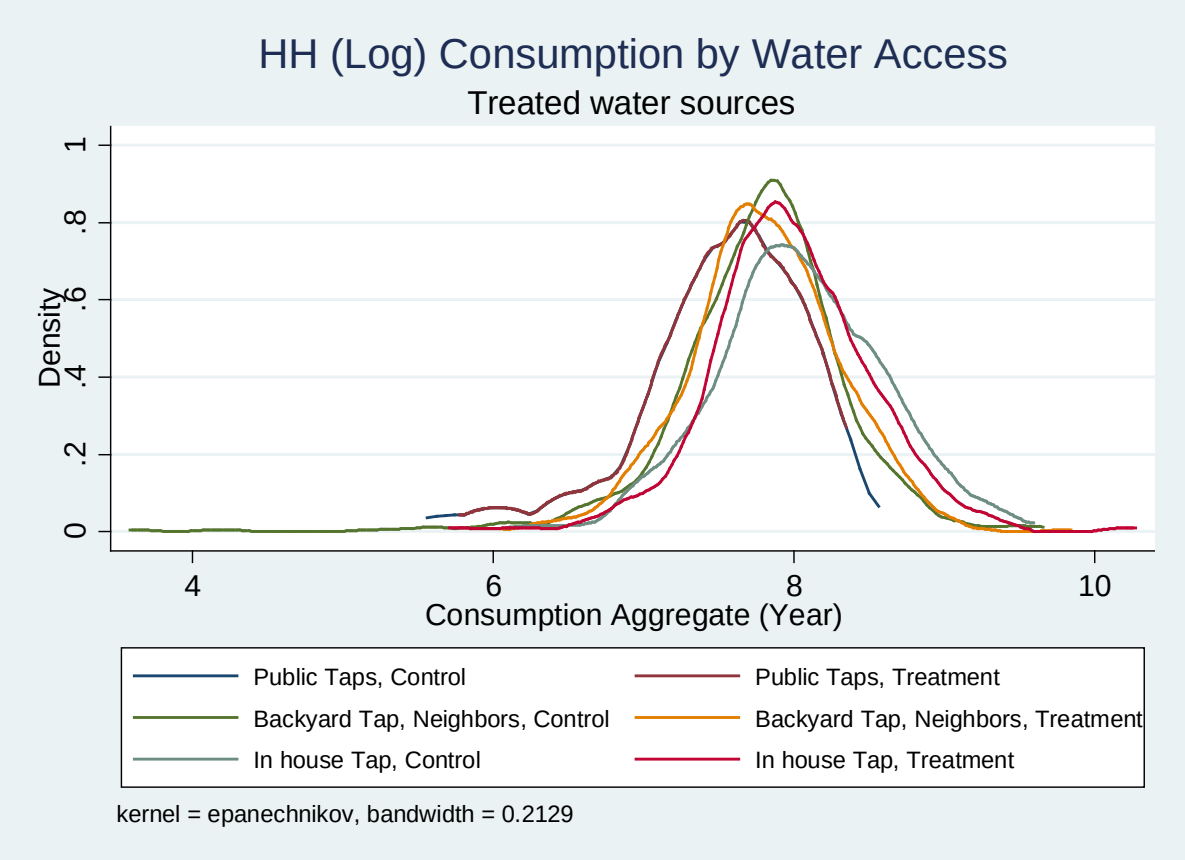


FIGURE II-28 LOG-CONSUMPTION DISTRIBUTION BY UNTREATED WATER SOURCES

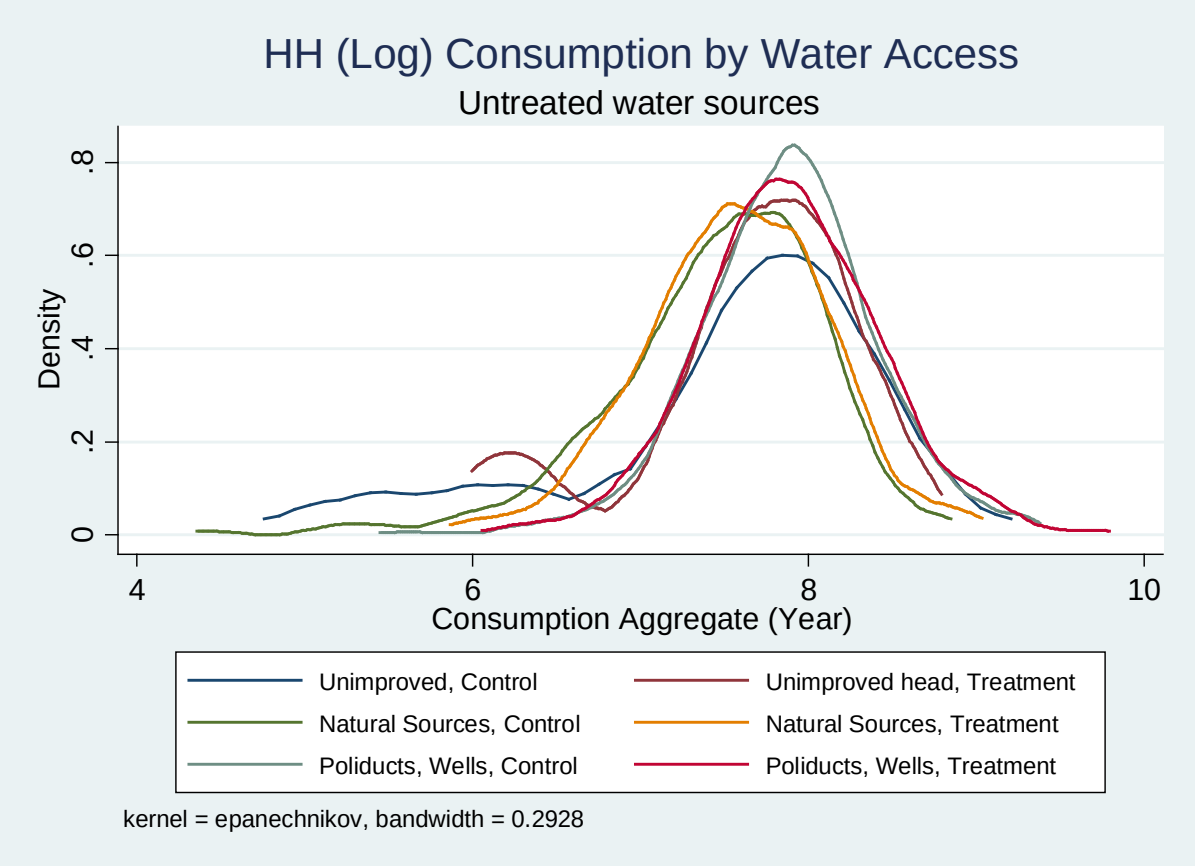


TABLE II-27 ANNUAL CONSUMPTION/EXPENDITURES BY WATER SOURCE TYPE

	Control				Treatment					
	Mean	SE	Median	Obs	Mean	SE	Median	Obs	Difference	p-value
Unimproved	2,492.49	315.71	2,270.40	27	2,495.21	260.20	2,435.72	28	-2.72	0.99
Natural Sources	2,053.69	73.43	1,930.60	233	2,253.72	85.99	1,992.80	226	-200.03	0.08 *
Poliducts, Wells	3,005.62	76.50	2,651.00	485	3,083.19	87.05	2,606.00	491	-77.57	0.50
Public Taps	2,104.04	153.62	1,957.90	36	2,400.69	211.72	2,186.00	49	-296.65	0.29
Backyard Tap, Neighbors	2,768.40	60.55	2,423.88	637	2,747.69	63.78	2,462.48	651	20.71	0.81
In house Tap	3,384.45	161.60	2,780.60	229	3,607.22	157.23	2,988.68	192	-222.77	0.33
Total	2,803.76	42.35	2,457.40	1647	2,866.23	44.15	2,486.10	1637		

* p<0.1 ** p<0.05 ***p<0.01

Gender

Next, we distinguish between female-headed households and male-headed households in analyzing the income and expenditure levels of the sampled households.

Figure II-29 and Figure II-30 show the distribution of expenditures and income by gender for treatment and control groups. It appears that there are no considerable differences in the central tendency of the distributions.

Figure II-31 disaggregates the consumption measure by type of expense. Across treatment status there are very small differences between female and male-headed households. The differences across gender are important for food and non-food expenditures, with female-headed households having lower expenditures. Table II-28 confirms this observation. Differences across gender are significant in both treatment and control groups.

These results highlight the importance of considering gender as an important variable for future analyses. We will explore differences across gender in future analyses with the caveat that the sample size might not provide enough power to estimate heterogeneous effects precisely.

