



Impact of Rural Water Supply and Sanitation Project in Isoko South Local Government Area of Delta State

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ABSTRACT

Access to safe water and basic sanitation is fundamental for human health and development, emphasized by global initiatives such as the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs). This study evaluates the impact of a rural water supply and sanitation project in Isoko South Local Government Area of Delta State, Nigeria. Through a survey research design, data on socio-demographic characteristics, water supply, sanitation facilities, and functionality were collected from 384 respondents across 16 communities. Results reveal significant improvements in water access, with a shift from unreliable sources like hand-dug wells and streams to more dependable boreholes. Sanitation facilities, particularly in schools, saw notable enhancements, with all schools now equipped with latrines. However, challenges such as poor maintenance of sanitation facilities in schools persist. Overall, the project demonstrates substantial positive impacts on water access and sanitation infrastructure, underscoring the importance of continued support for rural water and sanitation initiatives to sustain improvements in community health and development.

1. Introduction

Access to safe water and basic sanitation is considered a basic human need and a basic human right for all people. The importance of the water supply and sanitation system has been a subject of serious attention reflected in the measurement of human development and in their inclusion in the Millennium Development Goals (MDGs) and later the Sustainable Development Goals (SDGs) (WHO, 2020). Access to clean water and adequate sanitation facilities is crucial for public health, economic development, and environmental sustainability. In rural areas of developing countries like Nigeria, the absence of reliable water sources and proper sanitation infrastructure poses significant challenges, leading to various health problems and hindering socio-economic progress. Recognizing these challenges, initiatives such as rural water supply and sanitation projects have been implemented to improve access to safe water and promote hygiene practices in underserved communities. This study focuses on evaluating the impact of one such project in the Isoko South Local Government Area of Delta State, Nigeria.

Previous studies have highlighted the importance of rural water supply and sanitation projects in improving health outcomes, reducing waterborne diseases, and enhancing the quality of life in rural communities (Okunlola et al., 2018; Gwimbi, 2019). In Nigeria, where access to clean water remains a significant challenge, various initiatives, including government-led programs and NGO interventions, have aimed to address this issue (Ojomo, 2020). However, the effectiveness and sustainability of these projects vary, influenced by factors such as community involvement, funding mechanisms, and maintenance strategies (Adelodun et al., 2021). The need to protect available sources of water guided the various colonial and post-colonial policies and regulations in the water and sanitation sector (Olatunbosun, 2019).

2. Materials and Methods

2.1 The Study Area

Isoko South Local Government is located in the rain forest belt 50N of the River Niger and within the flood plain of the Niger Delta. It lies approximately at latitude 5°22'55.52" North and longitude 6°12'51.01" East. It has a land mass of 1026km². The LGA is bounded in the North by Isoko North Local Government Area, in the South by Patani Local Government Area and Bayelsa State; in the West it shares boundary with Ughelli North Local Government Area and East by Ndokwa East Local Government Area (Ikpokpo, 2016).

Isoko south is located in a region of deciduous and evergreen forests, with patches of mangrove forest, as well as a forest reserve along the Aviara clan area. The area is in the tropical rain forest area of the Niger-delta and experiences high rainfall and high humidity most of the year. The climate is equatorial and is marked by two distinct seasons-the Dry and Rainy seasons. The Dry season lasts from about November to April and is significantly marked by the cool "Harmattan" dusty haze from the north-east winds. The Rainy season spans May to October with a brief dry spell in August.



Fig. 1 - Delta State showing the study area

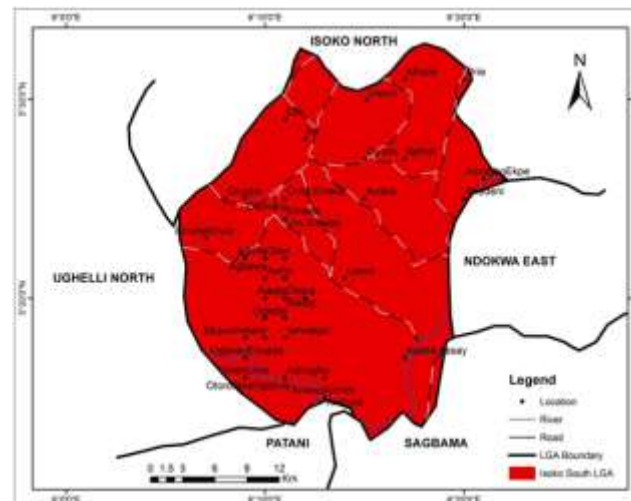


Fig. 2 - Isoko South Local Government Area of Delta State

3. Methodology

This study adopted the survey research design. This involves the administration of a structured questionnaire and conducting interviews on sampled population. A field survey design is appropriate when conducting comparative research and is used to discover the link between two or more variables under study. Data needs include the demographic characteristics of respondents (sex, age, marital status, education, family size and income status), water and sanitation facilities and their functionality, and access to safe and sustainable water supply. Data was sourced directly in the field using structured questionnaire and field observation in the study area. The population of the study was estimated to be 368,784 persons and Taro Yamane's formula was used to determine the sample size of 400.

