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Research Paper OA**‘There is water available and so our hearts are at peace’: exploring the impact of access to safe water on women’s subjective well-being in Ghana**Prosperous Ahiabli ^{a,*}, Peter Adatara^b and Ruth Cross^a^a School of Health, Leeds Beckett University, Leeds, UK^b School of Nursing and Midwifery, University of Health and Allied Sciences, Ho, Ghana

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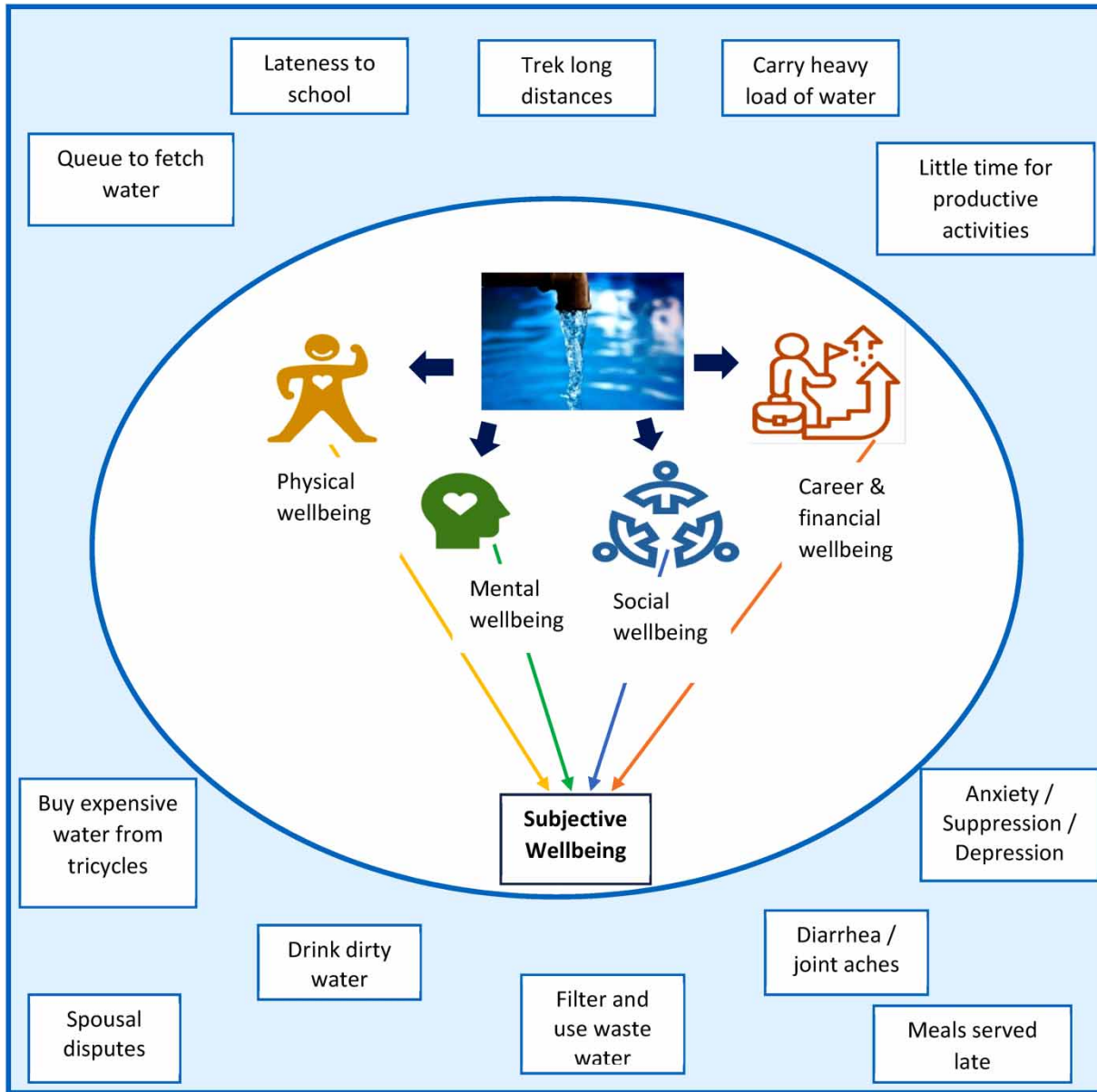
 PA, 0000-0002-0350-6571**ABSTRACT**

