Chapter 30
Water and Sanitation Infrastructure Access in Selected Rural Communities

Samuel Medayese
https://orcid.org/0000-0001-6683-0101
Federal University of Technology, Minna, Nigeria

Balikis Ajoke Ali
Federal University of Technology, Minna, Nigeria

Ayobami Abayomi Popoola
https://orcid.org/0000-0002-9742-0604
University of KwaZulu-Natal, South Africa

Olamide Martins Olaniyan
Lead City University, Nigeria

Kolawole Adebayo Shittu
Kwara State University, Nigeria

Bamiji Michael Adeleye
Federal University of Technology, Minna, Nigeria

Taiwo Oladapo Babalola
Pan African University, Nigeria

Nunyi Vachaku Blamah
Howard College, University of KwaZulu-Natal, South Africa

Ojoma Gloria Popoola
Kogi State University, Nigeria

Omowumi Owoyemi-Medayese
Federal University of Technology, Minna, Nigeria

ABSTRACT

Access to potable water and sanitation promotion is critical to public health and community development. The rural communities of Garatu and Gidanmangoro were selected for a comparative investigation of the challenges households faced in accessing water and sanitation facilities. The study used primary data collected through survey questionnaire administration. Findings revealed that many of the respondents are female. In Garatu, 79%, and Gidanmangoro, 56%, have access to boreholes, while no residents of the two communities have access to the pipe water. The results also indicated that only about 17% of respondents have access to a water closet facility. The study revealed that the challenges associated with access to water and sanitation facilities include slow pace of domestic and commercial activities, household children absence or lateness to school, water unaffordability, and social friction and quarrels resulting from the long queue at the water point. It is recommended that attention be placed upon potable water facilities to improve household access in rural communities.

DOI: 10.4018/978-1-7998-7356-3.ch030

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INTRODUCTION

In the past few decades, water and sanitation have received policy attention by regional and international organizations such as the African Union and the United Nations (ECA, 2000; Hope et al., 2020). Access to water and sanitation was a central theme of the Millennium Development Goals (MDG) (1990 to 2015) of the United Nations (UNICEF/WHO, 2006). Even the active agenda of the Sustainable Development Goals (SDG) has it as one of the exclusive goals pertinent to reaching the envisaged sustainable human settlement. In essence, access to water and sanitation is seen as a human right that should be accessible to everyone, irrespective of gender or race (UN-Habitat, 2010).

However, the inaccessibility to potable water and securely managed sanitation infrastructure worldwide is alarming, having a greater magnitude in Africa (Montgomery & Elimelech, 2007; Mutschinski & Coles, 2021). For example, the WHO/UNICEF (2019) estimated that 2.2 billion and 4.2 billion of the world population have no access to safe water facility and secure sanitation infrastructure, respectively. In many African countries, like Nigeria, one-third of the people in most communities are denied their human right to access water and sanitation (WHO, 2019). However, the implications of its inaccessibility cannot be overemphasized. Different empirical investigations have associated the inaccessibility with possible health issues (like Diarrheal, Schistosomiasis, Intestinal helminths, etc.) and economic burden (Yasin et al., 2015; Aketch et al., 2016; Hope et al., 2020).

The burden of inadequate water and sanitation infrastructure is most severely felt by women and girls in developing countries (Fink et al., 2011; Assefa et al., 2021; UNICEF, 2021). This may be because they are saddled with the responsibility to collect water in 8 out of 10 households (UNICEF/WHO, 2017). Also, it is expedient to note that women have a hygienic obligation during menstruation, childbirth, and pregnancy, which require access to water. Unsafe sanitary practices, asides from the health implications, expose them to the risk of being attacked or assaulted (UN-Habitat, 2021). These threats, perhaps, have influenced the submission of earlier empirical studies on the gender dimension of water and sanitation access. For instance, Bayu et al. (2020) examined unequal access to sanitation from the lens of governance. They suggested that the influence of social and political dimension in water governance can be observed to increase women's entry in developing nations. Pouramin et al. (2020) submitted that policy attention to address water and sanitation inequities could lessen disease and infection burden, will and significantly aid reaching the SDGs 3, 5 and 6. This can be reinforced by Ivens (2008) and UNICEF (2021), who submitted that attention to addressing gender disparity in water and sanitary access would economically benefit women and girls. Hennegan et al. (2018) reported that sanitation determines the choice of menstrual management made by women in Kaduna city, Nigeria. These, however, highlight the importance and need for women to have adequate access to safe water and secure sanitation to upscale their comfort.

Consequently, it is expedient to state that few studies in the gender dimension of access to essential services have been explicitly focused on rural communities. Therefore, this paper explores and contributes to knowledge on access to water and sanitation infrastructure in the selected rural communities of Minna, Nigeria. The communities (Garatu and Gidanmangoro) are within the peri-urban-rural corridor of Minna, Niger State, Nigeria (Sanusi and Akande, 2020). Iterating the environmental shocks in Minna, Idowu et al. (2020) wrote that spatial challenges, which included limited access to water and sanitation facilities, are standards in peri-urban areas such as Garatu and Gidanmangoro communities of Minna. Adeleye et al. (2014) reported that water queues and increasing travel distance to the nearest potable water source are common in Minna, Northern Nigeria. The author presented that few households connected to public

