

# **Assessment of the Contributions of Rural Water Supply and Sanitation Agency (RUWASSA) on Provision of Potable Water Supply in Katsina State, Nigeria.**

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## **Abstract**

*This study assessed the contribution of Rural Water Supply and Sanitation Agency (RUWASSA) to the provision of potable water in some selected local government areas of Katsina State, Nigeria. The rapid increase in the population rate coupled with increasing industrialization and expanding agriculture has necessitated the demand for increase in water supply in Katsina State. The need to supply water for human consumption has been an issue of concern for human survival. There have been public outcries over scarcity of safe drinking water which had led to many households relying on water vendors to buy water for their daily consumption. The study was anchored on Water for All Theory of Change (WATC). The study adopted survey research design and sourced data from primary source using structured questionnaire designed on five (5) point Likert scale. The data collected was subjected to multiple regression analysis and the result revealed among other things that there is positive and statistically significant relationship between water adequacy strategy and provision of potable water supply in Dutsinma, Mani and Faskari Local Government Area of Katsina State. The study recommended among other things that the RUWASSA agency should as a matter of fact put in a lot of effort in the area of water adequacy strategy to ensure availability of potable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina state.*

**Keywords:** *Water supply, potable water, Katsina, multiple regression and Nigeria*

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## **Introduction**

Supplying water for domestic and occupational purposes has been a concern for human survival. Water is important for mans' survival and for the improvement of their economies through industrial activities. "Water supply is one of the world's most pressing concerns of the 21st century and its shortage is now the single greatest threat to human health, the environment, global food supply as well as socio-economic advancement" (International Development Research Centre, 2002). In Sub-Saharan Africa, "domestic usage of water accounts for around 9% of consumable water demands" (World Research Institute, 2014), therefore,

inadequate water to satisfy this need is a major setback in rural areas of the semi-arid zones in Northern Nigeria.

This position captures the assertion of Agnew and Woodhouse (2011:34) as they stated thus: “Water is central to human’s social and economic existence”. It is on the basis that UNDP (2006:22) wrote; “Not having access to safe water therefore, is a form of deprivation that threatens life, destroys opportunity and undermines human dignity. In Katsina State, considering the continuous rise in the population rate and industrialization, there is urgent need for increase in water supply in the State (Ishaku & Majid, 2011).

However, in spite of the increase in demand, the scarcity of water is becoming more obvious particularly in urban as well as rural areas of Katsina state. Katsina state since its creation out of old Kaduna state in 1987 has made efforts to prioritise provision of adequate potable water to the people for both domestic and industrial usage. The state ministry of water resources have made concerted frantic efforts towards ensuring provision of potable water supply through various schemes. The Katsina State Rural Water Supply and Sanitation Agency (RUWASSA) serves as a driver to ensure the actualization of the stated wider objective of the state, that is: To provide a comprehensive water data base in public domain and assessment of impact of climate change on water resources, promotion of citizen and state action for water conservation, focused attention to vulnerable areas including over exploited areas, increasing water efficiency, and promotion of basic level integrated water resources management.

The Katsina State Rural Water Supply and Sanitation Agency (RUWASSA) came into being in November 2003 through legislation by the state house of assembly to complement the effort of Katsina State Ministry of Water Resources and Katsina State Water Board. The establishment of the agency was among other things aimed at giving more priority to the provision of portable drinking water, improvement of hygiene and sanitation of the rural communities across the state, thereby assisting in prevention and eradication of water, sanitation and hygiene related disease etc.

Water supply has been an issue of concern in developing countries. There have been public outcries over scarcity of safe drinking water. According to WHO (2015) only 32% of rural population in developing countries have access to safe drinking water. In order to address the issue, the federal government of Nigeria got involved in the management of water resources in 1976 when the Federal Ministry

of Water Resources and the 11 River Basin Development Authorities (RBDAs) were created. Today, all the 36 states and the Federal Capital Territory of Abuja have water corporations boards managing their public water supply. Their efforts are supplemented, in many cases, by local governments who supply water to villages within their jurisdictions.

In Katsina State, none of the 34 Local Government Headquarters presently has an uninterrupted municipal water supply. In particular, it is only Katsina metropolis and some other few Local Government Areas that are connected with pipe borne water supply. “Regrettably, none of these Local Government Areas households receive an uninterrupted water supply. It is in fact not uncommon for many households to go up to six months in a year without seeing a single drop of water coming through the municipal water supplies to which they are connected” (Katsina State Bureau of Statistics, 2017). It is against this backdrop that the study is carried out to find out if the Katsina State Rural Water Supply and Sanitation Agency (RUWASSA) has ensure adequate supply of safe drinking water to the people of some selected local government area of Katsina State.

