AN ASSESSMENT OF THE SOCIO-ECONOMIC IMPACT OF WATER ACCESS FOR ROMA AND OTHER MARGINALIZED GROUPS IN RURAL SERBIA

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ABSTRACT

This paper uses survey data aiming to assess the socio-economic impacts of providing water supply access to selected group of low-income communities in rural Serbia. Employing a mixed-methods approach, we have collected quantitative and qualitative data from beneficiaries of the water supply program to evaluate changes in quality of life, hygiene, nutrition, and new opportunities arising from reduced time spent on water collection. Results indicate that 94.6% of participants reported improvements in their quality of life, with an average satisfaction score of 8.8. Key benefits included enhanced hygiene and increased time for education and income-generating activities, though non-returnees exhibited higher satisfaction levels compared to returnees, highlighting persistent challenges for the latter group. The paper concludes that integrated strategies are essential to address both water access and broader socio-economic challenges. Recommendations for policymakers include the development of targeted interventions to improve infrastructure and support initiatives that facilitate employment and education.

Introduction

Recognizing the critical role of clean water securing health and well-being, access to water is a universal human right enshrined in the UN Sustainable Development Agenda which provides "universal access to safe drinking water and sanitation by 2030" as its Sustainable Development Goal (UN, 2016). Domestically available running water and

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sewage-system access are a necessity to maintain public health as even low-income settlements relying on communal taps or standpipes to access potable water often face higher rates of water contamination and infection by communicable diseases (Enqvist et al., 2020). Moreover, while scarcity of access to clean, potable water may not only lead to negative health outcomes and worsen quality of life, it bears wider socio-economic impacts such as reduction of disposable income or deteriorating education outcomes as well that are often overlooked and inadequately considered when drafting policy and conducting research (Adom et al. 2023).

Insufficient access to water exacerbates existing inequalities, disproportionately affecting marginalized communities, which widens economic disparity (Israilova et al., 2023). Inadequate or no access to public water infrastructure necessitates time spent fetching and planning ahead to secure daily water needs creating a *Bastiat* conundrum of expending time and resources for daily necessities which creates lost-cost opportunities for the communities it affects. As the time spent on water and the inability to secure hygienic environments cause a higher expenditure of time and labor that might be dedicated to other areas of life (SIWI, 2005), impoverishment of basic daily necessities such as water may be a fundamental pillar undermining other efforts to help communities in other economic or socio-areas (Ranganathan, Balazs, 2015).

Water is not only essential for human consumption but is also a key resource for numerous economic sectors, including agriculture, energy production and tourism. The inextricable link between sustainable water management and economic development is well recognized: studies have shown a causal link between access to water and economic growth. For instance, low-income countries that have wider running-water access see a higher average GDP growth of 3.7%, while countries with power access experience an average growth of only 0.1% (SIWI, 2005). Inadequate water supply may also hamper local or domestic food production, with inadequate supply being a correlating factor to food scarcity (Mancosu et al., 2015). Unfortunately, communities might actively compete with industry and agriculture for water access and use. Wescoat et al. (2007) have corroborated the link between poverty and water access in the US, particularly for low-income households located in suburban or remote rural areas.

Throughout Europe, access to safe drinking water and sanitation services is fundamental to securing the health of a community. Unfortunately, marginalized communities still have inadequate access to clean water and sewage systems. In short, water, sanitation, and electricity, whose absence has a cascading effect on daily life, are the three components essential to quality housing. Therefore, ensuring "the availability and sustainable management of water and sanitation for all", as well as the "access to affordable, reliable, sustainable and modern energy for all" are goals 6 and 7 of the UN's Sustainable Development Agenda (UN, 2016). Clean and plentiful water, effective sanitation, domestic and personal hygiene, and urban design are all necessary for a healthy population (Brown et al, 2023). However, 'fringe' urban communities fall at the mercy of local municipal governments and administration to provide necessary services, creating a continuing cycle of marginalization.