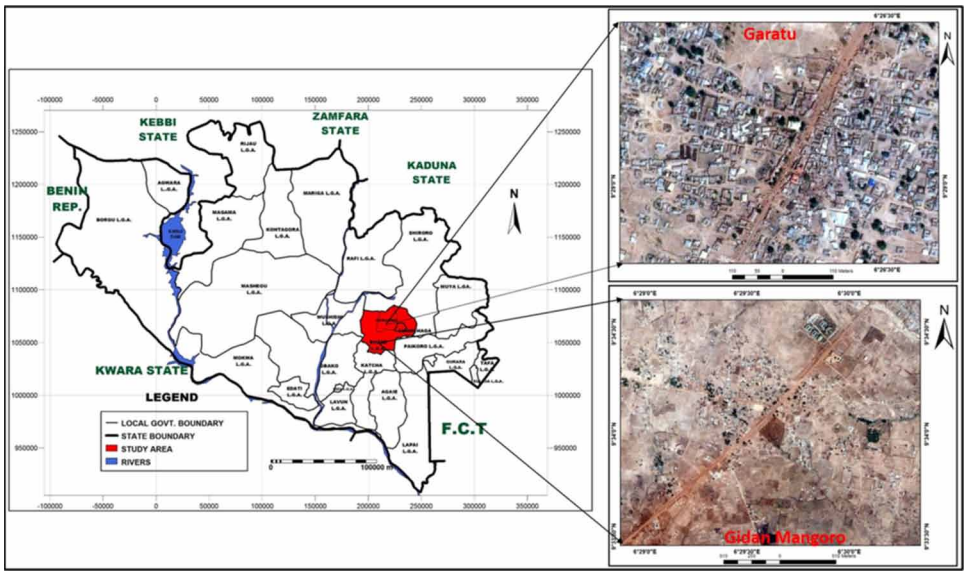
water supply have to complement their water supply with other sources of water supply. Most of them use well and rainwater when available, and some inhabitants buy water from water vendors in Minna (p.33).

The Garatu community is located in the western axis of Minna, Niger State, within the Kpakungu-Garatu urban corridor (Salami et al., 2020). Garatu community is situated in Bosso Local Government Area. Bosso is a local government area in Niger state domiciled in the town of Maikunkele. The local government consists of Bejo, Beji, Bosso, Chanchaga, Garatu, Kampala Kodo, Maikunkele, Maitumbi, and Shata. Based on the geo-environmental issues reported in the study area, the paper seeks to broaden the body of knowledge on the conditions and challenges of access to water and sanitation facilities in rural communities in developing countries. The study is inimitably based on the comparative analysis of two distinct rural-peri-urban communities. As such, the findings of the study can be compared relative to the rural areas in any other setting. More so, the study has been designed in such a way as to be useful for policymakers, scholars, and developers who are involved in rural water and sanitation infrastructure provision and are interested in inequitable access to these facilities.

THE STUDY AREA

Minna is the capital of Niger State in the North-central geopolitical zone of Nigeria. The Minna city-region comprises the main central part of the city, the suburban fringes, and numerous adjoining rural communities. It predominantly shall consist of two ethnic groups, namely the Nupe and Gwari. Minna is located on Latitude 9^0 37' North and Longitude 6^0 33' East with a spatial extent of about 884 Hectares. It is about 93km Northwest of Nigeria's Federal Capital City of Abuja (See Figure 1).

Figure 1. Garatu and Gidanmangoro communities in the Context of Minna, Nigeria



Two rural communities of Minna were selected. The first, Garatu, is located on Longitude 9° 26' 01.62''N and Latitude 6° 26' 24.75" E (Figure 1) with 1294 buildings within the boundaries of the community (Figure 2). The second, Gidanmangoro, is located on Longitude 9° 34' 33.65" N and Latitude 6° 29' 2.89" E (Figure 1), and it consists of 426 buildings (Figure 3). A preliminary reconnaissance survey revealed that the two communities are rural, with the predominant primary activities of livestock farming and monoculture plantations. Other activities such as weaving and local leatherwork in hides and skin can also be observed.

METHODS AND MATERIALS

The study adopted the cross-sectional survey approach to capture the experience of respondents in access to water and sanitation in the selected communities. Geospatial analysis of the satellite imagery of the two communities identified a total number of 1720 buildings wherein 1294 and 426 were in Garatu and Gidanmangoro, respectively (Figures 2 and 3). Yusuf (2013) averred a sampling ratio not less than 10% is sufficient for surveys of a medium population. To have a robust sample size generalizable for the entire communities, a sampling ratio of 25% was adopted. The targeted sample size was 430 households (324 in Garatu and 106 in Gidanmangoro, respectively). In sum, 430 buildings constituted the sample size, wherein 430 questionnaires were administered to households in each building. However, after data sorting and cleansing, 116 of the household sample questionnaires were considered not fit for data analysis. The reasons included incomplete questions and the poor understanding of the questions asked. In total, 314 (220 in Garatu and 94 in Gidanmangoro) buildings and households constituted the sample size used for analysis in this study. The buildings/respondents to be surveyed were randomly selected across the communities. The survey was conducted with the aid of a structured questionnaire. Time distance to the nearest water point/source was captured through the participant observation with the help of a stopwatch.