FIGURE II-29 DISTRIBUTION OF LOG CONSUMPTION BY GENDER OF THE HEAD OF HOUSEHOLD

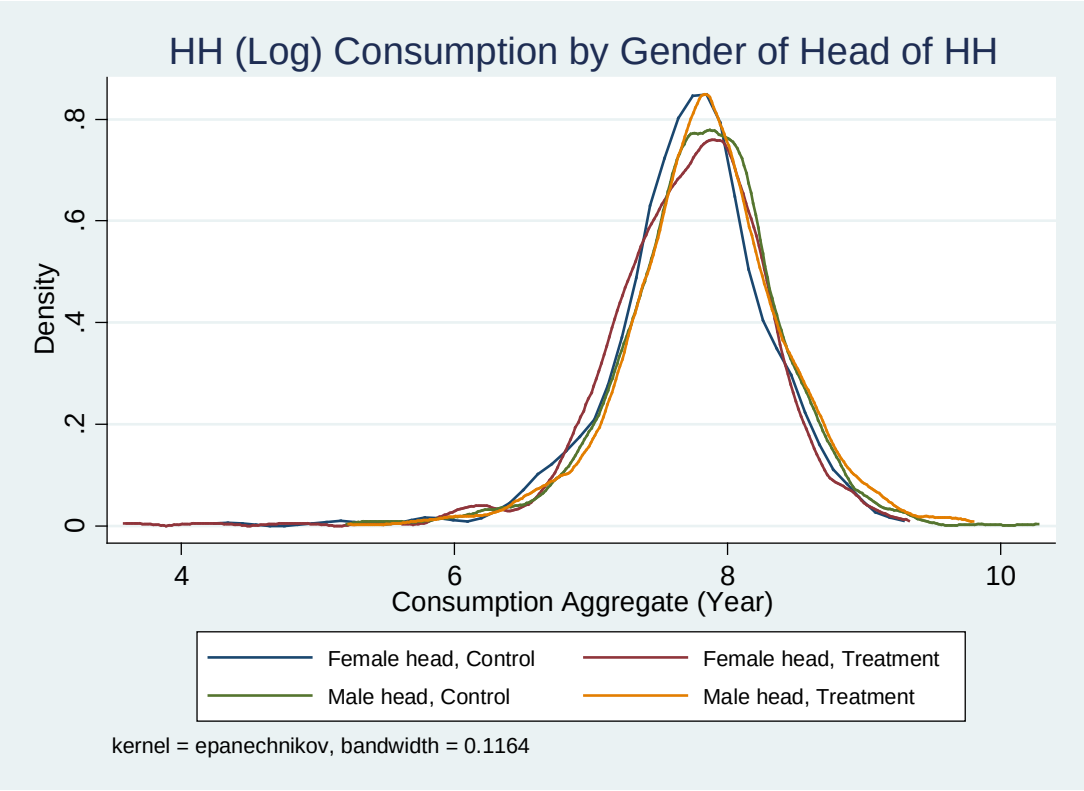


FIGURE II-30 LOG HOUSEHOLD GROSS INCOME DISTRIBUTION BY GENDER OF THE HEAD OF HOUSEHOLD

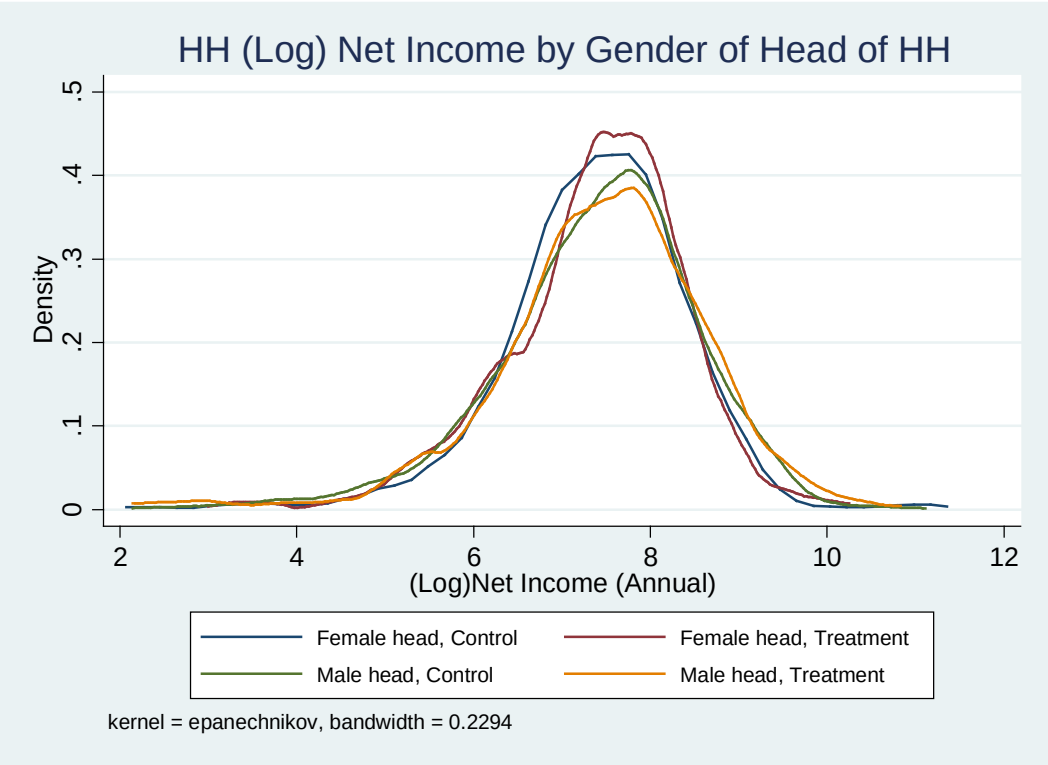


FIGURE II-31 DISTRIBUTION OF MEAN HOUSEHOLD CONSUMPTION BY GENDER OF THE HEAD OF HOUSEHOLD

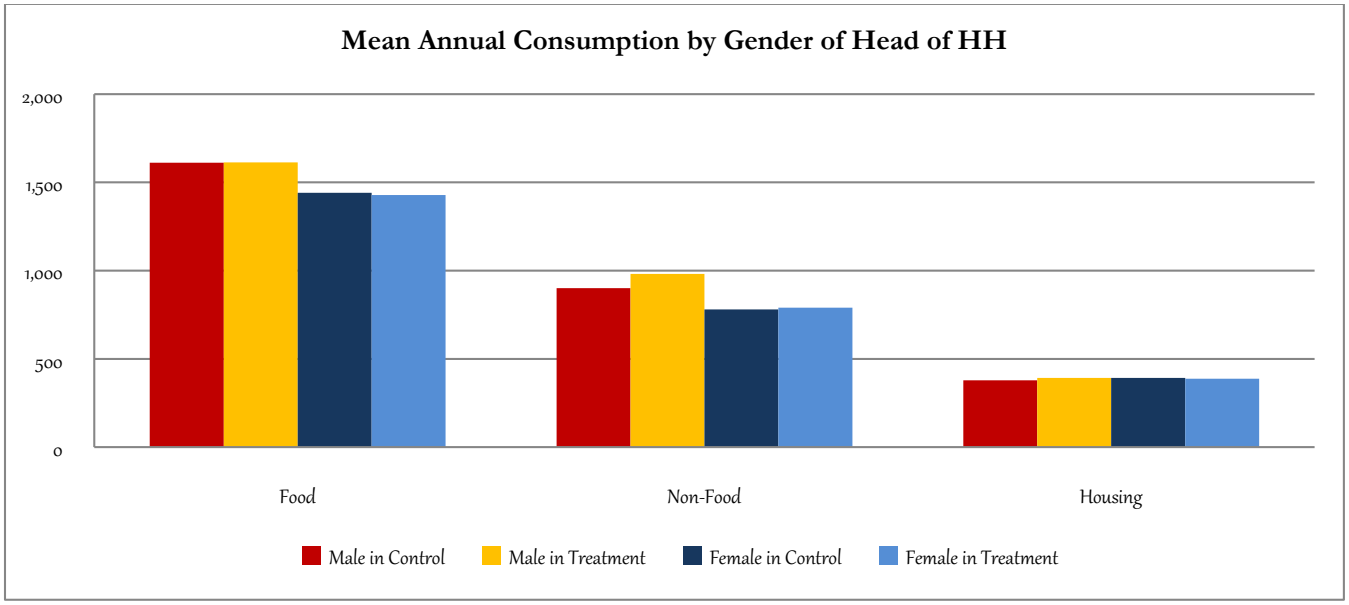


TABLE II-28 GENDER DIFFERENCES IN MEAN ANNUAL CONSUMPTION/EXPENDITURE

	Comparing Across Treatment Status					Comparing Across Gender			
	Difference	p-val	Difference	p-val		Difference	p-val	Difference	p-val
	Male		**Female**			**Control**		**Treatment**	
Food	-1.81	0.96	12.18	0.79		170.77	0.00 ***	184.76	0.00 ***
Non-Food	-80.18	0.08 *	-10.13	0.83		120.64	0.01 **	190.68	0.00 ***
Housing	-14.11	0.39	4.63	0.84		-13.65	0.52	5.09	0.79
Total Consumption	-96.10	0.22	6.68	0.94		277.76	0.00 ***	380.54	0.00 ***

* p<0.1 ** p<0.05 ***p<0.01

III. Conclusions

We have performed an in-depth analysis of the baseline survey designed to evaluate the water and sanitation interventions in Northern El Salvador, with various goals in mind. First, the research design could have been compromised by the many changes that occurred between its conception and when the projects began. Second, it was important to document the changes in the treatment areas due to the projects that were dropped because of infeasibility and low benefit-to-cost ratio. Finally, the baseline survey describes the situation in which the potential beneficiaries live. We have explored the main indicators that are expected to change because of the interventions. We have also attempted to uncover any possible differences between the treatment and controls that might hinder the validity of the evaluation design. We also believe that we are in a position to understand the mechanisms through which these infrastructure interventions affect the well-being of beneficiaries.

Lessons and Plans for Future Analyses

The results from the baseline analysis show that the research design appears to be appropriate. Treatment and control groups appear very similar in observable characteristics. The differences that remain can be easily controlled for using regression-adjusted difference-in-differences.

For future analyses it is important to explore the possibility of using a continuous treatment effect and to further identify treatment households, in contrast to treatment segments. One possibility for doing this is to geo-reference households and projects and allocate treatment status depending on the area of influence of each project. Furthermore, using the geo-references or the ex-ante matching procedure we would like to allocate treatment status at the household level and re-estimate the propensity score at the household level. The advantage of doing this is twofold. First, it will give us a measure of the “success” of propensity score matching at the segment level to identify treatment households, by calculating the proportion of false positives that might dilute the estimated impact. Second, identifying treatment households will likely increase the number of control households in the sample and thus the possibility of finding better matches for the treatment households. This could potentially increase the precision of the impact estimate and allow us to estimate more flexible specifications to explore nonlinear treatment effects.

References

Dehejia, R. H. & Wahba, S., 1994. Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Trainning Programs. *Journal of the American Statistical Society,* pp. 1053-1062.

Heckman, J., Ichimura, H., Smith, J. & Todd, P., 1998. Characterizing Selection Bias Using Experimental Data. *Econometrica,* pp. 1017-1098.

Heckman, J., Ichimura, H. & Todd, P., 1997. Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Program. *Review of Economic Studies,* pp. 605-654.

Heckman, J., Ichimura, H. & Todd, P., 1998. Matching as an Econometric Evaluation Estimator. *Review of Economic Studies,* pp. 261-294.

Rosenbaum, P. & Rubin, D. B., 1983. The Central Role of Propensity Score in Observational Studies. *Biometrika,* pp. 41-55.

World Health Organization, 1997. Volume 3 - Surveillance and Control of Community Supplies. In: *Guidelines for Drinking-Water Quality.* 2nd ed. Geneva: s.n., pp. 114-115.

