

Title: Community water supply improvement and wellbeing: a pre-post photovoice intervention study in Kenya

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1. Introduction

The Sustainable Development Goals (SDGs) baseline assessment of global access to water shows impressive performance between the year 2000 and 2015 (UNICEF/WHO, 2017). During this period, over 1 billion individuals gained access to piped water supplies, and 400 million gained access to other non-piped but improved sources such as boreholes, protected wells and springs, and packaged water (UNICEF/WHO, 2017). However, over 844 million people still remain without basic access to drinking water services. This category is comprised of those who either spend greater than 30 minutes making a round trip for water collection (often several times a day) or use surface water sources and/or unprotected wells and springs (UNICEF/WHO, 2017). In addition to the absolute number of people who lack basic access globally, geographic and social inequalities in access between and within regions are glaring. For example, though developed industrialized countries have very high coverage, inequities in access in countries like Canada and the US disproportionately affect Indigenous communities, rural communities, and economically distressed populations (Eichelberger, 2017; Bradford, 2016; Jepson and Vandewalle, 2016). In countries with low access coverage, disparities in access often affect ethnic minorities, the poorest households, and women (UNICEF/WHO, 2017).

For many populations disproportionately affected, the lack of access to safe water manifests in adverse health and social outcomes (Benova et al. 2014). For example, evidence has shown that the use of unsafe drinking water sources is a significant contributor to diarrheal diseases (Grundy et al., 2014) and poor psychosocial wellbeing (Stevenson et al, 2012; Bisung and Elliott, 2017). Research has also shown that when water facilities are far from home, the wellbeing of households is compromised in many ways. For example, school attendance is often affected, particularly for girls (Blanton et al, 2010; Migele et al, 2007) and quarrels among neighbours

over scarce water can easily arise (Subbaraman et al, 2015). In addition, engagement in economic and community activities can be affected, particularly for women, due to time spent collecting water (Author, 2015; Crow and Odaba, 2010).

In recent years, a number of longitudinal quantitative studies have demonstrated strong relationships between improved community water supply and wellbeing of households and communities. For example, Stevenson and colleagues used two rounds of surveys in northern Ethiopia to explore households' sensitivity to water insecurity and psychosocial stress following an intervention to improve supply and protect water sources from contamination (Stevenson et al, 2016). They found that household water insecurity was a predictor of psychological distress ($p < 0.01$) independent of household food insecurity, harvest quality, and socio-economic status. Bisung and Elliott (2018) also found a significant relationship between improved community household water supply and reduction in water expenditure in Usoma, Kenya following extension of municipal piped water to the community. In Morocco, Devoto et al, (2012) found that having piped connection on premises, following an intervention, led to important time savings. The authors also found evidence of reduced tensions and conflicts over water among households with piped connections. Prior to the intervention, competition for water at public or shared private taps and allocation of household water collection tasks caused tensions both between and within households (Devoto et al, 2012).

Though these quantitative studies generate important evidence, they do not demonstrate *how* population wellbeing actually improve. For example, the study by Bisung and Elliott (2018) found a significant relationship between piped water outside premises and reduced water collection time. However, because the study used quantitative analysis, we do not know the underlying mechanism between the two variables. Neither do we know *how* the reduction in

collection time translates into improved wellbeing of beneficiaries. To address these challenges, this paper uses pre-post photovoice data to examine changing perceptions around the links between access to safe water and wellbeing. The study captured women's water access trajectories and lived experiences before and after a community water supply intervention. Using a qualitative pre-post design, we were able to better reveal and provide evidence on the complex relationships between changing experiences of water insecurity, particularly after the intervention, and individual and population wellbeing. The two waves of photovoice data also provided unique opportunities to better monitor people's interactions with water overtime. The study design builds on other cross-sectional studies that have used photovoice to investigate the water-health nexus (Scorgie et al, 2016; Virgi and Mitchell, 2011; Davies et al, 2013; Badowski et al, 2011)

2. Methods

The lived realities of women were explored using two rounds of photovoice data, in August 2013 and July 2016, approximately 2.5 years post intervention.

2.1 Setting

This photovoice intervention project was conducted in Usoma, Kenya as part of a larger research program focused on community mobilisation, capacity building, and evidence informed decision making for water interventions. The study area is located on the shore of Lake Victoria in the Kisumu Municipality, Western Kenya, and has approximately 500 households. Prior to the intervention described below, access to a safely managed water source (defined as an improved drinking water source that is on the premises, available when needed, and free of faecal and

priority chemical contamination) was non-existent in the community. Other improved sources (i.e. protected wells and a borehole) that existed mostly served only a small fraction of the community and typically dried up during the dry season.