Significant variations in time spent fetching water may greatly affect individual professional development which may then further negatively affect economic potential. Evidence highly suggests that investing in water management and services is able to significantly boost economic growth in developing countries. By reducing associated water-borne illness and the time necessary to fetch water, time may be reinvested into other activities, especially for education among youth. Countering the ill-effects to such diseases also contributes to improved cognitive abilities, underpinning further downstream effects of increased education abilities and economic performance (Michaelowa, 2000).

Limited access to infrastructure increases the burden of uncompensated work, which disproportionately affects women and limits their availability for childcare and educational activities. Research dealing with the supplying of households with their daily water needs particularly underscores the significant impact of unpaid work carried out by mothers in rural areas, which has a direct effect on the general well-being of their children. Children from households that are not forced to collect wood and water show significantly better educational performance, with girls and boys adversely affected in terms of their education (Chaudhuri, Desai, 2021). Therein lies the other core issue that, when not done by the mother, fetching water may primarily fall on children. While the chore may be perceived as beneficial, providing physical activity or even financial remuneration, there are severe associated risks, including increased exposure to environmental hazards and physical strain. Given children's greater vulnerability and limited physical strength, as well as comparatively poorer judgment skills, relying on them to secure adequate water supplies for daily household needs raises serious concerns (Geere, Cortobius, 2017).

Furthermore, the issue of water supply also necessitates the expenditure of physical labor to transport water from public sources, involving carrying containers and storing them within one's home or domicile – the process of which may negatively affect water quality (Baguma et al., 2013). Therefore, the need to access water in public puts the elderly, orphans, the ill, the disabled or those facing social stigma at a disadvantage, making them especially vulnerable to household water insecurity (Wrisdale et al, 2017).

Among all marginalized communities in Europe, the Roma are the most impacted by poor water and sewage access. While they are still more likely to have poorer access to healthcare, education and ready employment, their primary lack water and sanitation access persists despite a range of initiatives undertaken to correct such disparities (Parekh, Rose, 2011). Exacerbating circumstances are the informal settlements in which the majority of Roma in Europe may live (Rosa, 2019; Chaudhuri, 2017; Filčák et al., 2018). As Roma settlements are generally located peripherally to major urban centers and frequently separated from main road access, there placement contributes to higher costs and logistical challenges in securing basic utilities. Living in *de facto* segregated communities isolated majority population, the majority of such settlements are close to industrial zones, waste disposal sites or agricultural cooperatives, which polluted the open water they use which is further cross-contaminated by the presence of

human and animal feces in rainy seasons and spreads waterborne diseases (typhus and diphtheria, among others) (Filcak et al., 2018). Indeed, the higher incidence of these diseases within the Roma community as whole reflects their poor access to water and sewage (Chaudhuri, 2017; Parekh and Rose, 2011). A further hindrance is that Roma communities are characterized by their distinct lack of physical infrastructure, socially in terms of housing, thereby making them difficult to hook up to existing sewage and waterlines (Filcak et al., 2018).

The issue facing access by the Roma community to safe and clean water as well as sanitation is not for a lack of political will. The EU and its Member States have acknowledged the dire need to improve daily living conditions among the Roma population living within their borders. Although it did not fully achieve its goals, the "Decade of Roma Inclusion" (2005) was initially declared in response to improving discrepancies in welfare, housing and exclusion (Brüggemann, Friedman, 2017). In 2011, the European Commission established the EU Framework for National Roma Integration Strategies, urging effective inclusion policies by 2020, public utilities and urban regeneration (European Commission, 2019). Furthermore, the "Roma Integration 2020" initiative aimed to address gaps in housing and utility access, particularly for EU accession candidates (Regional Cooperation Council, 2016). The 2018 proposal for the Drinking Water Directive further emphasized improving water access for all marginalized groups, including Roma (European Commission, 2018).

