Assessing and Providing Water for Small Communities in the Niger-Delta, Nigeria – A Water Supply Situational Study in Kpite-Tai in Ogoniland, Rivers State

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Abstract   A Development Needs Assessment study carried out in Ogoniland found availability of social infrastructures, including those of potable drinking water inadequate; barely a quarter sources water from functional community boreholes. The source of water for majority of the resident population are varied but susceptible to contamination; shallow hand-dug wells, ponds, isolated freshwater streams with few private boreholes. The Kpite-Tai community, one of several communities in Ogoniland exemplifies this lack and dependence on irregular source of water. A detailed development-driven study geared towards providing a sustainable water project for the population, using a group of communities was commissioned. The study mandate included among others: determining reliable estimate of community's population, the population density of the area, availability and access to potable water infrastructure (source(s), accessibility, distance to water source, the quantity used by households, for what purposes/uses, and most recent water intervention in community and from which agency/organization). Both the qualitative and quantitative socio-economic data collection approaches were utilized involving rapid appraisal methodologies. The paper presents some aspects of the results of the study.

Keywords: sustainable development goals, development needs assessment, Kpite-Tai-Ogoniland, water supply, water infrastructure, water accessibility

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1. Introduction

All 193 Member States of the United Nations General Assembly unanimously agreed to ''*Transforming our world: the 2030 Agenda for Sustainable Development*'' in September 2015. The 2030 Agenda is a plan of action for people, the planet and prosperity. Member States resolved to "end poverty in all its forms", to take bold and transformative steps to "shift the world on to a sustainable and resilient path" and to ensure that "no one will be left behind". The 2030 Agenda established 17 Sustainable Development Goals (SDGs) and 169 global targets, relating to development outcomes and means of implementation (MoI), for the period 2015-2030. These were designed to be integrated and indivisible and to balance the social, economic and environmental dimensions of sustainable development [1].

The establishment of SDG 6, *Ensure availability and sustainable management of water and sanitation for all*, reflects the increased attention on water and sanitation issues in the global political agenda. Fresh water, in sufficient quantity and quality, is essential for all aspects of life and sustainable development. The human rights to water and sanitation are widely recognized by Member States. Water resources are embedded in all forms of development (e.g. food security, health promotion and poverty reduction), in sustaining economic growth in agriculture, industry and energy generation, and in maintaining healthy ecosystems. SDG 6 includes eight global targets that are universally applicable and aspirational. However, each government must decide how to incorporate them into national planning processes, policies and strategies based on national realities, capacities, levels of development and priorities. They cover the entire water cycle including the provision of drinking water (target 6.1) (the paper's focus) and sanitation and hygiene services (6.2). Less than half of Member States have comparable data available on progress towards meeting each of the global SDG 6 targets. Almost 60 per cent of countries do not have data available for more than four global SDG 6 indicators, and only 6 per cent reported on more than eight global indicators, representing a major knowledge gap [1].

In Nigeria, access to water, sanitation and hygiene has been a very big challenge. Citizens in both the urban and rural areas struggle daily with this problem particularly women who spend a large proportion of their time in search of potable water for drinking and other household requirements. The concomitant effect of acute water shortage is the outbreak of waterborne diseases which threatens the lives of citizens particularly children who are susceptible to waterborne diseases such as cholera, diarrhoea, guinea worm, typhoid fever, hookworm infection. Indeed, in many communities in Nigeria, inadequate safe water supply and sanitation facilities have increased infant mortality rates. The improvement of the population's access to water and sanitation facilities has therefore been identified as a veritable means of improving the human development index. Nigeria has however, made appreciable progress in improving households' access to safe drinking water. The end-point status in 2015 was 67.0% access [2]. Nigeria is also adjudged to have done well on this indicator in light of the statistics provided by the Joint Monitoring Programme (JMP) / UNICEF and WHO. The recorded end-point status by the JMP of the proportion of households in Nigeria with access to safe drinking water was 69% in 2015. This compares well with the baseline figure of 40% in 1990 [3]. There are however, wide disparities in access to safe drinking water across states in Nigeria. The states in the south have higher access than states in the north. However, all over Nigeria, there is a good policy environment for the provision of safe drinking water. In fact, the overall Conclusion on Goal 7 was that there was strong progress in the provision of safe drinking water but weak progress in other indicators and thus the Goal was not met [2]. Confronting the enormous problems of providing safe drinking water and improving sanitation facilities in Nigeria requires effective collaboration between government and non-governmental actors.