### **Research Questions**

This study is therefore carried out to address the following research questions:

- i. To what extent did RUWASSA’s adequate water supply strategy ensured potable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina state?
- ii. How has RUWASSA’s maintenance strategy ensured the provision of potable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina state?

### **Objectives of the Study**

The main aim of the study was to assess the contribution of Katsina State Rural Water Supply and Sanitation Agency (RUWASSA) to the provision of potable water. The specific objectives are to;

- i. Examine the extent to which RUWASSA’s Adequate water supply strategy ensured provision of potable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina state.
- ii. Assess how the contribution of RUWASSA’s maintenance strategy of water facilities ensured the provision of potable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina state.

## **Research Hypotheses**

The following hypotheses were tested to enable us find out the relationship between variables that are prominent in this study:

**H0<sub>1</sub>:** There is no significant relationship between RUWASSA's water adequacy strategy and provision of potable water in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State.

**H0<sub>2</sub>:** There is no significant relationship between RUWASSA's maintenance strategy of water facilities and provision of portable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State.

## **LITERATURE REVIEW**

Inkani (2015) investigated households' vulnerability and adaptation to water shortage in rural areas of Katsina State, Nigeria. To achieve the objective of the study, the study made use of primary data collected from the rural residents through the survey study. The study used both descriptive and inferential statistical techniques. One-way ANOVA, chi-squares test and Kruskal-Wallis H-test were used. The study revealed that there was generally low adoption and assimilation of development plans relating to shortage of water. It was therefore recommended that there should be diversification of livelihoods and advancement of income levels.

Isaac, Charles and Eric (2015) also investigated on the analysis of access to water supply in the Awutu-Senya East Municipality, Ghana. The paper assessed the accessibility to water supply. The study adopted survey design and collected data through structured questionnaire administered to private and public providers of water. The study revealed that about 45% of the water sources are salty while 28% are impure and contaminated. The study recommended that the Municipal Assembly should issue a minimum water quality requirement to all identified private water operators in order to ameliorate the problem.

Ladan (2019) investigated shortage of water as a constraint to irrigation farming at Daberam Dam Site, Northern Nigeria. He examined the shortage of water as a constraint to irrigation farming at the dam site. The study adopted structured questionnaire administered to the irrigation farmers and direct observation during field visit.

Yusuf, Sani, Lawal (2017) assessed the effect of democratic government on water supply in Katsina State. The study adopted both qualitative and quantitative

research design. The study relied on both primary and secondary sources of data. The findings revealed that there are no adequate sources of potable drinking water in Bindawa local government. The study therefore recommended the provision of additional sources of potable drinking water in Bindawa local government and the need to imbibe maintenance culture on the water facilities.

Utsev and Aho (2012) conducted a study on water shortage and health problems in Benue State, Nigeria. The study made efforts to identify the various sources of water, their quality, and the resulting effects when in short supply within the Tse-Agberagba, Akpagher and Ibbilaalukpo communities of Benue state. The study made use of questionnaires, direct observation and oral interview as the instrument of data collection. The study revealed that there is shortage in water supply to meet the water demand of the people. The study recommended among others the improvement of water supply to the settlements through external assistance by provision of water supply facilities and educating water.

Lukman, Ismail and Bolorunduro (2016) conducted a study on the effect of selected factors on water supply and access to safe water in Nigeria. The study evaluated access to safe water supply in Nigeria (Katsina, Kano, Osun, Benue; Bauchi, Gombe, and Kaduna) were visited to confirm methods of water supply. The information was analyzed using analysis of variance (ANOVA). Effects of selected factors on access to safe water were assessed. The study revealed that the national average of access to piped water supply, protected wells; borehole and water vendors were 17.5%; 12.8%; 11.6% and 4.0% respectively.

Lukman, Oke, Asani, Bolorunduro and Foghi (2016) evaluated access to safe water supply in Nigeria with attention on Katsina, Kano, Osun, Benue, Bauchi, Gombe, and Kaduna. Information on access to safe water technology and water supply in Nigeria were obtained from secondary documents like the Ministry of Water Resources report and other related documents. The information was analyzed using analysis of variance (ANOVA). The study revealed among other things that the national average of access to piped water supply, protected wells; borehole and water vendors were 17.5%; 12.8%; 11.6% and 4.0% respectively. The National average of access to safe water supply was 45.9 %.

