



# CDD Initiatives in Mainstreaming Gender in Northeast Brazil: AN EXPLORATORY CASE STUDY



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# CDD Initiatives in Mainstreaming Gender in Northeast Brazil: AN EXPLORATORY CASE STUDY

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# EXECUTIVE SUMMARY

The present study focuses on gender while analyzing the effects of the Rural Poverty Reduction Project (RPRP) on the use of time and income generation as well as on cultural and social capital aspects. The study was based on a pilot project in Rio Grande do Norte designed to reinforce actions of the RPRP's focus on gender. The study should be viewed only as an exploratory evaluation that can be indicative of project effects, since the sample used was small and the time span between the subproject's implementation and the collection of impact data was short (only one year). However, other measures in the methodology guarantee a satisfactory minimum level of rigorosity in the evaluation, such as the comparison to a control group taken from a pipeline population of potential beneficiaries and a before-and-after approach to the analysis. The limitations in sample size were due in part to the fact that the study was carried out during the initial stages of implementation of the RN pilot project, when only a small number of subprojects had been approved for implementation, as well as to the study's limited budget. Impact observations were collected shortly after the project's implementation because one of the purposes of the current study was to provide input for design improvements in future project phases.

The integration of gender concerns into World Bank poverty-reducing programs has been implemented by promoting inclusive development, ensuring that both women and men have a voice in the development of their community and benefit from new development opportunities. Part of this strategy is to advance women's economic empowerment by enhancing their ability to participate in land, labor, financial, and product markets.

In 2009, a pilot project to mainstream gender in rural poverty-reduction projects and to empower women economically was implemented in association with the RPRP in the State of Rio Grande do Norte. The current study was conducted simultaneously with the pilot project in order to document its results and, when possible, draw lessons that could be helpful in new operations.

By combining community investments in water infrastructure with community investments in market-oriented production, the pilot project creates an experimental scenario that can determine what strategies are most adequate to mainstreaming gender and facilitating women's economic empowerment. The study estimates, on a preliminary basis, how community investments that save women's time in household activities—by themselves or combined with investments in production—create the enabling environment for women's economic empowerment and, eventually, help reduce poverty.

The pilot project was initiated in 2009 and has so far implemented 15 subprojects in 12 communities, benefiting 35 families. The types of subprojects implemented comprise water

supply systems for drinkable water and productive gardens. Three communities received water supply systems, benefiting 8 families; six developed productive gardens, benefiting 18 families; and three communities were host to both types of subprojects, benefiting 9 families. The study collected information from 20 communities, 12 of which benefited in 2009 and 8 of which, although approved for an RPRP, did not receive projects due to external reasons, such as limited funding. Therefore, there is a higher probability that the two groups (beneficiary and nonbeneficiary) were similar before RPRP implementation. This “pipeline” approach to sample selection helps reduce possible selection bias in the analysis. The beneficiary group was divided into three subgroups: (i) those that received only water projects, (ii) those that received only productive projects, and (iii) those that received both water and productive projects. In addition to community and household data (58 households interviewed), information on 161 adult individuals (above 16 years old) was also collected. Surveys were applied in 2009 (immediately before implementation) and in 2010 (roughly one year after RPRP implementation), allowing for comparisons of the evolution of indicators between the beneficiary and non-beneficiary groups.

The main hypotheses considered at the outset of the study were as follows: (i) investment in community water supply (with household connection) increases the free time of those involved with fetching water, particularly women and children, allowing them to carry out other activities that are likely to increase family well-being and income; (ii) women’s participation in income generation activities increases—as does their individual income relative to men—more in communities that received both types of projects; and (iii) greater economic contribution by women to family livelihood may result in (a) a lower rate of approval for traditionally gender-oriented cultural norms, (b) greater awareness of gender imbalances in power distribution in household decision making, (c) an increase in the size and scope of women’s social networks, (d) greater participation by women in public life, and (e) increased social capital among both men and women.

The analysis suggests that the RPRP had various effects in the short run. First, the study strongly suggests that investments in community water supply increase the free time of those involved with fetching water, allowing them to carry out productive activities at home and/or off the property, which are likely to increase family well-being and income. In short, their time poverty declines. There was a simultaneous reduction in the parcel of time allocated to collecting water and to household activities as well as an increase in time dedicated to farming, for both men and women, and in both cases the changes affected women. No other significant changes in time allocation were observed. Taking a closer look at the water fetchers, the study shows that young, single males were more intensively responsible for collecting water; the investments made by the project freed most of their time and allowed them to devote the freed time to more productive activities. The new allocation of time rendered large increases in income for water fetchers as a whole.

These results in time allocation are reflected in the analysis of income. We observed a significant increase in family income from own agricultural production, particularly in beneficiary communities with productive projects. Although the present study does not allow for final conclusions due to the small sample size, the increase in this type of

income in one year was on average 360 percent for beneficiary communities, while control communities perceived a 130 percent increase. Thus, increased time farming, which was significant for women in particular, seems to be related to this increase in farming income. It is worth noting that the increase in farming income was observed only in communities where productive projects were implemented and not in those that received only water projects. However, there were very few communities that received only water in our sample, therefore it is not possible to conclude that this relation always applies.

Women benefitted significantly by being able to devote less time to fetching water and housework, which gave them more time for agricultural activities in the family production, reflected in increased family agricultural income. Although analysis did not show that women spent more time in off-farm work, it also reveals that the women's income from paid work has increased. Since one would not expect that the availability of jobs off-farm is affected by RPRP projects, one probable explanation for the increase in women's off-farm income is the availability of more time to spend working outside the property, but this question has still to be answered. Men's time in farming also increased, as seen before, but neither their time nor income from off-farm work increased. On average, the total family income of families that benefited from the RPRP increased by 100 percent, and the results suggest that 30 percent of this value originates in women's increased income from off-farm work. The observed increase in women's contribution to family income, as well as their increased free time, may have helped to prompt the changes observed in cultural gender perceptions.

With respect to the project's social and cultural dimensions, the results of the research show that participation may have (i) the effect of increasing women's awareness of power imbalances in intrahousehold decision making; (ii) a positive and significant impact on female rates of engagement with key representative local and class institutions; (iii) a positive impact on women's social networks, which grew in size, became stronger and less gender biased, expanded to other localities, and have been more intensively used than before; and, finally, (iv) contributed to mitigating and reducing the effects of an overall and exogenous declining trend in civic engagement within treatment communities.

One unexpected result indicates that women are less open than men to changes in children's education, particularly that of girls, and interestingly, they also reject the idea of men participating in household work. This stresses the importance of targeting women as the object of efforts to increase engagement in market activities and improve access to education as the main forces in reducing gender inequality.

The limitations of the current study do not allow for final conclusions on the effects of the pilot RPRP in RN, but the results suggest a chain of effects that involve gender-related changes in time allocation, income generation, and perception of cultural norms, all in the direction of women's economic and social empowerment. However, various questions still remain. First, is the effect on farming income confirmed in a rigorous impact study? Second, why is an increase in women's off-farm work income observed while there is no indication that women allocated more time to that type of work? Moreover, are the effects on income related to a combination of water and productive projects or do they appear even

if these are implemented separately? Additionally, a further study should be developed to better understand the role young men play in household activities and the collection of water, as well as the ways in which they apply their freed time. Furthermore, why, when the time devoted to household activities decreases, do young women and men not spend more time studying? This may be a result of the short time span since implementation of the projects. Further studies of longer periods of impact would be needed to identify other medium- to long-term effects.

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# ABBREVIATIONS AND ACRONYMS

<b>ADPI</b>	Asymmetric Distribution of Power Index
<b>BDI</b>	Bargain Power Index
<b>CBO</b>	Community-based organization
<b>CDD</b>	Community-driven development
<b>COPEs</b>	Coordenadoria de Projetos Especiais [Office of the Coordinator for Special Projects]
<b>GAP</b>	Gender Action Plan
<b>PRONAF</b>	National Smallholder Farming Support Program
<b>RPRP<sup>1</sup></b>	Rural Poverty Reduction Project and/or Program <sup>2</sup>
<b>TGO</b>	Traditional Gender Orientation

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<sup>1</sup> Named PCPR in Portuguese.

<sup>2</sup> It is called "Program" when referring to the set of projects funded in the states of the Northeast and North of Minas Gerais and "Project" when referring to any of the states alone.

# 1. FOREWORD



The topic of poverty reduction inevitably poses questions about exclusion, inequality of opportunities and conditions for access to capital, work, and alternatives for men's and women's production. These elements are among the main factors behind the persistence of poverty, especially in the rural area, and are serious obstacles for the improvement of living conditions, economic growth, and more equitable socioeconomic and cultural development.

In 2001, after extensive consultations in all regions of the world revealed that improvement in gender disparity is a critical element in the fight against poverty, the World Bank adopted a broad strategy to optimize existing gender actions in its activities and projects that seek to reduce poverty and support development.

The Rural Poverty Reduction Program (RPRP) funded by the World Bank has extensive experience in Northeast Brazil, and several studies on its results and impact have been done since its implementation in 1993. However, until now there has been no study dealing exclusively with gender issues in this project. This case study, funded with a grant from the Gender Action Plan, presents research and analysis in the state of Rio Grande do Norte in the period 2009–2010.

This quantitative and qualitative study is exploratory, seeking to understand the effects of Bank-supported investments of the RPRP in Rio Grande do Norte state in order to

extrapolate the results to the other states in Northeast Brazil, where these projects were or are still being implemented. In the more recent iterations of the RPRP (since 2005, especially) specific consideration has been given to actions to promote the inclusion of women, improve their living conditions, and create a favorable climate for their economic empowerment, focusing on women as an at-risk group along with ethnic groups and young people.

The study was conducted in 20 rural communities in the setting offered by the Pilot Project for Gender Mainstreaming in Operations of the Rural Poverty Reduction Projects in the State of Rio Grande do Norte. Given financial and time constraints, the analysis of the results was primarily qualitative, although to a lesser extent there was a quantitative analysis. Notwithstanding the exploratory nature of the study, because of the limited observation time, it offers valuable and illuminating results.





## 2. INTRODUCTION



The strategy adopted in 2002 to integrate gender into WB works recommends that the “World Bank work with governments and civil society in client countries, and with other donors, to diagnose the gender-related barriers to and opportunities for poverty reduction and sustainable development; and to then identify and support appropriate actions to reduce these barriers and capitalize on the opportunities. The overarching goal of the strategy is to reduce poverty by promoting inclusive development. From a gender perspective, this means ensuring that both women and men have a voice in the development of their community and country, that both are able to benefit from the new opportunities that development brings, that both have access to the resources needed to be productive members of society, and that both share in a higher level of well-being” (World Bank 2002).

In addition, the overall objective of the action plan, adopted in 2007 to improve the implementation of the strategy, is “to advance women’s economic empowerment by enhancing women’s ability to participate in land, labor, financial, and product markets” (World Bank 2006). The objective of the plan’s *specific actions number 3* is “to improve knowledge and statistics on women’s economic participation and the relationship between gender equality, growth and poverty reduction.”

To introduce the guidelines of the World Bank’s Gender Action Plan, in 2009 a pilot project to mainstream gender in the operation of RPRPs and to empower women economically

was implemented in association with the RPRP in the state of Rio Grande do Norte, Northeast Brazil. The pilot project was designed to address three main aspects of women's economic empowerment and public affairs: (i) the building of an enabling environment in which women's economic empowerment can actually occur, (ii) the access of women to market (labor and production) economy activities, and, additionally, (iii) the stimulus to women's more effective and egalitarian participation in community decision making and public affairs. Operations would be documented and lessons drawn with a view to guiding future efforts. The project selected two types of community investments to be financed through the RPRP that can contribute to women's economic empowerment: (a) investments that help to decrease the time spent by women in household activities, or "time poverty reduction" investments, such as water projects that decrease the time spent collecting water, and (b) "access to market economy" investments.

The pilot project also designed, funded, and implemented a case study, whose background and methodology are described in a later section and whose findings are presented in this document.

The case study was conducted simultaneously with the implementation of the pilot project in order to document its results and, when possible, draw lessons that could be helpful in new operations on gender mainstreaming. Both the pilot project and the case study make an attempt to bridge cognitive and concrete gaps.

By combining community investments in water infrastructure with community investments in market-oriented production, the pilot project creates an experimental scenario that seeks to determine what strategies are most adequate to mainstreaming gender and facilitating women's economic empowerment. Furthermore, by focusing on communities that initially lacked water supply systems, by including a set of control communities in which no intervention was done, and by adopting a differences-in-differences methodology, the case study was able to estimate on a preliminary basis how well community investments that just save women time within the household economy and create the enabling environment necessary for their economic empowerment effectively contribute to the latter. Moreover, it will indicate if these effects also reduce rural poverty.

The case study is presented in nine different sections, as follows:

1. Foreword
2. Introduction
3. The Pilot Project
4. The Case Study
5. Case Study: Methodology and Sampling Design
6. Description of Household Characteristics
7. Effects of the PCPR: Key Findings
8. Cultural Dimensions
9. Concluding Remarks



### **3. THE PILOT PROJECT**



### 3.1 Background

For over 15 years, the World Bank has financed Rural Poverty Reduction Projects (RPRPs) in 10 States of Northeast Brazil following a participatory, gender-inclusive, community-driven development (CDD) approach. The projects aim to (i) improve the well-being and incomes of the rural poor through greater access to basic social and economic infrastructure and services, as well as to support for productive activities; (ii) increase the social capital of rural communities and their capacity to organize; (iii) enhance local governance through strengthening community associations and municipal councils; and (iv) foster closer integration of development programs at the local level. These projects finance matching grants for community investment subprojects (approved by municipal councils), depositing the investment funds directly in the community associations' accounts. Women's participation and leadership in community associations and municipal councils has steadily increased over the RPRPs' lifespan.<sup>3</sup> This would indicate that the RPRPs'

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<sup>3</sup>For instance, data from the Sergipe state disaggregated by sex show that 28 percent of its RPRP's beneficiary community associations had women as their presidents and that 40 percent of the RPRP's beneficiary families are headed by women. (In the rural areas of the state, female-headed households increased from 18 percent in 2000 to 32 percent in 2007.)

operational structure, based on community demand, enhances women's participation in community decision making and meets one of the conditions that is often underscored as essential to gender mainstreaming: the inclusion and effective participation of women as a privileged stakeholders.

Nowadays, the RPRPs' profile is experiencing a shift toward market-oriented productive investments. Nevertheless, the community-driven demands for investments has traditionally centered on basic infrastructure (water supply systems and rural electrification). These investments in basic infrastructure—especially for water projects—directly affect women in their workload, because traditional social norms and the patriarchal model of family organization in rural Northeast Brazil make household work a female obligation. These traditional rules shape a gender-asymmetrical distribution of power in intrahousehold decision making and deprive women of opportunities to participate in community and civil arenas of decision making. Fetching water for household consumption is the heaviest and most time-consuming activity of a household economy that is traditionally ascribed to women and is the main source of women's time poverty.

The literature on gender-oriented development has often pointed out that (i) reducing women's time poverty is necessary to reducing poverty and that (ii) reducing women's household workload is a requisite for empowering women to compete in markets, by removing the “unfreedoms” that constrain their individual choices and, conversely, by increasing their ability to define goals and act on them (i.e., the agency level of women's economic empowerment). In consequence, it may be hypothesized that by reducing the time women spend fetching water and contributing to the invisible household economy, the RPRP infrastructure community initiatives have contributed to creating an enabling environment to the entrance and inclusion of women in the visible market-oriented economy. The creation of such an enabling environment has also often been described as a requisite for mainstreaming gender and empowering women.

We have scattered evidence about how much women's time has been freed. However, we have no evidence at all about what use is made of this time and how much change occurs in the intrahousehold gender power division. In other words, we have no evidence about how well the enabling environment created by the RPRP's community-driven development initiatives has been used by women to increase their abilities and empower themselves.

