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Empirical Assessment of Water, Sanitation and Hygiene Practices in a Semi-Urban Setting: A Socio-Economic and Cultural Mirror

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Authors' contributions

This work was carried out in collaboration between authors DOO and UEO. Author DOO design the study, wrote the protocol, and the first draft of the manuscript. Author DOO managed the literature searches and the analyses of the study performed. Authors DOO and UEO did the statistical work and managed the analysis with appropriate interpretation of the data and results. All authors read and approved the final manuscript.

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ABSTRACT

Insufficient water, weak sanitation and poor hygiene practices create a serious burden of diseases in low-income regions and is affecting susceptible groups such as the poor. Although water and sanitation programs have been initiated in many local communities; Water, Sanitation and Hygiene (WaSH) promotion still receives little attention and funding. This study focuses on the socio-economic and cultural factors influencing Ota residents, a semi-urban town in South West Nigeria on WaSH services. The study uses structured questionnaire as one of the major research instruments. The method of data analysis utilized descriptive analysis with illustrative data representations. Analysis of the data reveals that literacy level and age group play a significant role in housing settlements while source of water and quality significantly affect health, and its quantity affects sanitation practices. The evidence from the study confirmed that cultural practices and access to water sources had no direct relationship. Hence, the problem of good water supply was

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seen to be more of economic and financial challenges that require timely government intervention. Financially, the economic context does not permit the implementation of a real water management policy. In most houses, income does not favor the subscription of some households to water distribution network. Therefore it is recommended that a concerted effort on the part of the government be focused on maximizing welfare policy programmes that would ameliorate the sufferings in the communities as it relates to access to clean water sources and other basic social infrastructure that could enhance people's living standard.

Keywords: Socio-cultural; economic; wash; semi-urban settlement; infrastructure.

1. INTRODUCTION

The Millennium Development Goal (MDG) for water and sanitation provides a useful context to monitor global, regional and national progress in expanding access to safe water and sanitation [1,2]. Access to clean water supply and good sanitation services enhance sound health, boost socio-cultural development, and promote economic balance [3]. However, the development and incidences of water, sanitation and hygiene challenges among many countries of West Africa and particularly Nigeria has become more pronounced in recent times [3-5]. Estimates from global report shows that 6.6% of burden of illness is attributable to poor water, sanitation and hygiene. This challenge is heavily concentrated in low income settings and is affecting susceptible groups such as the poor and the disadvantaged in developing nations which is a major contributor to the cycle of poverty [2,6-10]. The rationale behind this kind of condition connected with insensitivity of government institutions at all levels towards the low income settings, inadequate financial plan, poor sustainability of modern water systems and sanitation, poor hygiene and inadequate sanitation in public places [11].

The consequence of the shortfall in the provision of adequate infrastructure influences other processes that are directly related to human development such as life expectancy at birth, access to a good education and adequate financial returns [2]. Majority of the populace in these settings are most vulnerable to social exclusion and hence are not involved in the economic, social, political and cultural activities within the spheres of the urban settlements. It was also recognized that access to water and sanitation being a human right, contribute to economic development, education and improvement in nutritional standard of Children [12-15]. However, most of the susceptible people are often exposed to the most deplorable living standards and environmental constraints [16].

Although water and sanitation programs have been initiated in many communities in Nigeria, WaSH promotion still receives little attention and funding [17-19]. This assertion was corroborated [20] that in spite of the numerous commitments to international agreements as well as local policy initiatives at various levels of government, the water supply and sanitation coverage in Nigeria remains low with no significant improvement.

Existing literature on WaSH addressing the challenge of this kind seems loose and without thorough analytical techniques in understanding the issue from the perspective of cultural communities [20]. Most analysis is short of indigenous relevant concepts to facilitate understanding and solution. Such shortfall does not allow the understanding of complexities thus making it less useful to address realities. It was also argued by the author that instead of applying only logic of pure science to deal with water and sanitation issues, it would be more meaningful if the issues are solved within the cultural context. This would help to understand the realities of local circumstances of beliefs and values that would help to design intervention program to reduce health risks in the cultural communities. Most local settlements have been characterized with poor health conditions and high vulnerability to health risks, poor toilet facilities and environmental sanitation coupled with inadequate waste recycling and disposal arrangement [15]. Since water supply, safe sanitation and hygiene practice continue to have health implications in the developing world. Therefore, the participation of health professionals is crucial to expediting actions on how the progress on people's health can be improved upon [21]. [22] expressed that a great deal of the effect of water supply on health is mediated through increased availability of water supply and adequate hygiene practices.