2.1 Participant Recruitment and Characteristics

Eight women participated in the two rounds of photovoice data collection. In Phase 1, the women were purposively recruited through a snowball sampling technique. The research team was interested in the views women who were actively engaged in community activities, particularly activities related to organizing meetings or volunteering in communal activities. Women who agreed to participate after receiving verbal project information were asked to attend a scheduled group meeting where the project objectives were discussed.

Table 1 Participants characteristics

Participant's pseudonym	Age (years)	Education	Occupation (Phase I)	Length of stay in the community (years)
Zaaria	31	High school	Unemployed	8
Anita	36	Standard eight	Fish seller	15
Shemima*	25	Standard eight	House wife	8
Mary	52	Standard seven	Seamstress	26
Betty	57	High school	Fish seller and a community health volunteer	33
Dorcas	37	Standard eight	Unemployed	9
Wintima	46	Standard eight	Businesswoman	15
Diana	42	None	Housewife	27

**Replaced participant.*

2.2 Data Collection - Phase I Photovoice

Phase I data collection was preceded by training in basic photography and ethics. After the training exercise, each participant was given a disposable camera (each camera had 28 exposures) for eight days to take photographs. The photographs focused on what each participant felt best represented *attitudes and practices around water and sanitation that influence health in the community*. These photographs were printed and returned to participants. Participant were then asked to select four photos that best represented their views for use in subsequent face-to-face individual interviews. Interviews were conducted in DhoLuo and Swahili with the help of a translator (the two primary local languages), and the interviews sought to elicit information on: “what the photo was and where it was taken”; “why the photo was important to understanding water–health linkages”; and “how the photo related to health and wellbeing in the community” (Bisung et al. 2015: 2010). Signed informed consent was obtained during recruitment and after the photography training session. Details of the recruitment, data collection procedure, rationale for using photovoice, and some findings from Phase I are reported in Bisung et al. (2015).

2.3 Water Supply Intervention

Following Phase I photovoice project, a water supply intervention was implemented in the last quarter of 2013. This was led by a local NGO in collaboration with a community water and sanitation committee. The lead author participated in some of the initial water committee meetings but did not participate in delivery of the intervention. The intervention involved the extension of municipal piped water to a community water and sanitation facility. A committee elected by community residents manages the facility. This paper focuses on improved household access to water because the sanitation component of the intervention was limited to the community facility (i.e. no individual household connections). All households had access to

water from the facility at a fee of three Kenyan Shillings (the equivalent of about USD 0.030) per 20-liters of water. The intervention also made provision for any interested household to make secondary piped water connection from the community facility to their individual premises at their own cost. Households who made these connections pay monthly water bills to the municipal water company. About 20% of households made such connections (Bisung and Elliott, 2018). In addition, households with piped water on premises were allowed to resell the water to their neighbours, usually at about the same fee as the community facility. Despite the intervention, 8% of households continued to access the Lake for drinking water (Bisung and Elliott, 2018).

2.4 Data Collection - Phase II

The Phase II photovoice activity used similar data collection procedures to Phase I. Phase I participants were contacted individually and informed about the research team's intention to conduct a follow-up photovoice project and all initial participants agreed to participate. A participant who had relocated from the community was replaced with a new person with a similar demographic profile (i.e. age, level of education, marital status, occupation, length of stay in the community). During Phase II, participants were asked to photograph what they felt best represented *the links between water, health, and wellbeing in the community*. Reference was not made to the Phase I photovoice project though some participants remembered the photos they took. Another photography and ethics training session was conducted during phase II. Participant characteristics are shown in Table 1.

2.5 Ethics and Consent

Separate ethical reviews were obtained for Phase I and II from the University of University of Waterloo. This was very important since participants were not informed about, and did not consent to, a follow-up study during Phase I. In both Phase I and II, signed informed consent was obtained before the training workshop. Consent was also obtained to use participants' photographs in publications, presentations, and for teaching purposes.