## 3.2 The Pilot Project's Strategy

The pilot project's strategy includes the following:

- (a) The adoption of the RPRPs' largely documented, well-tested, and widely approved community-driven development (CDC) approach, to encourage women's participation: In Northeast Brazil, women's inclusion, participation, and leadership in community-based organizations has steadily grown throughout the RPRP's lifespan. Just to mention the experience of the RPRP in Rio Grande do Norte State, in its first generation,<sup>4</sup> 119 community associations out of 1,624 (7.3 percent) association beneficiaries of the project were headed by women; in its second generation<sup>5</sup>, these figures increased to 206 beneficiary community associations out of 802 (25.7 percent) led by women.
- (b) The funding of infrastructure community investments that have the potential to create an enabling environment for women's economic empowerment: The pilot project focused on water supply infrastructures because they seem to address the main reason for women's time poverty.<sup>6</sup> The literature on mainstreaming gender indicates that time poverty is one of the key obstacles to women's participation in the market economy and a main source of poverty in its multiple dimensions (income, human development outcomes, insecurity, vulnerability, powerlessness, exclusion, etc.). Reducing time poverty is a necessary aspect of whatever measure is taken to create an enabling environment in which women's economic empowerment may actually occur.
- (c) The funding of productive and market-oriented community facilities opening women's access to market economy: According to the literature on mainstreaming gender in development initiatives, it is hypothesized that women's access to the market economy—particularly the labor market—is the key factor of women's economic empowerment and overall poverty reduction.

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<sup>4</sup> Loan 4667-BR.

<sup>5</sup> Loan 7489-BR – Additional Financing.

<sup>6</sup> Time poverty is understood as the fact that, "for those who are working long hours, the time constraint makes it necessary for individuals to make hard choices in terms of to what they allocate their time, with these hard choices having implications for the welfare of individuals and the household to which they belong." Therefore, it refers to "the burden of competing claims on individuals' time that reduces their ability to make unconstrained choices on how they allocate their time," and, in many instances, leads to increased work intensity and to trade-offs among various tasks. Depending heavily on their members' time and labor for the provision of goods and services that are essential for their well-being and survival, facing severe time constraints, and lacking the economic resources to access market substitutes, poor households have often to resort to making tradeoffs between activities that may directly affect their members' well-being and their time poverty can exacerbate their income poverty in several ways. With regard to gender mainstreaming and women's economic empowerment, time poverty exerts a significant influence in exacerbating income poverty because, due to the gendered division of labor that causes poor substitutability of labor allocation in nonmarket work, "women are unable to take full advantage of economic opportunities and participate in income-generating activities" (Blackden and Wodon 2006).

### 3.3 The Pilot Project's Rationale

The strategy of supporting two types of community investments (one addressing the creation of an enabling environment for women's economic empowerment, the other opening women's access to the market economy) and its focus on communities that have recently requested water supply systems from the RPRP was justified by theoretical, context-specific, practical, and methodological reasons for promoting gender mainstreaming and women's economic empowerment.

From a theoretical standpoint, the literature on gender-oriented development has often pointed out that reducing women's time poverty is a necessary step in reducing poverty as well as rendering viable women's access to and participation in the market economy and to promoting women's economic empowerment. The reduction of women's time poverty ultimately means that a socioeconomic environment in which women have more opportunities to enter the labor market and the market economy has been created. As time is an inelastic asset, in the absence of this enabling environment whatever we may positively propose and effectively do to open market opportunities to women tends to become useless and lost. Therefore, building an enabling environment—that is, a socioeconomic scenario in which poor rural women's time poverty is drastically reduced—is a prerequisite of investments aiming to provide women open access to the market economy. The literature has also pointed out that reducing women's time poverty in rural areas is needed to reduce the household workload traditionally ascribed to them, to change traditional patterns of social division of labor and gender bias in time use and allocation, and to remove cultural norms that restrict women's participation in public domains. Such “unfreedoms” that constrain their individual choices have to be removed and, conversely, their ability to define goals and act on them (i.e., the agency level of women's economic empowerment) has to be increased. Finally, it has been well documented that fetching water for household use is the daily task that consumes the largest share of women's time in poor rural communities of Northeast Brazil. This task is traditionally ascribed to women according to prevailing gender-biased rules with respect to the social division of labor. Thus, fetching water answers for the largest share of women's household workload and is the main source of women's time poverty. In consequence, investments that reduce the time spent fetching water may hold a huge potential to reduce these women's time poverty and could have a huge impact on the creation of the enabling environment they need to enter the market-oriented economy and to contribute to rescuing their families from poverty.

From a context-specific standpoint, we considered the historical record of the RPRP. Historically, the RPRP has lacked activities specifically designed to mainstream gender and make the market economy accessible to women. However, throughout its 15-year lifespan, the RPRP has supported a community-driven, participatory, and gender-inclusive approach, which has led to huge investments in infrastructure (mostly rural electrification and water supply systems) and the increasing participation of women in community-based organizations. Thus, it has focused on investments that help to create the enabling

environment in which women can enter the market economy. Previous studies have gathered solid evidence that community-based organizations tend to be gender-inclusive, that women's participation in public matters has increased, and that this growth is significantly related to a community-driven approach to development. They also gathered some scattered evidence that water supply systems built by the RPRP have saved huge amounts of women's time. Nevertheless, there is no information on (i) how women's participation in community and public decision making has affected intrahousehold imbalances of power and (ii) no evidence that simply making more time available to women is (or is not) enough to propel them into more economically empowering activities.



## 4. THE CASE STUDY



## 4.1 The Case Study's Rationale and Limitations

The pilot project and its simultaneous case study make an attempt to bridge these cognitive and concrete gaps. By combining community investments in water infrastructure with community investments in market-oriented production, the pilot project creates an experimental scenario useful in determining what strategies are most adequate to mainstreaming gender and facilitating women's economic empowerment. Furthermore, by focusing on communities that initially lacked water supply systems, by including a set of control communities in which no intervention was made, and by adopting a difference-in-difference methodology, the case study was able to estimate on a preliminary basis how well community investments that save only women's time used within the household economy and create the enabling environment necessary for women's economic empowerment effectively contribute to that empowerment. Moreover, it will indicate if these effects also reduce rural poverty. (For details, go to the section on the methodological procedures of the case study.)

From a practical standpoint, we worked with limited funds to implement a system of supervising, monitoring, and researching able to deal with a pilot project larger in scope.

Considering that documentation and analysis were core components of the experience and an essential aim of any initiative to mainstream gender in development projects, we had to confine the exercise to a small set of communities and, in consequence, to limit the methodology of analysis to a preliminary case study, through which we could test a set of tools and procedures that, in the future, might guide a deeper and broader impact evaluation analysis.

Nevertheless, some measures were taken to guarantee a satisfactory minimum level of rigor in the case study, including the design of the sample, which includes a control group, and the methodology of data analysis, which applies the difference-in-difference method. Selecting the control group from those who applied to the RPRP reduces the differences in observable and unobservable characteristics between treatment and control groups and the risk of selection-biased results. Initially, it can be hypothesized that, as these communities have all submitted applications to the RPRP, they are similar with respect to their level of community mobilization and organization. Second, as they lack reliable all-season sources of drinkable water, it may also be hypothesized that these communities have in common similarly high levels of poverty and material needs. Given that traditional patterns of sexual division of labor likely prevail in these communities, women may suffer from extreme levels of time poverty. Thus, selecting communities that have applied to water supply infrastructures, we can hypothesize that we are able to initially measure changes from traditional to new patterns of time allocation by men and women in both household and market economies and, thus, to estimate the outputs of the process of creating an enabling environment for women's economic empowerment.

## 4.2 Case Study Objectives

The case study was designed to document and analyze this experience, aiming to measure results in three main aspects of poverty reduction and gender mainstreaming:

- a. The reduction of women's time poverty as a consequence of investments made in basic infrastructure and the reduction of the burden women carry in light of their household workload and traditional patterns of gender-biased work division
- b. The increases in women's monetary incomes as a consequence of more access to the market economy and the changes in intrahousehold time allocation, power distribution, influence in decision making, and consumption patterns promoted by their increased contribution to family income and new role as the family's coproviders of monetary income.
- c. The changes in their levels of participation in public arenas and community-based organizations.



## **5. CASE STUDY: METHODOLOGY AND SAMPLE DESIGN**



As mentioned, this study covers communities benefiting from the RPRP in Rio Grande do Norte (RN) with respect to the program's effects on time use and income generation for women over the age of 16, as well as gender-related cultural effects of the project. The number of communities studied was small (20 in all), given the pace of the program's implementation, which began slowly and benefitted relatively few communities when the study began, and because of the limited budget for gathering field data. Therefore, household and community data were not used for a quantitative analysis of program impact. The study concentrated on analysis of the individual data collected from 161 men and women over the age of 16, from 58 households, interviewed in 2009 and 2010, just before and after the implementation of the RPRP subprojects. Interviews were conducted in 12 RPRP beneficiary communities (treatment) and 8 communities that were not beneficiaries (control), with the subject communities split among those that only received water supply projects, those that received only production subprojects, and those that received both types (table 1).

**Table 1:** Sample Design

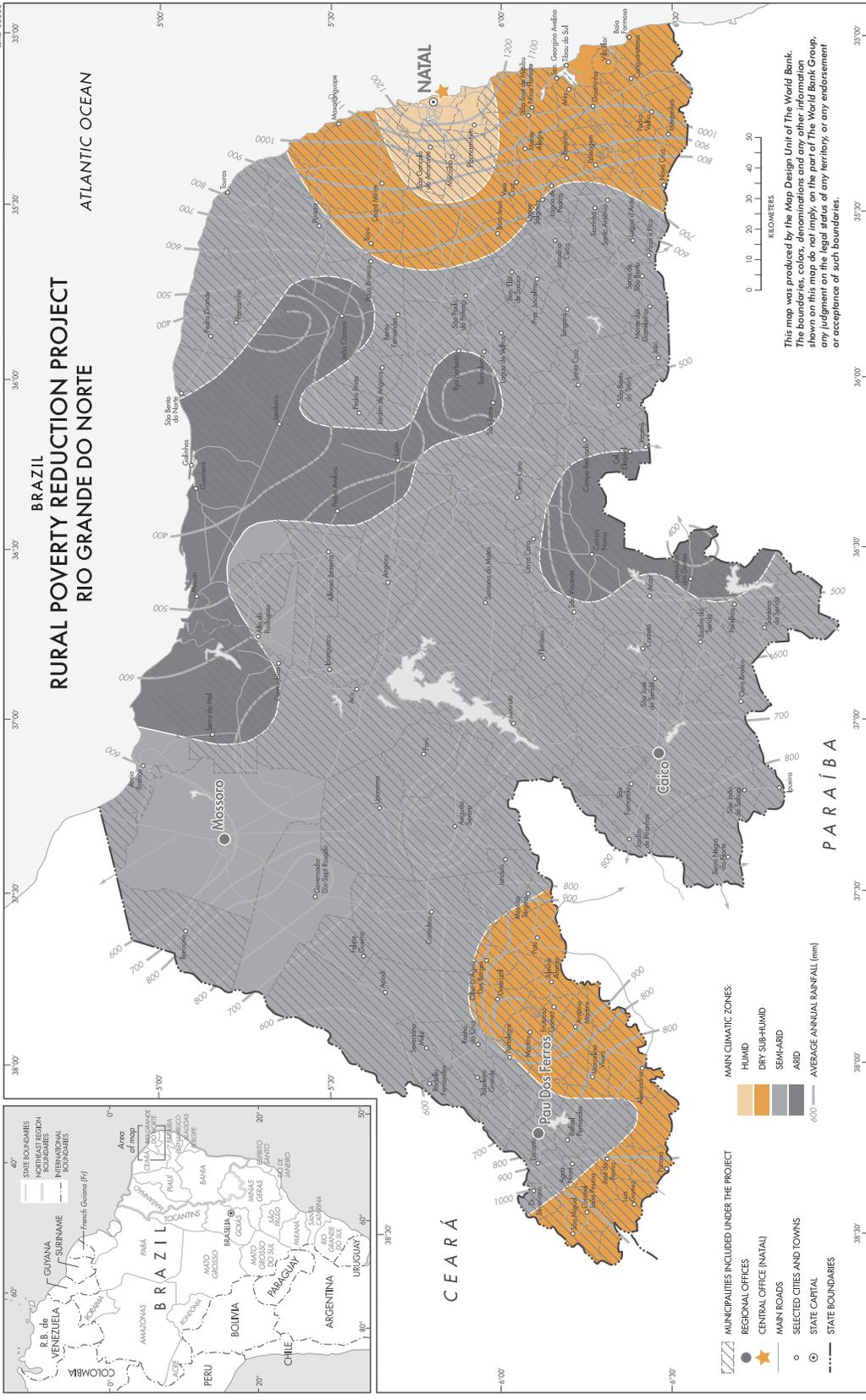
SAMPLE GROUP	COMMUNITIES		HOUSEHOLDS		INDIVIDUALS INTERVIEWEES	
	TOTAL	%	TOTAL	%	TOTAL	%
Treatment	12	60%	35	60%	101	63%
<i>Water supply</i>	3	15%	8	14%	24	15%
<i>Productive</i>	6	30%	18	31%	46	29%
<i>Water and productive</i>	3	15%	9	16%	31	19%
Control	8	40%	23	40%	60	37%

Individual information was collected on employment and income, time use, education, cultural perceptions of gender, and social capital. Household information was collected on housing, health, and family income. Household data are used to describe and compare the basic characteristics of the families studied, while individual data are analyzed to estimate possible effects of the project. Although the individual sample was small, it is possible to determine whether there are indications that the project has had any effect on the indicators studied.

The methodology made simultaneous use of the pipeline and differences-in-differences methods to reduce likely problems from a skewed selection characteristic of RPRP type projects (see Binswanger et al. 2009). The pipeline method refers to the sample selection of the control group, in which subjects are randomly chosen from a group of communities that presented projects for inclusion in the RPRP and that have been approved but not yet included because of the project's budgetary limitations. These communities should resemble the beneficiary communities, because they satisfied all the requirements for approval by the project but owing to reasons other than their characteristics were not beneficiaries. The differences-in-differences method compares the value of the study indicators for the treatment group and control group before and after participation in the program. In this study we compare the value of the indicators in 2009, when the field entry interviews were conducted, and in 2010, when the exit interviews took place. The hypothesis of this approach is that the nonobservable differences between the treatment group and control group are added and fixed in time, so that they could be eliminated when we compare them to the same communities at two different times. This hypothesis can be erroneous if changes in the indicators rely on initial conditions in the communities that could differ in the treatment and control communities (Ravallion 2005). That is why it is important to supplement this differences-in-differences method with the pipeline method.

All communities in the sample are in the western and mid-western regions of Rio Grande do Norte state. Individual, household, and community data were collected through questionnaires specifically designed for each of these levels.

# BRAZIL RURAL POVERTY REDUCTION PROJECT RIO GRANDE DO NORTE



- MUNICIPALITIES INCLUDED UNDER THE PROJECT
  - REGIONAL OFFICES
  - CENTRAL OFFICE (NATAL)
  - MAIN ROADS
  - SELECTED CITIES AND TOWNS
  - STATE CAPITAL
  - STATE BOUNDARIES
- 
- HUMID
  - DRY SUB-HUMID
  - SEMI-ARID
  - ARID
  - 600
  - AVERAGE ANNUAL RAINFALL (mm)

This map was produced by the Map Design Unit of The World Bank. The boundaries, colors, denominations and any other information shown on this map do not imply, on the part of the World Bank Group, any judgment on the part of any territory, or any endorsement or acceptance of such boundaries.

## **6. DESCRIPTION OF THE HOUSEHOLD CHARACTERISTICS**



This section describes the sample's household characteristics, including demographic data, education, health, consumption, assets, and income from farming and livestock. The data are presented separately for each sample group. The sample consisted of the following:

- Three communities benefitting from water supply subprojects (water communities)
- Six communities benefitting from productive subprojects (productive communities)
- Three communities benefitting from both water and productive subprojects (water productive communities).