Narayan (2015) reviewed 121 rural water supply projects in 48 different countries. The data used in the study were generated from the project report evaluations. The main objective of the study was to understand the effect of beneficiary participation

on project effectiveness. To accomplish this task, a multivariate regression model was adopted with projects as the unit of analysis. Participation was quantified on a 7-point scale. A score of one meant there was no participation while a score of seven meant there was a significant level of participation. The study made use of factor analysis on the performance results of 20 projects an overall measure of project effectiveness was generated.

Isham and Kahkonen (2014) investigated two rural water projects in India and one in Sri Lanka relying on quantitative and qualitative data from 1,088 households and 50 water committees. They examined circumstances under which a community-based approach in water resource management is most likely to succeed. Results from the econometric models came out in three interacting layers. First, it affirmed that well-designed water services lead to improved household health and reduced time of water collection; attainment by involving more community members in the design process and also by allowing beneficiaries not outsiders to make final decisions about the type of services needed. Lastly they revealed that a community-based approach in water resource production and management is most likely to succeed in communities with existing active community groups and associations.

Ananga (2015) conducted a study on the role of community participation in water production and management in Kisumu, Kenya. The study adopted mixed methods research design. The approach involved the application of both quantitative and qualitative techniques. The quantitative component of data collection involved administering a survey questionnaire through a simple random sampling technique. The study revealed that networking and collaboration, continuous community engagement/participation, the formation of water consumer groups, coordination and organizational management, extent of institutional formalization, provision of dividends to the community, clannism, population increase, and poverty and community fatigue. The study recommended that an important policy contribution is that CP can be used as a viable strategy in the establishment of effective water schemes in urban informal settlements.

### **Theoretical Framework**

The study adopted water for all theory of change (WATC) by Splash (2015). The theory was necessitated with the available statistics on the effects of water shortage on lost income, lost schooling and its cruel toll on child mortality. For instance, “Hundreds of millions of African, Asian and Latin American families are paying every day in lost income for their lack of access to improved drinking water and

sanitation services; children, especially girls, mostly in Africa and Asia, are missing school because neither their homes nor their schools have adequate drinking water and Over 90% of deaths from diarrhea diseases in the developing world today in children under 5 years old occur as a result of inadequate drinking water” (WHO’s Decade for Action, 2015:10).

The argument of Water for All Theory of Change is that “profound change in people’s lives can only be achieved by increasing the benefit of water in multiple spheres”. The theory is also concerned with how human uses of water fit within ecosystems that address people’s immediate needs while taking into account their long-term relationship with their environment. The theory’s emphasis on drinking water provision has been so profound that it sees it as traditional work of every government because water according to the proponents is the driver of life and should therefore, be made adequate. “The availability concept in the theory called for maintenance concept for sustainable availability to be attained which centers on productive uses of water and ecologically (biological) sustainable water-resource management e.g. through afforestation to increase evaporation and in essence precipitation” (CARE, 2011:1).

From the discussion above, we could state here that Water for Life is centrality of the theory. The relevance of the theory to the study lies on its power to symbolize thus: “not just that no one can survive without safe drinking-water, but that, in different ways at different ages, access to adequate water services influences everybody’s health, education, life expectancy, well-being and social development”. Hence, the need for government, non-governmental and the civil society organizations to join hands together to provide potable water.

## **METHODOLOGY**

### **Research Design**

The research design adopted for the study was cross sectional survey research design. This design is used to obtain information concerning the variables under study and to describe what exists with respect to variables under study. The design was deemed suitable for this study, due to its ability to elicit a wide range of baseline information from the respondents.

### **Target Population, Sample Size and Sampling Techniques:**

The population for the study constituted Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State. The population of Dutsin-ma according 2006

census was 169,829, Mani 176,301, and Faskari 194,400. Therefore, the total population of the three local government stood at 540,530. However, a sample size (population) for the study was drawn using Krejcie and Morgan sample table (1970) which gave us a sample size of 384. The sample size for the study was 384 but 10% of the sample size was added which led to the administration of 422 questionnaires to take care of unreturned questionnaire and incorrectly filled questionnaire as suggested by Israel (2013). The return rate was 93.13% as 393 respondents duly filled and returned their questionnaires, while 29 questionnaires, representing 6.87% were not returned. Therefore, 93.13% rate of returned is enough to make inferences from the sample since it is not below the original sample size of 384.