2.6 Data analysis

Interview data in both phases was recorded with the permission of each participant and transcribed verbatim. Phase I data were imported into NVivo 10 and analysed based on major themes identified by participants in each photograph. To enhance rigour, preliminary results were presented to participants and the entire community in May 2014 for feedback. The detailed data analysis procedure is reported elsewhere (Bisung et al. 2015). Phase II data were manually analysed following a similar data analysis procedure to Phase I. Photos were first matched with the interview transcripts, and then coded based on the main theme identified by participants. The interviews were then coded line by line using results and sub-themes identified in Phase I as a coding frame. Subthemes also emerged deductively based on participants' views. All subthemes were then grouped based on conceptual similarity. Photographs, themes and subthemes were continuously reviewed to ensure that photographs and concepts grouped under a theme were related to the same phenomenon. To facilitate reporting, overarching themes were developed for similar sub-themes that emerged in both phases. For example, "exposure to water related diseases and disease burden" and "reduced exposure to water-related diseases", which emerged

in Phase I and Phase II respectively, were grouped under one overarching theme: disease exposure and burden.

3. Results

The results are presented based on the overarching themes (Table 2). For each overarching theme, we first briefly report perceived impacts of inadequate access on health and wellbeing prior to the intervention. This is followed by an exploration of experiences around improved community water supply and wellbeing, post-intervention.

Table 2: Major themes identified in Phase I and Phase II

Overarching Themes	Phase	# of photos
Disease exposure and burden	Phase I	20
	Phase II	18
Water collection burden	Phase I	12
	Phase II	14
Household water expenditure	Phase I	6
	Phase II	17
Education	Phase I	3
	Phase II	8
Time spent on water collection	Phase I	3
	Phase II	18
*Direct employment	Phase I	0
	Phase II	15
*Inequalities	Phase I	0
	Phase II	16

* Not identified as major themes in Phase I

3.1 Disease exposure and burden

The links between lack of access to safe water and high prevalence of infectious diseases are well recognized in the literature (Yang et al, 2012; Strunz et al, 2014; Halvorson et al, 2011).

During Phase I, participants emphasized how incidence and prevalence of diseases such as

diarrhea, schistosomiasis and malaria were linked to water and sanitation challenges in the community. Every participant captured these longstanding health challenges in their photos:

If it rains, the rain water carries all the human waste from open defecation into either stagnant ponds or into the lake. People come in contact with this waste when they go to fetch water and are exposed to infections (Anita – Phase I).

After the water intervention, participants reported significant reductions in the prevalence and incidence of water related infections, attributed primarily to reduced exposure to surface water sources:

It is obvious that diseases like bilharzia and diarrhea have reduced even within my household because we hardly go to the lake to fetch water these days (Dorcas- Phase II).

Mary emphasized that access to water that is free from faecal contamination was very important for disease prevention:

There are so many advantages of having clean water within homes. Initially, our drinking water was really dirty. Some could even contain human waste because of open defecation. But as you know, the tap water is very clean and free from dirt. This reduces diseases that are related to water (Mary –Phase II)

Improved hygiene practices, which were linked to water availability, also had an influence on disease transmission. Practices commonly captured were hand washing and cleaning of toilets. Participants linked these practices to improved health and wellbeing:

First, with clean water, the hygiene standard has improved. Because there is water, people wash their hands after visiting the toilet, which has reduced disease transmission. Even children are now allowed to use the toilets because even if they make the toilet dirty, there is water to clean it (Wintima – Phase II)

Similarly, Zaria believed that an increase in the number of households with toilets “*is related to the availability of water because toilets are now easy to clean and maintain...even the nurses have been telling us to construct more toilets because water must go with sanitation if we are to eliminate diseases*” (Zulfa-Phase II).

Thus, access to piped water was considered a facilitator of improved hygiene and sanitation, both very important for breaking the faecal-oral transmission route of water-borne diseases.

3.2 Water collection burden

The negative impacts of lack of access to safe water on health and wellbeing of children and women were emphasised at baseline. These impacts included disproportionate disease burden, calories expended on water carrying, and injuries sustained through water collection (Bisung et al. 2015). Zaria had this to say about a photo that captured a girl carrying water from the Lake:

The workload in the house is sometimes too much for mothers. This includes collecting water for the household. So children are required to help look after their younger siblings or fetch water (Betty- Phase I).

Participants were also concerned about the amount of energy expended on carrying water:

We use a lot of energy to fetch and transport water. Our children too sometimes get exhausted from fetching water (Zulfa-Phase I).

...previously you had to walk long distance to fetch 20 litres, carry on your head and walk back. So you get tired even after going one trip (Diana – Phase II).