In addition, eight communities that had been approved but had not yet received any RPRP project made up the control group. Table 2 presents the demographic data, education, and employment profile of each type of treatment community and control community.

The families' size and mean age are similar in the beneficiary communities and control communities, as is the percentage of individuals receiving government payments. There is a slight difference between the treatment and control groups in terms of the percentage of men and women living in the household, educational level, and paid employment.

**Table 2:** Main Demographic Characteristics, Employment, and Education (average per household)

SAMPLE GROUP	RESIDENTS	MEN	WOMEN	AVERAGE AGE	LITERACY RATE	AVERAGE NUMBER OF SCHOOL YEARS COMPLETED	PERCENTAGE OF RESIDENTS WITH SOME PAID EMPLOYMENT	PERCENTAGE OF RESIDENTS RECEIVING SOME GOVERNMENT PAYMENTS
Treatment	4.46	2.40	2.14	34.38	68%	5.15	20%	16%
<i>Water supply</i>	4.75	3.00	1.75	32.27	64%	5.35	18%	18%
<i>Productive</i>	4.39	2.17	2.22	34.81	67%	5.07	20%	17%
<i>Water and productive</i>	4.78	2.33	2.44	35.41	73%	5.14	19%	12%
Control	4.78	1.91	2.87	32.90	59%	4.18	15%	15%

Table 3 shows the assets and family income for all the sample groups. Assets include farm implements—tractors, sprayers, plows, etc.—and domestic durable goods, such as refrigerator, stove, cars, and motorcycles. The assets indicator also counts the value of debts and monetary reserves. It does not include any estimate of the value of the interviewee's house or land, given the difficulty in obtaining reliable values for these assets.

**Table 3:** Assets and Annual Family Income\* (in R\$)

SAMPLE GROUP	VALUE OF TOTAL ASSETS 2009	VALUE OF TOTAL ASSETS 2010	TOTAL ANNUAL FAMILY INCOME 2009	TOTAL ANNUAL FAMILY INCOME 2010
Water	2,632	3,412	7,078	5,400
Water+productive	8,086	19,786	7,736	19,340
Productive	7,987	9,924	9,122	17,156
Treatment (all)	6,788	10,971	8,299	15,031
Control	1,083	1,782	7,725	10,181

\*Annual income includes paid work, income from farming, beekeeping, poultry, gathering (not including livestock) as well as government payments, retirements, harvest guarantees, unemployment insurance (rental income was not included because it presented problems).

In the comparison here we present the characteristics of each treatment group separately. The average income in the period prior to the subproject of the beneficiary (treatment) communities is similar to, although slightly higher than, the income of the nonbeneficiary (control) communities, indicating that in this aspect the selection of the control appears to have been appropriate.<sup>7</sup> However, the value of the household assets is significantly higher than the control in two of the treatment groups: communities that had only productive subprojects and those that received productive and water projects. Beneficiary communities that had only water supply subprojects had increased assets, but they were closer to the group of nonbeneficiaries.

In the comparison with the indicators for 2010, after implementation of the subproject the increase in the beneficiary communities' average income was greater, nearly doubling, reaching an average of R\$ 15,000 per year, while income of nonbeneficiary communities had an increase of about 40 percent. In the next chapter, which analyzes changes in the individual income of adults, it is possible to determine whether the total increase in family income can be explained in part by the effect of the RPRP on earned income. But in table 4 we see that much of the effect on income is due to the higher family agricultural income.

Another point to note is that the increase in income between 2009 and 2010 varied greatly among the treatment groups, but this conclusion is not too solid, because the number of observations in each group is small. Although communities with both types of subprojects (water and productive) had an average family income similar to the other treatment groups in 2009 (between R\$ 7,000 and R\$ 9,000), they experienced a much greater increase in 2010 than the other communities, of about 150 percent to more than R\$ 19,000 annual family income. Communities with productive subprojects had an 88 percent increase in average income to R\$ 17,000 in 2010, while communities that had only water supply subprojects actually saw a decline in income, but this appears to be the result of problems with specific data of this group that had a great decrease in the number of retirements and in personal agricultural production. Since this sample group included only three communities, and therefore few observations, it is probable that this result is only specific for some households and does not reflect the real effect on communities that were beneficiaries of water supply subprojects.

With respect to assets, communities that received both types of subprojects experienced a significant increase in assets in the period between 2009, before the subproject, and 2010, after implementation of the subproject, more than doubling their initial assets. This increase is consistent with the increase in income for this group of communities, as noted above.

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<sup>7</sup> The entry profile of the treatment sample differed from that of the group of communities that wound up as beneficiaries, which are analyzed as treatment in this report. Average characteristics of the group called "treatment" in the entry profile therefore differ from those shown here for the treatment group, because they involve different households. Some communities that expected to be in the treatment group did not in fact become beneficiaries and were put in the control group.

Analysis of income from family agricultural production showed the positive effect of implementation of the productive subprojects. As shown in table 4, while the increase in agricultural production income in the control communities was on average 130 percent, the increase for communities benefitting from the RPRP, considered together, was 360 percent. This effect is due solely to the increased production in the communities that had productive subprojects. Since many of these productive subprojects are related in some way to agricultural production, a positive effect was to be expected, but its magnitude in just one year is surprising, because it was proportionally almost three times greater than that in the nonbeneficiary communities. As noted above, the increase in family agricultural income is one of the principal reasons, if not the principal one, for the increase in total family income observed in the period.

**Table 4: Income from Agricultural Production on the Property (in R\$)**

SAMPLE GROUP	GROSS ANNUAL AGRICULTURAL INCOME 2009	GROSS ANNUAL AGRICULTURAL INCOME 2010
Water	821	0
Water+productive	1.656	8.309
Productive	1.434	7.925
Treatment (all)	1.350	6.213
Control	980	2.325

As shown in table 5, data on disease incidence indicate no significant difference between control communities and beneficiary communities with respect to the average frequency of diarrhea, tapeworms, dengue, and food poisoning, either before or after the implementation of the RPRP subprojects. Therefore, there do not appear to be significant differences between the treatment and control groups in terms of health-related factors before the implementation of the projects and no significant impact of the RPRP on these common illnesses in the first year of implementation.

**Table 5: Health Indicators of Incidence of Common Diseases (average occurrence in the sample of illness in the 12 previous months)**

SAMPLE GROUP	DIARRHEA 2009	DIARRHEA 2010	FOOD POISONING 2009	FOOD POISONING 2010	TAPEWORMS 2009	TAPEWORMS 2010	DENGUE 2009	DENGUE 2010
Water	0.13	0.14	0	0	0.13	0.14	0	0
Water+productive	0	0	0	0.13	0	0	0	0
Productive	0.06	0	0	0	0.06	0.06	0.06	0
Control	0.26	0.05	0	0.10	0	0	0.09	0



## **7. EFFECTS OF THE RPRP: KEY FINDINGS**



Given the small number of individual observations (161), the analysis of the program's effects is based only on estimates for the complete sample, including the three types of treatment samples (three that received only water supply subprojects, six that received only productive projects, and three that received both types).

Results of the differences-in-differences analysis, which compared changes in the indicators in the beneficiary communities with those in the non-beneficiary communities for the period between 2009 and 2010, indicate some significant effects of the program that impact men and women differently.

## 7.1 Time Allocation and Use according to Various Activities

One main hypothesis to be tested under the study is that investment in community water supply (with household connection) increases the free time of those involved with fetching water—particularly women and children—allowing them to carry out productive activities, off the property or within the home, which are likely to increase family well-being and income.

This section is organized as follows: First, use of family workforce, measured as Parcel of the Daily Workload by Main Activities and alternatively as Percentage of Household Inhabitants Engaged by Activities—fetching water, production, household activities, farming, animal breeding, participation in the labor market as wage workers, and going to school—is analyzed at the initial point (T1)<sup>8</sup> use of family workforce.<sup>9</sup> Subsequently, data obtained in the second round (T2) of the field research are compared with values recorded in the first round and between beneficiaries of treatment and control groups. Finally, these observations are subject to a difference-in-difference analysis. An acceptable lower limit of statistical significance of 5 percent (T value > 1.23) is taken.<sup>10</sup> The main results are presented in table 6, table 7, and table 8.

**Table 6:** Parcel of the Daily Workload by Main Activities

TIME ACTIVITIES ALLOCATION	T <sub>1</sub>			T <sub>2</sub>			Δ (T <sub>2</sub> – T <sub>1</sub> )		
	CONTROL	TREATMENT	T-TEST	CONTROL	TREATMENT	T-TEST	CONTROL	TREATMENT	T-TEST
Fetching water	4.65%	8.31%	-1.3499	0.61%	0.25%	0.8675	-3.47%	-8.61%	1.6719
Farming	5.50%	0.6%	2.4045	8.33%	13.04%	-1.1108	1.87%	12.72%	-2.3277
Breeding	7.55%	12.42%	-1.2976	8.50%	10.11%	-0.5664	-0.20%	-3.43%	0.6709
Wage working	3.91%	2.95%	0.3710	4.77%	5.15%	-0.1243	0.53%	1.67%	-0.2541
Studying	1.31%	1.57%	-0.1705	2.89%	4.81%	-0.8037	1.35%	3.27%	-0.6172
Domestic activities	26.56%	32.26%	-1.0755	24.45%	22.85%	0.3390	-0.73%	-10.78%	1.6320
Productive activities	21.08%	18.23%	0.57477	27.47%	29.78%	-0.4153	2.25%	10.99%	-1.1776

<sup>8</sup> Prior to participating as beneficiary of the RPRP.

<sup>9</sup> Alternatively measured as parcel of the daily workload by main activities and as percentage of household inhabitants engaged in activities such as fetching water.

<sup>10</sup> For methodological presentation, see section 3.

**Table 7:** Percentage of Household Inhabitants Engaged by Activities

TIME ACTIVITIES ALLOCATION	T <sub>1</sub>			T <sub>2</sub>			Δ (T <sub>2</sub> – T <sub>1</sub> )		
	CONTROL	TREATMENT	T-TEST	CONTROL	TREATMENT	T-TEST	CONTROL	TREATMENT	T-TEST
Fetching water	18.33%	27.73%	-1.2239	3.92%	5.95%	-0.5126	-13.73%	-25.00%	1.1331
Farming	10.00%	8.91%	0.2133	15.68%	25.00%	-1.2757	3.92%	15.48%	-1.2356
Breeding	30.00%	37.62%	-0.7724	41.18%	45.24%	-0.4582	7.84%	9.52%	-0.1261
Wage working	10.00%	9.90%	0.0189	7.84%	9.52%	-0.3303	-1.96%	-2.38%	0.0526
Studying	3.33%	8.91%	-1.2388	9.80%	11.90%	-0.3740	5.88%	5.95%	-0.0098
Domestic activities	27.00%	21.58%	1.3665	16.47%	15.71%	0.2754	-11.76%	-6.19%	-1.2255
Productive activities	15.00%	18.56%	-0.9611	20.10%	21.13%	-0.3231	15.69%	23.81%	-0.6703

**Table 8:** Key Indicators of Impact on Time Allocation by Type of Intervention

	CONTROL	TREATMENT	WATER SUBPROJ.	PRODUCTIVE SUBPROJ.	BOTH SUBPROJ.
Time fetching water 2010 (minutes)	10.4	3.3	1.6	5.7	1.4
Percentage of daily workload fetching water 2010	0.6%	0.3%	0.1%	0.5%	0.1%
Parcel of people fetching water in 2010	3.9%	6.0%	5.3%	5.7%	6.7%
Difference on time fetching water (minutes)	6.2	-3.0	-6.5	-1.7	-3.4
Difference on the percentage of workload fetching water	-3.5%	-8.6%	-10.7%	-11.0%	-4.6%
Difference on the parcel of people fetching water	-13.7%	-25.0%	-36.8%	-34.3%	-6.7%
Difference on the percentage of workload in productive activities	3.2%	9.1%	20.7%	11.7%	-1.2%
Difference on the parcel of people in productive activities	3.4%	2.4%	6.6%	2.1%	0
Difference on the percentage of workload studying	1.4%	3.3%	5.8%	5.3%	2.7%
Difference on the parcel of people studying	5.9%	6.0%	0	8.6%	6.7%

Data shown in Table 6 indicate that at T1—the baseline—families composing the treatment groups have a statistically significant higher parcel of daily workload than control families allocated to fetching water and breeding, while the reverse is observed for farming activities. For the other activities considered (wage work, study, and domestic and productive work) the samples of treatment and control groups are “well behaved,” as the averages of the parcel of time allocated to these activities are statistically similar. Such similarity is still more prevalent when the indicator “time activities allocation” is measured as a percentage of household inhabitants engaged in the various considered activities (see table 7).

After one year of project implementation, the outstanding outcome, shown in table 6, is the simultaneous statistically significant difference in the reduction of the daily parcel of workload dedicated to fetching water and the increase in farming. In 2009, water fetchers spent 29 percent of their daily workloads fetching water for their households—28 percent in control communities and 32 percent in treatment communities. As shown in table 8, by 2010 the time they spent fetching water was reduced in the treatment communities, but increased in the control communities. As expected, it decreased the most in communities that received a water-based intervention. However, in all treatment communities the percentage of people involved with fetching water and the proportion of the daily workloads they dedicated to this activity have been reduced. Although in this study the treatment sample was separated into three groups to allow for comparisons among types of subproject, subsample sizes effectively surveyed are too small to allow meaningful comparisons. Therefore, various important questions are left for future studies, such as: how did communities that benefitted only from productive subprojects decrease time spent on water collection and how was the family workforce reallocated to respond simultaneously to the continued burden of water fetching and the new demand of labor imposed by the productive subprojects?<sup>11</sup>

Likewise, a reduction of the parcel allocated to domestic activities was observed, and although not statistically significant at the level of 5 percent but significant at 10 percent, there was an increase in productive activities. These results seem clearly to confirm the initial hypothesis: investments provided by the project in the form of water supply and productive subprojects are freeing time originally allocated to fetching water and to domestic activities, and that time can now be devoted to productive activities. The results seem also to suggest that no statistically significant impact was observed in time allocation for the activities of breeding, wage work, and study. Nevertheless, it is worth noting that the direction of change is positive for the allocation of time to wage work in favor of the treatment families group compared to control families.

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<sup>11</sup> The available data suggest that different types of subprojects had different impacts on time spent fetching water to the households, income, and gender-related indexes. Time allocated to fetching water has also been reduced in communities that just received productive subprojects, and young bachelors have benefitted the most from these reductions. Considering the parcel of the workload dedicated to fetching water, reductions equaled the following: 40 percent among young bachelors; 9 percent among young bachelorettes; 8 percent among other women; and 9 percent among other men. Considering the parcel of the workload allocated to productive activities, it increased for young bachelors (39 percent), young bachelorettes (34 percent), and other women (12 percent) but decreased among other men (-3 percent). These facts suggest that a significant parcel of the water fetchers—mostly the young bachelors—has redirected the time they spent carrying water to productive activities and probably did so to the detriment of women who also carried the burden of fetching water.

The implications of these results with respect to income and well-being are shown in section 7.3.

The difference-in-difference analysis so far considered the total number of members of the treatment and control groups' families, regardless of gender composition. The issue to be addressed now is, What do these results suggest in terms of changes in time allocation for women and men? A time relations approach is used for this purpose.

## 7.2 Time Relations

The  $Y = f(X_n)$  linear functions have variables defined as follows:

Y = dependent variables, whose alternative definitions are: difference in the percentage of daily workload and parcel of workload spent fetching water for the household; farming; breeding; working for wage; studying; household activities; and productive activities.