Disease burden is associated with deficient water supply, sanitation and hygiene which could

largely be prevented with proven cost-effective interventions. The benefits of these interventions are greater than the health benefits alone and can be valued at more than the costs of the interventions [9]. Some of the hypothesis for this study are: i) Can the problem of water and sanitation in communities be truly solved without reference to the general contexts of environment and culture? and ii) What would the assessment of economic significance and its financial implication bring to this context?. Nigeria being one of the world's water flashpoints necessitates the investigation and identifying the state of water and sanitation practices in a selected semi-urban municipality in Nigeria. It is also considered that the facts derived from this study would be a vivid reflection of what obtains in most parts of the country. Given the challenges posed, this paper seeks to empirically investigate the socio economic and cultural factors that influence WaSH program. The study contends that any attempt at improving the livelihood of this populace must be preceded by a fundamental understanding of the factors that characterized the formation of this settlement.

2. METHODOLOGY

2.1 Study Area

This study focuses on Ota metropolis, a town in Ado-Odo local government of Ogun State, Southwest Nigeria. The municipality covers an area of 885 square kilometers with an average density of 372 persons per square kilometer and lies between latitude 6°58' N and longitude 6°42' E. The Ado-Odo/Ota Local Government Area is one of the 20 Local Government Areas (LGAs) of the State. The municipality shares neighborhood with the commercial city of Lagos State thus hosting majority of the population spill over from the densely populated commercial city of Lagos. The LGA is the second largest in Ogun State and having about four hundred and fifty (450) towns, villages and settlements. The towns and cities include Ado-Odo, Agbara, Igbesa, Iju-Ota, Itele, Kooko Ebiye Town, Owode and Sango Ota, among others. Fig. 1 is the map of Nigeria showing the location of Ota and the adjacent cities to it.



Fig. 1. Map of Nigeria showing the study area and adjacent cities to it

2.2 Methodological Framework

The study is empirical in nature and it made use of structured questionnaires in addition to in-depth interviews and on-site observations in capturing the information on water, sanitation and hygiene among the respondents in the study area. The study is both quantitative and descriptive with field works that assessed socio cultural and economic factors influencing semi-urban dwellers in Southwest-Nigeria. The responses from this study were transformed to quantitative measureable variables. It takes into account housing typology which comprises parameters such as average household income, size of households, water rate and usage pattern, number of subscribers to drinking water system, and annual average rainfall. Other factors are: human and environmental factors, sanitation behavior, problems of poor water and sanitation, economic significance and its financial implications.

The samples were selected using the stratified random sampling techniques to randomly select household units among the stratified settlement clusters [21,23]. The study covered several communities and villages within the 16 wards in the local government area which has an estimated population of 526,565 residents living in and around it [24]. A total of 500 questionnaires were administered and 495 were collected which captured 99 percent return rate. The demography showed that 249 male and 246 female responded to the questionnaire. The literacy level of the respondents showed a better understanding of the subject matter as this promotes the efficacy of the research. In order to protect the identity of the respondents and to ensure confidentiality, results are presented without any reference to names of communities, groups and individuals.

2.3 Statistical Analysis

For the purpose of this study, the instrument for data collection was structured into six different sections: the first section deals with the socio-demographic characteristics of the respondents, second section is concerned with the housing characteristics, third section focused on water-related challenges in the settlement, fourth section dwells on socio-cultural factors influencing water sources while the fifth and sixth section were concerned with the hygiene behavior and sanitation problems respectively. The assessment of the instrument (questionnaire) was based on the socio-cultural

and economic factors that influence the lifestyle of the people, predominantly among the people living in the semi-urban areas.

The respondents were assessed on the issues bordering on housing characteristics, water supply and socio cultural impediments to improve standard of living, sanitation and hygiene behaviors. In a bid to execute a thorough research, a total of 50 variables were used; 9 variables related to the socio-demographic information of the respondents, 6 on housing settlement, 13 focuses on water related issues, 6 captured socio-cultural factors, 7 variables relate to sanitation and hygiene, 9 questions were raised in addressing the problems of poor water supply and sanitation. The quantitative data was analyzed using SPSS with a linkert scale ranging from two to seven rating points. The frequency and percentage representation of the retrieved data were done. Inferential statistics was utilized in the multivariate regression and the variant opinions and perception scores were calculated as the sum of the individual respondent's scores for each case analyzed.