“The simple random technique is most convenient to the targeted respondent that will be administered with questionnaire hence with random selection or random sampling, each individual has an equal probability of being selected from the population, ensuring that the sample will be representative of the population” (Keppel, 1991). Moreover, out of this 384, we partition the sample according to the population of each Local Government using percentage method as shown in table 1:

**Table 1**                    **Distribution of Questionnaire**

<b>S/N</b>	<b>Local Government</b>	<b>Questionnaire Returned</b>	<b>Percentage%</b>
1	Dutsin-ma	123	31
2	Mani	128	33
3	Faskari	142	36
<b>Total</b>		<b>393</b>	<b>100</b>

**Source:** Researcher’s Survey, 2020.

### *Research Instrument*

The instrument used for this study is structured questionnaire because they are much more efficient in that they permit collection of data from a much larger sample. The structured questionnaire was constructed base on the research questions posed and adopted five (5) point Likert scale.

### **Validity and Reliability of Instrument**

It is equally important that the “items and questions cover the full range of the issue or attitude being measured, assessment of the items of an instrument in this respect

is called content validity” (Kumar, 2011). In order to ensure content validity of the instrument, the questionnaire was adapted from previous research works of Inkani (2015) which was also given to experts to validate the content of the instruments to ensure that the instrument measures what it supposed to measure.

The reliability of the instrument was done using Cronbach Alpha with the help of Statistical Package for Social Sciences (SPSS) version 20.0. The bench mark was 70%. This means that if the output from Cronbach Alpha is 70%, it means the instrument is reliable. In order to ensure internal consistency of the questionnaire, a pilot study was conducted among 10 respondents and the Cronbach’s Alpha output result from the SPSS was 96.8% showing that the instrument is reliable to proceed with analysis as depicted in table 2.

**Table 2 Reliability Statistics**

Cronbach's Alpha	N of Items
.968	15

*Source:* Output from SPSS 20.0

### **Data Analysis Techniques**

Data collected will be coded and entered into the Statistical Package for Social Sciences (SPSS) software. A multiple regression method was used to analyse the data collected because the study presented multiple independent variables with one dependent variable causal relationship. Thus:

$$PWS = \alpha + \beta_1CWA + \beta_2CWM + \varepsilon$$

Where:

- $\alpha$  = Alpha (Constant)
- PWS = Potable Water Supply
- CWA = Contribution of Water Adequacy
- CWM = Contribution of Water Maintenance
- $\varepsilon$  = Margin error (Signifies variables not included in this model)
- $\beta_1$ - $\beta_2$  = Parameters

### **RESULTS AND DISCUSSIONS**

This section presents empirical analysis of returned data, results and discussions. The study adopted parametric statistical tools. Parametric tool was considered

appropriate because the preliminary result shows that the data are normally distributed and show no evidence of outliers. The hypotheses were tested at 95% confidence level.

**Decision Rule:** Reject the null hypothesis if the P-value is less than 5% level of probability and if otherwise, accept the null hypothesis. The hypothesis of the study is stated in a null form as:

**H0<sub>1</sub>:** There is no significant relationship between RUWASSA’s water adequacy strategy and provision of potable water in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State.

**H0<sub>2</sub>:** There is no significant relationship between RUWASSA’s maintenance strategy of water facilities and provision of potable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.845 <sup>a</sup>	.714	.711	.46021	2.117

a. Predictors: (Constant), Maintenance\_of\_facilities, water\_adequacy

b. Dependent Variable: portable\_water

Source: SPSS version 20.0 Output from study data, 2020.

The table 3 presents the model summary of the analysis. The R<sup>2</sup> of 0.714 calculated points to the fact that about 71.4% variations in provision of potable water in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State is explained by the predictors (maintenance strategy and water adequacy strategy). This means that the remaining 29% variation can be explained by factors not included in the model for this study.

Durbin-Watson can be used to test the independence of error terms. The general rule of thumb is that if the Durbin-Watson value is between 1.5 and 2.5, the assumption of independence of the terms is not violated. The Durbin Watson coefficient stood at 2.117 as shown in Table 3 which falls within the benchmark. This indicates the absence of harmful serial correlation. This also fulfils one of the assumptions of linear regression.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1802.270	2	901.135	5198.365	.000 <sup>b</sup>
	Residual	67.606	390	.173		
	Total	1869.876	392			

A. Dependent variable: portable\_water

B. Predictors: (constant), maintenance\_of\_facilities, water\_adequacy

Source: SPSS version 20.0 Output from study data, 2020.