A. Appendix - Figures

FIGURE A-1 GROSS INCOME DISTRIBUTION

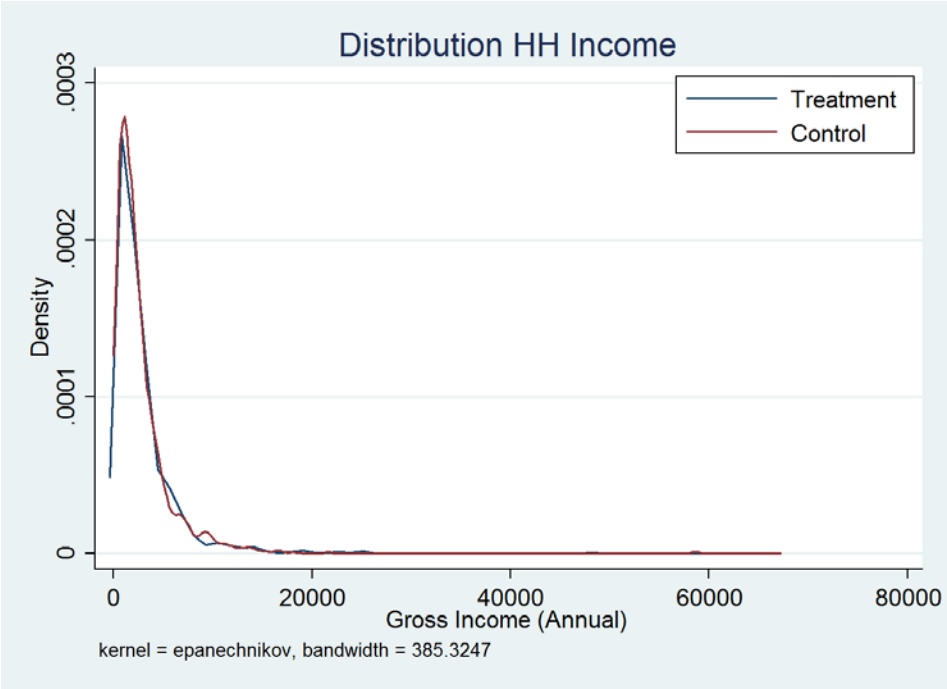


FIGURE A-2 LOG GROSS INCOME DISTRIBUTION

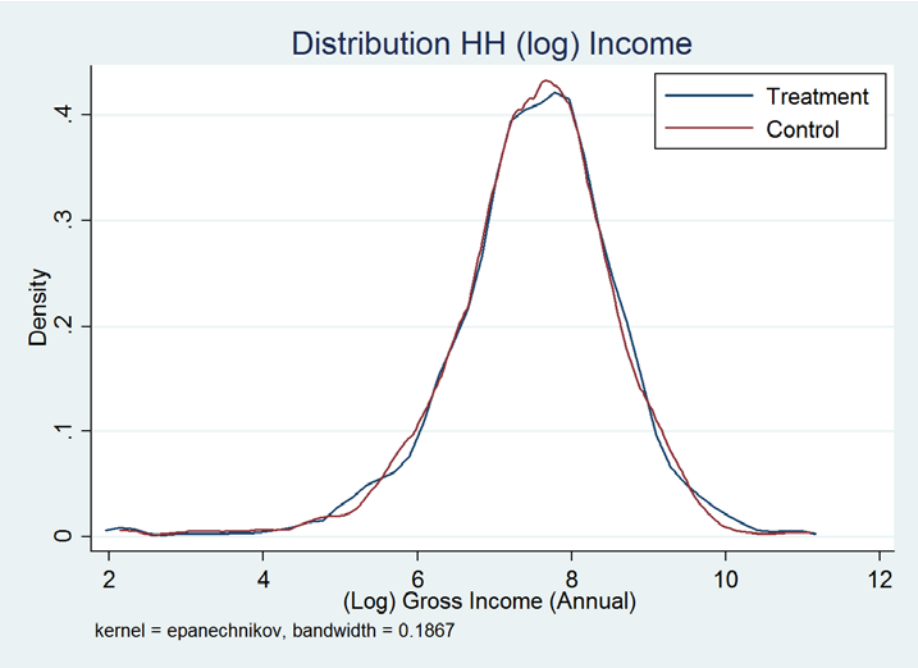


FIGURE A-3 PER CAPITA/DAY CONSUMPTION

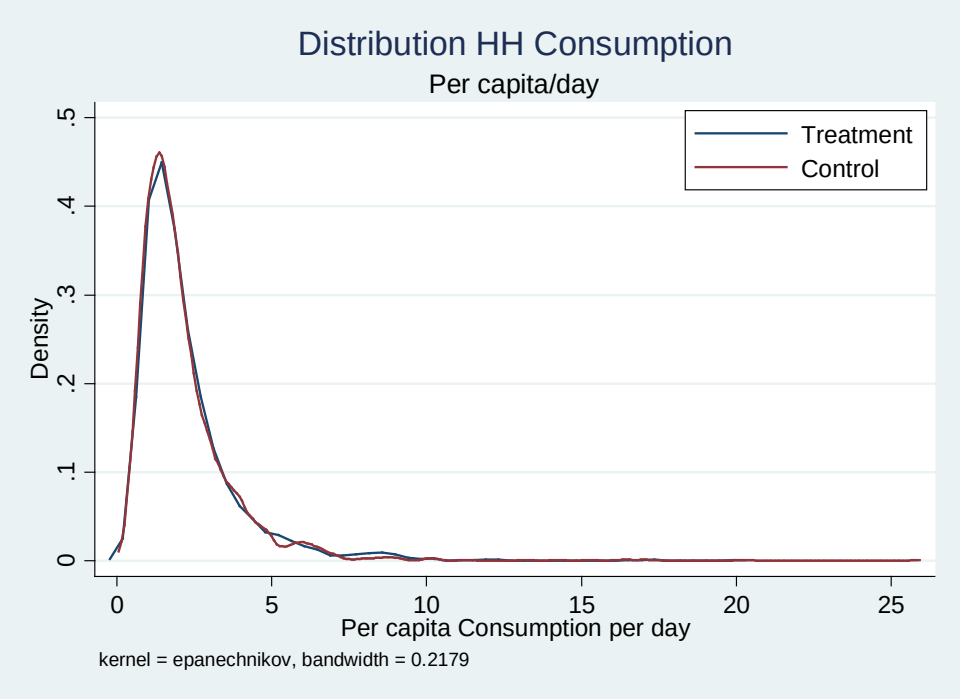


FIGURE A-4 HOUSEHOLD CONSUMPTION BY WATER ACCESS

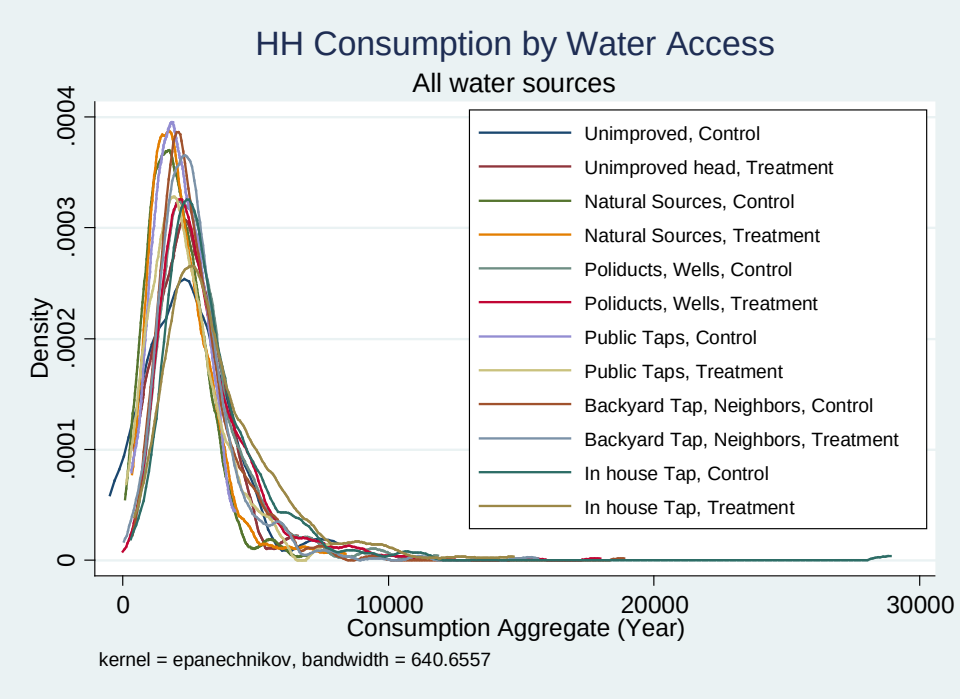


FIGURE A-5 LOG HOUSEHOLD CONSUMPTION BY WATER ACCESS

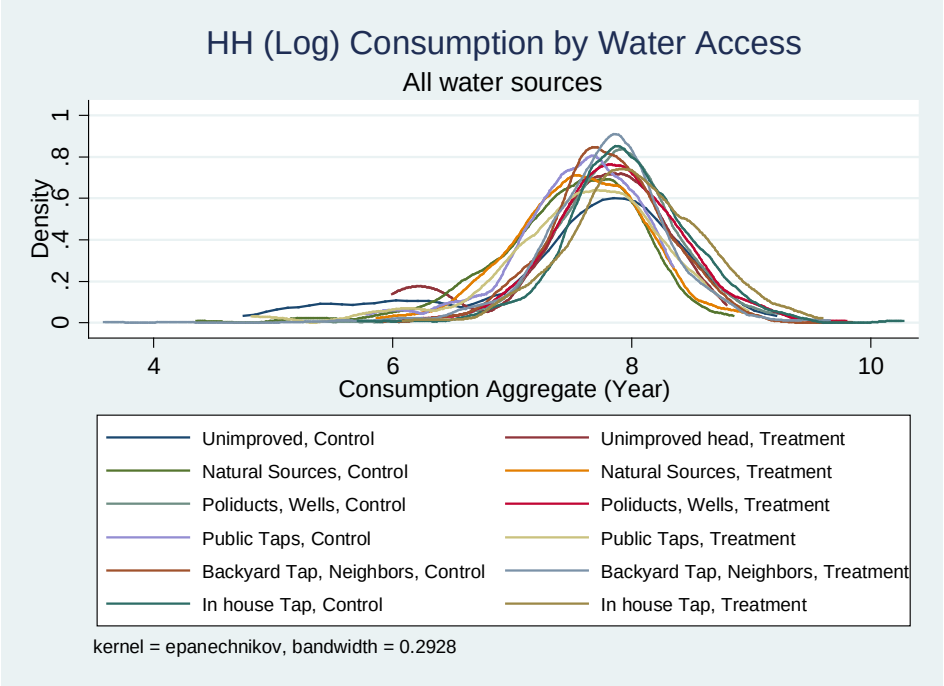


FIGURE A-6 HOUSEHOLD CONSUMPTION DISTRIBUTION BY GENDER OF THE HEAD OF HOUSEHOLD

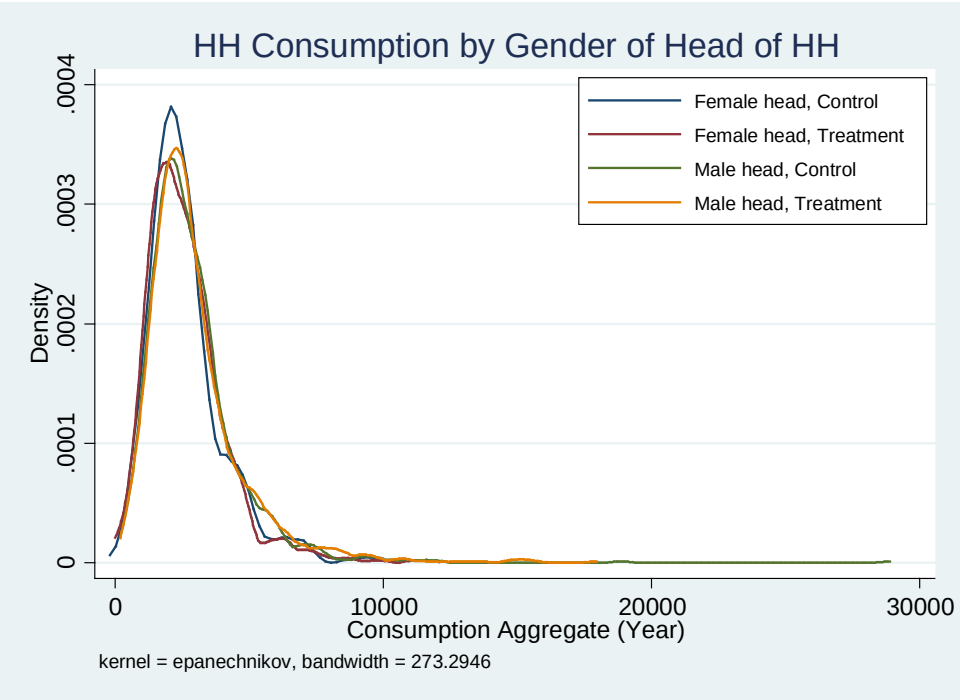