After the intervention, participants believed that the water collection burden had reduced drastically. When asked to compare pre and post intervention periods, Zulfa argued that the two periods were incomparable:

there is less burden because the tap is here, and this is the house [pointing to distance between a tap and a house in a photo]. So if you compare it to what we used to go through before the availability of clean water in the village, it is much easier. The two periods are just not comparable at all if you know what we went through! (Zulfa-Phase II).

Reduced burden of other household activities mostly done by women and girls, including washing, cooking, and bathing younger children, were also highlighted. Particularly for women with babies, these activities were made easier with the introduction of piped water. For example, Dorcas noted that

the water is always readily available, which makes the work of mothers, especially mother with infants, very easy. You can bath them and wash their clothes without any hassle (Dorcas-Phase II)

Also, the availability of water has made children's work in the village very easy because they do not have to run to the lake for water before they come back to cook. Now people have water very close to their houses so it has really made the work of every child and mother very easy (Mary-Phase II)

3.3 Time spent on water collection

Improved access had a positive impact on time use among households. Distance to water collection points reduced significantly, and queuing for water no longer existed even among households without piped water on the premises. At baseline, Mary lamented that if they wanted to access the nearest tap water, they had to “*forgo all other productive activities*” (Mary –Phase I). These predicaments were recounted during discussions in phase II as Diana illustrates: “*we used to spend a lot of time looking for clean and safe water*” (Phase II). Though the water intervention led to different levels of access within the community, considerable time savings were reported across the board. Diana noted that “*you can just walk a short distance and get water*” (Diana-Phase II). For others, improved access gave them extra time to do housework, take care of children and “*relax a bit*”:

So with the inception of piped water, people are at least using their time efficiently and more productively. People get some free time to do housework. They can also now relax a bit. All these can influence their health, making at least people look healthy (Anita – Phase II).

In addition, people were able to do multiple activities within a day without having to worry about water collections:

Once you save time, there are so many things like attending community meetings. If you have another business or if you have a personal issue to attend to, you will have ample time to do that without having to worry a lot about where you are going to get water (Shemima- Phase II).

I grow vegetables. That is where I spend most of my extra time, in my farm growing vegetables (Diana – Phase II).

3.4 Water expenditure

Similar to time savings, participants mentioned that the amount of water expenditure reduced for many households, post-intervention. Prior to the intervention, some households accessed water through vendors at a relatively higher cost. This had a negative impact on other household basic needs:

Sometimes you have money for buying cooking flour but end up using it for buying water, and then you may end up lacking food (Mary – Phase I).

After the intervention, things changed for Mary because she now has piped water on premises.

When asked about her household monthly water bill, she said:

we pay around 500KHS for the whole month [approximately \$5.00 USD] even when we allow others to use it. So you can see it is really cheaper and convenient compared to buying from vendors (Mary-Phase –II)

Savings from reduced water expenditure were sometimes redirected to household needs such as buying “*vegetables and food*” (Mary –Phase II), supporting “*grandchildren in school like paying schools levies*” (Betty-Phase II) and “*buying soap and detergents*” (Dorcas-Phase-II). To some participants, reduced water expenditure meant that they could now join “merry-go-round” (women savings cooperatives):

So the money most of us save, we form groups and merry-go-round [cooperatives] to save there. We can then borrow from those groups and use the money to do anything we want in our homes (Anita – Phase II).

For others, budgeting household expenses is less stressful when water is available:

For most women there is less struggle on how to budget our small incomes because at least we are making some saving on water purchases (Diana –Phase II).

3.5 Education

Access to safe drinking water is closely linked to education in many ways. Water borne and water related diseases can keep children away from school, and sometimes affect their cognitive development, particularly in areas where nutrition and sanitation are poor (Bowen et al, 2012; Ngunjiri et al, 2014). Mary had this to say about a photo of school children:

Initially, they [school children] used to drink water from wells and boreholes which weren't clean. This caused stomach problems making them not to be in schools, sometimes for a whole week. So the water helps to improve children's education by making them stay in school (Mary-Phase II).

The lack of access to water also has serious repercussions for the quality of teaching and learning as one woman recounted:

You know...when you are thirsty you cannot concentrate in class. But when there is water, as a teacher or student, you just drink as much as you want and concentrate on your studies (Mary-Phase II).

Before the intervention, it was quite common for children to arrive in school late because of time spent searching for water:

Most children go to school late because they spend the early hours of the morning collecting water. Because they need to bath before going to school. When they return from school, they spend time collecting water instead of doing their school work (Shemima- Phase I).