FINDINGS AND DISCUSSIONS

Existing Water Facilities

The findings of the study identified eight water facilities in Garatu. Out of the eight identified water facilities, it was discovered that five were dysfunctional. This implies that 37.5% of the existing water facilities are not functional. Figure 2 captures the location and spatial distribution of the eight existing water facilities in Garatu, stating their coordinates, the type of facility, and the present conditions. There is a cluster of water facilities in particular locations in the community at the detriment of some other areas. This reveals significant unequal access to water facilities across the Garatu community.

The research findings revealed the existence of five water facilities in Gidanmangoro, with only one facility not functioning. Figure 3 provides a geospatial analysis (spatial distribution) of the water facilities in Gidanmangoro, their coordinates, typology, and condition.

Figure 2. Spatial distribution of water facilities and buildings in Garatu

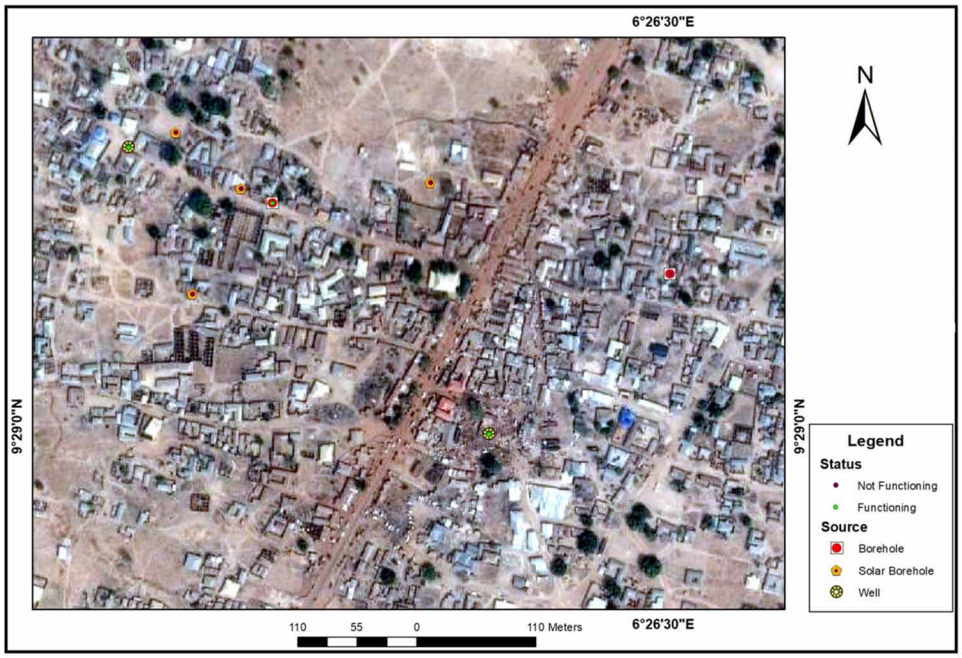
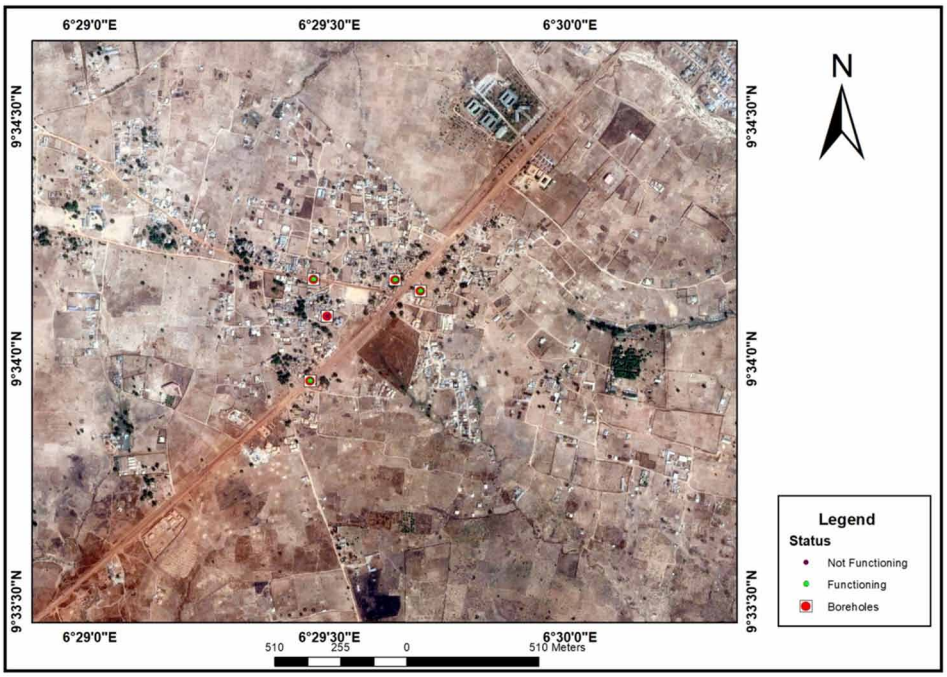