3. RESULTS

Table 1 shows the socio-economic characteristic of the respondents. From the analysis, the housing characteristics showed that over 90 percent of the respondents lived in brick houses, 7.1% live in mud houses and only 0.6% live in other types of houses made with local materials.

The percentage distribution of the total audience comprises of 50.3% males and 49.7% females with the male population having a dominant distribution compared to the females. The result from the study reveals that 50.3% of the total respondents earn daily wages, 5.7% earn weekly income, only 1% are paid on fortnight basis, 35.2% receive monthly salary and others outside these categories were 7.9% of the total sample study. The estimated monthly income from businesses indicates that 61% had less than N25,000 Nigerian naira, approximately (\$125) as income from business, 20.8% of the total respondents have 26,000-50,000 as income, those making up to 51,000-100,000 are 6.1% while those on the range of 100,000 and above are 12.1%. 4.2% of the surveyed sample is engaged in farming as their means of livelihood, 49.1% are traders, 22.4% are skilled craft workers, those in civil service are 11.1% and other respondent represents 13.1% of the total sample.

Table 1. Socio-economic characteristic of the respondents

Categories of the inhabitant houses	Frequency	Percent
Brick House	457	92.3
Mud House	35	7.1
Others	3	0.6
Gender		
Male	249	50.3
Female	246	49.7
Total	495	100.0
Age group		
Less than 15	8	1.6
15 - 24 years	120	24.2
25 - 44 years	234	47.3
45 - 64 years	103	20.8
65 - 74 years	22	4.4
75 years and Above	8	1.6
On what basis people are paid		
Daily	249	50.3
Weekly	28	5.7
Fortnightly	5	1.0
Monthly	174	35.2
Others	39	7.9
Estimated income from business		
Less than 25,000	302	61.0
26,000 - 50,000	103	20.8
51000 - 100,000	30	6.1
100,000 and Above	60	12.1
Occupation		
Farming	21	4.2
Trading	243	49.1
Skilled Craft	111	22.4
Civil Service	55	11.1
Others	65	13.1

Table 2 shows the marital status and literacy level of the respondents. As regards to marital status, it was observed that 23% percent of the total respondents were single while 3.2% were engaged. Greater percentage of the respondents 71.5% were married and the widowed constituted 2.2% of the respondents.

With reference to the literacy level as presented in Table 2, 12.3% of the total respondents cannot read nor write, 7.3% only read but not write,

however 80.4% can read and write. Of the total respondents, 6.1% had no schooling, 20.2% had primary school education, 51.1% had secondary school education which is a great fraction compared to the others and 21.8% had tertiary education. Other forms of education by the respondents summed up to 0.8%. Analysis of the data reveals that literacy level and age group influence plays a significant role in housing settlements while source of water and quality significantly affects health and sanitation practices.

Table 2. Marital status and literacy level of the respondents

Marital status	Frequency	Percent
Single	114	23.0
Engaged	16	3.2
Married	354	71.5
Widowed	11	2.2
Literacy level		
Can't read or write	61	12.3
Only read but not write	36	7.3
read and write	398	80.4
Level of education		
No schooling	30	6.1
Primary	100	20.2
Secondary	253	51.1
Tertiary	108	21.8
Quranic school	2	.4
Others	2	.4

4. DATA ANALYSIS

The analysis on the data collected is presented in the Table 3. Model 1 shows the empirical evidence of the estimated bivariate and multivariate analysis of the study. The F-test was employed for the ANOVA in determining the model's fitness as shown in Table 4 (Cases 1-6).

It is observed that a significant relationship exist between the variables at 1% and 5% level of significance ($P < 0.01$ and $P < 0.05$).

5. DISCUSSION

5.1 Housing Characteristics

The result on housing characteristics in Table 1 shows that brick houses are mostly common in the community. Mud houses are also located among the bricks houses. Most often there is little or no effort made for adequate provision for

modern toilet facilities within or close to the houses. The common practice of pit latrine locations was found to be at a distance of about 3 to 8 m from the main buildings. This location was determined by available landed property. This has implication on the sanitation and hygiene of the surrounding since a significant percentage of the residents have no option than to adapt to pit latrine toilets, open air defecation and other poor hygiene practices that eventually

expose the communities to serious health hazards. As presented in Tables 3 and 4, bivariate and ANOVA analysis respectively, there is a significant positive relationship between age group and the kind of houses that people of the rural communities live in ($\beta_1 = .163$; $P < 0.01$). This shows that age group has the capacity of influencing people's choice in housing construction.