Kids used to go to school late because they have to look for water to bath or even for the household use before going to school. But now water fetching cannot contribute to lateness (Anita-Phase II).

3.6 Employment and household income

Before the water intervention in Usoma, much of the economic impacts highlighted were related to opportunity costs related to time spent collecting water, with participants arguing that water collection time could be used for other productive activities like gardening and fishing. Hardly did participants mention direct links between improved water supply and income generation activities, a theme that emerged post-intervention. For example, the sale of water by households

with piped connection to their neighbours was the most tangible income-generating activity related to water:

There are people who sell water directly to other people. For example, if I have water in my yard and my neighbours do not, they will buy from me. I will get some money to pay for my water bill and whatever remains is just profit for me. Secondly, there are also people who do not even have taps in their yard but they buy, carry on their bicycles and resell to people who maybe are indisposed or are too busy to go collect water (Dorcas-Phase II)

Improved access to water also resulted in financial benefits for those engaged in home-based businesses, such as food vendors:

Even people who sell food or tea now get good water at a reduced price. Their profits will definitely increase. Imagine buying one jerricans at 3KS instead of 20KS? That is already savings of 17 KS (Betty-Phase II).

For other participants, the real financial benefits came from animal rearing:

When animals take clean water, they look healthy and don't get sick frequently. So when you sell them you make more money (Dorcas-Phase II).

We also get clean water to give our animals. You know many people keep chicken, goats, sheep and cattle in this village. So rearing these animals is becoming less hectic (Anita-Phase II)

3.7 Inequalities: an unintended consequence

Inequalities in service levels meant that not everyone achieved the maximum health benefits of improved access to water and sanitation. For example, some households without piped connection could not afford to buy adequate quantities of water:

There are still some very poor families within the community who are not able to buy and use tap water for all their activities. They can buy tap water for drinking only, but the remaining household activities, they just go to get water from the lake because it is free. I don't know what can be done, but it will actually be good if everyone uses piped water for all their activities so that we all enjoy the health benefits equally (Diana –Phase II).

The participants were also concerned about disparities in water collection time. Since piped connections were not evenly distributed in the community, some households spent more time in accessing water than others.

Bringing tap water to Usoma has really changed the lives of people but there is a small challenge in the sense that not every home or household has managed to bring tap water to their yards because of poverty. This increases the time taken to fetch water for those without taps in their yards (Mary-Phase II).

According to Dorcas, some households were disadvantaged from the very beginning because the community facility and initial pipe lines were far from their premises:

In Usoma we are divided into four quadrants, area A, B, C, and D. This area (area C) still has challenges with water collection because we are a bit far from the initial water lines so it costs more money [to make piped connection], which we don't have. (Dorcas- Phase II)

4. Discussion

This paper examines links between access to water and population wellbeing using two rounds of photovoice data. A number of themes were identified that represent the major pathways through which (un)safe water influences health and wellbeing. At baseline, participants generally felt that the lack of access to water negatively impacted their wellbeing through exposure to diseases, increased water collection burden, negative effects on school attendance, and excessive water expenditure and water collection time. Post intervention, improved access had a positive impact on these issues. A complementary quantitative study in the same community showed similar impacts of the intervention. For example, average water collection time reduced by 30 minutes per trip, including queuing time (Bisung and Elliott, 2018). Similarly, household direct water expenditures reduced by 30KS on average (approximately 30 cents USD). Aside from this case study, quantitative evaluation of interventions in Morocco and Argentina also report similar association between improved access and time use and water expenditure (Galiani, 2007; Devoto et al, 2012).

In both phases of the project, exposure to water related disease was the dominant theme captured; every participant took a photo to illustrate the links between water and infectious diseases. This was not surprising since the community had a high burden of water related diseases. For example, a previous study found schistosomiasis in about 73.2% of adults (Won et al, 2014). High incidence of schistosomiasis is primarily driven by lack of adequate sanitation and frequent contacts with contaminated lake water. Diarrhoeal diseases and other water-related diseases such as malaria and soil-transmitted helminths were also endemic in Usoma. Further, Table 2 provides an indication of how benefits were prioritized among participants based on the

number of photos discussed per theme. Time savings was the second dominant theme after disease exposure while education had the least number of photos.