Despite these many efforts, numerous Roma households face nearly insurmountable barriers to accessing water and sanitation services. Reports indicate that access to safe and clean, domestically piped water is significantly lower among Roma with discrimination worsening such disparities (UNDP, 2018). To illustrate, only 14% of Roma communities in Slovakia are connected to public water access, while 49% are not connected to any public sewage system (Atlas of Roma Communities, 2019). Although the percentage of Roma households that are not connected to tap water has decreased from 30% in 2016 to 22% in 2021, the discrepancy between this access is till 15 times higher compared to the EU population in general (1.5%) (FRA, 2022).

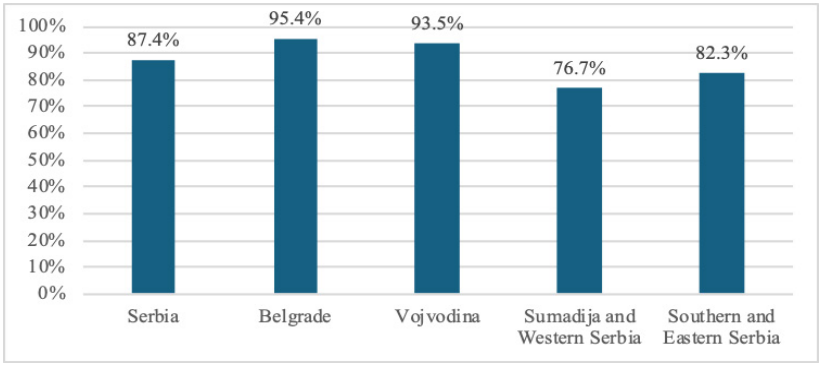
In addition to the Roma population, there is another vulnerable population group, namely returnees, who face major challenges when returning to their home country, especially if they are forced to return. According to many studies, irregular returnees have difficulties integrating socially and culturally compared to non-migrants or other returnees (Beauchemin et al., 2022; Anda, 2017). While the return of irregular migrants has been one of the critical elements of EU immigration policy since the early 2000s, it has been on the political agenda in Serbia since the start of negotiations with the EU on visa liberalization for Serbian citizens in 2007. As stated by GIZ (2022), the majority of returnee's face problems such as low education levels and school dropout, high unemployment and poor quality of employment, low income and poor housing conditions, while almost half of them live with more than two problems such as lack of space, humidity, a leaky roof or lack of daylight.

From a methodological and analytical standpoint, beyond the concern of a lack of comprehensive studies on water and sewage access is also a standing issue within the literature (Ezbakhe et. al. ,2019). Insufficient comprehensive statistics and standardized definitions of "vulnerability" create a challenging environment in which to assess water. Disparate contexts necessitate nuanced evaluation, as not all marginalized groups face the same systemic issues (Lerisse et al., 2003).

Context and Background: Water Access in Serbia and Other Countries

Although the majority of individual households in Serbia have access to public water and sewage, there is still a significant proportion not connected. According to the latest available official data, 12.6% of Serbia's more than 2.5 million households are not connected to the water supply (SORS, 2024); even for those connected, many located in the underdeveloped rural areas do not have continuous and reliable access to clean water (Figure 1). Compared to the region of Vojvodina where almost all households are connected to running water, almost one in four households in Sumadija and Western Serbia, and almost one in five in Eastern and Southern parts of the country are not connected. Migration into the public system is marred in these areas by the rapidly aging local population and persistent poverty (Bobic et al., 2016). Households not connected to public water must fetch their own water through wells or other uncertain access points which takes up considerable time, energy and resources that could be applied to other more pressing issues.

Figure 1. Share of households in Serbia with access to public water infrastructure in 2023



Source: Authors' calculations

Despite the many existing evaluations of the infrastructure projects in Serbia that address effectiveness, they largely do not examine the marginal effects on the socio-economic background of their participants. In response, this study tries to address this gap by analyzing the socio-economic impact of water supply and access to not only the Roma but other marginalized groups throughout Serbia as based on the self-reports of beneficiaries whose objective was to improve general access to water infrastructure.