Women from Kordorwukope and Gbegbevia had to travel about 2 km to access safe water, until 2018 when International Needs Ghana, a Non-Governmental Organisation, extended piped water to each of the two communities. Since the extension of water to the communities, no study had been carried out to ascertain the effects of access to safe water on the well-being of women living in those communities. This study therefore aimed at exploring the effects of physical access to safe water on the well-being of women living in the Gbegbevia and Kordorwukope Communities. A qualitative research design was used. The study population included seven women who had lived in the study communities for at least 2 years before the water project was implemented. Five key themes were apparent in the data: challenges women encountered before gaining access to safe water; physical well-being; mental well-being; social well-being; and career and financial well-being. The results of this study show that the extension of piped water to the study communities brought about significant improvement in physical, mental, social, career, and financial well-being of women in the study communities.


Key words: gender inequality, Ghana, rural communities, safe water, women’s well-being**HIGHLIGHTS**


- By using a qualitative design, this article explores and gives a rich description of women’s lived experiences in accessing safe water.
- This article explores the impact of access to clean water on multiple dimensions of women’s subjective well-being.
- The article projects water as an important social determinant of health, which contributes meaningfully to holistic health as defined by the World Health Organisation.

GRAPHICAL ABSTRACT



LEGEND

 Area with water access

 Area without water

INTRODUCTION

Access to safe drinking water is a human right (UN 2016). Denying people this human right is equal to depriving them of their well-being, because access to safe water is a contributor to the well-being of populations (UN 2018). According to Western &

Tomaszewski (2016) well-being is the capacity of people to live healthy, creative, and fulfilling lives. The well-being of an individual can be determined objectively or subjectively. Subjectively, it can be assessed by how good people feel about life and is said to be high when people consistently experience positive emotions such as happiness and experience negative emotions less frequently. Objective indicators of well-being include health, education, access to basic facilities, and social connections, among others (Diener *et al.* 1997; Veenhoven 2008). Rath & Harter (2010) classify subjective well-being as follows: physical, social, career, financial, and community well-being. Physical well-being is living a healthy life and having strength to accomplish day-to-day tasks; social well-being is having good relationships with others; career well-being deals with how people spend their time or how much they like what they do each day; financial wellbeing is about people's ability to control their economic lives; and community well-being is how much sense of engagement people have with their neighborhood (Rath & Harter 2010). WHO (1948) conceptualized health as a state of complete physical, mental, and social well-being of a person. Hence, by exploring these dimensions of well-being, the researcher essentially explores the effects of access to safe water on women's holistic health. Well-being is regarded as an important development index for societies (Voukelatou *et al.* 2020). One clear indication that access to clean water is pivotal to human well-being is the consistent inclusion of the subject matter in the global development agenda (UN 2021). Under the millennium development goals, increasing access to safe water and sanitation is featured as a target (target 7c). However, under the sustainable development goals (SDGs), increasing access to safe water and sanitation is given more prominence, as it is featured as a goal (SDG 6) with eight targets (UN 2021).

The WHO and UNICEF Joint Monitoring Programme (JMP) report that in 2022, about 2.2 billion people across the globe did not have access to safely managed water. The JMP estimates that globally, 703 million people lack access to basic water services and 408 million out of these people live in Sub-Saharan Africa. It also mentions that 73 million people in Sub-Saharan Africa use surface water (WHO/UNICEF 2023a). Only 44% of Ghana's population have access to safely managed water and 4% of the population still use surface water (WHO/UNICEF 2023b). Approximately 62% of Ghanaian urban dwellers have access to safely managed water services. This is more than double the proportion of Ghanaian rural dwellers who have access to safely managed water services – 18.84% (WHO/UNICEF 2023b). In the Volta Region of Ghana, 64% of rural dwellers were reported to have access to safe water (CWSA 2019). However, the Ketu-South Municipality of the Volta Region, where this study took place, recorded just 37% of its rural dwellers having access to safe water, which was the lowest coverage in the Volta Region. This indicates that in Ghana, the distribution of the populations with access to safe water is characterized by inequalities. The problem of inequalities in access to safe water is a global public health problem. The geographical location, wealth status, and gender of people among other factors determine how easily they access water or how much they suffer the consequences of not having access to safe water (World Bank Group 2017).