FIGURE A-7 HOUSEHOLD GROSS INCOME DISTRIBUTION BY GENDER OF THE HEAD OF HOUSEHOLD

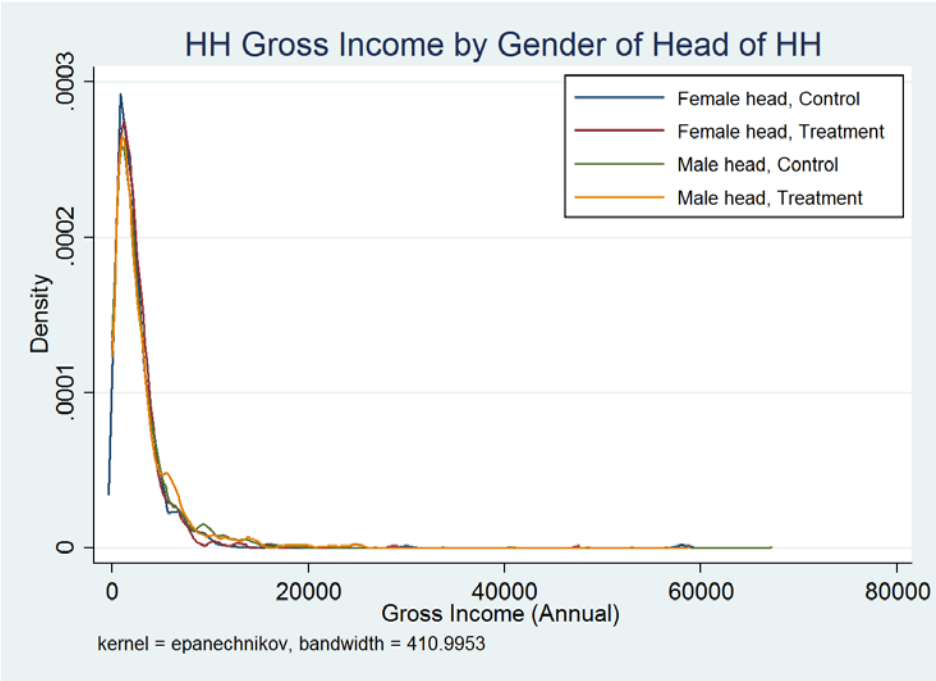


FIGURE A-8 LOG HOUSEHOLD GROSS INCOME DISTRIBUTION BY GENDER OF THE HEAD OF HOUSEHOLD

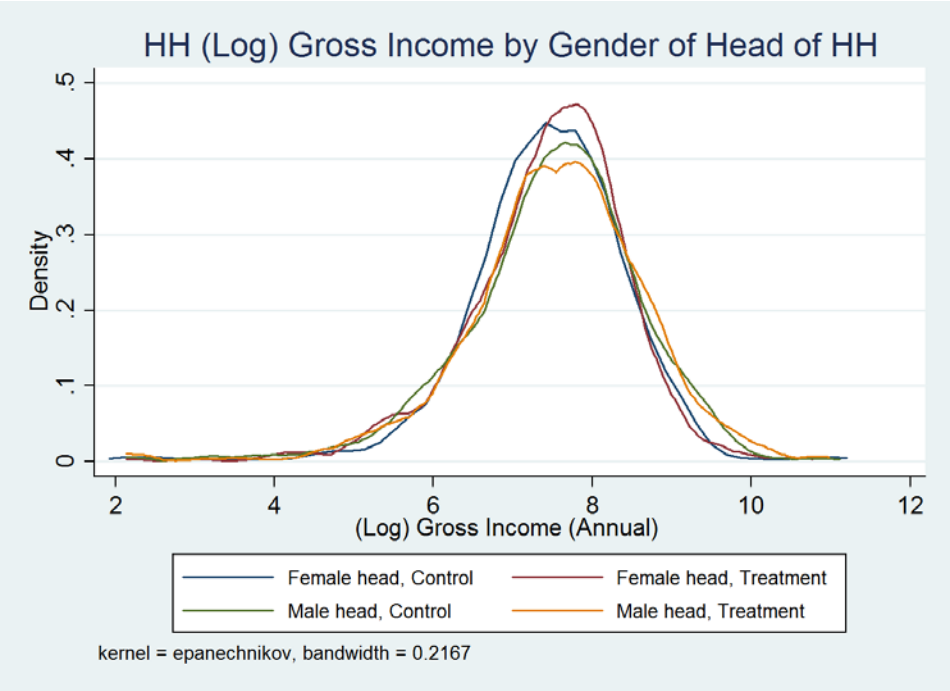


FIGURE A-9 HOUSEHOLD NET INCOME DISTRIBUTION BY GENDER OF THE HEAD OF HOUSEHOLD

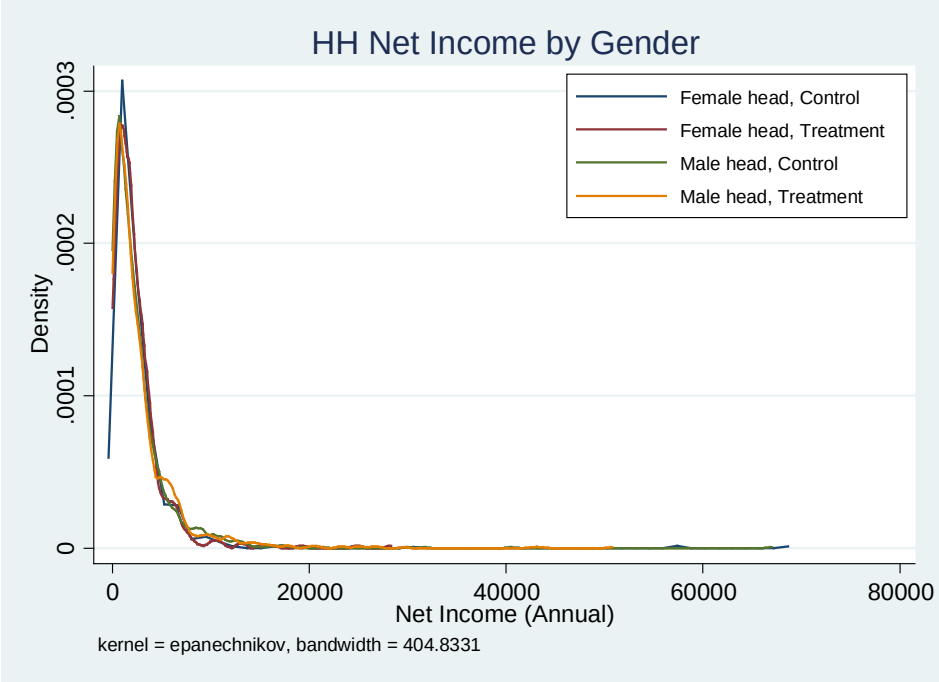


FIGURE A-10 GEOGRAPHICAL DISTRIBUTION OF MEAN NET INCOME

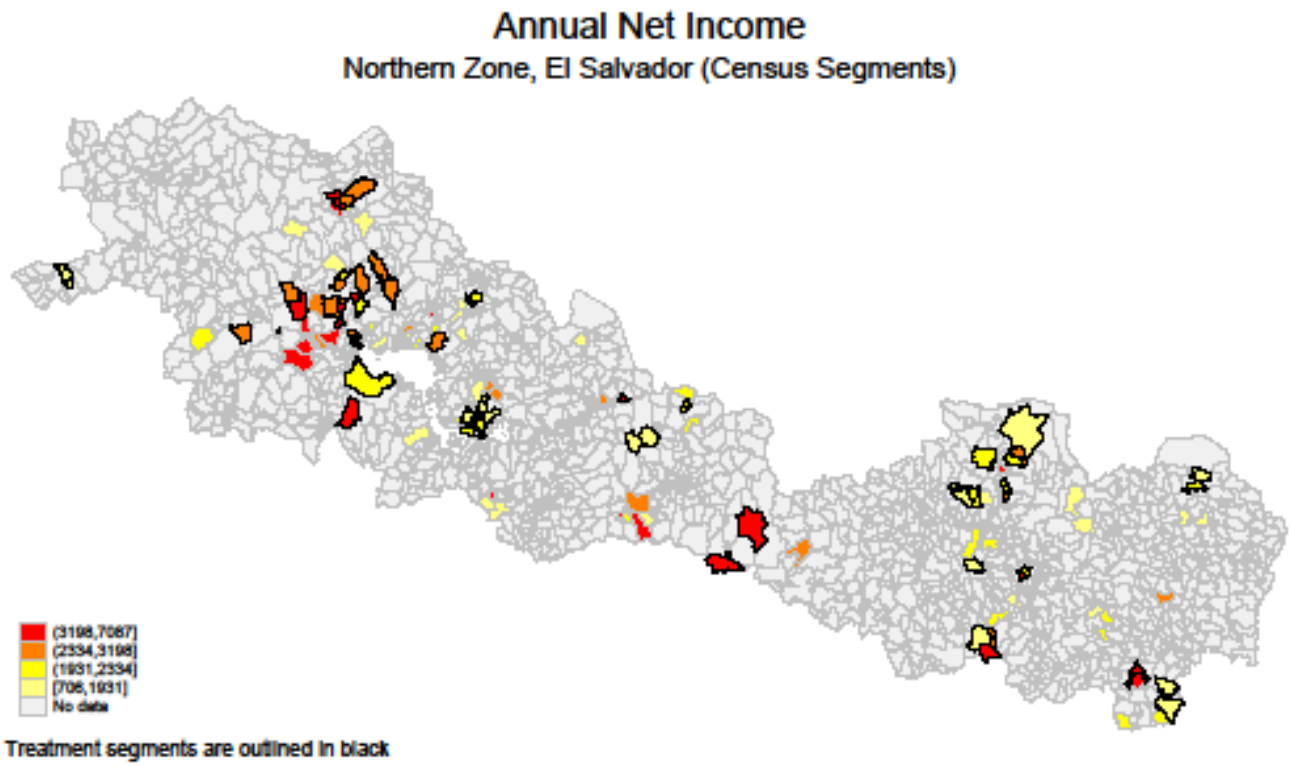
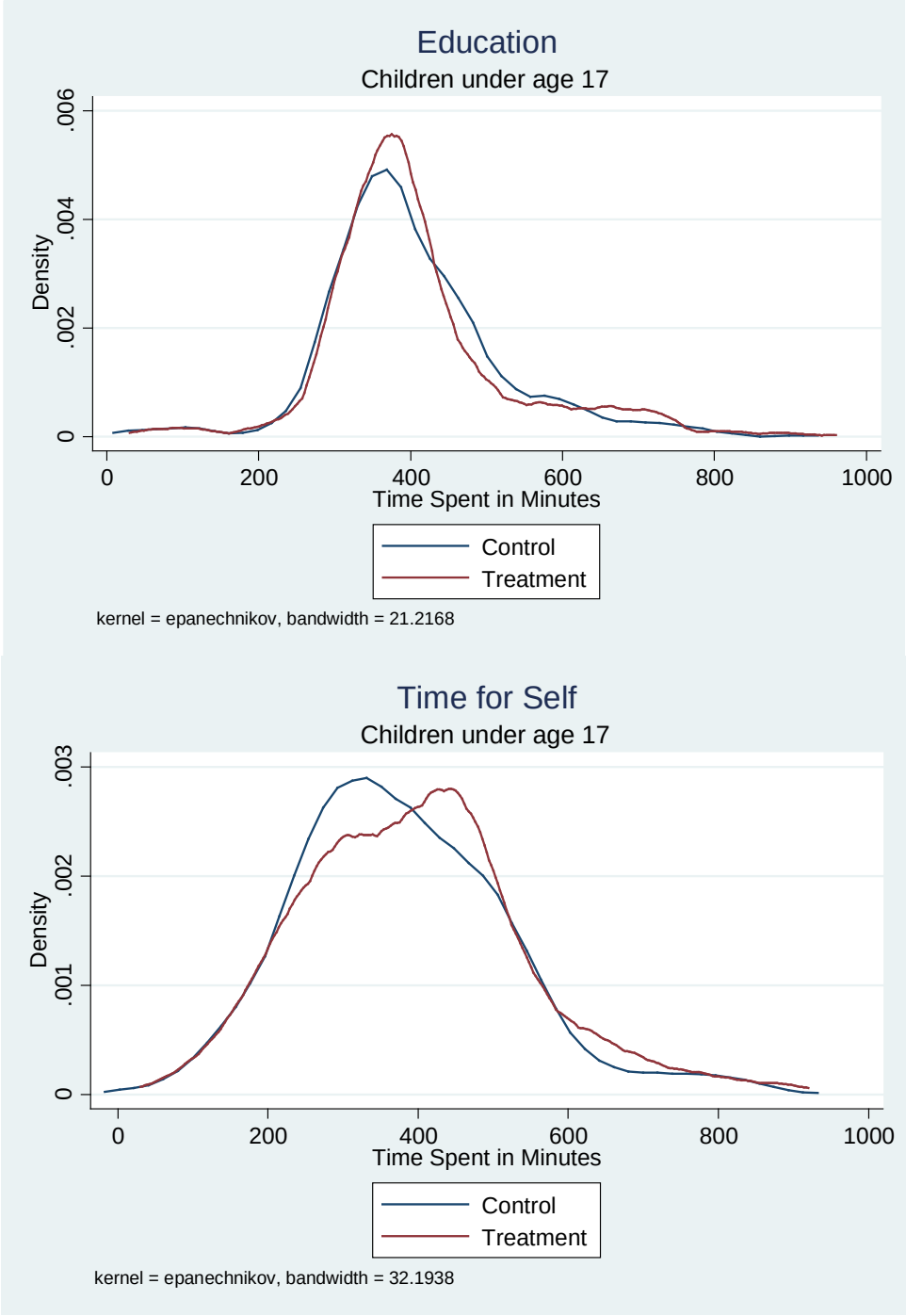
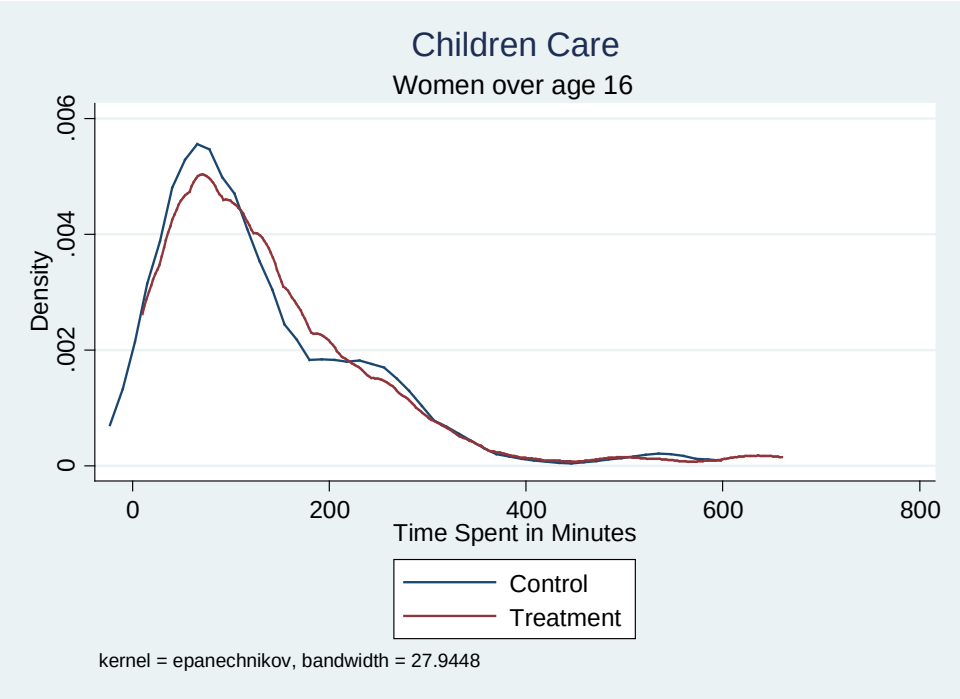
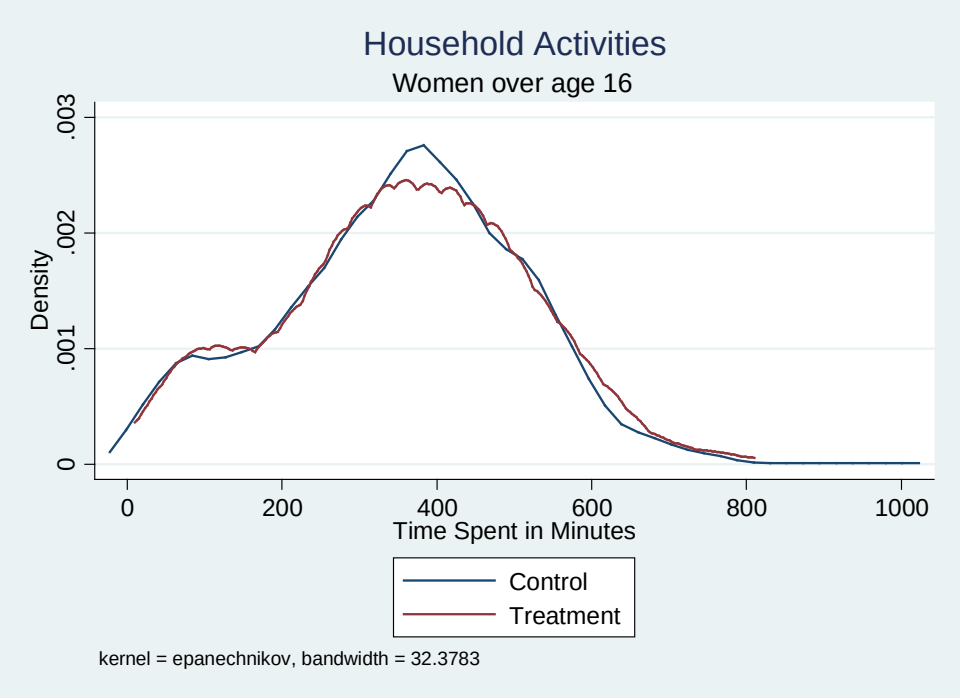