Purposive sampling technique was used to select communities that benefited from both water and sanitation facilities. Sixteen communities were selected in Isoko South LGA that benefitted from the project. These were Umeh, Ikpide, Araya, Uruwhre, Ada, Egbo, Urovor, Ukpude, Uro, Ewrokpe, Otuloho, Aberuo, Ivori, Ewhokpaka, Erowha and Olade communities. Data collected were presented in tables and analyzed using descriptive statistics such as percentages, means and standard deviations to ascertain variations in the data set.

4. Results

4.1 Demographic Characteristics of Respondents

Table 1 – Socio-Demographic Characteristics of Respondents

Variable	Options	Frequencies	Percentage(s)
Sex			
	Male	172	44.8
	Female	212	55.2
	Total	384	100
Age			
	21-30 years	160	41.7
	31-40 years	131	34.1
	51 years and above	93	24.2
	Total	384	100
Marital Status			
	Single	143	37.2
	Married	197	51.3
	Divorced	44	11.5
	Total	384	100
Household Size			
	1-5	204	53.1
	6-11	105	27.3
	12-17	71	18.5
	18 and above	4	1.0
	Total	384	100
Educational Attainment			
	Primary	42	10.9
	Secondary	297	77.3
	Tertiary	45	11.7
	Total	384	100
Occupation			
	Farming	176	45.8
	Artisanship	65	16.9
	Civil /Public Service	66	17.2
	Trading	77	20.1
	Total	384	100

In Table 1, Sex distribution shows a slight majority of female respondents (55.2%) compared to male respondents (44.8%). This gender breakdown is crucial for understanding potential disparities in access to water and sanitation services, as women often bear the primary responsibility for water collection and hygiene practices within households.

Table 1 also reviewed the age of respondents, data showed that majority of respondents fall within the age range of 21-40 years, with 41.7% aged 21-30 years and 34.1% aged 31-40 years. This demographic distribution indicates that the project's impact can significantly affect the working-age population, which is crucial for economic productivity and community development.

Marital Status: The majority of respondents are married (51.3%), followed by single (37.2%) and divorced (11.5%). Marital status influences household dynamics and responsibilities related to water management and sanitation practices. Married respondents may have larger households and different priorities compared to single or divorced individuals. Evaluating how the project has addressed the needs of different marital status groups can inform targeted interventions and strategies for sustainable outcomes.

Household Size: Most households have 1-5 members (53.1%), indicating relatively small family sizes. However, a significant proportion of households have 6-11 members (27.3%), highlighting larger families with potentially higher water and sanitation needs.

Educational Attainment: The majority of respondents have secondary education (77.3%), followed by tertiary (11.7%) and primary education (10.9%). Education level influences awareness, behaviour change, and capacity building regarding water and sanitation practices.

Occupation: The largest occupational group among respondents is farming (45.8%), reflecting the agrarian nature of the community. Other significant occupations include trading (20.1%), civil/public service (17.2%), and artisanship (16.9%). Understanding the occupational composition helps assess the project's impact on livelihoods, economic activities, and overall community development.

4.2 Water Supply

The result of the sources of water available to the communities in the study area before the inception of the project is presented in Table 2, while the result for water sources available since the inception of the project is presented in Table 4.9.

Table 2 - Sources of water available before the inception of the project

Water Sources	Before the project		After the project	
	Frequency	Percentage	Frequency	Percentage
Hand dug well	242	63.1	72	18.8
Stream/Rivers	125	32.6	31	8.1
Boreholes	17	4.3	281	73.2
Total	384	100	384	100

Before the project, hand dug wells were the most prevalent water source, accounting for 63.1% of respondents. However, after the project, their prevalence decreased significantly to 18.8%. Hand dug wells are often prone to contamination and may not provide consistently safe water, posing health risks to communities. The decrease in their usage after the project suggests that alternative, more reliable water sources have been introduced, potentially leading to improved water quality and reduced waterborne diseases.

Streams and rivers were the second most common water source before the project, with 32.6% of respondents relying on them. However, after the project, their usage decreased substantially to 8.1%. Streams and rivers are susceptible to pollution and seasonal variability, making them unreliable and potentially unsafe sources of water. The decrease in their usage after the project indicates a positive shift towards more secure and accessible water sources, likely resulting in improved public health outcomes.