Just like in most parts of the world, women in Ghana suffer disproportionately from the consequences of not having physical access to safe water within their communities (Jeil *et al.* 2020). This is because women typically have socially prescribed roles of fetching water and performing tasks like washing and cooking that require water usage (UNICEF 2016). This sometimes requires trekking long distances and spending a considerable proportion of their productive hours searching for water for the home (Mushavi *et al.* 2020). UNICEF (2016) estimated that collectively women and girls spent over 200 million hours daily in performing water-fetching tasks, globally. This impacts the school performance of girls and the livelihood of women, leading to limited options to earn income to better cater for their dependents (Jansz & Wilbur 2013). It also contributes to women spending little time with their families (Nauges & Strand 2013). The trips to fetch water are arduous, as they involve carrying heavy containers over the long distances travelled (UN Women 2021). Many women without physical access to safe water complain frequently of pains in the neck and knees, compared to their counterparts with physical access to water (Joy & Paranjape 2005). Lack of physical access to safe water makes the life of women more stressful and brings about their unhappiness. It leads to misunderstandings among women, their male partners, and children. The process of 'perceiving, coping with and adapting to risks posed by stressors', including limited access to safe water leads to frustration, fear, anxiety, embarrassments, worry, and other negative mental and emotional health states among women (Bisung & Elliott 2017, p. 4). Access to safe water makes it less stressful for women to attend to exclusive hygiene needs and those of their children. It helps women live more productive lives and feel safer from abuse and physical harm (Jansz & Wilbur 2013). These are important contributions that safe water makes towards enhancing women's well-being and provide ample justification for SDG 6.

A good number of studies have explored gender inequalities in access to safe water and connections to different dimensions of subjective well-being (Bisung & Elliott 2017; Mushavi *et al.* 2020). However, little has been published about this in Ghana, and very scanty information is available on Volta Region where the study was carried out. Further, the authors of this study

rarely found any single study that addressed the impact of water access on all the multiple dimensions of subjective well-being discussed. Kangmennaang & Elliott (2021) assert that there is no clear understanding of the impact of water access on holistic well-being. Knowledge of synergies that exist between water access and holistic well-being is essential for understanding the total impact of water access on well-being and for the development of better indicators for assessing outcomes of water projects (Kangmennaang & Elliott 2021). This study was inspired by these existing gaps.

The objectives of the study were as follows:

1. To explore and understand the experiences and challenges that women in Kordorwukope and Gbegbevia faced to access safe water before gaining physical access to safe water.
2. To assess the effects that the provision of safe water within the Kordorwukope and Gbegbevia communities is having on the well-being of women, from the perspective of women.

MATERIALS AND METHODS

Study design and setting

This was a qualitative study conducted in Kordorwukope and Gbegbevia, neighbouring communities located in the Ketu-South Municipal Assembly of the Volta Region of Ghana. This study sought to achieve a rich description of women's experiences in accessing safe water and the effects on their well-being and hence, the use of a qualitative approach, which supports the exploration of people's lived experiences, namely, phenomenology.

Purposive sampling was used to select study participants. The inclusion criteria used were as follows: women, at least 18 years of age, who had lived in the study communities at least 2 years prior to the extension of clean water to their communities, and continued to live there until the period of the study. Study participants had therefore experienced life in their communities both without and with physical access to safe water, long enough to contribute meaningfully to the study. Community leaders were contacted via phone, and subsequently, letters seeking their permission to conduct the study in their respective communities were sent with Protocol Consent Forms as attachments, through 'Whatsapp' mobile phone application. The Community leaders, after granting permission to carry out the study, recommended some women in the study communities who met the inclusion criteria. They engaged them on issues outlined in Protocol Consent Form and, with the permission of the women, forwarded their contacts to the researcher. The researcher further engaged the potential study participants to ensure that they met the selection criteria. To address the risk of selection bias from the community leaders, some questions were rephrased and asked to check for consistency in answers provided to questions by participants during interviews. Each study participant gave verbal consent to participate in the study and for interviews to be recorded, using a mobile phone call recording application. Refer to Table 1 for information on study participants.

Data collection

Semi-structured interviews were used to collate information from study participants because of the flexibility it affords and the fact that it allows the collation of rich data, a desirable outcome for this study (Kakilla 2021). The interviews were conducted through phone calls. This mode of data collection was to avoid exposing the researcher and study participants to the risk of contracting COVID-19, as recommended by the Ethical Committee that supervised the work.