According to the SDG Report (2022), the proportion of the world's population using

safely managed drinking water systems increased from 70% in 2015 to 74% in 2020. However, around 2 billion people still did not have access to these basic services that year, including 1.2 billion people who did not even receive a basic service. It is particularly notable that eight out of ten people without access to basic drinking water services live in rural areas, with around half of this population living in the least developed countries.

Some high-income countries also face this problem. In France, where over 99% of the population is reported to have piped water at home, 77% of informal Roma settlements have no access to drinking water (Brown et al, 2023). Three interlinked trends are critical to understanding why safe and effective water and sanitation services remain inaccessible for many people in high-income countries. First, systemic racism drives persistent inequality in societies, limiting access to resources and perpetuating social exclusion and poverty. Second, changes in infrastructure funding models have led to a reduction in subsidies that could otherwise be made available to those in need. Thirdly, inequalities persist because the availability and quality of services are often linked to housing and property ownership.

Access to piped water has improved significantly for the Roma population over time. While the proportion of Roma households without piped water has decreased from 30% in 2016 to 22% in 2021, this figure is still more than 15 times higher than that of the general EU population, which is only 1.5%. The highest rates of Roma without piped water are in Romania (40%) and Slovakia (28%). In Romania, a significant proportion of the general population (21%) is also affected by the lack of tap water, narrowing the gap between Roma and non-Roma. As with other housing indicators, there are no significant differences by gender or age. However, Roma children under the age of 15 are more likely to live in households without tap water than their older counterparts. Furthermore, Roma with severe health limitations in daily activities are disproportionately affected: 28% have no access to tap water compared to 18% of those without such limitations in Romania. This inequality is particularly marked in North Macedonia and Romania compared to other countries (FRA, 2022).

Bearing this in mind, this paper aims to identify current state with regards to water access of the marginalized households facing insufficiencies in water supply to arrive at an outcome applicable to real-world application in delivering better water access to marginalized communities. Additionally, by assessing the effectiveness of the provided water access support, the research aimed at detecting the most significant benefits of the reduced time that was spent for fetching the water as well as the indirect impacts that water access might have on the labor and education outcomes.

Following the introductory part and the current section which provided a statistical overview of the water access in Serbia and other countries and analysis of the research context, the third section summarizes the methodological approach taken, the data collection methods and the characteristics of the sample. The results obtained are presented in the fourth section, along with a discussion of the results in comparison to

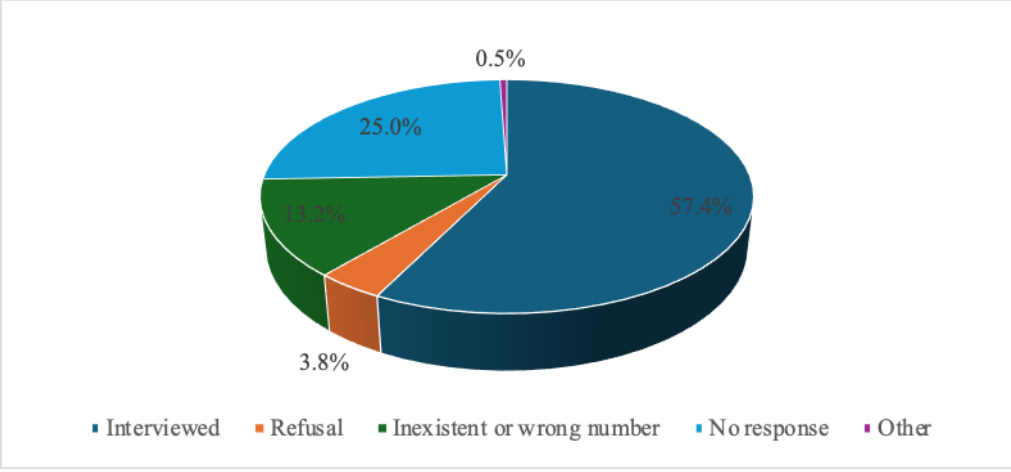
similar such projects. The final section provides recommendations for policy makers applicable to designingsimilar projects in the future.