Table 3. Analysis of the data collected

a. Dependent Variable: What kind of house do you live in (Model 1)					
	Un-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.395	.082		16.924	.000
Age Group	.052	.019	.163	2.733	.007
Marital Status	-.038	.019	-.122	-2.035	.042
Literacy	-.100	.022	-.240	-4.511	.000
Level of Education	-.040	.019	-.115	-2.118	.035
b. Dependent Variable: Type of toilet (Model 2)					
(Constant)	1.822	.344		5.302	.000
Level of Education	.413	.119	.177	3.479	.001
Estimated Income from business	.356	.114	.159	3.111	.002
c. Dependent Variable: How many times do you bath in a day (Model 3)					
(Constant)	2.096	.056		37.661	.000
How close are you to your source of water	-.057	.027	-.112	-2.131	.034
d. Dependent Variable: How close are you to your source of water (Model 4)					
(Constant)	3.766	.912		4.129	.000
Are there cultural practices that hinder your access to water in your community?	-.922	.453	-.103	-2.035	.043
e. Dependent Variable: Express your opinion on the sanitation of your surroundings (Model 5)					
(Constant)	1.402	.104		13.532	.000
How often is refuse disposed from your community?	.350	.070	.229	4.989	.000
f. Dependent Variable: What is the major water-related ailment that people suffer in your community? (Model 6)					
(Constant)	-.154	.333		-.461	.645
Are Occupants/Family members sick due to water shortage or non availability	-	.101	-.665	-	.000
Are you aware of any government intervention in providing water solution and hygiene facilities?	1.233			12.257	
How will you describe government intervention in solving poor water and sanitation challenges?	.381	.051	.377	7.543	.000
How often do you fall sick?	.694	.089	.376	7.792	.000
Is Government borehole located in the residential areas?	2.156	.090	1.282	23.879	.000
	-	.152	-.355	-9.616	.000
	1.461				

Table 4. ANOVA analysis of the data collected

ANOVA ^a Case 1						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.326	4	1.082	14.178	.000 ^b
	Residual	32.117	421	.076		
	Total	36.444	425			
a. Dependent Variable: What kind of house do you live in						
b. Predictors: (Constant), Level of Education , Age Group, Literacy, Marital Status						
ANOVA ^a Case 2						
2	Regression	109.082	2	54.541	15.613	.000 ^b
	Residual	1369.389	392	3.493		
	Total	1478.471	394			
a. Dependent Variable: Type of toilet						
b. Predictors: (Constant), Estimated Income From your business, Level of Education						
ANOVA ^a Case 3						
3	Regression	.949	1	.949	4.543	.034 ^b
	Residual	75.007	359	.209		
	Total	75.956	360			
a. Dependent Variable: How many times do you bathe in a day						
b. Predictors: (Constant), How close are you to your source of water						
ANOVA ^a Case 4						
4	Regression	3.364	1	3.364	4.140	.043 ^b
	Residual	313.656	386	.813		
	Total	317.021	387			
a. Dependent Variable: How close are you to your source of water						
b. Predictors: (Constant), Are there cultural practices that hinder your access to water in your community?						
ANOVA ^a Case 5						
5	Regression	14.561	1	14.561	24.890	.000 ^b
	Residual	262.672	449	.585		
	Total	277.233	450			
a. Dependent Variable: Express your opinion on the sanitation of your surroundings.						
b. Predictors: (Constant), How often is refuse disposed from your community?						
ANOVA ^a Case 6						
1	Regression	12.009	5	2.402	164.558	.000 ^b
	Residual	4.919	337	.015		
	Total	16.927	342			
a. Dependent Variable: What is the major water-related ailment that people suffer in your community?						
b. Predictors: (Constant), Is Government borehole located in the residential areas?, How often do you fall sick?, Are you aware of any government intervention in providing water solution and hygiene facilities?, How will you describe government intervention in solving poor water and sanitation challenges?, Are Occupants/Family members sick due to water shortage or non availability						

The pattern and type of houses built in the communities could be attributed to the influence of age group and the general pattern adopted by the majority of the peer groups within a given period of time. On the contrary, changes in marital status ($\beta_2 = -.122$; $P < .05$), literacy ($\beta_3 = -.240$; $P < .001$) and level of education ($\beta_4 = -.122$; $P < .05$) in these communities revealed an inverse relationship with housing characteristics, hence have not improved the kind of houses inhabited by these communities. Marriage life style and settlement in most cases is polygamous in nature and does not encourage better housing initiative as majority of the household heads are still

struggling with the challenges of daily livelihood with large number of family members to cater for.