X = independent variables, whose definitions are treatment and control and treatment\* woman and treatment\*man, the former for the first model and the latter for the second model (see table 9A– through table 9N).<sup>12</sup>

**Tables 9A-N:** Regression Analysis of Changes in Time Allocation per Activity

	9A: DIFFERENCES IN THE % OF THE DAILY WORKLOAD FETCHING WATER FOR THE HOUSEHOLD				9B: DIFFERENCES IN THE % OF THE DAILY WORKLOAD FARMING			
	1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL	
Treatment	-1.83	*			2.27	**		
Treatment*Woman			-1.86	*			2.15	**
Treatment*Man			-0.98				1.79	*
Constant	-1.92		-1.91		0.48		0.48	
Number of observ.	132		132		132		132	
F (k, n-1)	3.33		1.86		5.16		2.66	
Prob > F	0.0702		0.1596		0.0247		0.0735	
R-squared	0.0210		0.0358		0.0400		0.0428	

<sup>12</sup> In all of these tables “\*” means statistically significant at 10 percent level and “\*\*” at 5 percent level.

9C: DIFFERENCES IN THE % OF THE DAILY WORKLOAD BREEDING				9D: DIFFERENCES IN THE % OF THE DAILY WORKLOAD WORKING FOR WAGE			
	1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		
Treatment	-0.68			0.25			
Treatment*Woman		-0.11			1.04		
Treatment*Man		-0.95			-0.43		
Constant	-0.06	-0.05		0.15	0.15		
Number of observ.	132	132		132	132		
F (k, n-1)	3.33	1.86		0.07	1.04		
Prob > F	0.0702	0.1596		0.7991	0.3579		
R-squared	0.0210	0.0358		0.0005	0.0153		

9E: DIFFERENCES IN THE % OF THE DAILY WORKLOAD STUDYING				9F: DIFFERENCES IN THE % OF THE DAILY WORKLOAD IN HOUSEHOLD ACTIVITIES			
	1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		
Treatment	0.64			-1.65			
Treatment*Woman		-0.11			-1.90	*	
Treatment*Man		0.90			-0.91		
Constant	0.61	0.61		-0.16	-0.16		
Number of observ.	132	132		132	132		
F (k, n-1)	0.41	0.57		2.73	1.82		
Prob > F	0.5245	0.5690		0.1010	0.1658		
R-squared	0.0029	0.0107		0.0201	0.0310		

9G: DIFFERENCES IN THE % OF THE DAILY WORKLOAD IN PRODUCTIVE ACTIVITIES				9H: DIFFERENCES IN THE PARCEL OF PEOPLE FETCHING WATER FOR THE HOUSEHOLD			
	1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		
Treatment	1.15			-1.19			
Treatment*Woman		1.63			-1.86	*	
Treatment*Man		0.53			-0.27		
Constant	0.37	0.37		-2.00	-1.99		
Number of observ.	132	132		135	135		
F (k, n-1)	1.33	1.39		1.42	1.83		
Prob > F	0.2506	0.2526		0.2362	0.1651		
R-squared	0.0106	0.0151		0.0096	0.0280		

9I: DIFFERENCES IN THE PARCEL OF PEOPLE FARMING				9J: DIFFERENCES IN THE PARCEL OF PEOPLE BREEDING			
	1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		
Treatment	1.27			0.13			
Treatment*Woman		2.11	**		0.88		
Treatment*Man		0.39			-0.52		
Constant	0.57	0.57		0.75	0.75		
Number of observ.	135	135		135	135		
F (k, n-1)	1.62	2.36		0.02	0.90		
Prob > F	0.2055	0.0982		0.8994	0.4074		
R-squared	0.0113	0.0267		0.0001	0.0137		

9K: DIFFERENCES IN THE PARCEL OF PEOPLE WORKING FOR WAGES				9L: DIFFERENCES IN THE PARCEL OF PEOPLE STUDYING			
	1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		
Treatment	-0.05			0.01			
Treatment*Woman		1.01			-0.38		
Treatment*Man		-0.99			0.29		
Constant	-0.33	-0.33		1.14	1.14		
Number of observ.	135	135		135	135		
F (k, n-1)	0.00	1.68		0.00	0.19		
Prob > F	0.9571	0.1911		0.9919	0.8272		
R-squared	0.0000	0.0269		0.0000	0.0030		

9M: DIFFERENCES IN THE PARCEL OF PEOPLE IN HOUSEHOLD ACTIVITIES				9N: DIFFERENCES IN THE PARCEL OF PEOPLE IN PRODUCTIVE ACTIVITIES			
	1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL	2 <sup>ND</sup> MODEL		
Treatment	1.15			0.65			
Treatment*Woman		1.80	*		1.05		
Treatment*Man		2.20	**		0.17		
Constant	-2.81	-2.83		1.54	1.53		
Number of observ.	135	135		135	135		
F (k, n-1)	1.31	2.55		0.43	0.65		
Prob > F	0.2536	0.0818		0.5153	0.5221		
R-squared	0.0112	0.0438		0.0034	0.0081		

The main results can be summarized as follows. Under the alternative of **measuring Y as a percentage of the daily workload:**

- It is confirmed that treatment leads to a significant difference (10 percent level) in terms of reducing the percentage allocation of the daily workload to fetching water and to a reduced allocation of **women's** percentage (significant at 10 percent level) more than of men's (see table 9A).
- An increased percentage allocation of daily work to farming for the treatment as a whole (at 5 percent level) and in particular for women (at 5 percent level) but also for men (at 10 percent level (see table 9B).
- A reduced percentage allocation of daily work to household activities for women (at 10 percent level) (see Table 9F).
- No significant differences confirmed for breeding, working for wages, studying, and productive activities.

Under the alternative of **measuring Y as parcel of people engaged in a given activity:**

- The reduction of the parcel of women dedicated to fetching water (at 10 percent level) and the increased parcel devoted to farming (at 5 percent level) are again confirmed (see tables 9H and 9I).
- Surprisingly, as shown in table 9M, induced by the treatment, there was an increase in the parcel of men (at 5 percent level) and women (at 10 percent level) dedicated to household activities. This result underscores the need to investigate how the combination of increased time allocation to farming and to household activities for women and men plays out. This issue is presented and discussed in section 7.3.

## 7.3 Analysis of Income

As noted above in the section on 7.1 effects on time use, the RPRP significantly shortened the time women and men devote to fetching water and the time spent by women in domestic activities. Men and women spent more time on agricultural activities on the property, and men and women in the RPRP beneficiary communities spent much more time on agricultural production activities than the men and women in non-beneficiary communities. This apparently resulted in higher family agricultural income, as was seen in section 2 when we described the samples' income and assets characteristics

It was not statistically demonstrated, however, that there was more time spent on paid work, either for women or for men. Nevertheless, there were significant gains in income from paid work off the property for women benefitting from the project. The results show that annual individual income increased on average, for both men and women, by R\$ 989 in the beneficiary communities, compared with the increase in non-beneficiary communities, but this effect is not statistically significant (table 10). However, when we analyze the effect on men and women separately, we note a statistically significant positive effect for women, with an average increase of R\$ 2,230, while the average increase for men was statistically not different from zero (table 10). Considering that the average increase in total family income

in the treatment group was about R\$ 7,000, the average increase of income from paid work for women of R\$ 2,000 shows that women's individual contribution to the increase of family income, not counting their work on the property, was 30 percent. The remaining 70 percent, about R\$ 5,000, seems to come mainly from agricultural income from their own production, as described in table 4.

**Table 10:** Effect of Total Annual Income of Adults Over 16 Years Old (in R\$)

<b>Δ TOTAL ANNUAL PAID INCOME</b>	<b>MODEL 1</b>		<b>MODEL 2</b>	
<b>Treatment</b>	<b>988.78</b>			
<b>Treatment *Women</b>			<b>2,231</b>	<b>**</b>
<b>Treatment *Men</b>			<b>-181.72</b>	
<b>Control</b>	<b>-124.78</b>		<b>-124.78</b>	
Number of observ.	161		161	
F (k, n-1)	2.33		2.47	
Prob > F	0.1286		0,0876	
R-squared	0.1286		0,0517	

\*\* Statistically significant to 5%

The analysis of the effect on individual income by source points out that the difference between men and women with respect to increased total income is due mainly to the significant increase in paid agricultural work off the property. As shown in table 11, which analyzes the effect on wage income in the agricultural sector, once again the effect on women is significantly positive while there is no significant effect for men. No effect on other income sources was significant for women or for men.<sup>13</sup> Nevertheless, since the total effect on income from paid work is much higher, in absolute terms, than that observed for income from agricultural work, we conclude that work in the nonfarm sector, as well as other sources, must contribute to increased income even if not measured statistically.

<sup>13</sup> Results not shown here, since none were significant, but available from authors at request.

**Table 11: Effect of Annual Agricultural Sector Income for Adults**

<b>Δ TOTAL ANNUAL PAID INCOME</b>	<b>MODEL 1</b>		<b>MODEL 2</b>	
<b>Treatment</b>	<b>258</b>			
<b>Treatment *Women</b>			<b>447</b>	<b>*</b>
<b>Treatment *Men</b>			<b>79</b>	
<b>Control</b>	<b>-83</b>		<b>-83</b>	
Number of observ.	161		161	
F (k, n-1)	2.66		1.88	
Prob > F	0.1050		0.0339	
R-squared	0.0143		0.1557	

\* Statistically significant to 10%

1. Rough estimate of heteroscedasticity

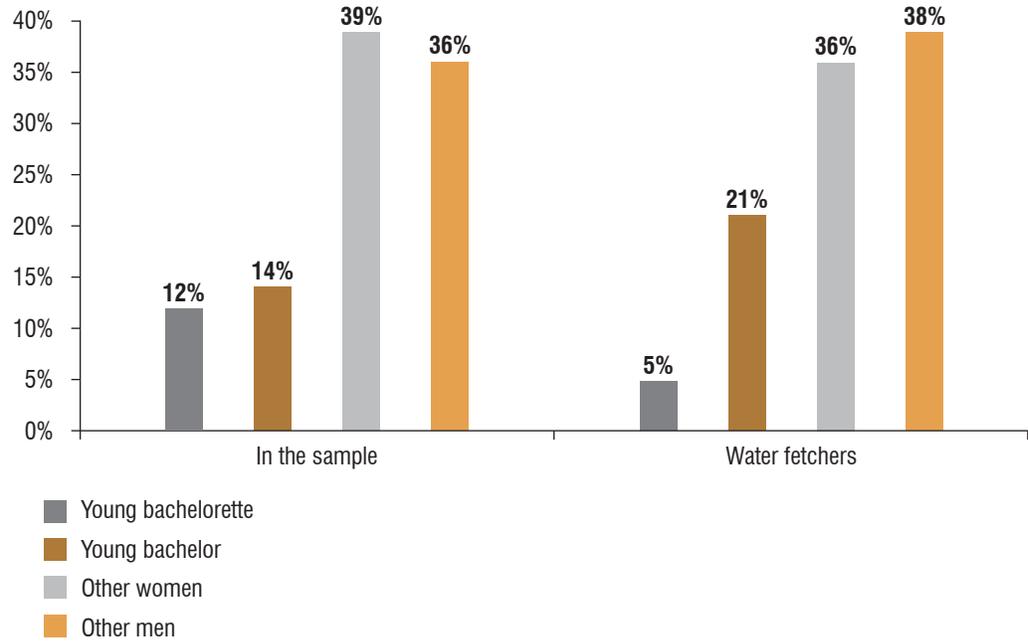
These results seem to show that women have benefitted in terms of income in the short term from the subproject's implementation. For women, who in 2009 had total annual paid income of R\$ 1,692, the estimated effect represents an increase in the absolute value of *approximately 124 percent*; while women of the control group, whose total annual income in 2009 was R\$ 2,194, experienced a loss of 7 percent.

## 7.4. Gender and Generation

The study has also generated a relevant series of hypotheses—that merit additional specific studies—with a relatively small number of observations, by breaking down the data by age and gender. We identified four groups: (i) young bachelors (under 25), (ii) adult/married men, (iii) young bachelorettes (under 25), and, (iv) adult/married women. Different impacts are found according to gender and generation.

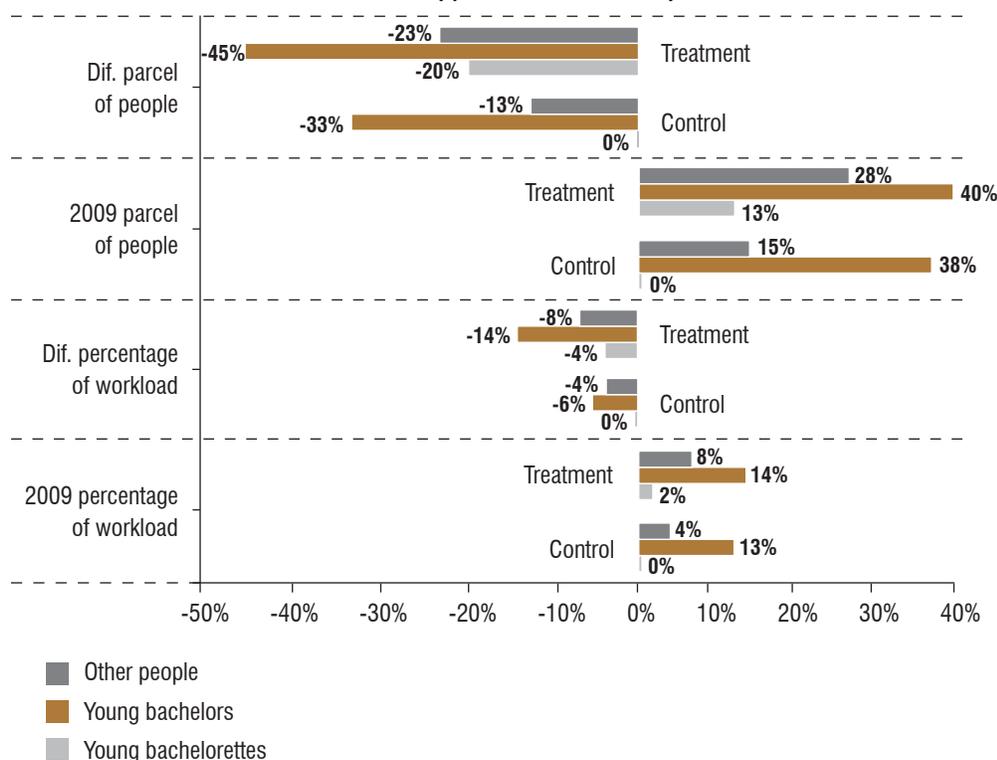
Water fetchers made up just 23.5 percent of the people interviewed in 2009, and about 72 percent of them lived in treatment communities. Women represented 52 percent of the sample, but just 41 percent of the water fetchers were women. Conversely, young bachelors represented just 14 percent of the sample, but they in fact counted for 21 percent of water fetchers. Young bachelorettes were less involved than other people in fetching water to their households. In control communities, none of the young bachelorettes fetched water to their households. In treatment communities, 13 percent of them fulfilled this task, which represented just 2 percent of their daily workload. Conversely, young bachelors were overrepresented among the water fetchers (38 and 40 percent in control and treatment communities, respectively) and spent heavy shares of their workloads in this activity (13 and 14 percent, respectively). Fetching water was their main or exclusive homework duty. The length of distances between house and water source, safety reasons, and body strength have been pointed out as the main reasons for preferring that young bachelors fill the role of water fetchers.

**Graph 1: Proportion of Young Bachelorette and Bachelors, Older Women, and Men**



Water-based interventions have reduced the parcel of people involved with fetching water and also the proportion of their daily workload spent with this activity. This reduction was more intense among young bachelors. They became the major direct beneficiaries from water-based interventions. In treatment communities, 45 percent of the young bachelors stopped fetching water and the parcel of their burden with this activity almost zeroed. In control communities, 33 percent of the young bachelors stopped fetching water, but the activity still represented 7 percent of their workload. A meaningful parcel (20 percent) of the young bachelorettes has also stopped fetching water and the proportion of their daily workload spent in this activity also declined 4 percent. Graph 2, below, reflect the changes in time and people allocated to fetching water by type of community and generation.