Boreholes witnessed a remarkable increase in usage after the project, rising from 4.3% before the project to 73.2% after its implementation. Boreholes are typically drilled deep into the ground, providing access to groundwater that is generally safer and more reliable than surface water sources. The significant increase in borehole usage indicates the successful implementation of the project in introducing new, improved water sources to the community. This transition to boreholes suggests enhanced access to clean water, reduced water-related diseases, and improved overall quality of life for residents.

Overall, the table illustrates the transformative impact of the rural water supply and sanitation project on water sources in Isoko South Local Government Area. The project succeeded in reducing reliance on traditional, less reliable water sources such as hand dug wells and streams/rivers, while substantially increasing access to safer and more sustainable water sources like boreholes. This shift represents a significant improvement in water infrastructure and has likely contributed to better health outcomes and socio-economic development in the community. Evaluating the changes in water sources before and after the project provides valuable insights into the project's effectiveness and its positive implications for the well-being of residents in the area.

Table 3 - Number of Boreholes provided in the community

Number of Borehole	Frequency	Percentage
0	24	6.3
2	304	79.2
3	56	14.6
Total	384	100

The result of the number of boreholes provided in the community under the project is presented in Table 3. The result indicates that 6.3% of the respondents said no borehole was provided in their community, while 79.2% and 14.6% indicated that two and three boreholes were drilled in their communities respectively. This result suggests over 90% of the respondents were provided with boreholes under the project which represents a significant success in rural water supply in the study area. This also explained why there was a major shift from other water supply sources to borehole as the major water supply source since the inception of the project.

The shift from hand-dug wells to boreholes as the primary source of water supply (from 63% to 43.2%) after the project demonstrates the positive impact of the project on water access. This shift also aligns with the submission of (Aluko, 2015), that boreholes provide safe and sustainable water sources in rural areas. However, the study also indicates a decline in toilet functionality (3.1%) after the project due to poor maintenance, which underscores the importance of post-project maintenance strategies.

4.3 Sanitation Facilities

Sanitation facilities are essential components of public health infrastructure, crucial for promoting hygiene, preventing disease transmission, and improving overall well-being. Access to adequate sanitation facilities, such as latrines and toilets, ensures dignified and hygienic disposal of human waste, reducing the risk of waterborne diseases and environmental contamination. In the context of rural water supply and sanitation projects, the provision of sanitation facilities plays a pivotal role in enhancing community health, particularly in underserved areas where open defecation and inadequate sanitation practices are prevalent. By improving access to sanitation facilities, these projects contribute to the achievement of Sustainable Development Goal 6 (SDG 6) by promoting universal access to sanitation and ensuring sanitation-related services for all. Moreover, the presence of sanitation facilities in schools and public spaces not only fosters a culture of cleanliness and hygiene but also supports education, productivity, and social dignity, thus laying the foundation for sustainable development and improved quality of life. The result of the sanitation conditions in the selected public primary schools under this project is discussed in this segment.

Table 4 - Availability of latrines in the school before and after the inception of the project

Variables	Before the project		After the project	
	Frequency	Percentage	Frequency	Percentage
No	300	78.1	0	0
Yes	84	21.9	384	100
Total	384	100	384	100

The table presents data on the availability of latrines in schools before and after the inception of the rural water supply and sanitation project in Isoko South Local Government Area of Delta State. Analyzing this table provides insights into the changes in sanitation facilities within schools and their implications for the health and well-being of students and staff.

Before the inception of the project, the majority of schools (78.1%) did not have latrines. This indicates a severe deficiency in sanitation infrastructure, posing significant health risks to students and staff. The absence of latrines can lead to open defecation, which contributes to the spread of waterborne diseases, soil contamination, and overall poor hygiene practices within the school environment. The lack of latrines highlights the urgent need for interventions to improve sanitation facilities in schools. Without adequate facilities, students and staff are more susceptible to illness, absenteeism, and compromised learning and working conditions.

After the Project, following the implementation of the rural water supply and sanitation project, all schools (100%) now have latrines. This represents a remarkable improvement in sanitation infrastructure within the educational institutions. The availability of latrines ensures dignified and hygienic sanitation facilities for students and staff, promoting a healthy and conducive learning environment.

Access to latrines contributes to improved hygiene practices, reduces the risk of waterborne diseases, and fosters a culture of cleanliness and sanitation awareness among school communities. By providing adequate sanitation facilities, the project enhances the overall well-being and academic performance of students while also supporting the health and productivity of school staff.

Table 5 - Kind of toilet constructed

Type	Frequency	Percentage
Pit latrine	8	2.1
Pour flush	223	58.1
WC latrine	59	15.4
No response	94	24.5
Total	384	100

Table 5 presents result of the type of toilets provided by the project. The result indicates that 58.1% of the respondents maintained that the project constructed pour flush type of toilets, while 15.4% and 2.1% reported that WC latrine and pit latrine were constructed respectively. In the same vein, 90.6% of the respondents reports that two (2) units of toilets were constructed in their schools under this project (Table 4.13).