Table 4 above shows the result from the multiple regression analysis which tests the effects of the independent variables (adequacy of water, maintenance of facilities) on provision of potable water supply in Dutsinma, Mani and Faskari Local Government Areas of Katsina State. The F-statistic which measures the adequacy and goodness of fit of the model used in the study stood at 5198.365 with a p-value of 0.000<sup>b</sup> which is significant at 5%; this shows that the model is fit for the data.

Model		unstandardized coefficients		T	sig.
		B	std. error		
		standardized coefficients			
		Beta			
1	(constant)	-.086	.099	-.874	.383
	Water adequacy	.585	.017	.807	35.01
	Maintenance of facilities	.141	.017	.189	8.179

a. Dependent Variable: potable water

Source: SPSS version 20.0 Output from study data, 2020.

Table 5 presents the coefficients of the explanatory variables. The results show a positive and statistically significant effect of water adequacy strategy on provision of potable water supply. The coefficient of 0.585, indicates that one percent increase in water adequacy strategy by RUWASSA lead to 59% increase in potable water supply in Dutsinma, Mani and Faskari Local Government Areas of Katsina State. However, the significance of this can be judged from the P value represented as “sig”(0.000). The P-value is less than 0.05, indicating that the relationship depicted in the model is statistically significant at 95% confidence level. Base on

the decision rule, the study therefore reject the null hypothesis in favour of alternate hypothesis. The study therefore concludes that RUWASSA's water adequacy strategy has significant relationship to provision of potable water in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State.

In the same vein, the coefficient of maintenance of facilities' strategy also shows a positive and statistically significant effect of maintenance of facilities strategy on provision of potable water supply. The coefficient of 0.141, indicates that one percent increase in maintenance of facilities strategy by RUWASSA lead to 14% increase in potable water supply in Dutsinma, Mani and Faskari Local Government Area of Katsina State. However, the significance of this can be judged from the P value represented as "sig"(0.000).

The P-value is less than 0.05, indicating that the relationship depicted in the model is statistically significant at 95% confidence level. Base on the decision rule, the study therefore reject the null hypothesis in favour of alternate hypothesis. The study therefore concludes that RUWASSA's maintenance of facilities strategy has significant relationship on provision of potable water in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina State.

The policy implication of this result is that RUWASSA strategy used in supplying water to the local government in order to ensure uninterrupted water supply have the capability of putting an end to the issue of water supply in the areas where there is problem of water scarcity if sustained in the study area.

### **Conclusion and Recommendations**

The study assessed the contribution of Katsina State Rural Water Supply and Sanitation Agency (RUWASSA) on the provision of potable water. Based on the analysis carried on the primary data collected from the sample of 393 respondents, the results obtained show that RUWASSA's water adequacy strategy have a positive and statistically significant effect on provision of potable water in Dutsinma, Mani and Faskari Local Government Area of Katsina State. With one percent increase RUWASSA's water adequacy strategy, there is likely to be an increase of about 59% in potable water provision. The results further reveals that "RUWASSA's maintenance of facilities strategy shows a positive and statistically significant effect on provision of potable water in Dutsinma, Mani and Faskari Local Government Area of Katsina State". The result also shows that one percent increase in maintenance of facilities strategy in the study area tends to increase

provision of potable water by about 14%. Based on the findings, the study therefore recommended that:

- i. The Agency should as a matter of fact put in a lot of effort in the area of water adequacy strategy to ensure availability of potable water supply in Dutsin-ma, Mani and Faskari Local Government Areas of Katsina state. Through strategic allocation of water sources and proper identification of vulnerable areas, thorough investigation of water shortage areas. This will go a long way in ensuring that a large number of people having access to potable water in these areas.
- ii. The Katsina State Rural Water Supply and Sanitation Agency (RUWASSA) should also strive to imbibe the culture of maintenance in its operations and among communities it serves as a whole. In itself; the agency should ensure prompt and routine maintenance of water sources to ensure constant supply of water to the generality. In respect to the people, the agency should encourage the beneficiaries to imbibe maintenance culture by handling with care and to take responsibility of any minor damage caused by them on the facilities.

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