**Graph 2: Changes in Fetching Water to Households by Generation and Type of Community**



The data presented suggest that relatively more young bachelors fetched water to their households and they spent a larger parcel of their daily workload doing it. After the investments in water supply and production, they experienced the largest reduction in the time poverty resulting from this duty and had larger parcels of time freed. Most of their freed time was relocated to productive works. The time freed from fetching water for other groups was also distinctly relocated.

In 2009, the burden of homework activities impinged mostly upon women—and mostly upon the adult/married women. The investments made in treatment communities seem to have reduced this female load, and such reduction seems to have occurred because there was a better distribution of homework activities between the adult/married women and the young bachelors and bachelorettes. Thus and as shown in table 12A and table 12B, the rate of decline in the representativeness of homework in the daily workload was more intense in treatment than control communities, whereas the rate of decline in the parcel of people engaged in homework activities was reversed when these communities are compared. Communities that have benefited exclusively from productive subprojects show the largest rates of decline in both indicators: the representativeness of homework activities in daily workload and the parcel of people involved in these activities.

**Table 12A:** Parcel of Workload with Homework Activities by Gender, Generation, and Projects

	OVERALL		CONTROL		TREATMENT		WATER SUBPROJECTS		PRODUCTIVE SUBPROJECTS		BOTH SUBPROJECTS	
	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif
Young bachelorettes	30%	-7%	22%	-6%	38%	-9%	21%	20%	51%	-19%	15%	-15%
Young bachelors	17%	-7%	13%	-5%	18%	-8%	19%	-25%	38%	-40%	5%	11%
Married/adult women	50%	-15%	45%	-7%	53%	-19%	51%	-6%	52%	-23%	55%	-21%
Married/adult men	13%	3%	14%	11%	13%	-3%	18%	-14%	8%	4%	14%	1%
Overall	30%	-7%	27%	-7%	32%	-10%	31%	-3%	37%	-16%	27%	-6%

**Table 12B:** Parcel of People with Homework Activities by Gender, Generation and Projects

	OVERALL		CONTROL		TREATMENT		WATER SUBPROJECTS		PRODUCTIVE SUBPROJECTS		BOTH SUBPROJECTS	
	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif
Young bachelorettes	27%	-14%	25%	-15%	25%	-12%	20%	20%	28%	-20%	20%	-20%
Young bachelors	11%	-5%	10%	-3%	12%	-5%	10%	-20%	20%	-10%	7%	0%
Married/adult women	40%	-19%	51%	-36%	34%	-10%	49%	-14%	29%	-8%	33%	-12%
Married/adult men	11%	2%	11%	8%	11%	-1%	16%	-4%	12%	-9%	5%	8%
Overall	24%	-8%	27%	-12%	22%	-6%	28%	-7%	22%	-9%	16%	-2%

Conversely, the engagement with productive activities has increased. As presented in table 13A and table 13B, the proportion of people engaged in productive activities increased slightly more in control communities, but the proportion of the daily workload allocated to productive activities increased significantly more in treatment communities. Among treatment communities, those which benefited just from water-based interventions show expressively higher increases in the representativeness of productive activities in the daily workload. This result confirms the hypothesis that time poverty reduction investments—such as water supply systems that reduce the time wasted fetching water to households—are key prerequisites to fighting poverty. However, family income has declined precisely in these communities in which the parcel of the daily workload in productive activities increased most. Hypothetically, most of the time reallocated from water fetching to

productive activities in communities that benefited from just water-based interventions was reallocated to more traditional or subsistence-based activities, which do not result in gains in monetary incomes.

Additionally, it should be added that the younger generation took the most advantage of the time poverty reduction to convert freed time to productive time. A higher proportion of young bachelorettes and bachelors entered into productive activities, and, consequently, their productive workload also increased the most. Adult/married women also benefitted from the investments made to reduce time poverty and to promote productive activities.

**Table 13A:** Parcel of Daily Workload with Productive Activities by Gender, Generation, and Projects

	OVERALL		CONTROL		TREATMENT		WATER SUBPROJECTS		PRODUCTIVE SUBPROJECTS		BOTH SUBPROJECTS	
	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif
Young bachelorettes	14%	15%	25%	3%	0%	40%	0%	22%	1%	34%	0%	56%
Young bachelors	14%	15%	13%	12%	16%	17%	22%	44%	8%	39%	17%	1%
Married/adult women	11%	6%	19%	-3%	7%	10%	11%	14%	4%	13%	9%	3%
Married/adult men	32%	10%	27%	3%	36%	0%	37%	23%	33%	-3%	40%	-17%
Overall	19%	7%	21%	3%	18%	9%	23%	21%	13%	12%	22%	-1%

**Table 13B:** Parcel of People with Productive Activities by Gender, Generation, and Projects

	OVERALL		CONTROL		TREATMENT		WATER SUBPROJECTS		PRODUCTIVE SUBPROJECTS		BOTH SUBPROJECTS	
	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif	2009	Dif
Young bachelorettes	8%	14%	11%	7%	3%	30%	0%	25%	5%	25%	0%	38%
Young bachelors	10%	10%	9%	4%	10%	14%	25%	25%	5%	13%	4%	13%
Married/adult women	12%	5%	11%	6%	12%	5%	19%	11%	6%	6%	16%	0%
Married/adult men	29%	-4%	24%	-1%	33%	-8%	35%	0%	35%	-11%	29%	-13%
Overall	17%	3%	15%	3%	19%	2%	26%	7%	15%	2%	18%	0%

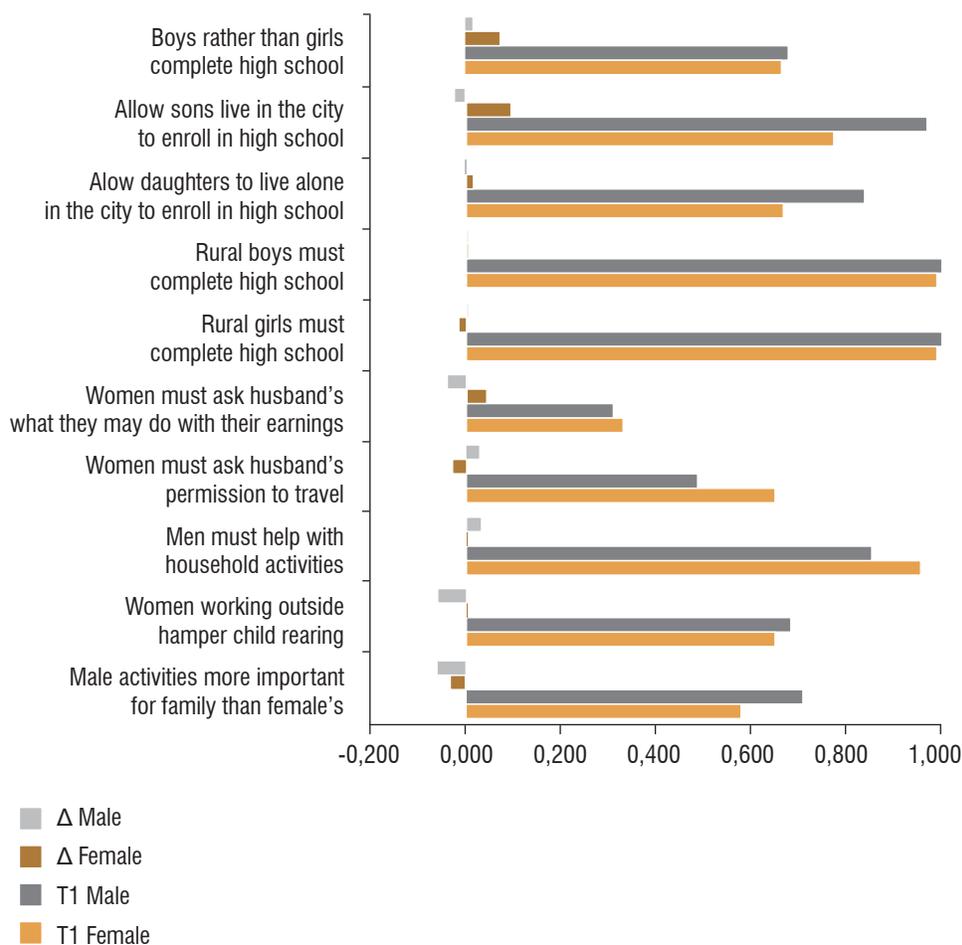
## 7.5 Cultural Dimensions

The two main hypotheses to be tested under the study consider that a greater economic contribution by women to family livelihood—which might be associated with a smaller household workload and participation in the project—could result in (i) a lower approval rate for traditionally gender-oriented cultural norms and (ii) a greater awareness of gender imbalances in power distribution in household decision making.

### 7.5.1 TRADITIONAL GENDER-ORIENTED CULTURAL NORMS

We made an attempt to grasp the cultural values and beliefs about gender issues that were shared by our informants and to determine whether they changed over time as a result of the participation in the project. Thus, we asked their opinion on (i) the importance of the different contribution men and women make to family livelihood; (ii) male participation in household activities; (iii) whether child rearing is jeopardized when women work off the property; (iv) whether women must ask their husbands' permission to travel and visit their parents; (v) whether women must ask their husbands' permission when deciding what they shall do with the money they earn; (vi) whether it is important that young women and young men graduate from high school; (vii) whether they would allow their daughters and sons to live alone in town to complete high school; and (viii) whether it is more important that their daughters or their sons complete high school. With this information we built a Traditional Gender Orientation (TGO) Index, which reflects choices that distinguish more gender-imbalanced perspectives (values closer to 1) from more gender-balanced perspectives (values closer to zero).

**Graph 3: Traditional Gender Orientation by Sex**



As summarized in graph 3, our data show that male activities were, for the most part, considered more important than female activities for the family's livelihood by both men and women. This perception has slightly decreased, and it has dropped more among men than among women. The majority of our interviewees considered that child rearing may be compromised when women work off the property. This opinion has also declined more among men than among women. Most informants also approved male help as needed in household activities, and this view has increased among men. They agreed that women must ask their husbands' permission before travelling to visit their parents, but while this view has grown among men, it has declined among women. The majority also considered that women do not need to ask their husbands' permission in deciding how to spend the money they earn, but this opinion has gained support among men, whereas it lost favor among women. All but one informant initially stated that completing high school is important for both boys and girls. A higher number of informants pointed out that they would allow their sons rather than their daughters to live alone in town to complete high school. Women were less open than men to allowing their children to live alone in town. Their opinion did not change with regard to their daughters, but they became more willing

to allow their sons to live in town to study. Finally, when they were urged to state whether it was more important that boys or girls complete high school, both men and women favored the boys, and this opinion has increased more among women than among men.

**Table 14:** Traditional Gender Orientation Index by Sex

	T <sub>1</sub>	T <sub>2</sub>	
Female	0.473	0.533	
Male	0.448	0.510	ΔΔ
Δ	0.091	0.050	0.409
t T-test	1.002	0.628	1.545

Overall time changes in these perspectives have not been statistically significant. The Traditional Gender Orientation Index (table 14) points to similar results for men and women in both points in time.<sup>14</sup> It reaches a slightly and insignificantly higher value among women than among men and has increased over time, showing that people have adhered to more imbalanced perspectives with respect to gender issues.

**Table 15:** Traditional Gender Orientation Index by Sex and Sample Group

TRADITIONAL GENDER ORIENTATION INDEX	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.433	0.485	0.461	0.450	0.569	0.509	11%	21%	17%
Water subprojects	0.418	0.486	0.459	0.402	0.582	0.501	2%	21%	14%
Production subprojects	0.420	0.472	0.446	0.423	0.543	0.479	12%	22%	17%
Control	0.499	0.415	0.466	0.560	0.519	0.546	10%	24%	14%
Δ (Treatment - Control)	-0.066	0.070	-0.005	-0.111	0.050	-0.037	<b>-0.002</b>	<b>0.003</b>	<b>0.009</b>
t T-test	-1.923	1.819	-0.191	-2.264	0.851	-0.959	<b>-0.056</b>	<b>0.083</b>	<b>0.320</b>

As observed in table 15, there were key differences between treatment and control groups with regard to the TGO Index. Overall, they presented similar values at T<sub>1</sub>. However, women in treatment groups showed less traditional views on gender-related issues than women in control groups, and the opposite was true among men. Differences in women's views are statistically significant between treatment and control groups. This trend has not changed over time; women in control communities and men in treatment communities continue to hold more traditionally oriented views on gender issues.

<sup>14</sup> The index of traditional gender orientation (TGO) suggests that people with lower income and schooling, regardless of gender and age, held more traditionally oriented views in gender issues.

Contrary to what was expected, our data show that these views became more traditionally oriented over time. This trend was more intense among men than among women, and more marked within the treatment group than in the control group. The methodology of differences-in-differences shows that changes in the TGO Index are not statistically significant and cannot be considered a consequence of the impact of the treatment. (Table 16) Regression analysis also shows that temporal variation in the Traditional Orientation on Gender Index is not significantly related to participation in the project or sex.<sup>15</sup>

**Table 16:** Effect on the Traditional Gender Orientation Index

	1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL	
Treatment	0.33			
Treatment*Woman			-0.59	*
Treatment*Man			1.12	
Constant	2.11		3.25	
Number of observ.	97		97	
F (k, n-1)	0.11		1.32	
Prob > F	0.7456		0,2727	
R-squared	0.0011		0.0279	

### 7.5.2 INTRAHOUSEHOLD BARGAINING POWER

As has been pointed out by the literature on gender relationships in rural societies, a woman's premarital ties to the labor market and postmarital residence rules strongly affect the distribution of power in intrahousehold decision-making processes. On the one hand, it is expected that women who worked and, especially, who earned an income before marrying, experience more balanced intrahousehold power relationships than those who did not. On the other hand, uxirilocality after marriage and, especially, living on a woman's family property also increase the bargaining power women enjoy in postmarital intrahousehold decision-making processes.

We measured women's postmarital bargaining power firstly by inquiring about postmarital rules of residence and premarital participation in the labor market economy. Then we measured the actual bargaining power of men and women in postmarital decision-making processes by asking who decides on a series of family and domestic issues (child rearing, household daily and extraordinary expenses, and productive decisions).

<sup>15</sup> In addition, there were no significant statistical correlations between the temporal indexes of traditional orientation on gender-related issues (and its temporal variation) and variables such as sex, age group, engagement in the productive economy, personal income, household workload, the bargaining power that people bring into their marital life, or the actual distribution of power in intrahousehold decision making.

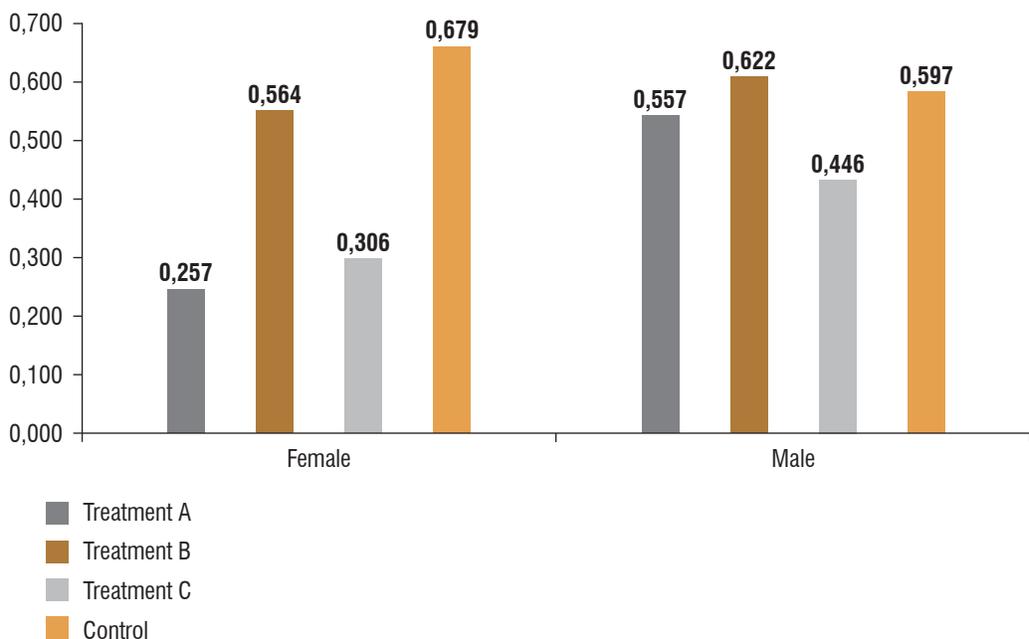
With this information we built two indices:

- The first index (Bargaining Power Index, BPI) measured the potential bargaining power each informant held in intrahousehold decision making. It is a weighted average in which three variables are considered: postmarital residence in the community in which his/her family lives, postmarital residence on his/her family's property, and premarital insertion in the labor market.
- The second index measured the informant's perspective on gender imbalances in intrahousehold postmarital decision making (the Asymmetric Distribution of Power Index, ADPI). Considering who decides on seven different issues (from calling a doctor to treat a child to deciding when to buy livestock), this index is an average in which values closer to 1 mean a male-oriented pattern of asymmetric power distribution and values closer to zero mean a less-asymmetric pattern of power distribution.