The attainment of government's avowed water policy and the SDG#6 is largely dependent on the availability of functional infrastructure. But generality usually hides specificities. Most parts of the country still lack access to water in both quantity and quality. To address water resources problems and achieve the Sustainable Development Goal, SDG#6, decision makers at all levels of government will need to make informed choices among often conflicting and uncertain alternative actions. These choices are best made with the full benefit of research and analysis. A Development Needs Assessment study carried out in Ogonland found availability of social infrastructures, including those of potable drinking water inadequate; barely a quarter sources water from functional community boreholes. The source of water for majority of the resident population are varied but susceptible to contamination; shallow hand-dug wells, ponds, isolated freshwater streams with few private boreholes. The Kpite-Tai community, one of several communities in Ogoniland exemplifies this lack and dependence on irregular source of water. A detailed development-driven study geared towards providing a sustainable water project for the population, using a group of communities was commissioned. The paper presents some aspects of the results of the study. The paper is structured into the following parts: an introduction; the approaches/methods utilized and the outcomes/results obtained from the investigation and then the recommendations and policy implications of the field findings.

2. Study Approaches/Methods

2.1. Study Area

The Kpite-Tai community has the geographical coordinates of Latitude 04^0 43.939' N and Longitude 007^0 18.010' E. The community is located within the Tai Local Government Area (LGA) of Rivers State and is made up of four constituent villages, namely; Korokoro, Bue-Mene, Bue-Tenyor and Koroma (Figure 1). The community exhibits a nucleated pattern with housing pattern, type and structure typically that of a rural community. Residential housing locations are in accord with family/lineage ties, with transportation and communication routes the easy attraction for easier mobility.

2.2. Data Collection and Analysis

The study mandate and/or objectives included the following: 1) Determine reliable estimate of community's population; 2) Determine the population density of the area; 3) Determine availability and access to potable water infrastructure: source(s), accessibility, distance to water source, the quantity used by households, for what purposes/uses, quality (potability-biophysical analysis, not covered here); and 4) provide information about the most recent water intervention in community and from which agency/organization, as well as 5) Assess possible contamination of water source(s) from oil activities, from which area/part of community prone to or suffers from oil pollution, etc. (also not reported here).

