ASSESSMENT OF ATTITUDE OF WATER PURIFICATION AND SOCIO ECONOMIC VARIABILITIES AMONG HOUSEHOLDS IN ZAMFARA STATE, NIGERIA

Abdulfatah Hajara AMINU[1], Mustapha Lawali KAGARA[2] & Seun Nurudeen AKOREDE[3]

[1]Department of Human Kinetics and Health Education, Ahmadu Bello University, Zaria.

[2]Department of General Studies, College of Health Sciences and Technology, Tsafe.

[3]Department of Human Kinetics and Health Education, Ahmadu Bello University, Zaria.

Abstract

The paper assessed the attitude of water purification and socio economic variabilities among households in Zamfara State, Nigeria. A descriptive survey research design was used. Population for this study was 592,106 households in Zamfara state. Sample size of 384 was selected using multistage sampling procedures which include cluster, proportionate and systematic sampling. Instrument for data collection was questionnaire developed by the researcher and validated by five (5) experts. The instrument was pilot-tested using Cronbach Alpha and a reliability co-efficient of 0.892 was obtained. SPSS version 25 was used for data analysis, descriptive statistics of frequency and percentages was used to analyze the demographic characteristics of the respondents, mean and standard deviation was used to answer research question 1 and 2. Inferential statistics of one-sampled t-test was used to answer hypotheses 1 on the attitude towards water purification, multiple regression analysis was use to answer research question 2 on socio economic determinants of households water purification. All hypotheses was tested at 0.05 level of significance, the result revealed that attitude of water purification among households in Zamfara State is significant ($p = 0.000$); socio economic determinants (income, education and occupation) on attitude toward water purification among households in Zamfara State is significant ($p = 0.000$) Based on the results, the study concluded that households in Zamfara State demonstrate significant positive attitudes toward water purification methods which are influenced by socio economic factors such as income, education, and occupation. Based on the conclusion, the study recommended that Zamfara State Ministry of Water Resources and Rural Development should capitalize on positive attitudes by launching campaigns that reinforce the benefits of water purification, NGOs and international agencies tailor interventions to address socio economic disparities, especially for low-income and less-educated households.

Key words: Attitude of water purification, household, socio economic variabilities

INTRODUCTION

Treatment for drinking water production involves the removal of contaminants and/or inactivation of any potentially harmful microbes from raw water to produce water that is pure enough for human consumption without any short term or long term risk of any adverse health effect. In general terms, the greatest microbial risks are associated with ingestion of water that is contaminated with human or animal (including bird) faeces. Faeces can be a source of pathogenic bacteria, viruses, protozoa and helminths (WHO, 2020). The size and capacity of water

treatment systems vary widely ranging from simple households units to small facilities that serve manufacturing industries to large scale centralized water treatment plants dedicated to cities and towns. Selection of specific treatment processes depends upon factors such as intake water quality, degree of purification required, intended water use, flow capacity requirements, government regulations, available capital and the operations as well as maintenance costs involved (Centre for Disease Control, 2022). Water contamination is primarily caused by the discharge of untreated wastewater from enterprises. The effluent or sewage discharge from various enterprises which contains varying levels of contaminants is dumped into rivers or other water sources.

The waste water may have a high proportion of organic and inorganic contaminants at the initial discharge. Industries generate waste water as a result of fabrication processes, processes dealing with paper and pulp, textiles, chemicals and from various streams such as cooling towers, boilers and production lines (Singh, et al, 2018).

Objective of the Study

The main purpose of this study is to assess the attitude of water purification and socio economic variabilities of households in Zamfara State. Therefore, the study will be guided by the following specific objectives, to:

1. Assess attitude of households towards water purification in Zamfara State;
2. Assess socio economic determinants of attitude toward water purification among households in Zamfara state.

Research Questions

The following research questions are formulated to guide the study:

1. What are attitude of water purification among households in Zamfara State?
2. What are the socio economic determinants of attitude households toward water purification in Zamfara state?

Hypotheses

The following hypotheses were formulated to guide the study:

1. **H_{02}:** Attitude toward water purification among households in Zamfara State is not significant.

2. **H_{02}:** There is no significant difference in socio economic determinants (income, education and occupation) of attitude toward water purification among households in Zamfara state.

Methodology

This paper will assess attitude toward water purification and socio economic variabilities among households in Zamfara State. In order to achieve this purpose, research design, population of the study, sample and sampling technique, data collection instrument, validation of the instrument, data collection procedure and procedure for data analysis were discussed.