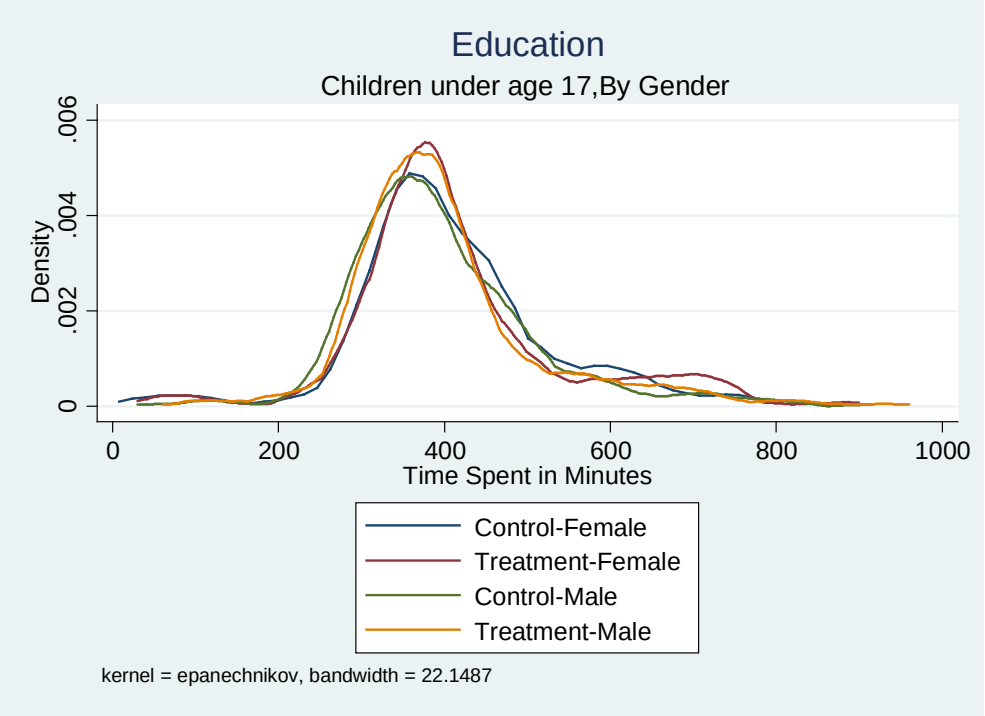
FIGURE A-11 DISTRIBUTION OF TIME USE FOR CHILDREN AND WOMEN ACROSS VARIOUS CATEGORIES

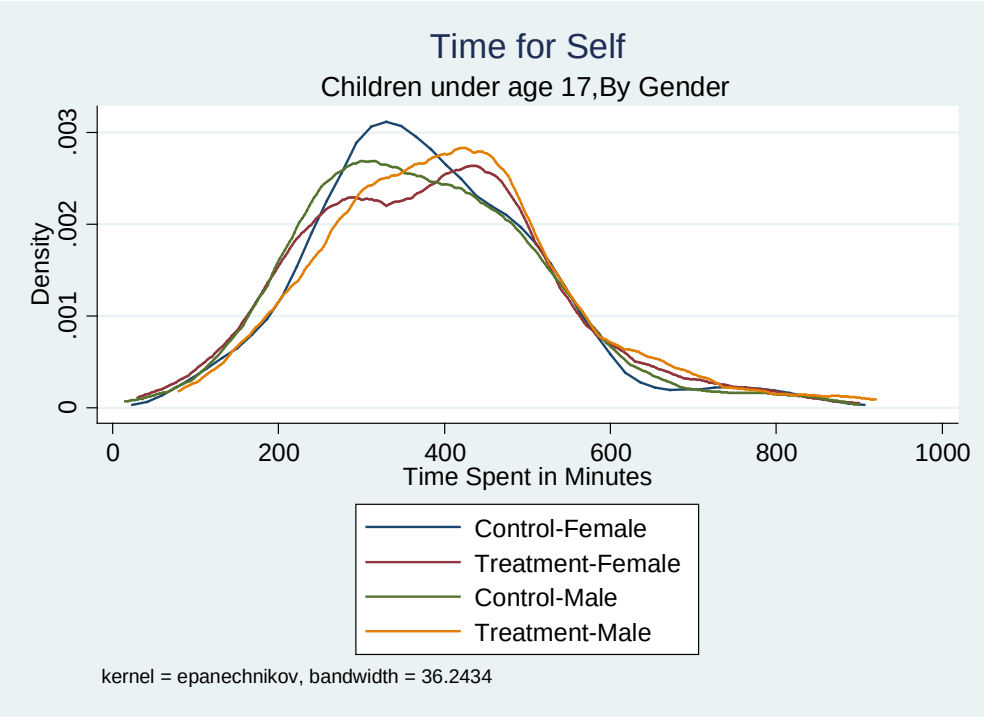


Time for Self
Women over age 16
Density
0
.0005
.001
.0015
.002
.0025
0
200
400
600
800
1000
Time Spent in Minutes
Control
Treatment
kernel = epanechnikov, bandwidth = 29.2869
Agricultural Production
Women over age 16
Density
0
.002
.004
.006
.008
.01
0
200
400
600
800
Time Spent in Minutes
Control
Treatment
kernel = epanechnikov, bandwidth = 22.2229


Children Care
Women over age 16
Density
0
.002
.004
.006
0
200
400
600
800
Time Spent in Minutes
Control
Treatment
kernel = epanechnikov, bandwidth = 27.9448


Household Activities
Women over age 16
Density
0
.001
.002
.003
0
200
400
600
800
1000
Time Spent in Minutes
Control
Treatment
kernel = epanechnikov, bandwidth = 32.3783


Education
Children under age 17,By Gender
Density
0
.002
.004
.006
0
200
400
600
800
1000
Time Spent in Minutes
Control-Female
Treatment-Female
Control-Male
Treatment-Male
kernel = epanechnikov, bandwidth = 22.1487


Time for Self
Children under age 17,By Gender
Density
0
.001
.002
.003
0
200
400
600
800
1000
Time Spent in Minutes
Control-Female
Treatment-Female
Control-Male
Treatment-Male
kernel = epanechnikov, bandwidth = 36.2434

B. Appendix –Tables

TABLE B-1 EVENTS IN THE COMMUNITY IN THE LAST 12 MONTHS

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Drought						
Yes	24	36.92	31	47.69	55	42.31
No	41	63.08	34	52.31	75	57.69
Fires						
Yes	3	4.62	3	4.62	6	4.62
No	62	95.38	62	95.38	124	95.38
Floods						
Yes	41	63.08	29	44.62	70	53.85
No	24	36.92	36	55.38	60	46.15
Crop pests						
Yes	23	35.38	20	30.77	43	33.08
No	42	64.62	45	69.23	87	66.92
Animal pests						
Yes	16	24.62	11	16.92	27	20.77
No	49	75.38	54	83.08	103	79.23
Cholera						
Yes	7	10.77	6	9.23	13	10.00
No	58	89.23	59	90.77	117	90.00
Dengue						
Yes	12	18.46	16	24.62	28	21.54
No	53	81.54	49	75.38	102	78.46
Other contagious diseases						
Yes	22	33.85	12	18.46	34	26.15
No	43	66.15	53	81.54	96	73.85
Ag. product prices increases						
Yes	53	81.54	53	81.54	106	81.54
No	12	18.46	12	18.46	24	18.46
Ag. input prices increases						
Yes	57	87.69	56	86.15	113	86.92
No	8	12.31	9	13.85	17	13.08
Increases in unemployment						
Yes	45	69.23	35	53.85	80	61.54
No	20	30.77	30	46.15	50	38.46