Table 1 | Profile of study participant

| Code | Community | Age (years) | Occupation |
|------|--------------|-------------|------------------------|
| GR1 | Gbegbevia | 35 | Seamstress |
| GR2 | | 28 | Trader |
| GR3 | | 43 | Farmer |
| GR4 | | 20 | Gari processing/trader |
| KR1 | Kordorwukope | 47 | Farmer/trader |
| KR2 | | 57 | Farmer |
| KR3 | | 28 | Seamstress |

Interview questions under objective 1 included: ‘Can you share your daily activities as a woman prior to extension of water?’; ‘What did it feel like living in Kordorwukope/Gbegbevia as a woman prior to the extension of piped water to the community?’; ‘As a woman, what specific challenges did you encounter to access water for you and your family and how did you cope?’ Interview questions under objective 2 included: ‘How has your life and daily experiences changed since water was extended to this community in 2018?’; ‘Would you say you are a happier person (living a more satisfied life) than you were before water was extended to this community? What are the reasons for your answer?’.

Data analysis

Data collated from interviews were transcribed and analyzed using the thematic analysis approach. Specifically, Braun & Clarke’s (2006) thematic analysis approach was applied. The following processes were followed in analyzing the data: familiarizing with data, coding, grouping codes to form different themes, reviewing and defining themes, and producing write-up on findings.

Ethical approval

Ethical approval was obtained from the Leeds Beckett University (UK) Public Health Promotion Programme Research Ethics Committee with reference 87363 and the University of Health and Allied Sciences (Ghana) Research Ethics Committee with reference UHAS-REC A.12 [195] 20-21.

POSITIONALITY

The lead author of this article is a community development practitioner with International Needs Ghana, A Non-Governmental Organisation. He comes from Ghana and lives there. He has about a decade of experience in coordinating, monitoring, and evaluating development projects targeted at improving health and well-being of underserved communities. This includes water projects. Monitoring and evaluating the impact of projects on the well-being of communities is an important part of his work. He has a Masters in Public Health Promotion from the Leeds Beckett University and has special interest in studying social determinants of health. The second author is the dean of the School of Nursing and Midwifery at the University of Health and Allied Sciences, Ho, Ghana. He is a Ghanaian and resides in Ghana. Before joining academia, he worked in various capacities: as a nurse, nurse tutor, and clinical coordinator with the Ghana Ministry of Health. His research interests include but are not limited to noncommunicable diseases, maternal, and child health. The third author of this article is a Course Director in Health Promotion at Leeds Beckett University. Her research focuses on evaluating interventions designed to support disadvantaged women and other marginalized groups using qualitative participatory methods. She is British but has lived and worked in some African countries, including Ghana. The authors were conscious of their biases and ensured that they listened actively and represented the people’s lived experiences well in the study.

RESULTS

Five themes emerged from the analysis: the first was ‘challenges women encountered to access safe water’, which provided answers to the first objective of the study. The remaining four themes, physical well-being, social well-being, mental well-being, and career and financial well-being, addressed the second objective of this study. Each of these themes explored a different dimension of well-being and was deductively coded; they were informed by the World Health Organisation’s conceptualization of health and Rath Harter’s (2010) classifications of subjective well-being. Financial and career well-being dimensions of well-being were merged as one theme because they are close in meaning. No significant amount of data was collated on community well-being as the study was focused on women as primary managers of water, hence the exclusion of this theme from the write-up. Please refer to [Table 2](#) for codes and their meanings.

Theme 1: challenges women encountered to access safe water

This theme explores the experiences and challenges women in the study communities faced to access water before the extension of water to their respective communities and how they coped with water challenges.

The dawn of each day at Kordorwukope and Gbegbevia saw women trekking long distances in search of water.

‘We really suffered ... we woke up at 4am and went to other communities’ wells’ - (GR3)