4.4 Functionality of Water and Sanitation Facilities

Assessing the functionality of water and sanitation facilities is essential for evaluating the effectiveness and sustainability of rural development projects. In the context of the rural water supply and sanitation project in Isoko South Local Government Area of Delta State, Nigeria, understanding the functionality of these facilities provides valuable insights into their impact on community health and well-being. This section examines the functionality of water supply facilities, primarily boreholes, and sanitation facilities, including toilets, within the project area.

4.4.1 Functionality of Water Supply Facilities

Table 6 - Functionality of boreholes under project

Variable	Frequency	Percentage
Yes	364	94.8
No	20	5.2
Total	384	100

The result of the functionality of the water Supply facility (boreholes) is presented in Table 5 and 6. The result shows that 94.8% of the boreholes were still functional while and 5.2% of respondents were of the view that boreholes provided in them of the community were not functional. Overall, this result has shown a very high percentage of functional water supply projects in the study area. This can be attributed to good maintenance practices by the managers and users of these boreholes.

Table 7 - Number of boreholes still functioning

Number	Frequency	Percentage
1	169	44.0
2	189	49.2
3	4	1.0
No Response	22	5.7
Total	384	100

The result in Table 6, shows the number of functional boreholes in the study area. the result indicates that 44.0% of the respondents reported that only one (1) borehole out of the two (2) or three (3) provided is still functional, while 49.2% reported that two (2) boreholes constructed in their communities were still functional (Plates 1, 2 and 3). This suggests that greater number of boreholes are still functional which is an indication of good maintenance and performance of these water supply sources.



Figure 1 - Functional Borehole at Olade Community



Figure 2 - Functional Borehole at Araya Community



Figure 3 - Functional Borehole at Ivori Community, Isoko LGA



Figure 4 - Abandoned non-functional borehole at Ukpude Aviara Community, Isoko LGA

4.4.2 Functionality of Sanitation Facility (Toilets)

The functionality of toilet facilities was also assessed to know the current state of the facilities and result is presented.

Table 8 - Functionality of Sanitation Facility (Toilets)

Variable	Frequency	Percentage
Yes (Functional)	12	3.1
No (Not functional)	302	78.6
No Response	70	18.2
Total	384	100

The result indicates that only 3.1% of the toilets provided were still functional, while 78.6% of the respondents reported that the toilets in their schools were no longer functional. This may be attributed to poor maintenance by the school authorities as well as the users. The result further shows that 25.0% of the respondents who reported that the toilets are still functional, said only one (1) toilet unit is still functional, while 33.3% of the 12 respondents reported that the two (2) toilet units constructed were still functional, with 41.7% saying three (units) were still functional.





Figure 7 - Toilets and Hand washing Facilities constructed at Egbo Community

The interviews conducted indicated that most of the projects remain operational, although instances of breakdowns in water facilities and occasional vandalism were reported in certain communities benefiting from the project. However, the condition of sanitation and hygiene facilities in public primary schools within the study area presented a contrasting scenario. According to the interviews with the Monitoring and Evaluation (M&E) officer of the local government, some school toilets were non-functional due to a lack of water supply. This deficiency stemmed from the absence of connections to water sources within the school premises. Additionally, some toilets were overgrown with bushes and lacked access roads or paths, leading to instances of open defecation in and around the schools. The interviews also revealed that students had resorted to digging shallow holes for defecation, which were later exposed by animals. In contrast, sanitation facilities in individual households were reported to be functional and better maintained than those in public schools. Notably, some individual toilets had been upgraded from pit latrines to flush toilets. It is pertinent to highlight that the findings from the questionnaire align closely with the functionality status of the projects as reported during the interviews.

5. CONCLUSION

In conclusion, the impact of the rural water supply and sanitation project in Isoko South Local Government Area of Delta State has been significant and transformative. Through the implementation of this project, access to clean water has been greatly improved, with a notable shift from unreliable sources such as hand-dug wells and streams to more dependable boreholes. This improvement in water infrastructure has not only enhanced public health outcomes by reducing waterborne diseases but has also contributed to the socio-economic development of the community. Furthermore, the provision of adequate sanitation facilities, particularly in schools, has promoted hygiene awareness, reduced open defecation, and created a conducive environment for learning and productivity. While challenges such as sustainability and community participation persist, the project serves as a commendable example of effective intervention in addressing critical water and sanitation needs in rural areas. Moving forward, continued support, collaboration, and investment in similar initiatives are essential to sustain the positive impacts achieved and ensure lasting improvements in the quality of life for residents of Isoko South Local Government Area and similar communities across Delta State and beyond.

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