Figure 3. Spatial distribution of water facilities and buildings in Gidanmangoro



Socio-Demographic Characteristics of Respondents in the Study Area

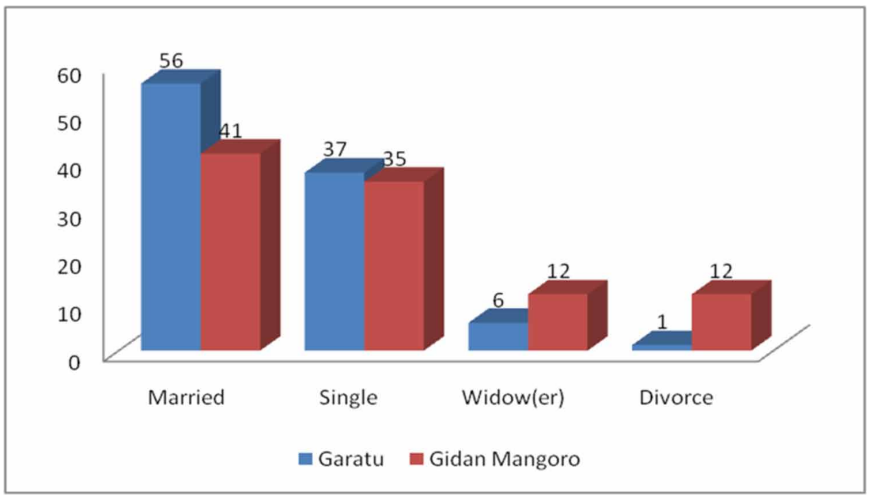
The gender, age, and household size are presented in Table 1. The respondents for the study cut across both genders (male and female). Table 1 shows that on average, there were more female respondents, with 57.3% female and 42.7% male across both communities. In Garatu, the percentage of female respondents (59.1%) was considerably higher than that of Gidanmangoro (53.2%). The age distribution of respondents from the study area shows that the majority (78.3%) of the respondents are between the ages of 21 and 40 years.

Table 1. Gender of respondents

	Garatu		Gidanmangoro		Average	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
Gender						
Male	90	40.9	44	46.8	134	42.7
Female	130	59.1	50	53.2	180	57.3
Total	**220**	**100**	**94**	**100**	**314**	**100**
Age						
21-30	95	43.2	36	38.2	131	41.7
31-40	89	40.5	25	26.5	114	36.3
41-50	28	12.8	19	20.6	47	15.0
Above 50	8	3.5	14	14.7	22	7.0
Total	**220**	**100**	**94**	**100**	**314**	**100**
Household Size (in persons)						
1-3	23	10.5	22	23.4	45	14.3
4-6	107	48.6	25	26.6	132	42.0
7-10	77	35.0	36	38.3	113	36.0
Above 10	13	5.9	11	11.7	24	7.7
Total	**220**	**100**	**94**	**100**	**314**	**100**

The majority of the households have between four to ten members. However, the more predominant household size is between four and six persons. When disaggregated across the two sampled communities, the result reveals that the most predominant household size in Garatu is within the range of 4-6 persons per household, while for Gidanmangoro, the most predominant household size is between 7-10 persons per household. The result shows that 35% of the households in Garatu have more than seven persons per household. In comparison, the value is greater in Gidanmangoro where 38% have seven or more persons per household. The implication is that water demand will be high in both communities. The household sizes in Garatu are 1-3 (10%), 4-6 (49%), 7-10 (35%) and above 10 (6%) while in Gidanmangoro are 1-3 (24%), 4-6 (26%), 7-10 (38%) and above 10 (12%). From the sampled respondents, the majority (Garatu 56%, Gidanmangoro 41%) of the respondents are married, 37% in Garatu and 35% in Gidanmangoro are single while the others are either widowed or divorced (Figure 4).

Figure 4. Marital status of respondents



Water and Sanitation Infrastructure Accessibility, Ownership and Availability

Water and Sanitation Facility Type and Ownership

The study identified the various type of water facilities available to the households in the study area, and the result is presented in Figure 5. The analysis reveals that boreholes, protected hand-dug well, and unprotected wells are the primary water facilities available to households in Garatu and Gidanmangoro. The borehole is the most common water facility available to households; Garatu 79% and Gidanmangoro 56%. The study also reveals that 16% and 29% of households rely on protected hand-dug well in Garatu and Gidanmangoro, respectively. Evidence from the captured data showed a lack of access to pipe-borne water provided by the State Water Board Authority. In this study, protected wells are conceptualized as ringed well with cover to prevent rodents and dirt from getting into the well.

The majority (66% in Garatu and 69% in Gidanmangoro) of the water facilities are publicly owned. However, when private ownership is concerned, evidence shows more privately owned water facilities in Garatu 34% than in Gidanmangoro 31%. In terms of sanitation, evidence (Figure 6) shows that as much as 27% and 20% of the household samples in Garatu and Gidanmangoro, respectively, depend on open defecation. Only 16% of the respondents from Garatu and 19% from Gidanmangoro have a water closet facility. This shows that most of the respondents do not have access to quality sanitation facilities.

Water and Sanitation Facility Accessibility and Conditions

There are different levels of access to water. Access to water can be in the house (indoor), outside the home (outdoor) but within the compound (the plot boundary), or outside the compound (outside the household plot boundary). As presented in Table 2, a large percentage (63%) of Garatu and 55% of Gidanmangoro access water facilities are located outside their compound thus reflecting that they depend on the neighborhood household residents to access water. Only 3.5% of the households sampled in the two rural communities have access to water within their home and 36.3% within the compound. Only a

small fraction of the respondents have water facilities within their dwelling units, as evident in Garatu (3%) and Gidanmangoro (4%). This is an implication of water stress as the majority of the households must walk outside their compound before having access to water. The water will have to be carried back to their homes for use, and this is a tedious endeavor with tremendous physical stress. It was established (Table 2) that the sanitation facility for many households is located outside their dwelling unit, Garatu 52%, and Gidanmangoro 54%. Only 16% in Garatu and 19% in Gidanmangoro have indoor sanitation facilities located within their dwelling unit. Over a quarter of Garatu (32%) and Gidanmangoro (27%) do not have indoor or outdoor sanitation facilities. The only sanitation facilities available to them are located outside their compound.