Table 2 | Codebook

| SN | Codes | Description | Examples |
|----|--|--|--|
| 1 | Challenges women encountered to access to safe water | This code explores the experiences and challenges women in the study communities faced to access water before the extension of water to their respective communities and how they coped with water challenges. | 'The load was so heavy. Some of us went to fetch the water with our babies at our back. When our babies were falling off, and the load was heavy, we had no option than to allow the load of water fall from our heads'. |
| 2 | Physical well-being | This code explores how access to safe water contributes to women living healthy lives and having the strength for daily activities | 'Carrying water from the fetching point to our homes, we really felt the heavy weight of the water we were carrying ... we felt pains, neck pains'. |
| 3 | Mental well-being | This code explores how access to safe water helps women to cope with the stresses of life, realize their abilities, learn well, etc. | 'It was a difficult situation for us. It really suppressed us ...' '... it was a shame for us, because we didn't have water'. |
| 4 | Social well-being | This code explores the effects of access to safe water women's relationship with other people (neighbours, partners, children) around them – social well-being. | 'Where I came from, there was water, before I married from this community. So, when the water challenges persisted, I started saying to myself, 'If I knew about the water challenges I wouldn't have come and be going through all this suffering...' |
| 5 | Career and financial well-being | This code explores how access to safe water helps women spend their time on work, school, and other productive ventures and their ability to better control their economic lives. | 'To go that far to get water and get back home and still go to the farm was tough for me ... sometimes to amass strength to do other activities was tough.' |

The women from study communities were sometimes unable to access water at the closest water-fetching points. They were compelled to travel further.

'By the time we got there, the community members had already exhausted much of the water, we did not get enough ...' - (GR1)

Due to the distance, some women were unable to go more than one trip in the mornings to fetch water. Others managed to take two trips in the morning. Depending on household water needs, women fetched in the evenings too.

'I woke up around 4:30am. I took 2 trips to fetch water ...' (KR1)

'It was not possible to go 2 trips to fetch water in a day, I therefore had to manage the little I got till the next day...' (GR1)

'In the evening ... we attended to other house chores and then had to go back and fetch water. These impacted negatively on our studies.' (KR3)

The women spent considerable amounts of time in queues, to fetch water. One woman shared: *'Sometimes, it took us an hour because we had to queue...'* They had to get to water-fetching points early.

'Other people came from other communities to fetch water... so, if you got there late you did not get any water...'(GR2)

The women interviewed shared how tiring it was trekking to fetch water, mainly due to the heavy loads of water they had to carry.

'Sometimes in between the fetching point and our communities we made some stops, took the load off our heads and rested ...' (GR1)

Some women went to fetch water with babies tied to their backs with cloth and sometimes had to allow water to fall off their heads, just to save their babies from falling from their back.

'The load was so heavy. Some of us went to fetch the water with our babies at our back. When our babies were falling off, and the load was heavy, we had no option than to allow the load of water fall from our heads ...' (KR2)

During the rainy seasons, households harvested rainwater in pots. Also, rainwater was collected at low-lying areas within Kordorwukope and Gbegbevia, and women went there to fill their containers.

'Yes. However, rainwater collected in the depressions we used to fetch from ...' (KR1)

Respondents described how women sometimes managed to take their bath due to water access challenges.

'... we first of all bathed our children and when they had left for school, we filtered the waste-water and used it to bath and wash' (GR2)

Most respondents mentioned that water fetched from pipes was used mainly for drinking purposes, and the other sources of water such as wells were put to other domestic uses.

'We do not drink the water from the depression, we use it for other purposes like washing... We use the piped water for drinking ...' (KR1)

However, some respondents admitted drinking from other unsafe sources.

'The water we used to fetch was not clean, but we used to drink it...' (KR2)

Sometimes due to long queues women joined to fetch water, meals were delayed. Other times, there was no water to prepare meals. The women either borrowed water from neighbours, went out to buy food from food vendors if they could afford it, or watched their families go to bed hungry.

'Because of the water situation, sometimes we didn't prepare any food ...' (GR1)

Some women had to carry their dirty clothes to other communities with access to water to wash. Others fetched and stored water over a number of days towards their laundry needs.

'I will pick a motorcycle to a place with water access, wash, allow time for items to dry and pick another motor bike back and pay ...' (GR1)

'You couldn't just wake up and decide to wash ... there was the need to fetch water ahead of time ...' (GR3)

In 2015, a new way of transporting jugs of water using motor tricycles with carriage emerged.

'I completed school in 2015 ... at the time the use of tricycles to fetch water was emerging' (KR3)

The tricycles carried 30 jugs of water at a time, each costing one Ghana Cedi. Any person placing an order for their service had to make a bulk purchase of 30 jugs of water. Sometimes, households teamed up to share cost. Those who could not afford were excluded.

'... a tricycle load of 30 gallons of water costs GHc30.00' (GR4)

'Sometimes we asked from people in our communities ... so we shared the cost' (GR2)

Sometimes women were left with no money after paying for jugs of water.

'...we incurred a lot of costs and were left with no money at all ...' (GR2)

Again, sometimes the tricycles delayed in supplying water to households after they had placed orders.