While common themes emerged in both phases, direct links between water and income generating activities emerged only post-intervention. Income generating activities ranged from direct resale of water to the use of water for small scale household business and agriculture. For example, as water became available, people engaged in gardening and animal rearing to supplement household food stocks and incomes. These activities can improve both nutritional status and income levels of households as reported in rural China (Fan et al, 2013). Already, several studies have underscored the need for further research to fully understand relationships between improved water supply and other dimensions of poverty – including food security (Stevenson et al, 2016; Workman and Ureksoy, 2017). Findings from this study present a first step toward demonstrating these relationships using qualitative data.

The study also revealed geographical and social inequalities in levels of access. Connection cost differed among households based on distance to the facility and primary water line. Households located farther away from the facility had to pay more if they wanted to have piped water on their premises. This resulted in geographical inequalities in terms of number of household connections in the various quadrants of Usoma. In addition, it was generally believed that relatively low-income households were less likely to make secondary connection to their houses. Quantitative analysis using data from the community suggests that households in the poorest quintile experienced higher levels of water insecurity, compared to those in the richest third to fifth quintiles (Bisung and Elliott, 2018). Thus, geography and wealth can intersect or operate

independently to create differences in levels of access. While it is acknowledged that the intervention resulted in general improvement in access for the entire community, these differences and inequalities are likely to manifest in inequalities in health and other social outcomes (e.g. diarrhoeal outcomes, time spent collecting water). Practitioners therefore need to pay attention to patterns and distribution of outcomes from water interventions and other urban services in order not to reinforce existing social and geographical inequalities (Gooding, 2016).

4.1 Implications for research and policy

This paper underscores the need for researchers to employ innovative methods when evaluating environment and health relationships, with a particular emphasis here on water and sanitation interventions. Commonly used quantitative studies may accurately reveal relationships between water interventions and different health outcomes but fail to reveal how people's ways of living mediate those relationships. In addition, research that fails to give voice and agency to users may not reveal how users perceive and react to intervention outcomes. For example, time and money savings were converted into social capital through participation in women savings cooperatives. These groups can foster sense of belonging, provide social support, and facilitate reciprocal relationships among members (Bisung et al. 2015). A key contribution of this research is the ability to reveal these social nuances.

More broadly, this research demonstrates the fundamental role of water in promoting population wellbeing. Education, women's empowerment, and effective time use are important dimensions and means of promoting wellbeing in many contexts. While these dimensions were important throughout this study, policy makers and practitioners within the water sector often regard them as "indirect or ancillary" benefits. We argue that these dimensions should be central when

measuring the impacts of water interventions or advocating for safe water supply. Further, mainstreaming universal access to water in policy circles should include clear articulation of all economic, social and environmental outcomes related to improved access at the household and community levels.

This paper represents a unique contribution to the growing literature on photovoice in health and social science research. The pre-post design provides new ways of exploring how changes in a phenomenon occur over time (Murray et al, 2012). There were other unique benefits of photovoice worth acknowledging. First, the photos served as prompts as well as tools for critical reflection. Second, the process of photo taking and discussion of community concerns enhanced awareness creation around water-health linkages (Bisung et al. 2015). Third, the photo assignment gave participants time to identify and reflect upon their water priorities before the individual interviews. There are however some methodological limitations worth acknowledging. For example, we recognize that the findings are not generalizable to the entire community since the study involved a small number of purposively sampled women. However, we believe the findings may be transferable to similar ecological and social contexts. Further, future studies could complement subjective experiences with objective indicators such as diarrheal episodes, school attendance, time use, and water expenditure. A complementary quantitative study with these indicators using data from the same community has been published by Bisung and Elliott (2018). We also acknowledge that interview translation could affect representation of some constructs and realities. Efforts were made to understand key local terms and related to water, and initial findings from phase I were shared with participants for member-checking.

5. Conclusion

The findings reported here support calls for progressive universal access to water in all contexts. In many contexts, improved access is a critical step in ensuring productive use of time, combating diarrhoeal diseases, promoting hygiene, improving school attendance and contact hours, and empowering women. Rigorous monitoring and evaluation studies that consider these issues are likely to (re)energise local stakeholders and policy makers in the water sector. In addition, attention to inequalities during and after implementation of interventions is critical for ensuring that no one or household is left behind.

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SUPPLEMENTARY DATA

Examples of pictures selected by participants for the interviews.

Water for animal rearing – Phase II



Lake water – Phase I



Proximity to water source and reduced water collection burden – Phase II



Water collection burden on women and children – Phase I



Reduced burden of other household activities - Phase II



Water related diseases – Phase I