TABLE B-2 PRINCIPAL SOURCE OF DRINKING WATER

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Own Tap Connection	706	42.87	564	34.45	1270	38.67
Own Poliduct	157	9.53	127	7.76	284	8.65
Private Well	218	13.24	208	12.71	426	12.97
Rain Capture	0	0.00	2	0.12	2	0.06
Public Tap	58	3.52	66	4.03	124	3.78
Public Well, gas/diesel Pump	6	0.36	6	0.37	12	0.37
Public Well, Manual Pump	6	0.36	14	0.86	20	0.61
Public Well, Open or Bucket	8	0.49	8	0.49	16	0.49
Protected Spring	66	4.01	96	5.86	162	4.93
Non Protected Spring	122	7.41	148	9.04	270	8.22
Rivers	15	0.91	25	1.53	40	1.22
Cistern Truck	4	0.24	4	0.24	8	0.24
Bottled Water	24	1.46	24	1.47	48	1.46
Neighbors Sell Water	32	1.94	20	1.22	52	1.58
Neighbors Give Water	179	10.87	199	12.16	378	11.51
Other	4	0.24	0	0.00	4	0.12
Bottled (garrafón)	34	2.06	118	7.21	152	4.63
Other Family Gives Water	7	0.43	7	0.43	14	0.43
Public Laundry	0	0.00	1	0.06	1	0.03
Public Tap from other Canton	1	0.06	0	0.00	1	0.03
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	91.78	0.00	***

TABLE B-3 PRINCIPAL SOURCE OF COOKING WATER

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Own Tap Connection	732	44.4	607	37.1	1339	40.8
Own Poliduct	166	10.1	130	7.9	296	9.0
Private Well	244	14.8	263	16.1	507	15.4
Rain Capture	0	0.0	3	0.2	3	0.1
Public Tap	54	3.3	62	3.8	116	3.5
Public Well, gas/diesel Pump	5	0.3	8	0.5	13	0.4
Public Well, Manual Pump	7	0.4	19	1.2	26	0.8
Public Well, Open or Bucket	8	0.5	8	0.5	16	0.5
Protected Spring	61	3.7	95	5.8	156	4.8
Non Protected Spring	118	7.2	143	8.7	261	7.9
Rivers	17	1.0	30	1.8	47	1.4
Cistern Truck	4	0.2	7	0.4	11	0.3
Bottled Water	9	0.5	8	0.5	17	0.5
Neighbors Sell Water	34	2.1	21	1.3	55	1.7
Neighbors Give Water	165	10.0	187	11.4	352	10.7
Other	1	0.1	0	0.0	1	0.0
Bottled (garrafón)	12	0.7	33	2.0	45	1.4
Other Family Gives Water	5	0.3	6	0.4	11	0.3
Does not cook	4	0.2	6	0.4	10	0.3
Public Laundry	0	0.0	1	0.1	1	0.0
Public Tap from other Canton	1	0.1	0	0.0	1	0.0
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	58.53	0.00	***

TABLE B-4 PRINCIPAL SOURCE OF WATER FOR LAUNDRY

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Own Tap Connection	740	44.9	587	35.9	1327	40.4
Own Poliduct	163	9.9	135	8.2	298	9.1
Private Well	257	15.6	290	17.7	547	16.7
Rain Capture	0	0.0	1	0.1	1	0.0
Public Tap	19	1.2	25	1.5	44	1.3
Public Well, gas/diesel Pump	1	0.1	4	0.2	5	0.2
Public Well, Manual Pump	6	0.4	23	1.4	29	0.9
Public Well, Open or Bucket	5	0.3	7	0.4	12	0.4
Protected Spring	45	2.7	70	4.3	115	3.5
Non Protected Spring	127	7.7	129	7.9	256	7.8
Rivers	155	9.4	197	12.0	352	10.7
Cistern Truck	4	0.2	8	0.5	12	0.4
Bottled Water	0	0.0	1	0.1	1	0.0
Neighbors Sell Water	23	1.4	12	0.7	35	1.1
Neighbors Give Water	79	4.8	111	6.8	190	5.8
Lakes	1	0.1	0	0.0	1	0.0
Non HH member does laundry (free)	10	0.6	11	0.7	21	0.6
HH member does laundry, other water	7	0.4	10	0.6	17	0.5
Other Family outside neighborhood	0	0.0	4	0.2	4	0.1
Does not do laundry	3	0.2	8	0.5	11	0.3
Public Laundry	0	0.0	3	0.2	3	0.1
Water Donated by FOMILENIO	2	0.1	1	0.1	3	0.1
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	68.97	0.00	***

TABLE B-5 WATER SOURCES USED BY HOUSEHOLDS

Water use and access of HH's	Control		Treatment		Total		Exact	
	Number	%	Number	%	Number	%	Fisher	
Use Public Tap (30 days)								
Yes	65	90.28	87	82.08	152	85.39		
No	7	9.72	19	17.92	26	14.61		
Total	72	100.00	106	100.00	178	100.00	0.194	
Has tap in the house								
Yes, in the backyard	573	57.24	579	55.04	1152	56.11		
Yes, in the house	229	22.88	192	18.25	421	20.51		
No	199	19.88	281	26.71	480	23.38		
Total	1001	100.00	1052	100.00	2053	100.00	0.000	***
Use water from Neighbor								
Yes	64	32.16	72	25.62	136	28.33		
No	135	67.84	209	74.38	344	71.67		
Total	199	100.00	281	100.00	480	100.00	0.124	
Use Poliduct								
Yes	222	62.18	180	49.18	402	55.60		
No	135	37.82	186	50.82	321	44.40		
Total	357	100.00	366	100.00	723	100.00	0.000	***
Capture Rain water								
Yes	219	69.52	293	67.20	512	68.18		
No	96	30.48	143	32.80	239	31.82		
Total	315	100.00	436	100.00	751	100.00	0.526	
Has private well								
Yes	370	44.47	411	46.23	781	45.38		
No	462	55.53	478	53.77	940	54.62		
Total	832	100.00	889	100.00	1721	100.00	0.468	
Use other sources								
Yes	368	41.72	358	42.17	726	41.94		
No	514	58.28	491	57.83	1005	58.06		
Total	882	100.00	849	100.00	1731	100.00	0.884	
Use Public well								
Yes	31	32.63	79	46.47	110	41.51		
No	64	67.37	91	53.53	155	58.49		
Total	95	100.00	170	100.00	265	100.00	0.037	**
Use Springs								
Yes	332	58.25	431	60.53	763	59.52		
No	238	41.75	281	39.47	519	40.48		
Total	570	100.00	712	100.00	1282	100.00	0.423	
Bought water from Truck (30 Days)								
Yes	56	15.64	150	30.12	206	24.07		
No	302	84.36	348	69.88	650	75.93		
Total	358	100.00	498	100.00	856	100.00	0.000	***

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-6 WATER SOURCES ACCESSIBLE IN NEIGHBORHOOD

Availability of water sources by neighborhood

	Control		Treatment		Total		Exact	
	Number	%	Number	%	Number	%	Fisher	
Public taps								
Yes	262	25.59	240	22.26	502	23.88		
No	758	74.02	830	76.99	1588	75.55		
Does not know	4	0.39	8	0.74	12	0.57		
Total	1024	100.00	1078	100.00	2102	100.00	0.122	
Household taps								
Yes	1001	97.75	1052	97.59	2053	97.67		
No	22	2.15	25	2.32	47	2.24		
Does not know	1	0.10	1	0.09	2	0.10		
Total	1024	100.00	1078	100.00	2102	100.00	0.941	
Poliducts								
Yes	357	21.58	330	21.11	687	21.36		
No	1273	76.96	1210	77.42	2483	77.18		
Does not know	24	1.45	23	1.47	47	1.46		
Total	1654	100.00	1563	100.00	3217	100.00	0.812	
Rain capture systems								
Yes	315	19.13	436	26.63	751	22.87		
No	1301	78.99	1179	72.02	2480	75.52		
Does not know	31	1.88	22	1.34	53	1.61		
Total	1647	100.00	1637	100.00	3284	100.00	0.000	***
Other sources								
Yes	882	53.55	849	51.86	1731	52.71		
No	760	46.14	784	47.89	1544	47.02		
Does not know	5	0.30	4	0.24	9	0.27		
Total	1647	100.00	1637	100.00	3284	100.00	0.566	
Public Wells								
Yes	95	5.77	170	10.38	265	8.07		
No	1550	94.11	1466	89.55	3016	91.84		
Does not know	2	0.12	1	0.06	3	0.09		
Total	1647	100.00	1637	100.00	3284	100.00	0.000	***
Springs								
Yes	570	34.61	712	43.49	1282	39.04		
No	1071	65.03	921	56.26	1992	60.66		
Does not know	6	0.36	4	0.24	10	0.30		
Total	1647	100.00	1637	100.00	3284	100.00	0.000	***
Truck deliveries								
Yes, cistern truck	38	2.31	36	2.20	74	2.25		
Yes, bottled water	320	19.43	444	27.12	764	23.26		
Yes, both	0	-	18	1.10	18	0.55		
No	1273	77.29	1123	68.60	2396	72.96		
Does not know	16	0.97	16	0.98	32	0.97		
Total	1647	100.00	1637	100.00	3284	100.00	0.000	***

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-7 POLIDUCTS, PUBLIC AND HOUSEHOLD TAPS: WATER AVAILABILITY

Water Availability by Days

		Control		Treatment		Total	
Public tap		Number	%	Number	%	Number	%
	0	0	0.0	2	3.0	2	1.5
	2	0	0.0	2	3.0	2	1.5
	3	8	12.3	12	17.9	20	15.2
	4	18	27.7	8	11.9	26	19.7
	5	1	1.5	1	1.5	2	1.5
	6	0	0.0	1	1.5	1	0.8
	7	38	58.5	41	61.2	79	59.8
Total		65	100	67	100	132	100
* p<0.1 ** p<0.05 ***p<0.01		Chi2	p-value				
		10.28	0.11				
HH tap							
	0	22	2.7	93	12.4	115	7.4
	1	12	1.5	20	2.7	32	2.1
	2	48	5.9	58	7.8	106	6.8
	3	111	13.7	70	9.4	181	11.6
	4	101	12.5	72	9.6	173	11.1
	5	15	1.9	11	1.5	26	1.7
	6	29	3.6	10	1.3	39	2.5
	7	470	58.2	414	55.3	884	56.8
Total		808	100	748	100	1556	100
* p<0.1 ** p<0.05 ***p<0.01		Chi2	p-value				
		83.51	0.00 ***				

Availability of Poliduct by months

		Control		Treatment		Total	
		Number	%	Number	%	Number	%
	2	1	0.5	0	0.0	1	0.3
	5	0	0.0	1	0.6	1	0.3
	6	7	3.2	8	4.8	15	3.9
	7	3	1.4	0	0.0	3	0.8
	8	4	1.8	1	0.6	5	1.3
	9	2	0.9	0	0.0	2	0.5
	10	3	1.4	3	1.8	6	1.5
	11	0	0.0	1	0.6	1	0.3
	12	201	91.0	153	91.6	354	91.2
Total		221	100	167	100	388	100
* p<0.1 ** p<0.05 ***p<0.01		Chi2	p-value				
		11.14	0.35				