To achieve the study objectives, both the qualitative and quantitative methods of data collection and analysis were involved. Open-ended discussions with stakeholders and some members in the form of focus group discussions (FGDs) and key informant interviews (KIIs) were conducted. Structured copies of a well-designed questionnaire were also administered to members of the Kpite-Tai community. The study focused on water supply; as a consequence, the questionnaire developed addressed areas such as household water use practices, water availability, access, water utilization characteristics, socio-economic factors, quality and quantity, and household determinants of collecting water from improved and unimproved water sources. Location and functional status of existing water supply facilities were also determined. In consideration of time, logistics and community structure, a total of 90 copies of the structured household questionnaire were randomly administered with the assistance of an appointed community facilitator and focal point-man in the Kpite-Tai community, out of which close to 70 copies were retrieved for analysis. Simple bivariate analysis of primary and secondary data was employed, involving simple descriptive methods and summary statistics: mean, range, mode and percentages for data collected. Tabular and graphical charts were also preferred data presentation modes.
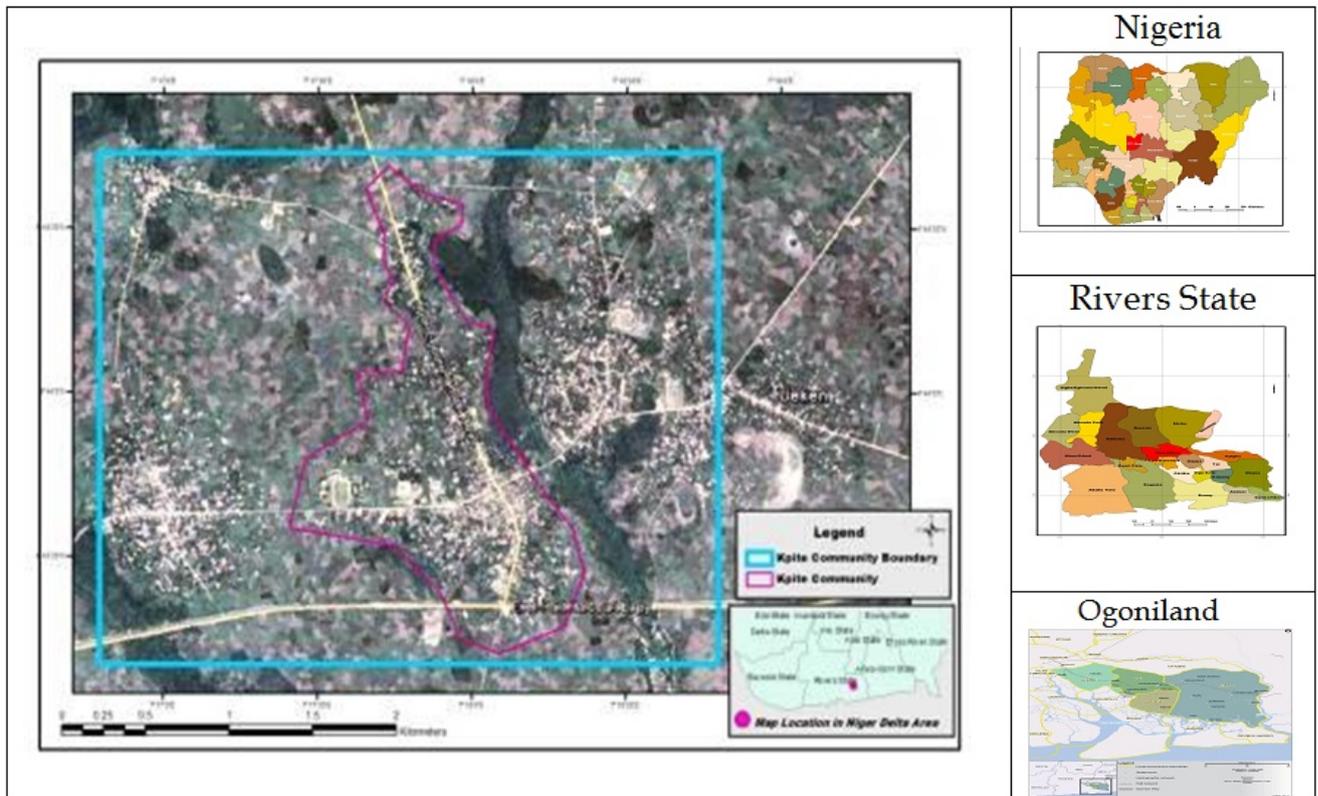
Figure 1. Google Map of the Kpite-Tai Community in Ogoniland, Rivers State

3. Results and Discussion

3.1. Socio-economic Characteristics of Respondents

The socio-economic characteristics of the respondents are presented in Table 1. The population of the Kpite Tai community was estimated to be 12,000 at the present (i.e., 2016). The community had slightly over 5,000 persons in 1991 with almost equal male-female proportions and was projected to increase to >6,000 in 1996 [4]. The community has therefore, witnessed an average annual growth rate of 2.7% over the years, indicative of the rural environment but higher than the 2.5% growth rate projected for Nigeria [5].

The study recorded an average household size of 8 in non-polygamous households; married women have an average of 5 children. This inevitably puts pressure on available water resources for domestic needs. Focus group discussants (FGDs) confirmed that there was the preponderance of men marrying more than one wife and the rearing of large families in the Ogoni communities but the practice of monogamy is gradually taking root and thus affecting household sizes. Households with 8 persons were actually highest in Rivers State (16.6%) in 2006 while those with more than 8 persons also amounted to 12.6% [6].

The marital status of the Kpite Tai community respondents was overly skewed towards higher proportion of those of the single marital status. Over one half were (55.8%) were single, 29.1% married, 10.1% divorced/separated and 5% widowed. These responses could be because of the rapid nature of the study and the willingness of the younger cohorts to be interviewed than the older genre. The age of respondents ranged from <21 years, which represented 11.5%, to those aged over 60 years (5%). Respondents aged 21-40 were preponderant and represented 57.7 %, while those aged 41-60 represented 25.6% (see Table 1). The study revealed a wide range of age distribution that was helpful in assessing the water consumption behaviour pattern and perceived quality. More of the women-folks were represented in the survey amounting to 66.3%, which is natural, considering that the burden of fetching and providing water for the household falls on them.