'Those days after calling someone (tricycle riders) to fetch water for you, it took about 3 days ... now, irrespective of the time, we get to fetch water.' (KR3)

Tiredness was not an excuse to skip fetching water or other house chores.

'That you went to fetch water and are tired was no excuse for not carrying out your chores...' (GR3)

Theme 2: physical well-being of women

This theme explores the effects of access to safe water on the physical well-being of women in the study communities. According to Rath & Harter (2010), physical well-being has to do with living a healthy life and having strength to accomplish day-to-day tasks.

The women reported having frequent joint and body aches. But after gaining access to water, the women experience such pains less frequently.

'Carrying water from the fetching point to our homes, we really felt the heavy weight of the water we were carrying ... we felt pains, neck pains ...' (KR1)

'I no longer experience the neck and waist pains...' (GR1)

Respondents mentioned that standing in the rain to fetch water exposed them to foot rot. They also mentioned that the frequency of ill-health among their children had reduced after the extension of water.

'They sometimes got infected with diarrhea ... those activities put us at risk of diseases such as foot rot ...' (KR2)

'The frequency at which children fall sick has also reduced...' (KR2)

The women reported that access to water made it possible for their families to eat well now, as compared to previous times when families skipped meals and sometimes went to bed hungry.

'Food gets ready well in advance before he gets home ...' (GR1)

Women in the study communities are culturalized to manage their menstrual flows using pieces of cloth that have to be washed and reused. The water situation therefore made it difficult for women to wash their cloth timely and to bath more frequently during that period. They therefore resorted to filtering waste water (from bathing their children) for the purposes of bathing and washing pieces of cloth among others. Now they have enough water to cater for these needs.

'How we manage our period now is different from how we used to manage it... from our childhood we have been used to using cloth ... to bath to my satisfaction, was not an option. But now, we have enough to bath to our satisfaction.' (GR1)

Theme 3: career and financial well-being of women

This theme explores the effects of access to safe water on the career and financial well-being of women in study communities. According to Rath & Harter (2010), career well-being deals with how people spend their time or how much they like what they do each day. Financial well-being is about people's ability to control their economic lives.

According to respondents, the water situation before 2018 reduced the amount of time and strength women allocated to productive activities.

‘... by the time we returned from fetching water, time was far spent and we had little time for other household chores.’ (GR2)

‘To go that far to get water and get back home and still go to the farm was tough for me ... sometimes to amass strength to do other activities was tough.’ (KR1)

Some female respondents also recounted how they used to get to school late and sometimes absented themselves due to the long distances travelled to fetch water.

‘We had to trek to a far place to fetch water. Due to this we got to school late...’ (KR3)

‘I was a student, sometimes we missed school due to water challenges...’ (GR2)

With physical access to water, the women reported that they were able to get more work done daily than before 2018 and as a result make more profit.

‘... we spend more time on our work and as a result make more earnings than at first. The quantity of cassava we are able to harvest (for gari processing) from our farms in a day has doubled. We are therefore able to process more gari and earn more.’ (KR1)

‘... now, because I am able to go early to start processing gari, I make profit equivalent to about 10 bags of gari ... before, I made profit equivalent to 5 bags of gari’ (GR4)’

Students are also able to get to school early. Water-related absenteeism among children from the study communities has reduced.

‘I was a student and sometimes we missed school due to water challenges...’ (GR2)

One study participant recalled her experience as a school girl.

‘We had trek to a very far place to fetch water, come back home before preparing for school. Due to this we got to school late ... we weren’t getting enough time for our studies. These impacted negatively on our studies.’ (KR3)

According to two seamstresses interviewed, the provision of water has contributed to retaining old customers and attracting new customers due to their ability to meet deadlines.

‘... If you travel far in search of water and return late and are unable to meet deadlines for clients... they shall give subsequent contracts to other people...’ (KR3)

‘... Since the water came, my heart has been at rest. I am sure of getting water ... no matter the time, when I am done delivering for my customers timely...’ (GR1)’

Theme 4: mental well-being of women

This theme explores the effects of access to safe water on the mental well-being of women in study communities. Mental well-being helps people to ‘cope with the stresses of life, realise their abilities, learn well and work well, and contribute to their community’ (WHO 2022).