### 7.5.3 BARGAINING POWER INDEX (BPI)

Our baseline data showed that the prevailing rule of postmarital residence is neo-locality. More than half of the married people moved to the community in which they currently live when married or afterward. Nearly two-thirds of them do not live in their families' landholdings. More than three-quarters of them worked before marriage, but just half of them had been wage workers. A larger proportion of men than women worked and received wages before marrying.

**Graph 4: Bargaining Power Index by Sex and Treatment/Control Groups**



Reflecting differences in these factors and as expected in social settings defined by traditional patterns of gender relationships, our data show that men hold higher bargaining power than women (0.556 *versus* 0.358, *t* of T-test comparison of means = 3.774). BPI was strongly correlated to manliness (Pearson correlation index = 0.3562, meaningful at 5 percent level). However, there were great disparities among the sample groups with regard to bargaining power held by men and women. Thus, women from control communities brought to their marriages more bargaining power than men and they held a lot more bargaining power than their counterparts in treatment communities. The bargaining power held by women in communities that have implemented a water supply system subproject is significantly smaller than in the others.

#### 7.5.4 ASYMMETRIC DISTRIBUTION OF POWER IN INTRAHOUSEHOLD DECISION MAKING (ADPI)

Differences in the bargaining power brought by men and women into marriage should be reflected in asymmetrical balances of power in actual intrahousehold decision-making processes. However, we did not find any meaningful correlation between these indices (Table 17).

On the contrary, our data show that gender imbalances in intrahousehold decision-making processes hugely varied according to the decisions to be made. Initially the actual power distribution was more equitable in matters related to child rearing and bearing, but it became more asymmetrical and male-oriented in matters related to (i) the acquisition of family assets and (ii) family economic production. In addition, men and youth—as represented by the children of household heads—held a more acute perception of asymmetrical distributions of power than did women, adults, and the elderly. These patterns have not changed over time.<sup>16</sup>

There were also meaningful differences between treatment and control groups. The latter held a more acute perception of a gender bias, particularly in the distribution of power in intrahousehold decision-making processes. This pattern has changed substantially. While people in the treatment group acquired a more acute perception of these power imbalances and now see that men hold more control over decisions related to productive issues and family assets, people in the control group lost this perception and tend now to see these intrahousehold decisions as being more evenly shared by men and women.

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<sup>16</sup> Additionally, analyzing the index of power distribution in intrahousehold decision-making (ADPI), it is found that older people and people with lower incomes held more gender imbalanced distribution views and attitudes.

**Table 17: Asymmetric Intrahousehold Power Distribution**

ASYMMETRIC INTRAHOUSEHOLD POWER DISTRIBUTION	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.512	0.468	0.491	0.570	0.465	0.517	9%	-4%	3%
Water subprojects	0.573	0.471	0.519	0.583	0.458	0.512	6%	-16%	-5%
Production subprojects	0.465	0.479	0.471	0.554	0.489	0.521	12%	-2%	6%
Control	0.587	0.526	0.559	0.532	0.487	0.512	-15%	-24%	-19%
Δ	-0.075	-0.059	-0.068	0.038	-0.022	0.004	0.135	0.106	0.121
t T-test	-1.241	-0.954	-1.569	0.692	-0.429	0.011	2.170	1.164	2.265

The Asymmetric Distribution of Power Index reproduces and synthesizes these trends. The increased perception of power imbalances was meaningful among women in treatment groups and, particularly, among women who live in communities that have implemented a production-related subproject. Women in the control group moved in the opposite direction. In both groups, men tended to lose their acuteness in perceiving power imbalances in intrahousehold decision making, but the index declined more in the control group than in the treatment group. As a consequence, the differences-in-differences (different temporal evolution between treatment and control groups) in the Asymmetric Intrahousehold Power Distribution Index is statistically meaningful.

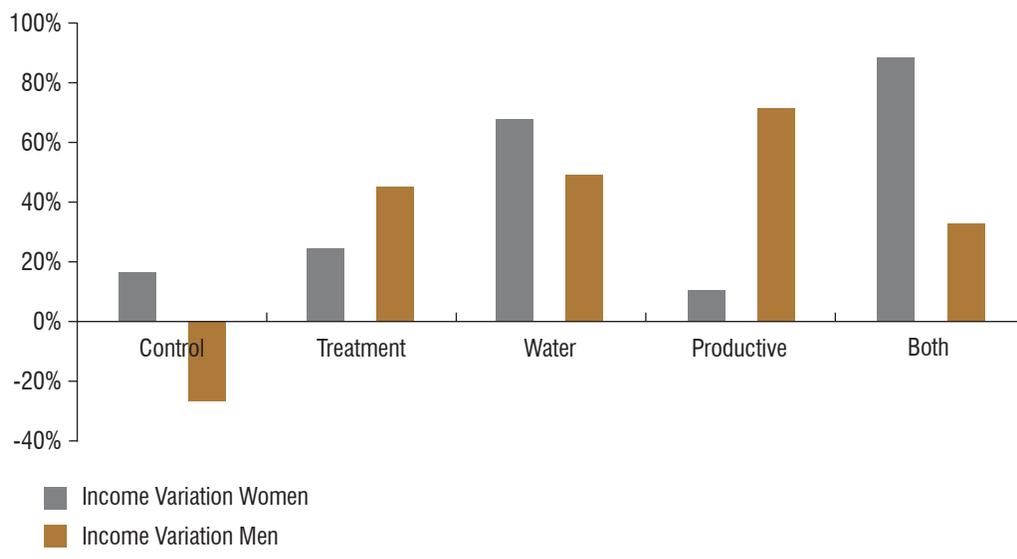
The result suggests that participation in the project may have the impact of increasing women's awareness of power imbalances in intrahousehold decision making. Regression analysis has supported this conclusion (Table 18).

**Table 18: Effect on the Perception of Asymmetric Imbalances in Power Distribution**

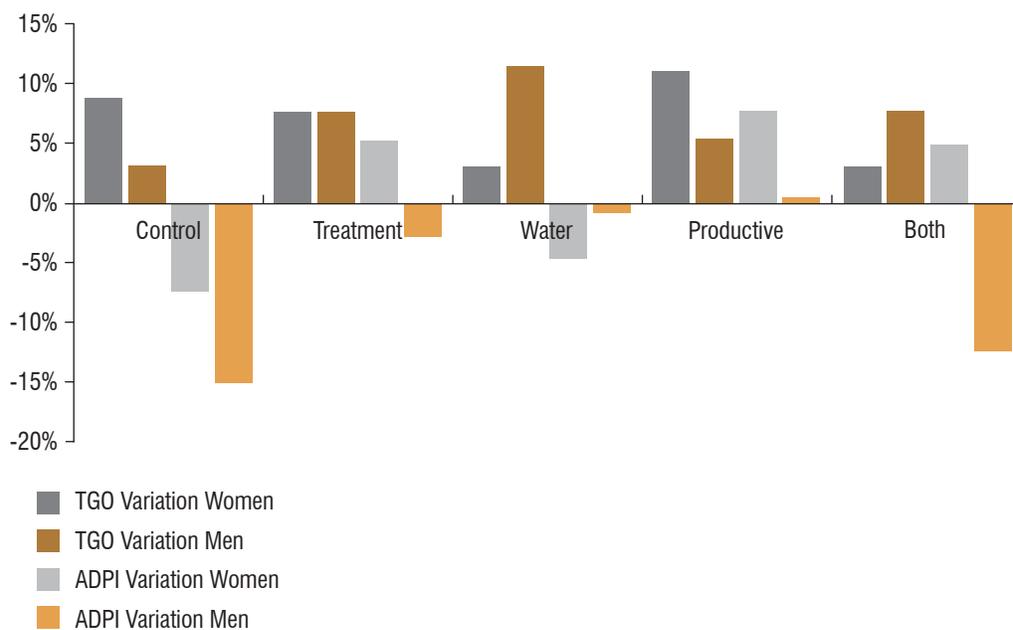
	1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL	
Treatment	2.32	**		
Treatment*Woman			2.79	**
Treatment*Man			1.18	
Constant	1.74		-2.64	
Number of observ.	82		82	
F (k, n-1)	5.37		3.90	
Prob > F	0.0231		0,0243	
R-squared	0.0608		0.0728	

Two parallel hypotheses are worth considering when addressing these changes in gender-related conceptions and attitudes in treatment groups. The first hypothesis would suppose a kind of backlash as women's earnings increased due to reduced time poverty and access to productive activities. The second and reverse hypothesis would consider that greater equality in economic contributions to household in general leads to greater equilibrium in intrahousehold decision making and less traditional orientation in gender issues. Preliminary analysis correlating income variation and cultural dimensions gives support to the second hypothesis. Hence, it was found that women's income has increased more (in comparison to men's) in communities in which gender views became less traditionally oriented (TGO Index) and intrahousehold decision making became less gender-imbalanced (ADPI Index). Conversely, women's income has increased less (in comparison to men's) just in communities in which gender-related views and attitudes as well as intrahousehold decision making became more traditionally oriented and gender-imbalanced. Therefore and as supported by the second hypothesis, it seems that an increase in the proportion of male contribution to household/family earnings (in detriment of female contributions) drove people to more traditional and gender-imbalanced views and attitudes (see Graphs 5A and Graph 5B).

**Graph 5A: Income Variation by Gender and Community Sample**



**Graph 5B: TGO and ADPI Variation by Gender and Community Sample**



## 7.6 Social Dimension

### 7.6.1 SOCIAL CAPITAL

A final set of hypotheses to be tested under the study refer to social capital. They propose that (i) women's social networks in traditionally oriented societies in gender issues might be smaller in size and geographical scope as well as more oriented to partners of the same sex than men's; (ii) women's participation in public life (from which community and civilian participation might be good proxies) might be more restricted than men's; and (iii) participation in the project might have a positive impact on the social capital held by both men and women.

We used two different theoretical paradigms to address social capital issues. One relates to social networks; the other refers to feelings, beliefs, and behaviors related to the sentiment of belonging to a group (such as trust, solidarity, cooperation, etc.).

On the one hand, we considered social capital as the amount of social, economic, and political resources individuals ("Ego") may access through their social networks (i.e., the "Alters") to improve their livelihood. According to this first paradigm, social capital was measured in terms of the size of the social networks from which Ego can receive help when

he/she needs it and the intensity of the social ties between Ego and Alters.<sup>17</sup> Analyzing these networks, we additionally considered the degree in which they are gender-oriented: networks mostly composed by Alters of the same sex as Ego, balanced, or mostly composed by Alters of Ego's opposite sex.<sup>18</sup> In addition, we considered their geographical scope, contrasting networks mostly composed of Alters from the same locality in which Ego lives to networks mostly composed by Alters who live in municipalities other than Ego's.<sup>19</sup> Finally, we considered how intensively the resources available to our interviewees through their social network have been actually used by them.

On the other hand, we considered social capital as related to the processes of collective action, community, and group identification. Thus, the social capital held by individuals meant their sentiment of belonging and sense of responsibility for the life and the achievements of a social group. It relies on the feelings of trust, solidarity, and cooperation the individual holds with regard to other members of the group, and it expresses itself in taking part in collective actions required and promoted by the group. Ordinarily, collective actions may express themselves through enrollment in more or less institutionalized groups, participation in community activities, and civilian participation. According to this second paradigm, social capital is measured by levels of participation in institutionalized interest groups (community associations, rural labor unions, and other community-based organizations); in community problem-solving activities (community participation); and in collective petitions to municipal authorities (civilian participation). The strength of community ties has also been considered.

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<sup>17</sup> We considered 10 situations in which Ego may need help: (i) needing guidance when needing to sell agrarian production or family assets; (ii) needing advice in understanding the rules of a governmental program or policy; (iii) needing help fixing and maintaining their dwellings; (iv) needing help finding a job for someone in the family; (v) needing help to obtain a loan of a small amount of money; (vi) needing help to obtain a loan of a large amount of money; (vii) needing help when leaving their children for a while; (viii) needing help when staying as a guest in the town; (ix) needing advice for solving family or personal issues; and (x) needing support to obtain services from state institutions. The index measuring the size of his/her social network equals the average of the situations in which he/she knows someone who can help. Considering the same 10 situations, Alters on whom Ego may rely were classified as acquaintances, friends, or relatives and the index measuring the strength of his/her social network equals a weighted average (acquaintances = 1, friends = 2, and relatives = 3) of the situations in which he/she knows someone who can help. This second index presupposes that kinship relations are closer or stronger than friendship and acquaintanceship.

<sup>18</sup> The index measuring the gender orientation of Ego's social network equals an average of the 10 situations he/she may need help with, in which a 0 value is attributed to Alters of the same sex as Ego and a value of 1 is attributed to Alters of the opposite sex. The closer to 0, the more homo-oriented is Ego's social network; the closer to 1, the more it is hetero-oriented; and the closer to 0.5, the more gender balanced it is.

<sup>19</sup> Considering the same 10 situations in which Ego may need help, we classified his/her Alters according to whether they live in the same local community as Ego, in the same municipality as Ego, or outside Ego's municipality. The index varies from 0 to 1, with 0 meaning that all Alters from whom Ego may expect help are from his/her locality and 1 meaning that all Alters are from other municipalities.

## 7.6.2 SOCIAL NETWORKS

Collected baseline data show that, when measuring social capital according to the first paradigm, male interviewees tended to hold larger and denser social networks than do females; male networks were wider or territorially scattered and less gender biased than were those of females; and men used their social networks more often than did women. The same trends distinguished control and treatment groups. People living in control communities have larger, denser, wider, and less gender-oriented social networks and used them more intensively than people living in treatment communities. There were meaningful differences in the size and territorial scope of the social networks of women from treatment and from control groups. Men's social networks were more identical in both groups (Graphs 9 and 10).

Temporal changes point out that female social networks have increased in size, density, and territorial scope. They have also become less gender biased, including more Alters of the opposite sex, and are more intensively used. Male social networks did not increase as much in size and density. They expanded in territorial scope and frequency of use.

The size of social networks has increased among the treatment group (and particularly among those who benefitted from production-related subprojects), whereas it has shrunk among the control group. Networks became stronger, wider in territorial scope, and less gender biased in both groups. Their use as a resource generator was also intensified in both of them. The comparative evolution of the use of social networks in treatment and control groups shows meaningful statistical differences, suggesting that participation in the project has a positive impact on rendering social resources more available and accessible to its beneficiaries.

More distinctive paths have been followed by male and female social networks over time. Men's social networks have shrunk—or, at best, remained unchanged—and do not show meaningful differences when treatment and control groups are compared. Meanwhile, women's social networks have flourished. They grew in size, became stronger and less gender biased, expanded to other localities, and were more intensively used than before.