An overwhelming proportion (> 89%) of the sampled population in the Kpite Tai community had some form of education. The modal educational attainment is secondary school and this amounted to 31.7%, followed by those with primary school education (23.4%). Approximately 18 percent of the respondents also possessed vocational/technical training while some 16.4 percent has tertiary education. Those without any formal education were fewest of the sampled population while a few others have unclassified educational attainment. The Ogoni are a distinct people who have lived in the Niger Delta for hundreds of years. They live in close-knit rural communities, their livelihoods based on agriculture and fishing. Across the Rivers State socio-political terrain, "the Ogoni people are known for hard-work; the major occupation of the adult population, male and female is farming followed by trading while fishing is of negligible importance". The location of the constituent Ogoni communities however affects the degree of involvement in the respective occupations; those close to water courses are into fishing than any other economic activity, including harvesting of fish from locally made ponds. Over a third (35.2%) of the sampled population in Kpite Tai

community cultivates the land (farming). Insignificant proportions are into varied forms of livelihood activities. Some 12.5 percent of the respondents also claimed to be unemployed. Employment issues have been most important to Kpite Tai community even from a recent study on development needs assessment [7]. The income distribution level among the sampled respondents in the Kpite Tai community is as shown in Table 1. The income levels are meager and variable and ranged from less than N5,000 to over N50,000. Some 13.7 percent of the respondents earn more than N50,000 in a month. Another significant proportion (12.2%) also earns >N15,000 to N20,000 monthly incomes. Combined, one fifth (20.7%) of the sampled respondents earn N15,000 to N20,000 in a month, the range of the minimum wage in Nigeria (N18,000 is official minimum wage in Nigeria in a month). The level of income for the Kpite Tai respondents is consistent with findings for neighbouring communities where modal income bracket was the N15,000-N20,000. Approximately 11 percent of the sampled population reported to earn this much then. This pattern of income distribution is expected given the subsistence nature of agricultural practice predominant in the study environment. These ranges of income are barely above the World Bank benchmark for income poverty of $1 per day.

Table 1. Sample Demographics

Demographics	Value
Population size	12,000 (2016)
Age range of respondents':	% response
<21 years	11.5
21-30	29.2
31-40	28.5
41-50	16.3
51-60	9.3
>60	5.2
Gender:	
Males	33.7
Females	66.3
Marital status:	
Single	55.8
Married	29.1
Divorced/separated	10.1
Widowed	5.0
Household size:	
Mean	8
Range	1-10
Education:	
None	3.1
Primary	23.4
Secondary	31.7
Tertiary	16.4
Others	7.5
Occupation:	
Farming	35.2
Fishing	5.3
Trading	9.1
Artisan	9.8
Civil service	6.6
Company employees	7.6
Contractor/business	3.8
Unemployed/students/Pensioners	22.6
Household income (monthly/Naira):	
<5000	7.9
5001-10,000	10.5
10001-15,000	10.2
15001-20000	12.2
20001-25000	9.9
25001-30000	7.2
30001-35000	7.5
35001-40000	7.7
40001-45000	5.4
45001-50000	7.8
>50000	13.7

3.2. Household Water Consumption, Sources, Infrastructure and Supply Situation

3.2.1. Household Water Consumption and Sources

The difference in household water management is usually influenced by multiple factors. The study determined the household water consumption behaviour by looking at the primary and secondary or alternative water supply sources. From the study, 38.4% of the sampled respondents' sources water from publicly-owned hand dug wells and another 31.1% uses privately-owned hand dug wells. One quarter (25.4%) relies on privately-owned boreholes for their water needs (Figure 2). The results are not too different from what obtains in neighbouring communities in Ogoniland; one quarter of the sampled respondents' source domestic water from community boreholes and some 21.4% on average do so from private boreholes [7]. The only nearby water body in Kpite Tai, "Onko stream" is claimed to be of no consequential benefit because "its water is not good for any use except for the elderly women who go in there once in a while to have a bath".