The dawn of every day saw women trekking miles to fetch water, and the nights saw women taken deep in thoughts about where they will get water the next day. Due to this, women were unable to sleep well. One respondent said: *‘Due to the water situation then, I could not sleep well at night’.*

Respondents also expressed other negative emotional states they consistently experienced such as depression, suppression, fear, shame, and anxiety.

'The water challenges made us unhappy...' (GR2)

'... It was a difficult situation for us. It really suppressed us...' (KR1)

'... you get anxious when you remember that there is no water...' (GR1)

'... it was a shame for us, because we didn't have water' (KR3)

Respondents also mentioned that the water situation stressed women.

'I had to wake up early and fetch water ... I had to come back home to cook and send to the farm. This stressed us ...' (KR2)

Some respondents mentioned that their self-esteem as women increased with the provision of safe water.

'... Our self-esteem is better than it was when there was no water here...' (GR1)

The women in the study communities expressed that they are now happier and more at peace. One respondent said: 'things are better now, so we are happier than we were...'

'... there is water available and so our hearts are at peace.' (GR2)

'We are happy because we no longer struggle ... That is our joy' (GR4)

The study respondents recounted how women in other communities made them feel inferior. They also expressed their sense of pride about the fact that they now have their own water.

'... fellow women around refused to help us carry our load of water. This made us question ourselves, 'aren't we also women?' But today, we also have our own water...' (KR3)

Theme 5: Social wellbeing of women

This theme explores the effects of access to safe water on the social well-being of women in study communities. Social well-being has to do with having good relationships with others (Rath & Harter 2010).

Study respondents mentioned that the water challenges led to spousal quarrels.

'I had to wake up early to fetch water ... After this, I had to come back home, cook and send food to the farm. This stressed us so much and sometimes led to quarrels with our spouses, because we got to the farm late...' (KR2)

Two of the women mentioned that they regretted moving to stay with their husbands in the Gbegbevia and Kordorwukope Communities.

'Where I came from, there was water, before I married from this community. So, when the water challenges persisted, I started saying to myself, 'If I knew about the water challenges I wouldn't have come and be going through all this suffering...'

Women were sometimes unable to have meaningful conversations with friends and family.'

'... even in the middle of conversations with family and friends, the thought of not having water makes my heart pound...' (GR1)

The water situation had an adverse impact on the relationship between women in apprenticeships and their supervisors at work.

'Because of the distance travelled to fetch water, I was unable to get to work on time. My madam always got angry at me...' (GR1)

Study respondents expressed that now, the spousal relationships have improved because of easy access to water.

'because of the water situation, sometimes we did not prepare food...this was a cause of quarrels...now, water related quarrels have reduced...' (GR1)

DISCUSSION OF RESULTS

The discussion of the results is organized according to the two objectives of this study.

An exploration of the experiences and challenges women encountered before gaining physical access to safe water within their communities

The findings show that women are the primary managers of water in homes and that they suffer disproportionately from the consequences of not having physical access to water as reported in other studies (Bisung & Elliott 2017; Jeil *et al.* 2020). The disproportional burden of water inequalities borne by women in the study communities is underpinned by deeply entrenched gender norms and roles (Scott-Samuel 2009). The low level of support men from study communities extend to women when it comes to fetching water may be traceable to the community's definition of masculinity – qualities and attributes the communities consider representative of men (Scott-Samuel 2009). For instance, Mushavi *et al.* (2020) recorded in Uganda that men, for fear of being regarded as women, did not involve themselves in water-fetching tasks (Mushavi *et al.* 2020). Mushavi *et al.* (2020), despite their acceptance that women bear a disproportionate burden of water-related challenges, assert that men also experience some impacts of lack of access to safe water, but indirectly as explained by the study undertaken in rural Uganda, which recorded a higher correlation between water insecurity and depression in men than in women. This, according to the authors, could be due to the failure of men to secure financial resources to solve the water challenges of their households.

Women adapted to these water-related challenges through a number of coping strategies. They contracted the services of commercial tricycles to fetch water for their homes. Another way the women coped was by leveraging their social capital to access safe water. They did this by sharing the cost of tricycle services with other households and borrowing jugs of water from neighbours. Previous studies indicate that women do well with leveraging social support to cope with stress (Kawachi & Berkman 2001). The study results also show that the high cost of tricycle services contributed to inequalities and exclusion of those who could not afford. This is consistent with the assertion that access to water in rural communities is often dependent on determinants that exclude some social groups based on economic, social, or ethnic characteristics, among other factors (Neves-Silva *et al.* 2020).