Descriptive research design was used for this study. According to Shields and Rangarajan, (2013), descriptive research is used to describe characteristics of a population or phenomenon being studied. It does not answer questions about how/when/why the characteristics occurred. Rather it addresses "what" question (what are the characteristics of the population or situation be studied). Descriptive research design focuses on the people and their beliefs, opinions, perception and behaviours (Nwana, 2015).

The population of this study comprise of five hundred and ninety two thousands, one hundred and six (592,106) households from all fourteen (14) Local Government Areas (LGAs) in Zamfara State. This is based on the data obtained on Distribution of Households by Type of Housing Unit from the National Population Commission (NPC, 2020), Zamfara State office, Gusau.

A sample size of three hundred and eighty four (384) Households was participated in the study. This is based on the sample size selection table by Research Advisors (2006), which suggests that for a population of 592,106 a sample size of 384 is sufficient for generalization at a 95% confidence level and at 5.0% margin of error. Multistage sampling technique was used by the researcher that comprises of cluster, proportionate and systematic sampling which Alvi (2016), explained that, this type of sampling technique are being used when the elements of the population are more than one and spread. Cluster sampling technique was used by the researcher to group or

to divide the state based on three (3) senatorial zones (i.e Zamfara central, north and west). A proportionate sampling technique was used to select one (1) Local Government (Gusau) from Zamfara central, One (1) Local Government (kaura namoda) from Zamfara north and 2 Local Government (Talata Mafara & Gummi) from Zamfara west senatorial zone. Thus, Zamfara central has only four (4) Local Governments, Zamfara north also has four (4) local governments while Zamfara west has (6) Local Governments respectively. In order to be fair to the population distribution, the research chooses two (2) Local Government from Zamfara west and one (1) each from Zamfara north and Zamfara central zones.

A proportionate sampling procedure was adopted to compose the sample size of 384 among the four (4) selected Local Government Areas where Gusau has 130 numbers of respondents, Kaura Namoda 100, Talata Mafara 78, and Gummi 76. Which Sulaiman (2015), explained that proportionate sampling is used when the elements of the populations vary considerably in size because, it assures that those in larger size will have the same probability of getting the larger sample size as those in the smaller size will get the small sample and systematic sampling was used for selection of households on the basis of numerical sequence.

Table 1: Sample Size Distribution

S/N	Senatorial Districts	Sampled Local Gov't Areas	Sampled Households
1.	Zamfara Central	Gusau	130
2.	ZamfaraNorth	Kaura-Namoda	100
3.	ZamfaraWest	Talata-Mafara	78
		Gummi	76
Total	**03**	**04**	**384**

A questionnaire titled "Assessment of attitude toward Water purification among Households" (AAWPH) was developed by the researcher. The questionnaire is made in four parts- A and B. Part A obtained the information of households socio demographic characteristics, parts B obtained households information on attitude toward water purification using likert scale level of agreement of Strongly Agree (SA), Agree (A), Strongly Disagree (SD) and Disagree (D) with the value of 4, 3, 2 and 1respectively.

The instrument was subjected and validated by 5 experts who scrutinized the instrument were suggestions and corrections where incorporated in the final draft.

The validated instrument was subjected to reliability test using cronbach Alpha to test the internal consistency via statistical package for social science (SPSS) and reliability level of 0.892 was obtained.

An introductory letter from the Head of Department of Human Kinetics and Health Education, Ahmadu Bello University, Zaria was to obtain by the researcher to enable him collect data from the sampled households, where 384 questionnaires were duly distributed to 384 households through their consent by the researcher with the help of three (3) research assistants and 384 questionnaires was retrieved.

For the analysis of the data that was collected from the households, the statistical package for social sciences (SPSS) Version 25 was used to analyze the data obtained from the respondents. The demographic characteristics of respondents were computed using frequency and percentage. Research question 1and 2 was answered using mean and standard deviation, One sample-t-test was used to test hypotheses 1on attitude toward water purification, while multiple regression analysis was used to test hypothesis 2 on socio economic determinants of water purification among households in Zamfara state. All hypotheses were tested at 0.05 level of significance.