Data and Methodology

This research is based on a program designed to provide access to water supply to selected low-income individuals to address basic socio-economic challenges exacerbated by the COVID-19 pandemic. The sampling frame included the entire population of beneficiaries participating in the program. Data collection took place in two waves: The first wave covered participants who took part from the start of the program in 2018 until June 2021, while the second wave included those who took part from 2018 until the end of 2022. The sample was analyzed according to key characteristics such as group affiliation, gender and returnee status. In total, 316 out of 551 participants were interviewed, representing 57.4% of the total sample (*Figure 2*).

Of the total 316 interviews conducted, 47.8% are women, 73.6% belong to Roma population, and 14.2% stated that they are returnees, meaning that they returned to Serbia after spending at least three months abroad. They are all considered low-income population, while a considerable part of the interviewees had difficulties in meeting basic needs (e.g. lack of bathroom or toilet).

Figure 2. Survey response rate in %



Source: Authors' calculations

**Total number of contacted persons (n) = 551*

Table 1. Socio-economic characteristics of participants

Female	**47.8%**
Returnee	14.2%
Number females in household	2.9
Number males in household	3.2
Number of children in household	1.6
Roma	73.7%
Internally displaced person	2.2%
Has well	44.9%
Brings water from others	32.0%
Bath or toilet in house	53.2%

Source: Authors' calculations

**Total sample (n) = 316 participants*

*** One member per participating household was interviewed. As all 1,976 household members are considered to have benefited from the measure, we set the number of beneficiaries to be equal to the number of household members in households receiving the measure.*

A phone survey was conducted to gather information on participants' satisfaction, experiences and other attitudes related to program implementation. Participants were asked a series of questions about their experiences with the program. The questionnaire referred to the household level, the data was weighted according to the number of household members and the analysis was conducted at the individual level.

The questionnaire consisted of 11 questions. The first section contained questions assessing household access to water prior to the implementation of the program. In order to assess the differences in outcomes between participants with different migration histories (returnees vs. non-returnees) and to consider the gender perspective, this section included questions asking participants to indicate their migration history and gender. In the second section, participants were asked to provide information on their general socioeconomic situation and to express their opinion on the improvement of their socioeconomic situation as a result of participating in the program. The third section contained questions about their overall satisfaction with participation in the program. The main research questions are as follows:

- How has access to water improved household living conditions and habits (e.g., hygiene, nutrition, washing clothes, etc.)?
- What is the perception of the interviewees with regard to socio-economic improvement of the household that could be attributed to the specific intervention and general satisfaction with the programme?
- What are the remaining challenges in water access, and how are they distributed across different demographic groups (e.g., returnees)?

Results and discussion

The main objective of the research is to assess whether the socio-economic situation of participants has improved as a result of the program. For the purposes of this analysis, an improvement in socio-economic status is defined as a respondent providing a score of 2 or higher on a scale of 1 to 10. As shown in the *Table 2* below, the program has been positively assessed by the vast majority of interviewed participants. Around 94.6% of participants indicated that program has contributed to improvement of the household's socioeconomic situation. The average rating of the program is 8.8, whereas minor differences between returnees and non-returnees could be identified. Non-returnees had slightly better perception of the program effectiveness if compared to returnees since 96.5% of them considered the program has positively affected their socio-economic situation in comparison with 82% of the returnees.

Table 2. Improvement of socio-economic situation as a result of the program in % and reported score (1 to 10 ratings)

	Total	**Returnee**	**Non-returnee**	**Diff.**
Improved socio-economic situation % (N=296)	94.6	82.0	96.5	*
Improved socio-economic situation (N=296)	8.8	8.3	8.9	***

Source: Authors' calculations

Before gaining access to water through the program, 44.4% of participants relied on wells, 27.2% obtained water from the public supply, 12.3% obtained water from neighbors, friends, or family, and 16.7% had access to a spring (*Table 3*). Responsibility for fetching water was relatively evenly split between male and female non-returnees. Among returnees, however, it was predominantly men who took responsibility for fetching water. In addition, 30.3% of participants already had access to water, meaning that no one in their household was responsible for fetching water.