Figure 5. Water facilities in the study area

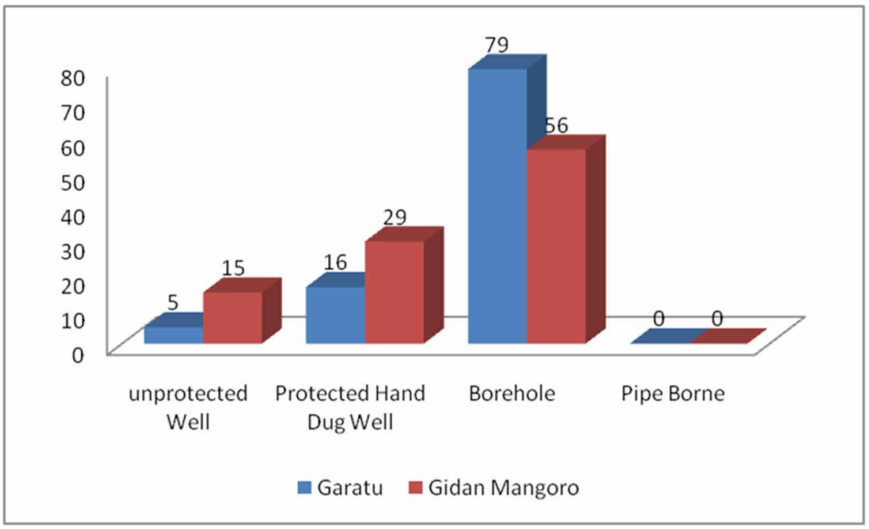


Figure 6. Types of Sanitation Facilities Available to Households

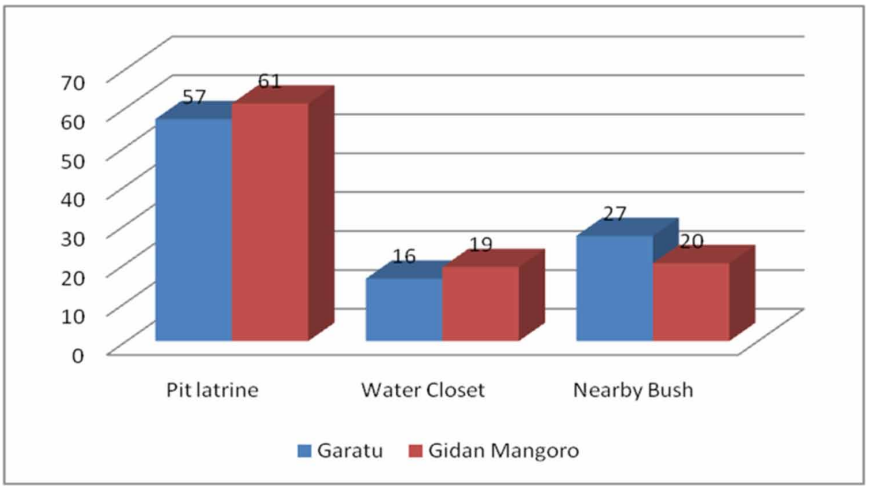


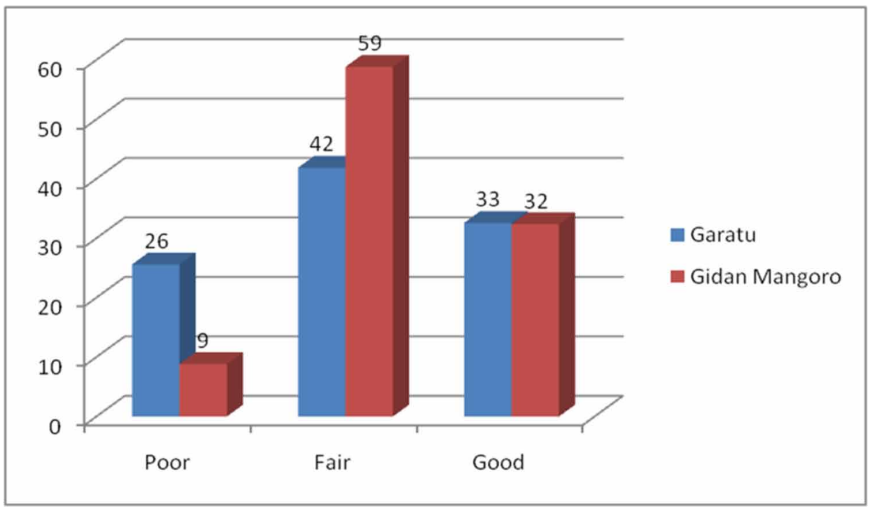
Table 2. Water and sanitation facility location and distance travel