RESULTS

All data collected on demographic characteristics of the respondents were tabulated using frequencies and percentages as indicated in Table 2

Table 2: Demographic Characteristics of the Respondents

Item	Variables	Frequency	Percentage (%)
Age	18 – 40	240	62.5
	40 and above	144	37.5
Gender	Male	297	77.3
	Female	87	22.7
Income	Less than 30,000	89	23.2
	30,000 to 50,000	167	43.5
	50,000 to 100,000	80	20.8
	More than 100,000	48	12.5
Education	Primary	14	3.6
	Secondary	64	16.7
	Tertiary	288	75.0
	Non Formal	18	4.7
Occupation	Civil Servant	237	61.7
	Business Man	81	21.1
	Farmers	36	9.4
	Others	30	7.8

Table 2 provides the demographic characteristics of the respondents in the study. The data is presented across three variables: age range in years, gender, income, educational qualification and occupation, with corresponding frequencies and percentages. In terms of age distribution, the majority of respondents 62.5%, (240 respondents) were between 18 and 40 years old, while 37.5% (144 respondents) were 40 years and above. The gender composition of the sample was predominantly male, with 77.3% (297 respondents) being men and 22.7% (87 respondents) being women. Regarding income levels, the largest group of respondents 43.5%, (167 respondents) reported earning between 30,000 to 50,000 Nigerian Naira, The second largest income group was those earning less than 30,000 Naira, accounting for 23.2% (89 respondents). 20.8% (80

respondents) reported earning between 50,000 to 100,000 Naira, while the smallest group (12.5%, 48 respondents) earned more than 100,000 Naira.

Educational qualifications of the respondents showed that the vast majority 75%, (288 respondents) had tertiary education. Secondary education was the next most common, with 16.7% (64 respondents). Only 3.6% (14 respondents) had primary education, while 4.7% (18 respondents) had non-formal education. In terms of occupation, civil servants constituted the largest group, representing 61.7% (237 respondents) of the sample. Businessmen made up 21.1% (81 respondents), while farmers accounted for 9.4% (36 respondents). The remaining 7.8% (30 respondents) were classified under "Others" for their occupation.

Table 3: Mean Scores of Responses on attitudes of households towards water purification in Zamfara State

S/N	Item	Mean	Std
1.	I believe in the use of filter to purify my drinking water.	3.57	0.60
2.	I believe in boiling my water before drinking.	3.36	0.63
3.	I believe that untreated water can hinder well-being or good health	2.96	1.13
4.	I believe that open defecation or faecal route can cause waterborne diseases.	3.31	0.85
5.	I believe that the use of aluminuim sulphate (Alum) can help in water sedimentation.	3.17	0.59
6.	I believe that the use of filters such as nets, clean rags and sievers can improve the quality of water.	3.50	0.70
7.	I believe that the use of contaminated water can expose individuals to so many diseases such as typhoid and cholera.	3.52	0.57
8.	I believe that the use of borehole water and dig well water is safe for drinking.	3.37	0.64
9.	I believe that faecal route or open defecation and urination are some of the major sources of water contamination	3.23	0.83
10.	I believe that putting water in the sun reduce contaminant in water.	2.50	0.98
	Aggregate	**3.25**	

Table 3 presents the mean scores of responses regarding the attitudes of households towards water purification in Zamfara State. The highest mean score is 3.57 for the belief in using filters to

purify drinking water, suggesting a strong inclination towards this method among households. Following closely is the belief in boiling water before drinking, with a mean score of 3.36, indicating that many households consider boiling an effective purification method. Additionally, the belief that untreated water can hinder well-being or good health has a mean score of 2.96, reflecting a moderate awareness of the health risks associated with unsafe water.

Households also show significant concern about waterborne diseases, as evidenced by a mean score of 3.31 for the belief that open defecation and the faecal route can cause such diseases, and a score of 3.52 for the understanding that contaminated water can lead to illnesses like typhoid and cholera. This awareness is crucial for promoting better water sanitation practices. The use of aluminium sulfate (Alum) for water sedimentation received a mean score of 3.17, indicating a moderate level of acceptance of chemical methods for water purification. The belief in the effectiveness of physical filtration methods, such as nets and clean rags, scored 3.50, further emphasizing a preference for practical, hands-on purification methods. Conversely, the idea that exposure to sunlight can reduce contaminants in water received the lowest score of 2.50, suggesting scepticism or lack of knowledge about this method. Overall, the aggregate mean score of 3.25 indicates a generally positive attitude towards water purification among households in Zamfara State., surpassing the decision mean of 2.50.

Table 4: Mean Score of responses on the socio-economic determinants of attitude of households toward water purification in Zamfara State

	Mean	**Std. Dev.**	**Mean Difference**
Attitude (Constant)	3.25	0.31	
Income	2.23	0.94	1.02
Educational Qualification	2.81	0.57	0.44
Occupation	1.63	0.94	1.62

Table 4 shows the mean score on the socio economic determinants of attitude of households toward water purification in Zamfara State with a mean of 3.25, 2.23, 2.81 and 1.63 and mean difference of 1.02, 0.44 and 1.62. Based on this outcome, socio-economic factors (income, educational qualification and occupation) determine the attitude toward water purification among households in Zamfara State.