Poliduct availability at time of the survey

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Yes	13	61.9	10	71.4	23	65.7
No	8	38.1	4	28.6	12	34.3
Total	21	100	14	100	35	100
* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value				
	0.51	0.47				

TABLE B-8 RAIN SYSTEMS AND WELLS: WATER AVAILABILITY BY DAYS, MONTHS AND AT THE TIME OF THE SURVEY

Availability of Rain systems by months

		Control		Treatment		Total	
		Number	%	Number	%	Number	%
	1	0	0.0	1	0.4	1	0.2
	2	2	0.9	1	0.4	3	0.6
	3	4	1.8	7	2.6	11	2.3
	4	12	5.5	11	4.1	23	4.7
	5	51	23.3	65	24.3	116	23.8
	6	145	66.2	183	68.3	328	67.4
	7	5	2.3	0	0.0	5	1.0
Total		219	100	268	100	487	100
* p<0.1 ** p<0.05 ***p<0.01		Chi2	p-value				
		10.33	0.17				

Rain system availability at time of the survey

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Yes	18	8.2	7	2.6	25	5.1
No	201	91.8	262	97.4	463	94.9
Total	219	100	269	100	488	100
* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value				
	5.600	0.018	**			

Availability of well systems by months

		Control		Treatment		Total	
		Number	%	Number	%	Number	%
	0	1	0.3	3	0.8	4	0.5
	1	1	0.3	2	0.5	3	0.4
	3	0	0.0	2	0.5	2	0.3
	4	1	0.3	2	0.5	3	0.4
	5	0	0.0	1	0.3	1	0.1
	6	8	2.2	10	2.5	18	2.4
	7	2	0.5	1	0.3	3	0.4
	8	5	1.4	5	1.3	10	1.3
	9	6	1.6	5	1.3	11	1.4
	10	19	5.1	14	3.5	33	4.3
	11	7	1.9	2	0.5	9	1.2
	12	320	86.5	348	88.1	668	87.3
Total		370	100	395	100	765	100
* p<0.1 ** p<0.05 ***p<0.01		Chi2	p-value				
		9.681	0.559				

Well system availability at time of the survey

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Si	34	69.4	31	70.45	65	69.9
No	15	30.6	13	29.55	28	30.1
Total	49	100	44	100	93	100
* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value				
	0.003	0.958				

TABLE B-9 PUBLIC AND HOUSEHOLD TAPS: NUMBER OF HOURS/DAY WATER AVAILABILITY

Water availability by hours

		Control		Treatment		Total	
Public tap		Number	%	Number	%	Number	%
	0.25	0	0.00	1	1.56	1	0.78
	0.5	1	1.54	5	7.81	6	4.65
	1	2	3.08	8	12.50	10	7.75
	1.3	0	0.00	1	1.56	1	0.78
	1.5	1	1.54	1	1.56	2	1.55
	2	15	23.08	4	6.25	19	14.73
	3	2	3.08	1	1.56	3	2.33
	4	2	3.08	1	1.56	3	2.33
	5	2	3.08	3	4.69	5	3.88
	6	1	1.54	1	1.56	2	1.55
	8	2	3.08	5	7.81	7	5.43
	9	1	1.54	1	1.56	2	1.55
	10	0	0.00	2	3.13	2	1.55
	12	3	4.62	4	6.25	7	5.43
	14	4	6.15	0	0.00	4	3.10
	15	1	1.54	0	0.00	1	0.78
	16	0	0.00	1	1.56	1	0.78
	18	0	0.00	1	1.56	1	0.78
	20	3	4.62	1	1.56	4	3.10
	24	25	38.46	23	35.94	48	37.21
Total		65	100	64	100	129	100
* p<0.1 ** p<0.05 ***p<0.01		Chi2	p-value				
		25.64	0.18				
HH tap							
	0	17	2.16	50	7.63	67	4.65
	1	91	11.58	90	13.74	181	12.56
	2	59	7.51	95	14.50	154	10.69
	3	41	5.22	74	11.30	115	7.98
	4	46	5.85	31	4.73	77	5.34
	5	35	4.45	20	3.05	55	3.82
	6	43	5.47	31	4.73	74	5.14
	7	21	2.67	10	1.53	31	2.15
	8	36	4.58	15	2.29	51	3.54
	9	11	1.40	2	0.31	13	0.90
	10	17	2.16	12	1.83	29	2.01
	11	1	0.13	1	0.15	2	0.14
	12	42	5.34	22	3.36	64	4.44
	13	2	0.25	0	0.00	2	0.14
	14	3	0.38	1	0.15	4	0.28
	15	1	0.13	1	0.15	2	0.14
	16	0	0.00	3	0.46	3	0.21
	17	2	0.25	0	0.00	2	0.14
	18	2	0.25	2	0.31	4	0.28
	20	9	1.15	19	2.90	28	1.94
	21	0	0.00	1	0.15	1	0.07
	22	3	0.38	2	0.31	5	0.35
	23	0	0.00	2	0.31	2	0.14
	24	304	38.68	171	26.11	475	32.96
Total		786	100	655	100	1441	100
* p<0.1 ** p<0.05 ***p<0.01		Chi2	p-value				
		106.91	0.00 ***				

TABLE B-10 IMPROVED WATER AND SANITATION "SCORES"

Uses Improved Water	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Unimproved	27	1.6	28	1.7	55	1.7
Natural Sources	233	14.1	226	13.8	459	14.0
Poliducts, Wells	485	29.4	491	30.0	976	29.7
Public Taps	36	2.2	49	3.0	85	2.6
Backyard Tap, Neighbors	637	38.7	651	39.8	1288	39.2
In house Tap	229	13.9	192	11.7	421	12.8
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	5.52	0.36	

Uses Improved Sanitary	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Unimproved, Open Air	203	12.3	145	8.9	348	10.6
Latrine, Common or Neighbor	68	4.1	82	5.0	150	4.6
Backyard Latrine, Hole	489	29.7	440	26.9	929	28.3
Backyard Latrine, Compost/Solar	514	31.2	532	32.5	1046	31.9
Inside Latrine, Hole	26	1.6	39	2.4	65	2.0
Inside Latrine, Compost/Solar	19	1.2	33	2.0	52	1.6
Backyard Toilet	140	8.5	139	8.5	279	8.5
Inside Toilet	188	11.4	227	13.9	415	12.6
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	23.88	0.00	***

TABLE B-11 ACCESS TO SANITARY SERVICES

Sanitary Service	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Yes, inside the house	233	14.1	299	18.3	532	16.2
Yes, in the backyard	1143	69.4	1111	67.9	2254	68.6
No	271	16.5	227	13.9	498	15.2
Total	1647	100	1637	100	3284	100

* p<0.1 ** p<0.05 ***p<0.01	Chi2	p-value	
	12.50	0.00	***

TABLE B-12 EDUCATION DISTRIBUTION OF HEAD OF HOUSEHOLD

	Control		Treatment		Total		Fisher p-value
Years Completed	Number	%	Number	%	Number	%	
1	96	9.5	111	10.0	207	9.8	
2	204	20.3	231	20.9	435	20.6	
3	158	15.7	181	16.4	339	16.0	
4	117	11.6	105	9.5	222	10.5	
5	66	6.6	98	8.9	164	7.8	
6	150	14.9	128	11.6	278	13.2	
7	31	3.1	48	4.3	79	3.7	
8	18	1.8	25	2.3	43	2.0	
9	76	7.6	99	8.9	175	8.3	
10	9	0.9	9	0.8	18	0.9	
11	10	1.0	10	0.9	20	0.9	
12	15	1.5	23	2.1	38	1.8	
13	55	5.5	39	3.5	94	4.4	
15	1	0.1	0	0.0	1	0.0	
Total	1006	100	1107	100	2113	100	0.089

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-13 TEST RESULT FROM CHLORINE TESTS

	Control		Treatment		Total		Fisher p-value	
	Number	%	Number	%	Number	%		
< 0.3	1457	88.5	1514	92.5	2971	90.5		
0.3-0.5	134	8.1	94	5.7	228	6.9		
0.5-1.0	30	1.8	13	0.8	43	1.3		
1.0-1.5	13	0.8	11	0.7	24	0.7		
1.5-3.0	10	0.6	2	0.1	12	0.4		
Did not allow	3	0.2	3	0.2	6	0.2		
Total	1647	100	1637	100	3284	100	0.001	***

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-14 TREATMENT HABITS FOR DRINKING WATER

Drinking water containers cleaning habits

	Control		Treatment		Total		Chi2	p-value
	Number	%	Number	%	Number	%		
Yes	1515	97.805	1456	94.42	2971	96.12		
No, it is bottled wate	28	1.808	82	5.32	110	3.56		
Never	6	0.387	4	0.26	10	0.32		
Total	1549	100	1542	100	3091	100	28.07	0.00 ***

* p<0.1 ** p<0.05 ***p<0.01

Drinking containers washed with :

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
Water only	289	15.8	254	14.6	543	15.2
Boiled water	10	0.5	6	0.3	16	0.4
Soap	1055	57.7	990	57.0	2045	57.3
Chlorine	19	1.0	21	1.2	40	1.1
Sand	3	0.2	5	0.3	8	0.2
Bleach	378	20.7	356	20.5	734	20.6
Other	74	4.0	106	6.1	180	5.0
Total	1828	100	1738	100	3566	100

Drinking water is treated with:

	Control		Treatment		Total	
	Number	%	Number	%	Number	%
No treatment	1333	86.7	1177	80.1	2510	83.5
Boiled	40	2.6	59	4.0	99	3.3
Chlorine	65	4.2	70	4.8	135	4.5
Puriagua	46	3.0	83	5.7	129	4.3
Sun	33	2.1	21	1.4	54	1.8
Industrial filter	5	0.3	21	1.4	26	0.9
Artisan filter	12	0.8	28	1.9	40	1.3
Other	4	0.3	10	0.7	14	0.5
Total	1538	100	1469	100	3007	100

	Control		Treatment		Total			
	Mean	SE	Mean	SE	Mean	SE	Difference	p-value
Days since container was washed	1.74	0.06	2.00	0.25	1.87	0.13	-0.26	0.31

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-15 HEALTH RISK PERCEPTIONS BY WATER SOURCE TYPE

Risk perceptions	Control		Treatment		Total		Exact
	Number	%	Number	%	Number	%	Fisher
Public System							0.00 ***
There is high probability	145	14.16	228	21.15	373	17.75	
There is little probability	391	38.18	402	37.29	793	37.73	
One cannot get sick	452	44.14	378	35.06	830	39.49	
Does not know	36	3.52	70	6.49	106	5.04	
Total	1024	100	1078	100	2102	100	
Poliduct							0.23
There is high probability	79	22.13	100	27.32	179	24.76	
There is little probability	159	44.54	141	38.52	300	41.49	
One cannot get sick	112	31.37	114	31.15	226	31.26	
Does not know	7	1.96	11	3.01	18	2.49	
Total	357	100	366	100	723	100	
Rain							0.41
There is high probability	269	85.40	381	87.39	650	86.55	
There is little probability	41	13.02	49	11.24	90	11.98	
One cannot get sick	4	1.27	2	0.46	6	0.80	
Does not know	1	0.32	4	0.92	5	0.67	
Total	315	100	436	100	751	100	
Wells							0.02 **
There is high probability	232	27.92	305	34.31	537	31.22	
There is little probability	410	49.34	414	46.57	824	47.91	
One cannot get sick	172	20.70	149	16.76	321	18.66	
Does not know	17	2.05	21	2.36	38	2.21	
Total	831	100	889	100	1720	100	
Other Sources							0.09 *
There is high probability	773	87.64	713	83.98	1486	85.85	
There is little probability	81	9.18	99	11.66	180	10.40	
One cannot get sick	28	3.17	37	4.36	65	3.76	
Total	882	100	849	100	1731	100	
Public Wells							0.00 ***
There is high probability	35	36.84	90	52.94	125	47.17	
There is little probability	30	31.58	62	36.47	92	34.72	
One cannot get sick	24	25.26	14	8.24	38	14.34	
Does not know	6	6.32	4	2.35	10	3.77	
Total	95	100	170	100	265	100	
Springs							0.34
There is high probability	134	23.51	140	19.66	274	21.37	
There is little probability	247	43.33	312	43.82	559	43.60	
One cannot get sick	185	32.46	255	35.81	440	34.32	
Does not know	4	0.70	5	0.70	9	0.70	
Total	570	100	712	100	1282	100	
Trucks							0.34
There is high probability	23	6.48	26	5.263158	49	5.77	
There is little probability	38	10.70	68	13.76518	106	12.49	
One cannot get sick	247	69.58	323	65.38462	570	67.14	
Does not know	47	13.24	77	15.58704	124	14.61	
Total	355	100	494	100	849	100	