	Garatu		GidanMangoro	
	Freq.	**%**	**Freq.**	**%**
Location of Water facilities				
Within the house	7	3	4	4
Within the compound	75	34	39	41
Outside the compound	139	63	52	55
Total	**220**	**100**	**94**	**100**
Location of Sanitation Facilities				
Within the House	35	16	18	19
Within the Compound	114	52	51	54
Outside the Compound	70	32	25	27
Total	**220**	**100**	**94**	**100**
Time Spent Collecting Water (in minutes)				
15 minutes	10	5	19	21
30 minutes	141	64	50	53
Above 60 minutes	69	31	25	26
Total	**220**	**100**	**94**	**100**
Travel distance to toilet facility (in minutes)				
Less than 15 minutes	163	74	74	79
15 - 30 minutes	57	26	24	21
Above 60 minutes	0	0	0	0
Total	**220**	**100**	**94**	**100**

The study assessment of the household's average time spent for the water collecting, as presented in Table 2, shows that 95% of the respondents in Garatu spend 30 minutes or more to collect water for domestic consumption against 79% in Gidanmangoro. Both figures are incredibly high and illustrate the stress and difficulty of access to water in the two communities. About 31% in Garatu and 26% in Gidanmangoro spend over an hour before collecting water for domestic use from the nearest source of potable water. The study further established that the majority (Garatu - 74%; Gidanmangoro - 79%) of the respondents spend less than 15 minutes to get access to a sanitation facility, while 26% and 21% of the respondents from Garatu and Gidanmangoro spend between 15-30 minutes to access a sanitation facility.

Respondent perception complemented with field observation shows that the condition of the water facility is mainly fair and poor. For example, 42% and 59% of the respondents from Garatu and Gidanmangoro, respectively, rated the state of the identified water facilities as fair; while those who rated them as good account for 33% in Garatu and 32% in Gidanmangoro (Figure 7). The study shows that the sanitation facility in the study area is relatively poor in terms of access and quality. It was revealed that 81% of the sampled communities reside in dwellings with shared sanitation facilities. In comparison, only 19% reside in homes where the sanitation facility is not shared with another household.

Figure 7. Household perception of the condition of water facilities



DISCUSSIONS

Africa's exposure to water scarcity and sanitation facility inadequacies have been well documented (ECA, 2000; African Union, 2020; Mutschinski & Coles, 2021). While the general perception of limited access remains undoubted, the rural spaces remain negatively affected (Mutschinski & Coles, 2021). Marks et al. (2020) have argued that small towns (many of which are adjoining rural villages) lag behind the cities in global drinking water and sanitation access. This experience is due to the numerous water insecurity complexities (Liu et al., 2019). The argument is spatial water distribution that shapes urban and rural space water access and sustainability. One of such complexities of potable water access is the number of people that have access to it. Access is defined in time and distance travel to the nearest potable water source. In this study, the evidence points at over 150 households with a resident size of between four to six persons depending on such nearest water source. This study did not focus on the non-domestic/residential use of water but rather on residential access, condition, and availability to such potable water sources.

Availability in the context of this study emphasized the water facility type. The evidence in this study points that the borehole and hand-dug well are the two common typologies of water facility access. The evidence suggests the 'individual/family/communal' water access approach to water resources in rural Minna. The argument for the individual dimension is defined by a mechanism that rural dwellers (communal or households) have devised for themselves to access water. The perception is that in the face of the failed water effort as evident in lack of access/connection to the public water mains which the State Water Board should provide, households have resulted to convenient but environmentally unsustainable approach through the digging of wells and sinking of boreholes to access water. In the face of adequate provision of potable water through pipe-borne water provided for public use, there will be little or no necessity to dig wells and sink boreholes, as evident in the communities.

Magara (2010) reported the geological, economic, and cultural variables that define water supply. The geological context in this regard captures the soil and environmental conditions that limit water availability in an area. Popoola et al. (2021) argued that some rural areas might be characterized by poor water access due to the morphological and geological (clay and hilly terrain) peculiarities that negatively

impact natural water resource generation and sustainability. Therefore, many rural hands dug well dry up or do not provide the needed capacity to supply sufficient water to cater to the rural household, particularly during the dry season. The seasonality of rural water facilities is further negatively impacted by the observation that many hand-dug wells are not ringed or covered. Idowu et al. (2011) reported the disease exposure from the unringed hand-dug wells in urban Lagos Nigeria. The scenario is further intensified in rural areas with lesser access to health care and other ancillary facilities that may limit disease exposure. Thus, with the preponderance of bare and unringed dug wells in rural areas, the rural disease exposure is much greater. This experience is further restricted by the relatively weak economic condition of the rural dwellers compared to urban residents.

The economic dimension of water supply also captures rural water affordability. Affordability is conceptualized in the cost of ringing the well or sinking a borehole. Without under-emphasizing the situation where some of the boreholes might be under-productive of water resources (Danert et al., 2010), the cost of sinking the water facility (borehole and well) along with the cost of maintenance can be a limiting factor for an average rural dweller especially those in developing countries (Montgomery & Elimelech, 2007; Oloruntade et al., 2014;). This study aligning with Oyebode et al. (2015), argues that the possibility of rural communities paying the amount required for a borehole project without the necessary financial structure and support system in place is minimal if not outright impossible considering the socio-economic status of rural dwellers.