The second part of the housing characteristics considered the relationship between toilet facility, level of education and estimated income from business. A critical observation of the empirical evidence from the above relationship in Table 3 shows that the level of individual education ($\beta_1 = .177$; $P = .001$) and the estimated level of income from business ($\beta_2 = .159$; $P < .005$) are the two most important determinants of type of toilet available in many households in the communities. This further implies that

households with higher level of education and income have a better chance of adapting to modern toilet systems and thereby maintaining high level of hygiene and good health standards than households with poor education and low level of income.

5.2 Health and Sanitation

The analysis of the result in Table 3 and 4 suggests significant inverse relationship between proximity to water supply ($\beta = -.112$; $P < .05$) and frequency of bath per day. This implies that the reduction in the number of bath by the respondents could be significantly explained by their closeness to source of water supply. It is therefore paramount to state that the farther away the rural dwellers are from the location of water, the more difficult it becomes for them to maintain a good personal hygiene by constant bath and washing-ups. Hence the proximity of water source plays a significant role in the determination of personal hygiene among the respondents. A further analysis as shown in Model 4 (Table 3) of the water-related factor indicates that distant location of water supply from the respondent could significantly reduce personal hygiene at 5% level of significance. In the survey, public water supply was not provided and where some taps were noticed, the facility has not been functioning for a long time. It is therefore advisable to always cite the location of water sources as close as possible to the users. This will also help to promote good hygiene practices and at the same time reduce the occurrence and contamination of infections traceable to poor personal hygiene as a resultant effect of poor quality and scarcity of water supply.

The analysis of result also indicates that sanitation of the environment could actually determine how often the inhabitants fall sick. The result from the survey portrays the fact that people who maintain a clean surrounding were associated with the highest number of populace that do not frequently fall sick while those with poor sanitation often fall sick. In other words the chances of individual contracting one sickness or another is as a result of poor sanitation and hygiene. Therefore it is possible to conclude here that the level of sanitation of surrounding and personal hygiene of the inhabitants of these communities is a significant factor in determining the prevalence of sickness. It was observed that areas which are densely populated showed that the unplanned nature of building arrangement

poses setbacks on the waste management and waste disposal procedures. It was also noted that buildings erected within the study area showed no allowance for the collection of wastes and sewage. While these can serve as a tangible reason for the waste management challenges within the area, personal interviews conducted with respondents on the field showed that environmental challenges experienced within the community is as a result of the population growth and construction expansion that began few years ago. In areas where the population is on the increase, there is always the accumulation of waste material, posing a direct threat to both humans and the environment at large. Therefore, there is always this need for the enforcement of waste management legislation and available framework for planning and policy implementation. More so, indiscriminate use of land must be regimented by implementing applicable clauses in guidelines for development.

5.3 Social-Cultural Factors

In Tables 3 and 4, it was examined whether there are some cultural practices that could hinder direct accessibility and proximity to water sources in the communities. The evidence from the study however confirmed that cultural practices and access to water sources had no direct relationship at 5 % level of significance. In other words cultural practices had little or virtually nothing to do with their access location to source of water as supported from the standardized beta coefficient of the estimation (Model 4). Therefore the problem of good water supply could be seen to be more of economic factors and financial factors that require timely government intervention and support. This factor was reiterated by [25] in [20] that affluence and income, exposure and education have been reported to correlate with improvements in individual and household water and sanitation practices.

5.4 Environmental Sanitation and Hygiene

High level of sanitation within the environment is believed to be associated with the degree and timeliness of refuse disposal from the community as evidenced in Table 3 (Model 5). The longer the duration of the refuse bin, the higher the rate of decomposition which constitutes significantly to greater percentage of environmental air pollution that poses a great risk of exposure of residents to health hazards. Statistical evidence

from the study as shown in Table 4 indicates there is a positive relationship between the frequency of refuse disposal and the level of environmental rating with respect to sanitation. However, there is no connection on the frequency of waste disposal and the sanitation level experienced in the communities. This can be buttressed further by the inconsistency in time of collection of waste by government waste managers as shown by information obtained from the respondents.