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-16 ANNUAL TRANSFERS TO AND FROM THE HOUSEHOLD

	Control			Treatment			Total					
	Mean	SE	Median	Mean	SE	Median	Mean	SE	Median	Difference	p-value	
Transfers IN from abroad	600.00	29.48	0	521.37	25.96	0	560.89	19.66	0	78.62	0.05	**
Transfers IN from other part of ES	81.46	8.91	0	82.69	7.39	0	82.07	5.79	0	-1.23	0.92	
Transfers IN from non-family members	6.81	2.03	0	15.76	4.11	0	11.26	2.29	0	-8.95	0.05	*
Transfers IN from other sources	49.89	5.65	0	65.14	5.69	0	57.48	4.01	0	-15.25	0.06	*
Total- Transfers IN to the household	737.43	30.84	180	684.36	27.31	180	711.03	20.61	180	53.08	0.20	
Transfers OUT of the household	5.30	1.64	0	6.67	1.95	0	5.98	1.27	0	-1.37	0.59	

* p<0.1 ** p<0.05
***p<0.01

TABLE B-17 MEAN ANNUAL INCOME BY WATER SOURCE TYPE

Income by Water Source Type

	Control				Treatment					
	Mean	SE	Median	Obs	Mean	SE	Median	Obs	Difference	p-value
Unimproved										
Brute Income	2,598.85	652.61	1360	27	3,180.52	641.02	1590	28	-581.67	0.53
Net Income	2,406.07	624.22	1200	27	3,041.52	627.54	1590	28	-635.44	0.48
Natural Sources										
Brute Income	2,047.53	158.73	1352	233	2,449.48	195.81	1651.5	226	-401.95	0.11
Net Income	1,764.65	146.59	1130	233	2,185.59	191.03	1383.5	226	-420.94	0.08
Poliducts, Wells										
Brute Income	3,349.45	259.37	1988.5	485	2,987.37	208.75	1800	491	362.08	0.28
Net Income	2,924.49	268.23	1660	485	2,478.29	155.98	1560	491	446.20	0.15
Public Taps										
Brute Income	1,702.63	170.32	1575	36	2,565.43	496.33	1780	49	-862.80	0.15
Net Income	1,530.42	163.82	1295.5	36	2,328.47	460.02	1578	49	-798.05	0.15
Backyard Tap, Neighbors										
Brute Income	2,711.25	114.68	1907	637	2,948.13	150.33	1900	651	-236.88	0.21
Net Income	2,445.24	108.24	1715	636	2,709.91	142.47	1716	651	-264.67	0.14
In house Tap										
Brute Income	3,666.67	351.04	2480	229	4,393.51	488.06	2584.25	192	-726.84	0.22
Net Income	3,129.13	234.32	2320	229	3,828.21	390.80	2388	192	-699.08	0.11
Total										
Brute Income	2,914.24	104.72	1860	1647	3,053.10	109.43	1908	1637		
Net Income	2,564.61	98.54	1639	1646	2,693.47	92.74	1676	1637		

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-18 PER CAPITA CONSUMPTION/EXPENDITURES

			Percentiles			
	Mean	SE	25	50	75	Obs
Control						
Food	430.08	7.16	251.33	364.00	518.27	1654
Non-Food	245.91	8.05	87.50	158.58	288.00	1654
Housing	121.61	5.04	40.00	75.00	150.00	1654
Total Consumption	797.60	15.81	436.63	633.44	955.51	1654
Treatment						
Food	440.05	7.67	256.10	365.73	534.86	1637
Non-Food	259.78	7.92	98.00	168.15	303.20	1637
Housing	121.65	3.58	40.00	80.00	150.00	1637
Total Consumption	821.48	15.65	449.23	650.60	973.00	1637
Total						
Food	435.04	5.25	254.80	364.00	526.50	3291
Non-Food	252.81	5.65	93.00	163.89	295.40	3291
Housing	121.63	3.10	40.00	80.00	150.00	3291
Total Consumption	809.48	11.12	443.33	642.58	964.10	3291
Difference		p-value				
Food	-9.97	0.34				
Non-Food	-13.87	0.22				
Housing	-0.04	0.99				
Total Consumption	-23.88	0.28				

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-19 CONSUMPTION/EXPENDITURES BY GENDER OF HOUSEHOLD HEAD

	Male Headed Households				Female Headed Households			
	Mean	SE	Median	Obs	Mean	Std. Err.	Median	Obs
Control								
Food	1,611.21	29.13	1,451	1,141	1,440.44	32.82	1,313	513
Non-Food	900.99	29.51	633	1,141	780.35	33.17	557	513
Housing	378.34	11.64	360	1,141	391.99	17.93	360	513
Total Consumption	2,890.55	54.33	2,521	1,141	2,612.79	62.04	2,356	513
Treatment								
Food	1,613.02	25.91	1,456	1,119	1,428.27	32.82	1,300	518
Non-Food	981.17	34.43	651	1,119	790.48	31.97	586	518
Housing	392.45	11.32	360	1,119	387.36	15.06	360	518
Total Consumption	2,986.65	57.26	2,542	1,119	2,606.11	63.11	2,378	518
Total								
Food	1,612.11	19.51	1,456	2,260	1,434.32	23.20	1,303	1,031
Non-Food	940.69	22.65	647	2,260	785.44	23.02	569	1,031
Housing	385.33	8.12	360	2,260	389.66	11.69	360	1,031
Total Consumption	2,938.13	39.45	2,530	2,260	2,609.43	44.23	2,370	1,031

TABLE B-20 INCOME BY GENDER OF HOUSEHOLD HEAD

	Male Headed Households				Female Headed Households				Male Headed Households				Female Headed Households			
	Control								Treatment							
	Mean	SE	Median	Obs	Mean	SE	Median	Obs	Mean	SE	Median	Obs	Mean	SE	Median	Obs
Monthly																
Income from agricultural activities	57.23	9.39	0	1141	17.33	8.66	0	513	66.93	9.45	0	1119	13.65	4.35	0	518
Salary (In-kind)	1.05	0.31	0	1141	0.90	0.46	0	513	0.49	0.23	0	1119	2.24	0.81	0	518
Salary (Cash)	153.20	6.44	100	1141	97.63	6.59	0	513	150.39	6.57	100	1119	108.82	7.08	0	518
Income from independent work	49.93	6.95	0	1141	50.64	13.29	0	513	59.09	5.37	0	1119	39.70	6.80	0	518
Income from All Sources	261.41	15.00	166.17	1141	166.50	20.96	88.33	513	276.90	12.52	180	1119	164.41	11.96	112	518
Annual																
Income from agricultural activities	686.77	112.72	0	1141	207.92	103.91	0	513	803.21	113.45	0	1119	163.80	52.17	0	518
Salary Income (In-kind)	8.29	3.14	0	1141	9.57	4.60	0	513	4.78	2.60	0	1119	20.63	8.34	0	518
Salary Income (Cash)	1,302.26	66.26	400	1141	816.63	64.94	0	513	1,279.71	63.98	432	1119	946.45	77.58	0	518
Income from independent work	552.07	81.41	0	1141	579.72	158.76	0	513	649.76	60.05	0	1119	441.36	80.36	0	518
Income from All Sources	2,549.39	177.03	1368	1141	1,613.84	248.10	600	513	2,737.46	143.32	1440	1119	1,572.24	139.22	606	518
Gross Income	3,015.62	125.08	1920	1141	2,672.83	188.73	1800	513	3,283.13	145.39	1920	1119	2,556.20	142.51	1847	518
Net Income	2,576.81	110.53	1634.8	1141	2,524.73	199.49	1663.25	512	2,838.33	123.58	1654	1119	2,380.53	119.92	1718.25	518

TABLE B-21 GENDER DIFFERENCES IN MEAN INCOME

	Comparing Across Treatment Status						Comparing Across Gender					
	Difference	p-val		Difference	p-val		Difference	p-val		Difference	p-val	
Monthly	**Male**			**Female**			**Control**			**Treatment**		
Income from agricultural activities	-9.70	0.47		3.68	0.70		39.90	0.01	***	53.28	0.00	***
Salary (In-kind)	0.56	0.14		-1.34	0.15		0.15	0.79		-1.75	0.01	***
Salary (Cash)	2.82	0.76		-11.18	0.25		55.57	0.00	***	41.57	0.00	***
Income from independent work	-9.17	0.30		10.93	0.46		-0.71	0.96		19.39	0.03	**
Income from All Sources	-15.49	0.43		2.09	0.93		94.91	0.00	***	112.49	0.00	***
Annual												
Income from agricultural activities	-116.44	0.47		44.11	0.70		478.85	0.01	***	639.41	0.00	***
Salary Income (In-kind)	3.51	0.39		-11.06	0.25		-1.28	0.82		-15.85	0.02	**
Salary Income (Cash)	22.56	0.81		-129.82	0.20		485.63	0.00	***	333.26	0.00	***
Income from independent work	-97.69	0.34		138.36	0.44		-27.65	0.86		208.40	0.04	**
Income from All Sources	-188.07	0.41		41.59	0.88		935.55	0.00	***	1165.21	0.00	***
Gross Income	-267.51	0.16		116.64	0.62		342.79	0.13		726.93	0.00	***
Net Income	-261.53	0.11		144.20	0.53		52.08	0.81		457.80	0.02	**

* p<0.1 ** p<0.05 ***p<0.01

TABLE B-22 KOLMOGOROV-SMIRNOV TESTS FOR DIFFERENCES IN DISTRIBUTION ACROSS TREATMENT STATUS

	p-value	p-value corrected	
Travel Times and Distances			
How far is the nearest public tap (meters)?	0.127	0.106	
Minutes to Public Tap	0.381	0.340	
Minutes to Other Sources	0.428	0.404	
Minutes to Public Well	0.217	0.175	
Minutes to Springs	0.467	0.439	
Income Measures			
Income from agricultural activities (Monthly)	0.513	0.495	
Monthly Salary (In-kind)	1.000	1.000	
Monthly Salary (Cash)	0.739	0.724	
Monthly Income from independent work	0.453	0.435	
Income from All Sources (Monthly)	0.099	0.091	*
Income from agricultural activities (Year)	0.513	0.495	
Annual Salary Income (In-kind)	1.000	1.000	
Annual Salary Income (Cash)	0.915	0.908	
Annual Income from independent work	0.398	0.381	
Income from All Sources (Annual)	0.360	0.343	
Gross Income (Annual)	0.690	0.674	
Net Income (Annual)	0.747	0.732	
Expenditure Measures			
Food Consumption (year)	0.986	0.985	
Non-Food Consumption (year)	0.324	0.308	
Housing expense (year)	0.371	0.354	
Consumption Aggregate (Year)	0.918	0.911	
(Per capita) Consumption Aggregate (Year)	0.805	0.793	
Per capita Consumption per day	0.805	0.793	

* p<0.1 ** p<0.05 ***p<0.01