The size of women's social networks has grown substantially more in the treatment than in the control group. This difference is meaningful at the 5 percent level and suggests the project may have had a positive impact on women's social networks.

**Table 19:** Characteristics of Social Networks

SIZE OF SOCIAL NETWORK	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.337	0.469	0.405	0.469	0.415	0.442	39%	-11%	9%
Water subprojects	0.429	0.529	0.485	0.513	0.442	0.473	19%	-16%	-3%
Production subprojects	0.323	0.463	0.392	0.492	0.489	0.491	52%	6%	25%
Control	0.479	0.419	0.452	0.461	0.419	0.442	-4%	0%	-2%
Δ (treatment - control)	-0.142	0.051	-0.047	0.009	-0.003	0.000	0.151	-0.054	0.047
t T-test	-2.444	0.079	-1.065	0.146	-0.042	-0.002	2.034	-0.727	0.873

DENSITY OF SOCIAL NETWORK	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.263	0.346	0.306	0.408	0.319	0.362	55%	-8%	18%
Water subprojects	0.339	0.383	0.364	0.439	0.337	0.381	30%	-12%	5%
Production subprojects	0.249	0.343	0.295	0.435	0.385	0.410	75%	12%	39%
Control	0.333	0.298	0.317	0.374	0.328	0.353	12%	10%	11%
Δ (treatment - control)	-0.070	0.049	-0.011	0.034	-0.009	0.009	0.104	-0.058	0.020
t T-test	-1.431	0.918	-0.312	0.642	-0.150	0.222	1.632	-0.956	0.450

GENDER ORIENTATION OF SOCIAL NETWORK	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.250	0.286	0.268	0.345	0.245	0.294	38%	-14%	9%
Water subprojects	0.308	0.323	0.316	0.363	0.260	0.305	18%	-19%	-4%
Production subprojects	0.244	0.289	0.266	0.368	0.286	0.327	51%	-1%	23%
Control	0.302	0.265	0.285	0.309	0.269	0.291	3%	1%	2%
Δ (treatment - control)	-0.052	0.021	-0.017	0.358	-0.023	0.003	0.087	-0.044	0.019
t T-test	-1.120	0.045	-0.512	0.756	-0.484	0.080	1.396	-0.872	0.472

TERRITORIAL SCOPE OF SOCIAL NETWORK	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.139	0.195	0.168	0.237	0.228	0.232	71%	17%	39%
Water subprojects	0.172	0.217	0.198	0.278	0.254	0.264	61%	17%	34%
Production subprojects	0.137	0.191	0.164	0.257	0.283	0.270	88%	48%	65%
Control	0.205	0.181	0.194	0.234	0.254	0.243	3%	40%	25%
Δ (treatment - control)	-0.066	0.013	-0.027	0.002	-0.026	-0.011	0.069	-0.040	0.016
t T-test	-2.256	0.466	-1.290	0.057	-0.524	-0.341	1.490	-0.790	0.465

USE OF SOCIAL NETWORK	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.184	0.279	0.225	0.435	0.347	0.387	155%	75%	112%
Water subprojects	0.283	0.335	0.309	0.521	0.322	0.407	136%	30%	86%
Production subprojects	0.185	0.261	0.216	0.438	0.432	0.435	166%	111%	139%
Control	0.220	0.344	0.275	0.263	0.330	0.300	11%	2%	5%
Δ (treatment - control)	-0.036	-0.065	-0.050	0.173	0.017	0.087	0.259	0.201	0.238
t T-test	-0.432	-0.531	-0.693	1.533	0.146	1.084	1.289	1.598	2.157

Regression analysis suggests that participation in the project has had no impact on the indices of social network size, strength, scope, and gender orientation. However, it has had a positive effect on the use of social networks as a source of the resources women and men need in order to maintain and improve their livelihoods (table 20).

**Table 20: Effect on the Use of Social Networks Index**

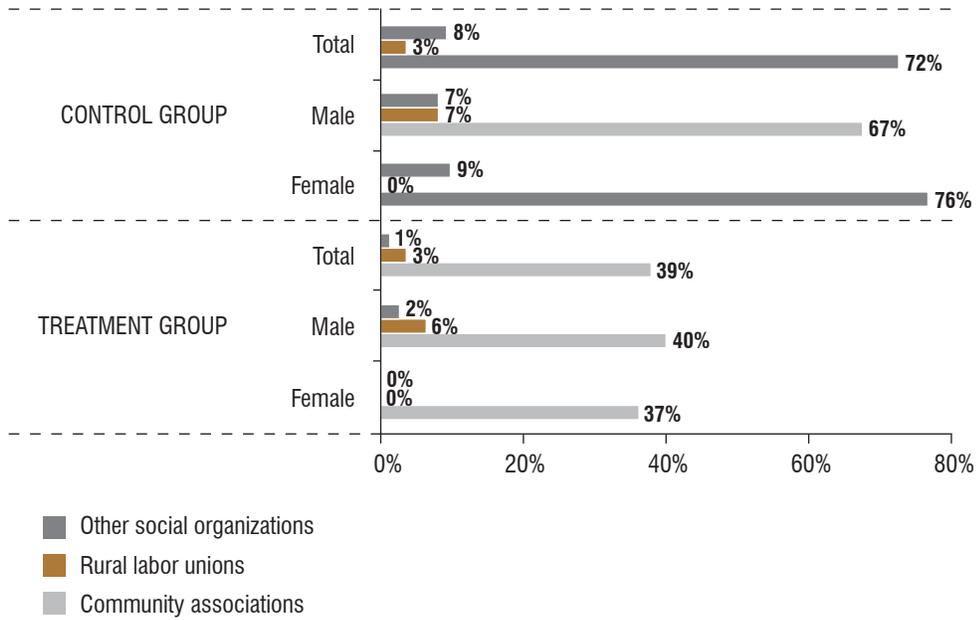
	1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL	
Treatment	2.88	**		
Treatment*Woman			2.12	**
Treatment*Man			2.37	**
Constant	3.46		0.27	
Number of observ.	39		39	
F (k, n-1)	8.32		4.11	
Prob > F	0.0065		0.0248	
R-squared	0.1117		0.1181	

### 7.6.3 PARTICIPATION IN COLLECTIVE ORGANIZATIONS

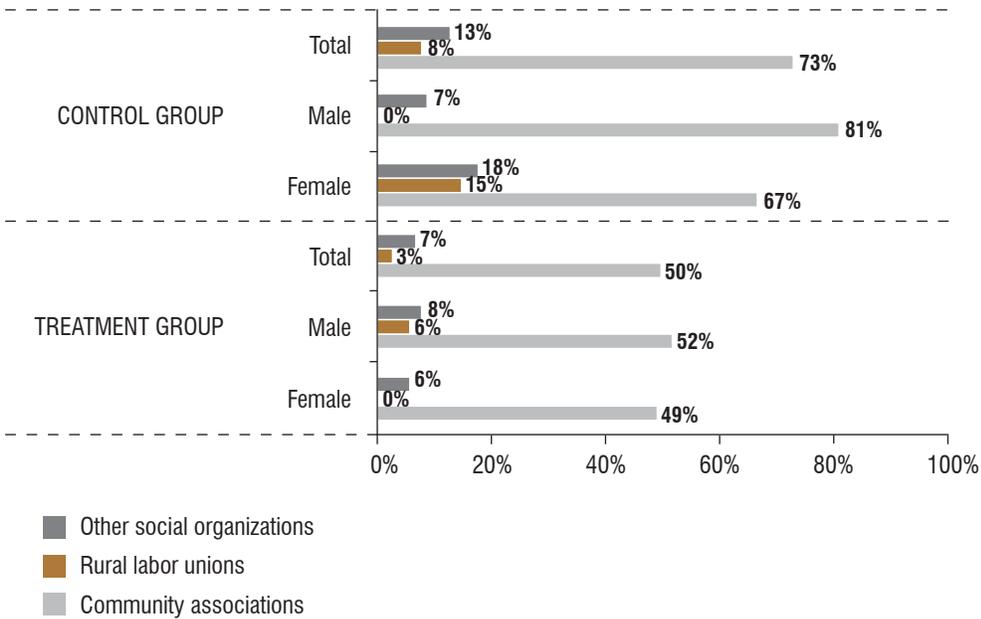
Baseline information on social capital tended to show meaningful differences according to gender and sample groups.

Men and women reported similar levels of participation in community associations. However, women were not formally enrolled in rural labor unions or other civil society organizations. In the treatment group, women distinguish themselves from men by their more intensive participation in activities promoted by community associations. Treatment and control groups also differ in levels of engagement with civil society organizations (i.e., membership, presence at meetings, and participation in activities organizations promote). As a rule, the engagement level in the treatment group was lower than in the control group. In addition, baseline data show that, among all civil society organizations, community associations presented by far the highest rates of membership, attendance at meetings, and participation in their activities by both men and women from treatment and control communities.

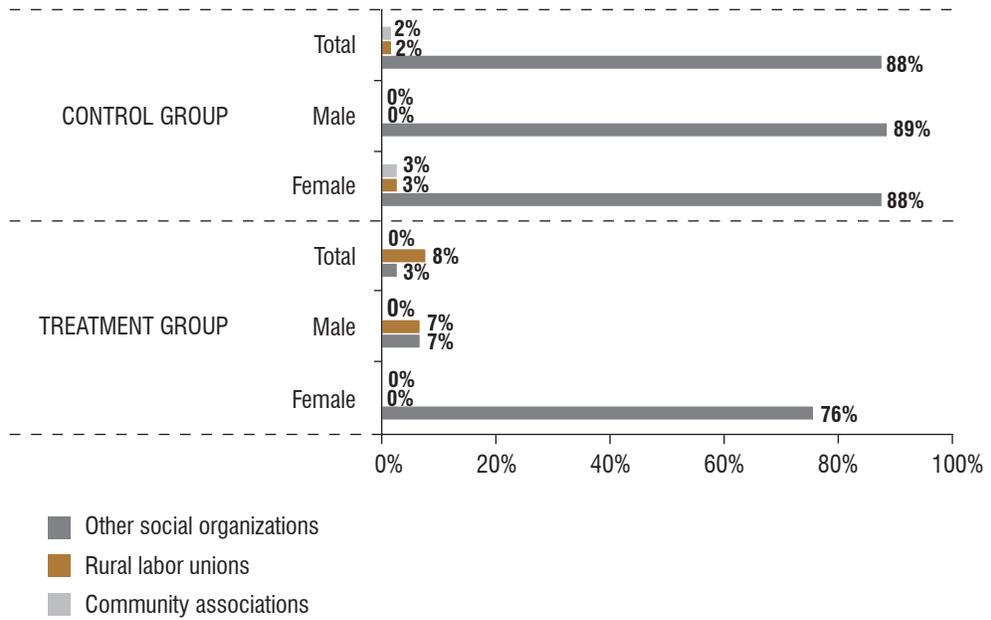
**Graph 6: Membership in Civil Society Organizations by Sex and Sample Group**



**Graph 7: Participation in Meetings of Civil Society Organizations**

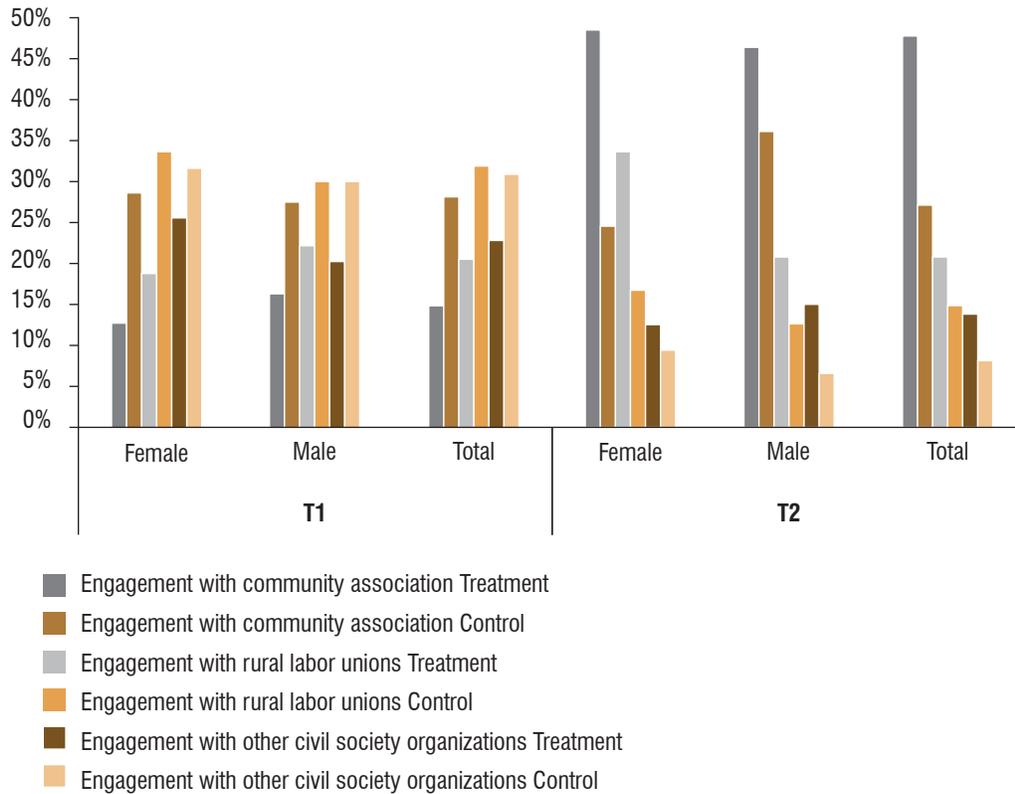


**Graph 8: Participation in Activities of Civil Society Organizations**



To analyze time changes we built three indices measuring engagement with (i) community associations, (ii) rural labor unions, and (iii) other civil society organizations. (See graph 6, graph 7, and graph 8.) The indices equal the average of the rates of membership, attendance at meetings, and participation in activities promoted by each one of these institutions.

**Graph 9: Evolution of Engagement Indices**



As can be seen in graph 9, while (i) the engagement with community associations has skyrocketed, (ii) the engagement with rural labor unions has increased, and (iii) the engagement with other civil society organizations has fallen. Meanwhile, our data also show that growth in the engagement level in community associations has been much higher in treatment communities than in control communities, and higher too among women than among men. Women in treatment communities were also the only group whose engagement level in rural labor unions increased. These changes reversed initial levels of engagement, which were higher in control than in treatment communities. In addition, in treatment communities, female engagement with both community associations and rural labor unions has also surpassed male engagement (see Tables 21 to 25).