Table 5: One-Sample t-test Analysis of Attitude toward Water purification among households in Zamfara State

Variable	N	Mean	Std. Dev.	df	t-value	p-value
Attitude	384	3.45	0.31	383	202.407	0.000
Test Mean	384	2.50	0.00			

Calculated $p < 0.05$, calculated t-value > 1.972 at df 383

The result of the one-sample t-test statistics in Table 5 reveals that the attitude toward water purification among households in Zamfara State is significant because the calculated p-value of 0.000 is lower than the 0.05 level of significance and the calculated t-value of 202.407 is higher than the 1.972 critical t-value at 383 degrees of freedom (df). Therefore, the hypothesis which stated that the attitude toward water purification among households in Zamfara State is not significant was rejected. This means that members of households in Zamfara State have positive attitude towards water purification.

Table 6: Multiple Regression Analysis on Attitude toward Water Purification and Socio-economic Variables

Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.232	.054	0.046	.30719	1.497

ANOVA

Model	Sum of Square	Df	Mean Square	F	Sig
Regression	2.041	3	.680	7.209	0.000
Residual	35.859	380	.094		
Total	37.900	383			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
(Constant)	3.650	.111		32.980	.000
Income	.037	.018	.112	2.122	.034
Educational Qualification	.064	.030	.115	2.105	.036
Occupation	.086	.019	.257	4.520	.000

Table 6 shows the outcome of multiple regression analysis on attitudes toward water purification among households and socio economic variables (income, education and occupation) in Zamfara State. The overall model shows a statistically significant relationship ($F(3, 380) = 7.209$, $p < .005$), indicating that at least one of the predictors (income, education qualification and occupation) has a significant influence on attitude toward water purification. However, the amount of variance explained by the model is relatively low, with an R-squared of 0.054, suggesting that only about 5.4% of the variability in attitude toward water purification can be explained by these socio-economic variables.

Examining the individual predictors, income, educational qualification and occupation each have statistically significant relationships with attitude toward water purification. Specifically, income ($\beta = 0.112$, $p < .005$), educational qualification ($\beta = 0.115$, $p < .005$), and occupation ($\beta = 0.257$, $p < .005$) all positively influence attitude, as indicated by their positive standardized coefficients. Based on this outcome, the hypothesis which stated that there is no significant

difference in attitude toward water purification among households on socio economic variables (income, education and occupation) in Zamfara State was rejected.

DISCUSSION

The finding from the study revealed that attitude toward water purification among households in Zamfara State is significant ($p = 0.000$). This means that the attitude of households in Zamfara State towards water purification is significantly positive. The finding aligns with several previous studies, while also showing some differences compared to others. This result is consistent with the study by Handan, et al (2023) on the assessment of knowledge, attitudes and practices on water, sanitation and hygiene in Zaria Local Government Area, Kaduna State, which found that most households (52.9%) made good attempts to treat unpackaged water, suggesting a positive attitude towards water purification. The most popular treatment methods were similar to those likely used in Zamfara, including alum, boiling, and chlorination. Similarly, Jimoh et al. (2017) found that 94.4% of respondents in Biye community, Kaduna State, were aware of household water purification methods, indicating a generally positive attitude. This high level of awareness aligns with the significantly positive attitude found in the current Zamfara study.

The finding also agrees to some extent with Abera et al. (2020) in Tigray, Ethiopia, where 48.5% of respondents had a favourable attitude towards water sanitation and hygiene practices, including water purification. However, the Zamfara study seems to show a more universally positive attitude compared to the mixed results in Tigray. On the other hand, this result contrasts somewhat with Mustapha et al. (2022) in Sokoto State, where only 46.2% of respondents claimed to treat their water supply. This suggests that the positive attitude in Zamfara may not necessarily translate to widespread practice, a common theme in WASH studies.

The significantly positive attitude in Zamfara also differs from Rima et al. (2017) in Nepal, where only 57.14% of participants had a positive attitude towards water sanitation and hygiene. This difference could be due to various factors including cultural differences, education levels, or recent WASH interventions in Zamfara. Overall, while the strongly positive attitude in Zamfara is encouraging and aligns with some previous studies, it's important to note that attitude doesn't always directly correlate with practice.