The result also shows that indifferent attitude characterizes poor sanitation which is basically associated with poor maintenance, indiscriminate dumping of refuse in drains and ineffective drainage systems. Though efforts have been made by governments, NGOs and action groups on water and sanitation needs of people, these groups are too often beset by disjointed management approaches and ineffective operating standards. This evidence therefore informs the need for immediate and frequent response to refuse disposal especially in public places. Efforts by the government and individuals in compliance to this observation could significantly reduce public health challenges, thereby reducing the chances of contamination with contagious airborne diseases predominant in both metropolitan urban centers and among the rural dwellers. It is understandable that good sanitation of the surroundings is a function of how often refuse is being removed from the community. Field observation and information from the focus group discussion tell that respondents patronize private waste collectors because of the government's inefficiency in waste collection.

5.5 Social Welfare Challenges

Analysis in Model 6 (Table 3) focuses on the problems of poor water and sanitation among the communities. The result reveals significant negative effect of sickness and major ailment related to shortage or non-availability of water ($\beta_1 = -.665$; $P < .001$). This also could be traceable to other factors such as poor hygiene, inadequate nutrition and dieting, though not captured in the current study. It is important to emphasize here that the people are not quite aware of any government's intervention programme ($\beta_2 = .377$; $P < .001$) in solving the social economic problems peculiar to their existence. The result from the analysis shows that government intervention programme in providing water and hygiene facilities would have

had a direct and significant positive impact on the major water-related ailment suffered in the communities. There is also a common link between communities' perception on government intervention and the major water-related ailment suffered by the people ($\beta_3 = .376$; $P < .001$). This evidence was statistically satisfactory on 1% level of significance based on the standardized beta coefficient estimate.

A critical analysis of the data provides statistical evidence in support of the fact that there is significant tendency of reducing major water related ailment that the people suffer in rural communities by 35.5% at 1% level of significance when there is full provision of government boreholes and clean water supply to the rural residence and communities. This simply illustrates the lapses in government social welfare intervention projects, especially in the interior parts of the communities. However it appears that there has not been any significant effort by the government, particularly in the provision of clean water supply to the people living in these areas. This therefore necessitates the need for a concerted effort on the part of the government in implementing welfare policies and programmes that would ameliorate the sufferings of the people.

6. CONCLUSION

The evidence from this study confirmed that cultural practices and access to water sources had no direct relationship ($\beta = -.103$; $P < .05$). A further analysis of the evidence in this paper reveals that the frequency and prevalence of sicknesses noticed among the dwellers could be traceable to the identified major water-related ailments such as Typhoid, cholera, dysentery and diarrhea ($\beta = -.229$; $P < .001$). Hence, the problem of good water supply could be seen to be more of economic and financial challenges that require timely government intervention and support. Government policy and programme should include support to issues such as community mobilization, awareness generation, behavioral change communication and coordination of IEC campaigns between rural water supply, health and education departments. In most houses, income does not favor the subscription of some households to water distribution network. Poverty still poses enormous threat to environmental balance and social cohesion and until it is curbed decisively, sustainable development of semi-urban cities will remain a mirage. It can also be noted from the

analysis that the level of income is a determinant factor on the method of waste disposal as majority of waste disposed was through private waste collection. The results apparently suggest that the policies on waste management have not been efficiently implemented.

7. RECOMMENDATION

It is therefore recommended that a concerted effort on the part of the government should be focused on maximizing welfare policy programmes that would ameliorate the sufferings in the communities as regards access to clean water sources and other basic social infrastructure that would enhance living standard in the communities. Proper sensitization and environmental education should be given to citizens. There should be provision of local knowledge and institutions to address the design, siting and maintenance of new infrastructure, resolve conflicts and pay (in cash or kind) for running costs. Appropriate mechanisms should be provided for local communities to work with the government to ensure changed attitudes and behaviors (e.g., in school children, women, adolescents and men) that would support government action that may be necessary to ensure sustainability and in addition, put up actions to sensitize bureaucrats and politicians to support such initiatives, given the huge and complementary benefits of such action in tackling the very real WASH challenges that continue to exist in the region. All the aforementioned would bring about community involvement and private sector collaboration that would engender anticipated development and also affect the attitudinal approach towards ensuring a sustainable access to water and social infrastructures in the community.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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