**Table 21:** Indices of Social Organization and Participation

ENGAGEMENT WITH COMMUNITY ASSOCIATION	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.122	0.160	0.142	0.483	0.462	0.472	294%	188%	233%
Water subprojects	0.111	0.161	0.139	0.583	0.527	0.552	425%	227%	303%
Production subprojects	0.137	0.149	0.143	0.427	0.474	0.450	213%	218%	215%
Control	0.283	0.272	0.278	0.242	0.358	0.294	-14%	32%	6%
Δ (treatment - control)	-0.160	-0.111	-0.136	0.241	0.104	0.178	0.401	0.215	0.313
t T-test	-0.483	-2.376	-4.807	2.290	0.914	2.315	3.212	1.560	3.399

ENGAGEMENT WITH RURAL LABOR UNIONS	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.184	0.218	0.201	0.333	0.205	0.267	81%	-6%	33%
Water subprojects	0.181	0.215	0.200	0.375	0.301	0.333	108%	40%	67%
Production subprojects	0.205	0.211	0.208	0.333	0.149	0.242	62%	-29%	17%
Control	0.333	0.296	0.317	0.162	0.123	0.144	-52%	-58%	-54%
Δ (treatment - control)	-0.146	-0.078	-0.115	0.172	0.082	0.123	0.321	0.160	0.238
t T-test	-3.975	-1.923	-4.180	1.931	0.974	2.003	3.209	1.542	3.298

ENGAGEMENT WITH OTHER CIVIL SOCIETY ORGANIZATIONS	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	0.252	0.199	0.224	0.122	0.147	0.135	-51%	-26%	-40%
Water subprojects	0.264	0.215	0.236	0.083	0.194	0.145	-68%	-10%	-38%
Production subprojects	0.248	0.184	0.216	0.154	0.149	0.152	-38%	-19%	-30%
Control	0.313	0.296	0.306	0.091	0.062	0.078	-71%	-79%	-75%
Δ (treatment - control)	-0.061	-0.098	-0.081	0.032	0.086	0.058	0.093	0.183	0.139
t T-test	-2.035	-2.779	-3.509	0.456	1.146	1.141	1.175	1.936	2.271

**Table 22: Effects on Social Organization and Participation**

	ON COMMUNITY ASSOCIATIONS				ON UNION LABORS				ON SOCIAL ORGANIZATIONS			
	1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL		1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL	
Treatment	3.57	**			3.71	**			2.51	**		
Treatment*Woman			3.19	**			3.78	**			1.52	
Treatment*Man			2.70	**			2.07	**			2.42	**
Constant	4.73		0.26		2.81		-4.30		0.54		-6.34	
Number of observ.	161		161		161		161		161		191	
F (k, n-1)	12.76		6.46		13.74		7.83		6.32		3.32	
Prob > F	0.0005		0.0020		0.0003		.0006		0.0129		.0387	
R-squared	0.0677		0.0694		0.0640		.0840		0.0314		.0381	

Finally, when comparing treatment and control communities, before and after situations, women’s engagement rates with community associations and rural labor unions point to differences that are statistically meaningful at the 1 percent level. Thus, our results suggest that participation in the project—and particularly in communities that have developed a water-supply system subproject—may have had a positive and significant impact in female rates of engagement with key representative local and class institutions. Regression analysis strongly supports these conclusions.

#### 7.6.4 THE STRENGTH OF COMMUNITY TIES

In addition, our baseline data show that women, and particularly those in control communities, held stronger ties than did men with their community peers. However, community ties were stronger in treatment communities and, particularly, among those that would develop production-related subprojects.

**Table 23: Index of Social Ties**

THE STRENGTH OF COMMUNITY TIES	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	82%	78%	80%	80%	81%	80%	0%	5%	2%
Water subprojects	79%	77%	78%	77%	81%	79%	0%	5%	3%
Production subprojects	86%	81%	84%	78%	83%	80%	-8%	1%	-4%
Control	77%	61%	70%	68%	77%	71%	-10%	42%	6%
Δ (treatment - control)	6%	17%	10%	12%	4%	9%	8%	-22%	-2%
t T-test	0.772	1.833	1.750	2.143	0.637	2.221	0.936	-2.163	-0.345

The main changes observed in the strength of community ties—a slight decline in women’s attachment to their communities that was more intense in the control than in the treatment groups and the increased attachment of men from the control group to their peers—cannot be related to participation in the project.

### 7.6.5 CIVIC ENGAGEMENT AND REPRESENTATION

Finally, baseline data also show that our male and female interviewees reported high and almost identical levels of civic engagement, having met municipal authorities to petition for local investments. Differences in the civic engagement index between sexes were not meaningful, but differences between treatment and control groups were significant at the 10 percent level. This high level of civic engagement has experienced an overall decline that has affected both men and women. However, it has been more intense in the control group than in the treatment communities.

**Table 24: Index of Civic Engagement**

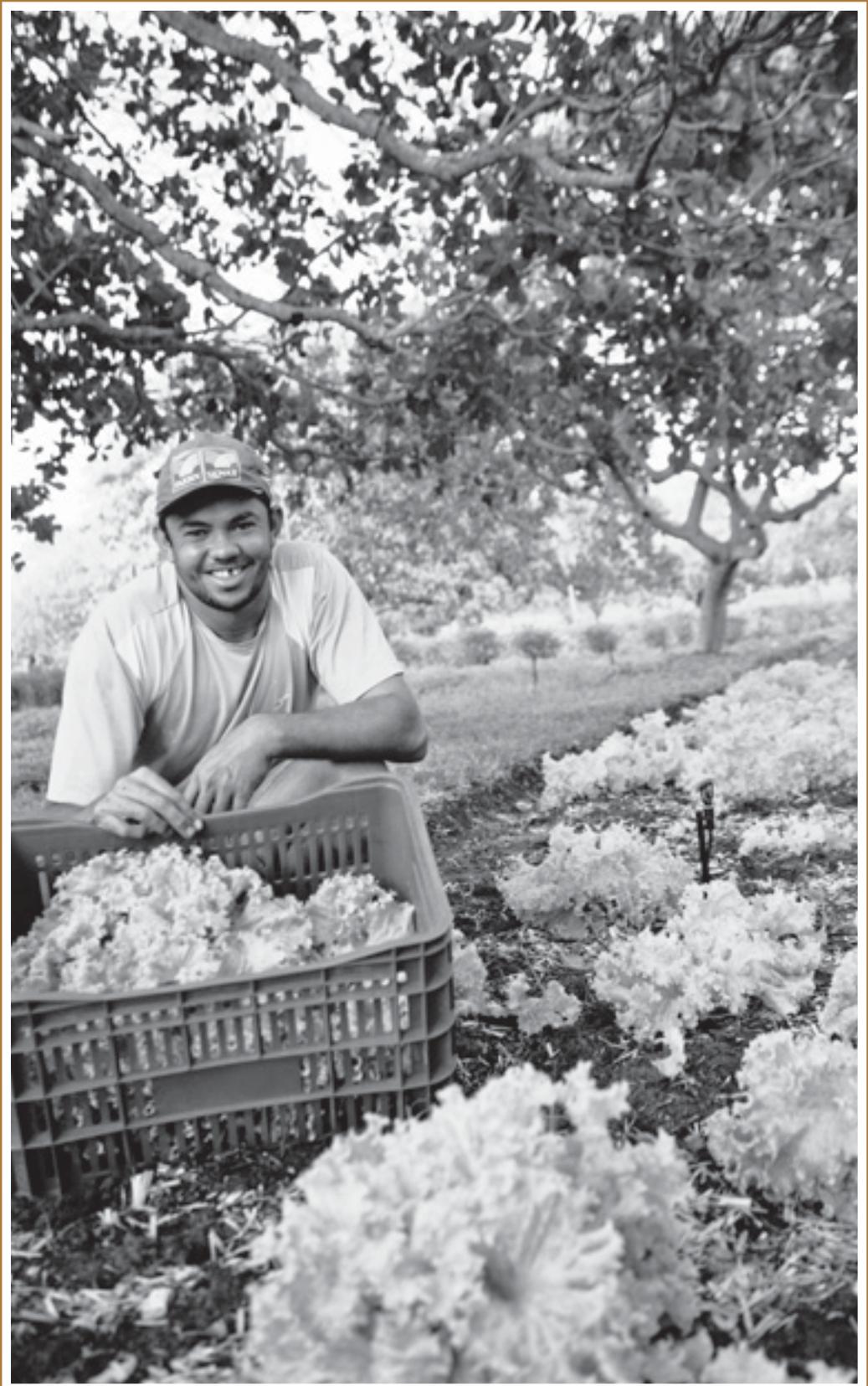
CIVIC ENGAGEMENT	T <sub>1</sub>			T <sub>2</sub>			Δ		
	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL	FEMALE	MALE	TOTAL
Treatment	72%	75%	74%	54%	48%	51%	-28%	-35%	-31%
Water subprojects	71%	75%	73%	52%	48%	50%	-27%	-32%	-30%
Production subprojects	74%	76%	75%	52%	48%	47%	-26%	-31%	-38%
Control	82%	87%	84%	31%	34%	32%	-63%	-60%	-62%
Δ (treatment - control)	-9%	-12%	-10%	23%	14%	19%	31%	26%	29%
t T-test	-1.152	-1.422	-1.790	2.514	1.639	3.012	2.421	2.230	3.263

The differences-in-differences methodology finds statistically meaningful differences at the 1 percent level between treatment and control groups (even when they are sorted by gender). These results suggest that participation in the project may have contributed to mitigating and reducing, at treatment communities, the effects of an overall and exogenous declining trend in civic engagement. Regression analysis strongly supports this conclusion.

**Table 25:** Effects on Civic Engagement

	1 <sup>ST</sup> MODEL		2 <sup>ND</sup> MODEL	
Treatment	3.16	**		
Treatment*Woman			285	**
Treatment*Man			264	**
Constant	0.44		-688	
Number of observ.	134		134	
F (k, n-1)	9.99		4.97	
Prob > F	0.020		0,0083	
R-squared	0.0746		0.0768	





## 8. CONCLUDING REMARKS



The analysis suggests that the RPRP had several short-term effects on the beneficiary communities. In the first place, there was a significant and relatively large increase in the agricultural income of families that benefitted from the productive projects. Although this study does not permit a definitive conclusion, it is important to note that the increase in agricultural income from the family's property one year after the project's implementation was 360 percent in treatment communities, while families that did not benefit from the project perceived an increase of only 130 percent in agricultural income.

Evidence collected and analyzed under the study strongly suggests that the investment in community water supply increases the free time of those involved with fetching water, particularly among women and young men, allowing them to carry out other activities, such as productive activities (including those financed by the project), within the home or off the property, which are likely to increase family well-being and income. Income effects are shown in section 7.3.

Measuring the indicator as a percentage of the daily workload, it is confirmed that treatment leads to (i) a significant difference (10 percent level) in terms of reducing the percentage allocation of the daily workload to fetching water and to a reduced allocation of women's percentage (significant at 10 percent level) more than men's; (ii) an increased percentage allocation of daily work to farming for the treatment group as a whole (at 5 percent level)

and in particular for women (at 5 percent level) but also for men (at 10 percent level); and (iii) a reduced percentage allocation of daily work to household activities for women (at 10 percent level).

Although the study used a relatively small number of observations, it was able to generate a relevant series of hypotheses—meriting additional specific studies—by breaking down the data by age group and gender. The results suggest the following main hypotheses, among others: (i) young bachelors spend a larger parcel of their time fetching water for the house, and when they benefit from water supply and productive investments their time spent in that task decreases more significantly than it does for women, and (ii) a larger parcel of young bachelors more involved with fetching water spends less time on this activity because of the investments in water supply and production.

In terms of the effect on income, the results indicate that women benefitted significantly by being able to devote less time to fetching water and housework, which gave them more time for agricultural activities in the family production, reflected in increased family agricultural income. An increase in women's income from paid work was also observed, likely resulting from more access to work off-farm, although the analysis did not show that women spent more time in off-farm work. Therefore, one question still to be answered is if the link between women's higher income from off-farm work and more free time is really significant. Since one would not expect that the availability of jobs off-farm is affected by RPRP projects, one probable explanation for the increase in women's off-farm income is the availability of more time to spend working outside the property.

Additionally, an important aspect to be analyzed in future studies is how educational level affects the benefits from freed time, as well as the effects on freed time itself. It is expected that people with higher educational levels could benefit more from more free time, by being able to engage in off-farm work that demands better education. It is unlikely that education can affect the benefits from work in the family's property or in agricultural work off-farm, given that in most cases these activities involve little technology; it is much more probable that it affects work in the nonagricultural sector. Income from agricultural work is exactly what increased due to RPRP projects, as we observed in the current study.

The increase in women's income from work off-farm seems to indicate that there have been changes in women's time allocation to paid work, showing that they were more actively engaged in the labor market. Men also benefitted and increased the time spent on their own agricultural production, but apparently did not spend more time or earn more from paid work. On average, families benefitting from the RPRP nearly doubled their total family income, and the results indicate that 30 percent of this increase was due to the increase in paid work by the women. The increase in the women's individual participation in family income can help explain the positive gender perspective effects in the beneficiary communities.

Future studies can explore in more detail the contribution of women to the observed increased income from agricultural work at the family's property. The current study allowed us to measure the increase in time women allocate to this type of work, but it

would be also important to try to measure how much of this increased effort contributed to actual income increase.

The results of the study are significant in both economic and sociocultural dimensions. In the economic aspect they confirm the hypothesis that a reduction in the time women spend on housework can open up concrete possibilities for women's entry in the labor market, and therefore for increased family income. It is possible that this effect is stronger or even only significant when investment in water projects is combined with productive projects. Although the sample was too small—especially for communities receiving water only projects—it would appear that combining water and productive investments is a more powerful instrument for increasing women's engagement in market and income gain than simply providing a water supply. Still, this can be a lesson for future operations, depending on further studies.

With respect to social and cultural dimensions, the results of the research show that participation in the project may have (i) the impact of increasing women's awareness about power imbalances in intrahousehold decision making; (ii) a positive and significant impact in female rates of engagement with key representative local and class institutions; (iii) a positive impact on women's social networks, which grew in size, became stronger and less gender biased, expanded to other localities, and have been more intensively used than before; and, finally, (iv) contributed to mitigating and reducing, at treatment communities, the effects of an overall and exogenous declining trend in civic engagement.

In the sociocultural aspect we should also note two intrinsic implications of the results, considering their potential importance for the implementation of new gender mainstreaming actions in the region. In the first place, the significant participation of young men in fetching water and their greater participation in housework reveals a characteristic of a patriarchal society in which asymmetric power sharing rules are refined from one generation to another, subordinating both women and children to paternal authority and giving young bachelors tasks traditionally seen as "women's work." The logical consequences of this traditional system are (i) both women and young bachelors have more time poverty than the patriarchs and (ii) actions aimed at reducing time poverty—such as investments in water supply systems that reduce the time needed for housework—interfere with traditional gender and generational asymmetries.

In the second place, and contrary to expectations, the study data appear to show that, with respect to certain cultural norms, women are the bulwarks of the status quo by being less open than men to changes with respect to the education of children, especially daughters, and acceptance of male participation in housework.

This aspect is particularly important when the woman is seen as a source of human capital who is willing to change to fight against inequity and poverty. For these and other reasons it is expected that her increased access to resources, entry in the labor market, and active participation within the family will make it possible to achieve one of the principal Millennium Development Goals: to increase education rates and expand opportunities for education, especially for girls, because "greater investment in girls' education is vital for increasing female participation and productivity in the labor market, especially in nonagricultural wage

employment. Greater productivity means higher economic growth and more effective reduction of poverty” (Tembon and Fort 2008).

The study’s findings therefore suggest that it is necessary and desirable to undertake new and broader research that can help us understand the situation more fully, including the implications for achieving the desired poverty reduction results of actions to improve gender equity.

The results also suggest that a further study should be developed to better understand the role young men play in household activities and the collection of water, and the ways in which they use their free time. Furthermore, it is important to understand why, when the time devoted to household activities decreases, young women and men do not spend more time studying. This may be a result of the short period elapsed since the projects were implemented. Further studies of longer periods of impact would be needed to identify other medium- to long-term effects.

One important aspect of the study that could be further explored in future studies is the difference in impacts derived from water and productive projects, or the combination of both. It was not possible to explore in detail this aspect in the current study, given that the actual subsample sizes were too small for meaningful comparisons. However, important questions were raised, including the question about how much of the effect observed on women’s and household income can be attributed to freed time from water collection or to the availability of productive activities. We observed that income increased only in those communities that received productive projects, and not in those with water-only projects. But the question that was not answered is if women’s income would increase in productive-benefited communities, under similar conditions, if they had still to spend time collecting water. The same question applies to household income as a whole, since young men also probably could redirect their attention to productive activities when freed from water collection.

There are some indications on these questions in the analysis of total household income for the three treatment subsample groups. We observed that income increase in communities with both water and productive projects was double the increase in income in communities that were benefited only with productive projects. Since at baseline these two groups were very similar in income and assets value, it is more likely that the difference in evolution over time is due to the combination of treatment projects.

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