The finding from the study revealed that socio economic determinants (income, education and occupation) on attitude toward water purification among households in Zamfara State is significant ($p = 0.000$). This means that socio economic factors such as income, education, and occupation significantly influence the attitude of water purification among households in Zamfara State. This result agrees with Abera et al. (2020) observed in their study in rural Ethiopia that unfavourable attitudes related to water, sanitation and hygiene were more common among residents with lower socio economic status.

The findings are also consistent with Rima et al. (2017), who reported a statistically significant difference in attitudes regarding water sanitation and hygiene based on mothers' education levels in rural Nepal. Those with higher education demonstrated more positive attitudes.

CONCLUSIONS

Based on the findings of the study, the following conclusions are made:

1. The attitude of households in Zamfara State towards water purification is significantly positive.
2. Socio economic factors such as income, education and occupation significantly influence the attitude toward water purification among households in Zamfara State.

RECOMMENDATIONS

Based on the conclusions, the study recommended that:

1. The Ministry of Water Resources and Rural Development should capitalize on positive attitude by launching campaigns that reinforce the benefits of water purification.
2. NGOs and international development agencies should tailor their water purification interventions to address socio economic disparities, focusing on low-income and less-educated households.

REFERENCES

Abera A.B.**,** Abraham D.A. Alemnesh A.A., Asfawosen B.A. Ataklti W.G., Degnesh Z.N. Equbay G.G., Kiros G.D., Kiros A.F. and Nega B.M. (2020), Knowledge, Attitude and Practices on Water Sanitation and Hygiene among Rural Residents in Tigray Region, Northern Ethiopia, *Journal of Environmental and Public Health*. https://doi.org/10.1155/2020/5460168.

Alvi, S. (2016), *contemporary decision making in research sampling,* 4th edition, John Wiley & sons, pp. 087-098.

CDC, (2022). Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Foodborne, Waterborne, and Environmental Diseases. available on https://www.cdc.gov/.

Handan, T. E., Ahmed, M. A., Victor, S., Umar, S. & Daze, D. H. (2023). Assessment of knowledge, attitudes and practices on water, sanitation and hygiene in Zaria Local Government Area, Kaduna State.Science World Journal, 18(3) 422-428.

Jimoh, M.I., Muawiyyah, B.S., Abdulhakeem, A.O., Abdulrazaq, A.G., Hadiza, A. & Lawal, A. (2017). Knowledge, Attitudes, and Practices of Household Water Purification among Caregivers of Under-Five Children in Biye Community, Kaduna State, department of Community Medicine, Ahmadu Bello University Teaching Hospital Zaria, Nigeria, *Archives of medicine and surgery*, *1*(2) 35-41.

Mustapha, M., Okareh, O.T., Sridhar, M.K.C. & Aliyu, M.M. (2022). Households awareness and practices on Water Sanitation and Hygiene (WASH) in an Arid Region of Northwestern Nigeria, Sokoto State. Nigeria. *West African Journal of Applied Ecology*, 30(2) 47 – 66.

National Population Commision, (2020). *Distribution of households by the type of housing unit. Available at Guasu NPC office.*

Nwana V. C. (2015). Disorder of the cardiovascular system. *Harrison Principles of Internal Medicine*. New York. Pp. S33–S37.

Research advisors (2006), sample selection table.

Rima, K.S., Kumar, P.S., Jitendra K.S., Sudip C. & Sanjeev K.S. (2017). Assessment of the knowledge, attitude and practice regarding water, sanitation and hygiene among mothers of under-five children in rural households of Saptari District, Nepal. *American Journal of Public Health Research*, *5*(5) 163-169.

Shields, P. & Rangarajan, N. (2013). A Playbook for Research Methods: Integrating Conceptual Frameworks and Project Management. Stillwater, OK: New Forums Press. Pp. 269-278.

Singh, N.B. Nagpal, G. Agrawal, S. & Rachna, N. (2018). Water purification by using Adsorbents: A Review. *Environmental Technology & Innovation.* 11: 187–240. doi:10.1016/j.eti.2018.05.006.

Sulaiman, H. (2015). Assessment for the implementation of Universal Basic Education in North-western Nigeria. *Journal of Education Research*, *3*(8), 76-88.

WHO, (2020) International Network to Promote Household Water Treatment and Safe Storage, combating waterborne disease at the household level, WHO annual report 2007, cited 2014 Nov 21. Available from http://www.who.int/water_sanitation_health/publications/combating_diseasepart1lowres.pdf.