An assessment of the effects of access to safe water on the well-being of women living in study communities

The study results show that the extension of safe water has contributed to some mental well-being outcomes. Women in study communities are experiencing positive emotions such as peace, higher self-esteem, confidence, and especially happiness more frequently than before clean water was extended to their communities. This is a shift from frequent experiences of negative emotions such as low self-esteem, sadness, depression, fear, and shame women experienced more frequently before gaining access to safe water. The fact that they have physical access to water is a source of happiness. This agrees with the position of some authors that objective circumstances impact people's subjective evaluations of their happiness and satisfaction with life (Böhnke & Kohler 2010).

The findings also show that the provision of water is contributing to physical well-being. Specifically, a reduction in exposure to health conditions like foot rot, joint aches, and diarrheal diseases among other water-related diseases was reported by women in study communities. These are consistent with the findings of previous studies (Page 1996; Joy & Paranjape 2005; Otufale & Coster 2012). Other studies report health complications such as spine, muscle and lower back

damages, guinea worm, bilharzia, and typhoid fever among others (Page 1996; Otufale & Coster 2012), which were not part of the findings of this study.

With respect to social well-being, [Mushavi *et al.* \(2020\)](#) reports how the failure of women to fulfil their water-related social obligations in a timely manner led to spousal disputes. It also points to improvement in women's relationships with spouses and neighbours after the extension of potable water to their communities. The result of this study aligns with these earlier findings: it points to an improvement in relationships with spouses and neighbours. This study provides evidence of women who regretted marrying men from the study communities because of the water challenges they faced. [Mushavi *et al.* \(2020\)](#) also record women questioning themselves as to why they married men from the study communities. The results show how women from the study communities felt inferior while fetching water from other communities. This was because of how women in the water-fetching communities refused to extend to them kind gestures, such as helping them carry their containers of water. [Bisung & Elliott \(2017\)](#) recorded how the lack of water made women feel inferior. According to the findings of this study, now, women in study communities have a sense of pride because they have access to water within their communities ([Bisung & Elliott 2017](#)). With respect to career well-being, [Jansz & Wilbur \(2013\)](#) assert that physical access to water makes it possible for women to spend more time on productive activities such as leisure. Another study found that access to water makes it possible for girls to perform better in education and for women to spend more time in the labor market ([Ortiz-Correa *et al.* 2016](#)). The result of this study aligns well with these findings: now, girls get to school early, stay, and also make more time for their studies after school hours. Women also spend enough time working and making more profit.

The World Health Organization equates health to a state of physical, mental, and social well-being ([WHO 1948](#)). The results of this study show that physical access to safe water contributes to all these dimensions of well-being, thus holistic health. This buttresses the point that the health of society is determined by multiple factors as postulated by [Dahlgren & Whitehead \(1991\)](#). [Dahlgren & Whitehead \(1991\)](#) categorized the determinants of health into five groups: age, sex, and constitutional factors; individual lifestyle; social and community influences; living and working conditions; and socioeconomic, cultural, and environmental factors. Juxtaposing the results of this study to the [Dahlgren & Whitehead \(1991\)](#) health determinants model, a 'give-and-take' interaction between access to water and the various groups of health determinants in the model is evident. For instance, the findings of this study show that access to water has positive implications for some factors mentioned under 'living and working conditions' group of determinants from Dahlgren and Whitehead's model, such as education (access to water contributed to increased student-teacher contact hours in study communities); work environment (women got to work earlier, had more time for their work and customers after the extension of water). With respect to the 'social and community networks' layer, we see in this study how access to water is enhancing the quality of spousal relationships and making it possible for women to spend more time with their families.

Globally, women are the primary managers of water in most homes. Their socially prescribed responsibilities revolve around water usage. Access to safe water has significant implications for women's subjective well-being. There is therefore the need to prioritize and commit more resources towards increasing access to safely managed water, to promote the well-being of women and to contribute to gender equality.

LIMITATIONS OF THE STUDY

1. Having community leaders recommend study participants introduced the risk of selection bias into the study. This was countered by checking for consistency in answers provided by study participants during interviews.
2. Conducting interviews via phone, the researcher missed the opportunity to observe facial expressions and gestures, possible indicators for whether answers were genuine.

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DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

CONFLICT OF INTEREST

The lead author is an employee of International Needs Ghana, the organization that implemented the water projects evaluated. However, no funding was received from the organization for the study.

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