The evidence drawn through the observation reveals that some of the sample households with borehole water points sell water to the other residents of the communities. Interview and on-spot observation revealed that the public ownership of boreholes is either by the government, community, or religious organization. Religious organizations such as mosques and churches invest in water infrastructure as both a social/corporate responsibility to their host communities or spiritual needs. Popoola and Magidimisha (2020) documented the roles of religious institutions in rural infrastructure access and project financing. The roles of non-governmental and religious organizations as a responsive alternative to ease the private water pricing burden and inadequate government water facility provision cannot be ignored. Religious bodies, mainly mosques and churches, are the two dominant religious houses in the communities, that provide services such as water facility provision to their communities as a humanitarian act. Imam (2019) alluded that partnership with the faith-based organization remains a crucial channel to social service delivery and implementation. Undoubtedly, these groups are essential to communal asset and service building (maintenance especially).

Many households depend on such water facilities outside their plot size and home. This accounted for almost 40% of the respondents traveling outside their compounds and home to the nearest potable water source. Informal discussion and researchers' experience reveal that access to water within the homes is often seen as a luxury and common only among the households privileged with a borehole facility. The social and communal culture of the residents in Northern Nigeria promotes the communal/compound location of water and sanitation facilities for 'all' to utilize. Evidence revealed that an open compound is expected in the Northern part of Nigeria. Thus, many households rely on each other for shared resources. This is evident as water facility provision is seen as a shared public good that all should have access.

The implication of the observed inadequacy and disparity in water resources demand and supply results in immediate and long-term pressure on rural dwellers. This pressure drives the rural households to alternative coping mechanisms such as dependence on rivers and streams, seasonal rainwater harvest, and increased travel distance to alternative potable water points to source water for their domestic use.

The findings revealed that ninety-four household travels are beyond the stipulated thirty minutes distance recommended by the World Health Organization.

On a closer look, the evidence shows that the water shock and pressure were greater in the Garatu community, as one of each three households travels a considerable distance to access the water facilities. In several instances, these water sources that require significant time to access are poor. Some of the factors that accounted for the poor condition of the water infrastructure include poor maintenance and the unsustainability of the water resource (Figure 8). In the *Gidanmangoro* community, the hand pump borehole is damaged. At the same time, the solar pumped borehole available in the *Garatu* community is dysfunctional, and the cost of the repair or purchase of a new one seems far too expensive for the village dwellers. The unsustainability of the water facilities as identified is mainly attributed to the imbalance in water demand and supply. Thus, the contributory pressure of travel distance, poor conditions, and insufficient water volume in the communities' existing water facilities is a substantial considerable limitation to access to water and sanitation facilities.

Figure 8. Water infrastructure condition Gidanmangoro and Garatu, respectively

The study argues that poor access to water facilities indirectly influences the sanitation facility choice, availability, and accessibility. The data obtained through the household survey complemented by confirmatory observation reveal that the sanitation facilities available to households are pit latrine, water closet, and nearby bush/open space. Such sanitation facilities in the sampled rural communities can be found within the house, or outside the compound. The observation revealed that many sampled sanitary facilities are in poor condition (Figure 9). This points to about ninety-five households dependent on open defecation in the sampled rural communities of Garatu and Gidanmangoro. This alludes to the fact that one in every three households in the sample rural areas of Minna uses sanitary facilities outside their homes or compound sets. The African Development Bank Group (2011) has documented that over 40 percent of the population of Sub-Saharan Africa still lack access to safe drinking water sources, and 69 percent do not have access to improved sanitation facilities. This is evident in a limited number of households with a single sanitary facility in use. This indicates stress in access to a sanitation facility, which may have severe health consequences on the users. Africa Health, Human and Social Development (2012) have ranked Nigeria seventeenth amongst the countries with the least sustainable access to the improved drinking water source. UNICEF (2021) alluded that about 340 million people in Eastern

and Southern Africa lack sanitation services. It was reported that 19% use open defecation, 179 million use unimproved facilities, and 63 million share sanitation facilities.

The data from the secondary sources show that 42% and 68% of the population are without improved water sources and access to improved sanitation, respectively the findings of this study have been further confirmed. The World Bank Water and Sanitation Program (WSP) (2018) recorded that inadequate sanitation costs in eighteen African countries (Nigeria inclusive) make about 5.5billion US dollars per year. It was reported that these countries account for 554 million people, which is more than half of Africa's population. It further recorded that the sanitation dearth accounts for between 1 to 2.5% of its GDP annually. In Nigeria, 70 million Nigerians utilize unsanitary or shared lavatory, while another 32 million lack access to toilets and use open spaces. The report pointed out that eliminating open defecation in these countries would require about 23 million toilets to be built and used. Open defecation costs are more per person due to the underlying health and environmental challenges than any other type of unimproved sanitation.

Figure 9. Public toilet at Garatu and Gidanmangoro rural communities, respectively

This study accessed some of the significant challenges associated with poor access to water and sanitation facilities in the study area. Findings include the slow pace of domestic and commercial activities (4.44), and social friction and quarrels resulting from long queues at functional available potable water points (4.41) are the common limitations in the Garatu community. However, Table 3 reveals that the challenging experience is different in *Gidanmangoro* community. Household reported that in addition to individual quarrels due to long queues (4.33), household children's absence or lateness to school (4.31) remains a common experience in the community. This points to the role of water access in educational sustainability and liveability in the communities. The view is that the social identity of the rural community owing to quarrels at water queues remains threatened due to the limited access to potable water in the communities. The other reported challenges are limited water affordability due to a highly rated increase in the price of water and indiscriminate defecation. This presents that water access remains a stressor to household affordability and income. The above analysis shows that inadequate or poor access to water and sanitation facilities touches on all fabrics of human well-being, especially women. This is evident in the household head comment that the girl child and mother are mainly responsible for sourcing water for household consumption.