Access to water brought numerous benefits for the participants. The quality of life of the program participants improved considerably, especially in the areas of hygiene and nutrition. The economic impact of the program was reflected in lower costs and more time for leisure, childcare or work. Specifically, 91.0% of respondents reported improved hygiene through access to water, 86.3% found it easier to wash their clothes, 87.5% reported better water quality and 87.0% noted that access to water improved their diet. In addition, 53.6% of participants were able to reduce their costs, while 54.2% reported having more time on their hands. Of those who had more time, 49.9% used it for leisure, 39.0% for childcare, 44.3% for work and 6.7% used the extra time to look for work.

However, there are still significant problems with the quality of the water supply. Despite the benefits of the program, 28.4% of households continue to have problems with access to water. Of those who reported problems, 72.9% reported low water

pressure, 41.8% reported cloudy water and 19.6% were at times without water supply. Participants also pointed out other major infrastructure problems: 74.8% had no sewage system, 42.8% had not yet legalized their houses, 34.6% had problems with electricity supply and 7.0% lacked facilities for people with disabilities. Despite these problems, 85.3% of households were satisfied with the program overall.

Table 3. Impact of the program: Overall and by returnee status

	Total	**Returnee**	**Non-returnee**	**Diff.**
	N=316	N=45	N=271	
Before				
Access water before*				
Brought from public water supply	27.2%	31.3%	26.5%	not.sign.
From neighbors/friends/family	12.3%	24.4%	10.2%	***
Own well	44.4%	33.6%	46.3%	*
Spring	16.7%	0.0%	19.5%	***
Other	6.7%	7.0%	6.7%	not.sign.
Who was responsible for water access?*	100.0%	100.0%	100.0%	
Males (father/son)	22.6%	49.1%	18.3%	***
Females (mother/daughter)	12.5%	8.8%	13.1%	not.sign.
Children	3.1%	22.7%	0.0%	***
Relatives	1.4%	0.0%	1.6%	not.sign.
Everyone	18.9%	28.1%	17.4%	not.sign.
No one	30.3%	5.3%	34.3%	***
After				
Better hygiene	91.0%	90.0%	91.1%	not.sign.
More time available	54.2%	77.9%	51.3%	***
Lower costs	53.6%	60.3%	52.8%	not.sign.
Better quality water	87.5%	63.5%	90.5%	***
Better nutrition	87.0%	84.8%	87.3%	not.sign.
Easier to wash cloths	86.3%	70.2%	88.3%	***
More time available for...*				
More time for children	39.0%	93.6%	28.8%	***

	Total	Returnee	Non-returnee	Diff.
More time for job search	6.7%	0.0%	7.9%	not.sign.
More time for work	44.3%	38.2%	45.4%	not.sign.
More time for leisure	49.9%	100.0%	40.5%	***
Any problem water access	28.4%	24.0%	29.2%	not.sign.
What problem with water*				
There are periods without water	19.6%	0.0%	22.5%	not.sign.
Low pressure	72.9%	70.6%	73.3%	not.sign.
Cloudy water	41.8%	63.3%	38.7%	not.sign.
Other infrastructural problems*				
No sewage	74.8%	59.2%	77.6%	**
Problems with electricity	34.6%	29.2%	35.6%	***
Legalization of object	42.8%	72.7%	37.5%	not.sign.
Access for persons with disabilities	7.0%	27.7%	3.2%	***
Satisfied with program: score	9.6	9.1	9.6	*
Would participate again				not.sign.
Yes	85.3%	87.8%	84.9%	
No	4.7%	12.2%	3.4%	
I don't know	10.0%	0.0%	11.7%	

Source: Authors' calculations

*A p-value lower than 0.1 implies that the difference between two groups is statistically significant at 10%. * significant at 1%, ** significant at 5%, *** significant at 10%.*