Table 3. Challenges associated with poor access to water and sanitation facility

	Garatu			Gidan Mangoro		
Challenges	**Weighted Sum**	**Mean**	**Rank**	**Weighted Sum**	**Mean**	**Rank**
Domestic & commercial activities	976	4.44	**1st**	401	4.27	**3rd**
High water prices from a water vendor	917	4.17	**7th**	387	4.12	**7th**
Time wastage	960	4.36	**4th**	399	4.24	**4th**
Long queues result in Quarrel	970	4.41	**2nd**	407	4.33	**1st**
Children are usually either late to or absent from school	967	4.40	**3rd**	405	4.31	**2nd**
Increases the chances of disease outbreak	951	4.32	**6th**	399	4.24	**4th**
Indiscriminate Defecation	932	4.24	**5th**	395	4.2	**6th**

While the peculiarity of the communal challenges may be unique, the comparative analysis of the access to water in the two communities (based on Chi-square test – see Table 4) shows no significance in water and sanitation facility access. The variables loaded for the analysis are types of sanitation, water facilities, time and distance travel access, and the condition of water facilities. The result shows no significant difference in access to water and sanitation facilities in Garatu and Gidanmangoro. The p-values recorded in each variable are above 0.05 at a 95% confidence level. Therefore, it implies that the situation of water and sanitation access in Garatu and Gidanmangoro is not different statistically (Table 4). The evidence is that Minna's rural access to water and sanitation facility experience is generic.

Table 4. Comparative analysis of water and sanitation access in the study area

Variables	P-value	Remark
Type of water facilities	0.287	Not Significant
Types of Sanitation Facilities	0.306	Not Significant
Time and Distance to Water Facility	0.402	Not Significant
Time and distance to Sanitation Facility	0.189	Not Significant
Condition of Water Facility	0.214	Not Significant
Condition of sanitation facility	0.354	Not Significant
Challenges to water and sanitation facility	0.461	Not Significant

Note: $P<0.05$=significant, $p>0.05$=not significant

In line with the perspectives of UNICEF (2021), as much as water is evenly tied to sanitation and hygiene, the lack of access or inadequacy of water facilities is a major encumbrance on rural sanitation and hygiene, as observed in the sample communities of Garatu and Gidanmangoro in Minna, Nigeria.

CONCLUSION

Water and sanitation infrastructure is the basic facilities needed for the functioning of the community. Therefore, water and sanitation accessibility remains relevant to community sustainability. The geospatial mapping of the sampled villages revealed that there is a total of thirteen water facilities in the two communities. The distribution of the water points in the two communities is clustered and not evenly distributed across the communities. This accounted for the increase in travel distance to the nearest water point for some sampled households. This condition indirectly influences the indiscriminate open defecation rampant in the rural communities of Minna.

The study concludes that the water and sanitation facility in the study area (Garatu and Gidanmangoro communities) is not adequate for the area's population. Although there is community cooperation in the provision of water facilities, the numbers provided are still below the number required by the population, which is evident from the time households spend to collect water. Hence, the two communities can be said to be experiencing water stress.

The study also concludes that sanitation facility in the study areas needs urgent attention. The majority of the households are observed to rely on the nearby bush as a toilet facility due to the absence of basic toilet facilities. The water and sanitation facility conditions can be said to be below par. Instances of poor facility maintenance contribute to water shocks and stress experienced among the sampled households. Poor access to water and sanitation facilities in the study area has an immense impact on various dimensions of the household's wellbeing. This is seen to be a significant contributor to the domestic quarrel between women and children. It also poses a threat to the educational wellbeing of the household girl child. The study, therefore, recommends that:

- Attention should be paid to the provision and distribution pattern of water facilities in the study area to reduce the time and distance walked to water facilities. More water point sources should be provided at each borehole stands to reduce queue and time spent for water collection.
- Environment sensitization and restriction against indiscriminate open space defecation should be managed. The study queries local planning responsiveness in building approval without toilets.
- The provision of community toilets should also be encouraged to help improve residents' access to sanitation facilities. Improved toilet facilities in the form of the public toilet should also be provided in the study area to alleviate the problem of access to sanitation facilities.
- The need for improved collaboration between the government and the rural people in infrastructure maintenance remains relevant to achieving water access and reducing the household shocks. Therefore, the study recognizes responsive citizenry in water facility maintenance and utilization.

STUDY LIMITATIONS

The study has comparatively examined the access to water and sanitation facilities in the two selected communities. The authors recognize that the study used a comparative analysis, making it more thorough with the improved data reliability. The study area – Northern Nigeria - where water research and access is critical because of the elongated dry season, making the households more vulnerable to water unavailability. Notwithstanding this, the study could not extend beyond the two selected rural communities to improve generalization. The authors also reported that the study relied on a subjective

participatory approach (questionnaire). The study did not triangulate the survey with either interview or FGD to understand further residents' experience with water and sanitation facility access. The study unit of analysis was household responses; thus, the study did not engage public stakeholders and Non-Government Organizations (NGOs) involvement in water and sanitation facility provision.

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