Overall, there seem to be some differences between returnees and non-returnees. Before the program, returnees were more likely to get their water from neighbors, friends or family. They were less likely to have their own well or access to a spring. Among returnees, men and children were responsible for fetching water, while among non-returnees this task was shared between adult men and women. Access to water brought greater benefits to returnees compared to non-returnees in the form of more time for children and more time to look for work. Compared to non-returnees, returnees were less likely to say that they still needed support to legalize their property and access to sanitation. Returnees were more likely to state that they needed access for people with disabilities. Overall, non-returnees reported benefiting more from the program than returnees.

Conclusion

While reliable access to safe drinking water and sanitation services remains a crucial concern for marginalized populations across Europe, it is a particular issue facing Roma communities that must deal with difficulties related to both the quality and affordability of water. Although numerous initiatives have been implemented to enhance living conditions among the Roma, significant disparities continue to exist, with Roma residing in improvised settlements that often illustrate socio-spatial marginalization.

By providing empirical evidence on the socio-economic impacts of water supply endeavors in low-income communities in Serbia, particularly in the context of crises such as the COVID-19 pandemic, this paper underscores the importance of addressing both immediate needs and long-term infrastructural challenges to enhance overall life quality.

Our research highlights several key findings of the impact of the water supply program on low-income households. With an average satisfaction score of 8.8, an overwhelming 94.6% of participants reported improvements in their daily socio-economic life. As direct benefits of participating in the program, the majority of the beneficiaries reported improved hygiene, better nutrition and that it was easier to do laundry. Notably, while both returnees and non-returnees benefited from enhanced water access, non-returnees expressed higher overall satisfaction, observing the program to be more effective. Nevertheless, there are ongoing challenges that remain prevalent to water quality issues and infrastructural deficits among returnees that had relied more on neighbors for water access prior to the program.

The research also established there to be a range of diverse benefits stemming from the reduced time spent on fetching water, which contributes to both improved education and labor-market outcomes. When provided with water access adult household members were also provided with more available time to spend with their children. Simultaneously, the children were able to dedicate this time to committing to their education. Prior to the intervention, the role of children in fetching water was quite prominent to the extent that children were exclusively in charge of delivering water in 3.1% of the households, observed and they jointly participated in fetching water along with other household members in 18.9%. After the program, 39% of the beneficiaries interviewed reported spending more time with children as the most important benefit of the program. This finding is noteworthy as the time children spend with their parents is considered to be a leading factor in a child's general wellbeing and mental health. Accordingly, at-home school assignments often require parental supervision which water access provides by free both parent and child from the onerous task. Additionally, better access to water may also lead to an increase in school enrollment rates among poor rural communities experiencing low enrollment.

The increased time available to spend on income-generating activities contributes to the availability of resources and therefore represents an important determinant of the family's wellbeing which may potentially help reduce overall poverty. In this regard, more than 53% of the participants interviewed reported to have lower costs due to their

water access. The results also indicate that 44.3% of the beneficiaries reported more time for other activities, with 6.7% indicating that they have more time to actively seek paid employment. Given this exact result, it would be prudent to consider integrating employment and skills development initiatives alongside infrastructural support measures to maximize impact.

Despite these overall positive impacts, other critical infrastructural challenges faced by the marginalized population in their daily lives were noted in the course of this research, the most pressing of which include: inadequate access to sewage systems; limited access or supply of electricity; and the inability to ensure adequate living conditions for the disabled.

Future research should explore the longitudinal impacts of the water supply program to assess long-term sustainability and changes in socio-economic conditions over time. In addition, investigating the exact barriers faced by returnees compared to non-returnees may cast light on more effective support mechanisms. It is necessary to investigate the broader infrastructural issues that contribute to water quality challenges, which integrate multi-sectorial approaches to address housing, sanitation and economic opportunities in conjunction with water access.

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Conflict of interests

The authors declare no conflict of interest.

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