	River/creek/ stream	Public well	Own hand-dug well	Community public borehole	Piped water in residence	Private borehole	Vendor/buy	Rainwater
Bue-Mene	0	44.4	30.5	0	0	23.2	0	1.9
Bue-Tenyor	0	38.5	33.6	0	0	21.4	0	6.5
Korama	0	34	31.7	0	0	28.8	0	5.5
Korokoro	0	36.7	28.4	0	0	28.1	0	6.8
Mean		38.4	31.1			25.4		5.1
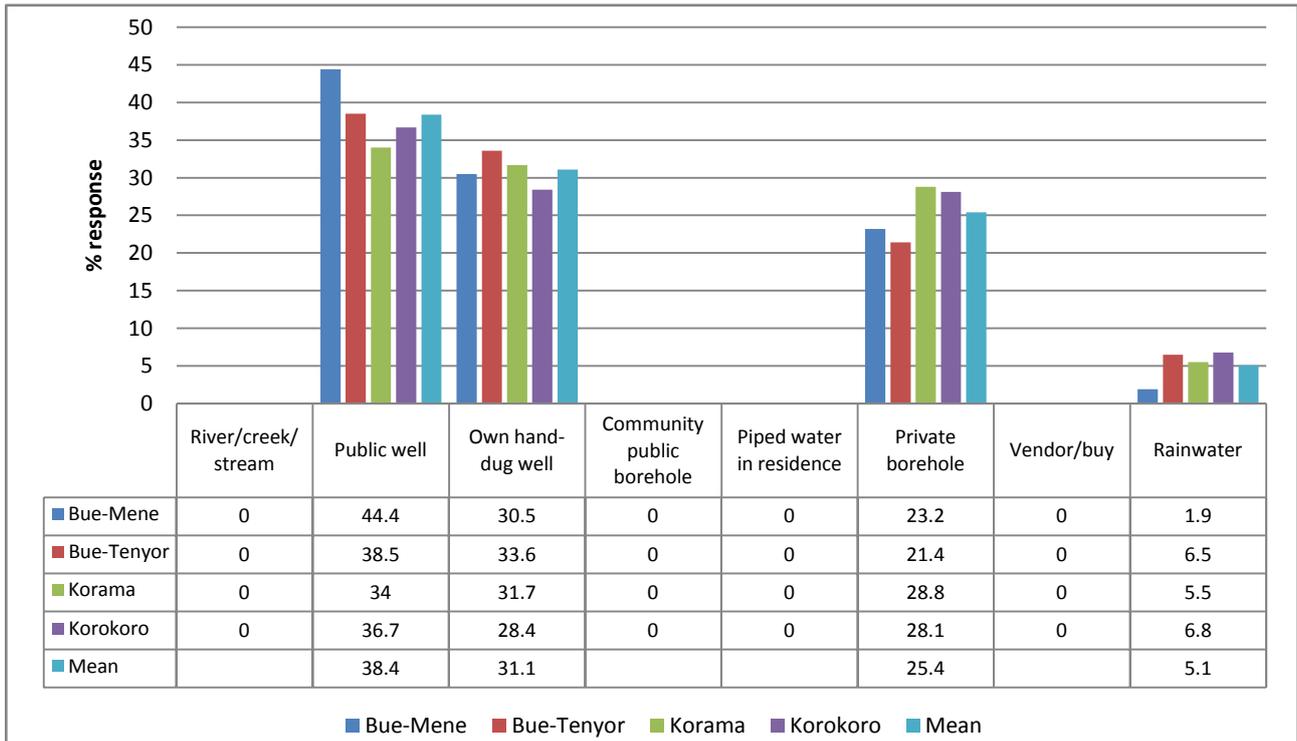
Figure 2. Domestic source of water for households in Kpite-Tai

	< 1year	1-2yrs	3-4yrs	4-5yrs	5-6yrs	6yrs +	Since birth
Bue-mene	6.4	9.4	1.2	1.7	5.6	43.2	32.5
Bue-Tenyor	9.5	8.8	3.5	3.1	9.4	27.5	38.2
Koroama	3.7	9.5	7.3	4.3	5.5	39.5	30.2
Krokro	1.3	11.4	1.5	1.5	5.6	47.2	31.5
Mean	5.2	9.7	3.4	2.6	6.5	39.4	33.2
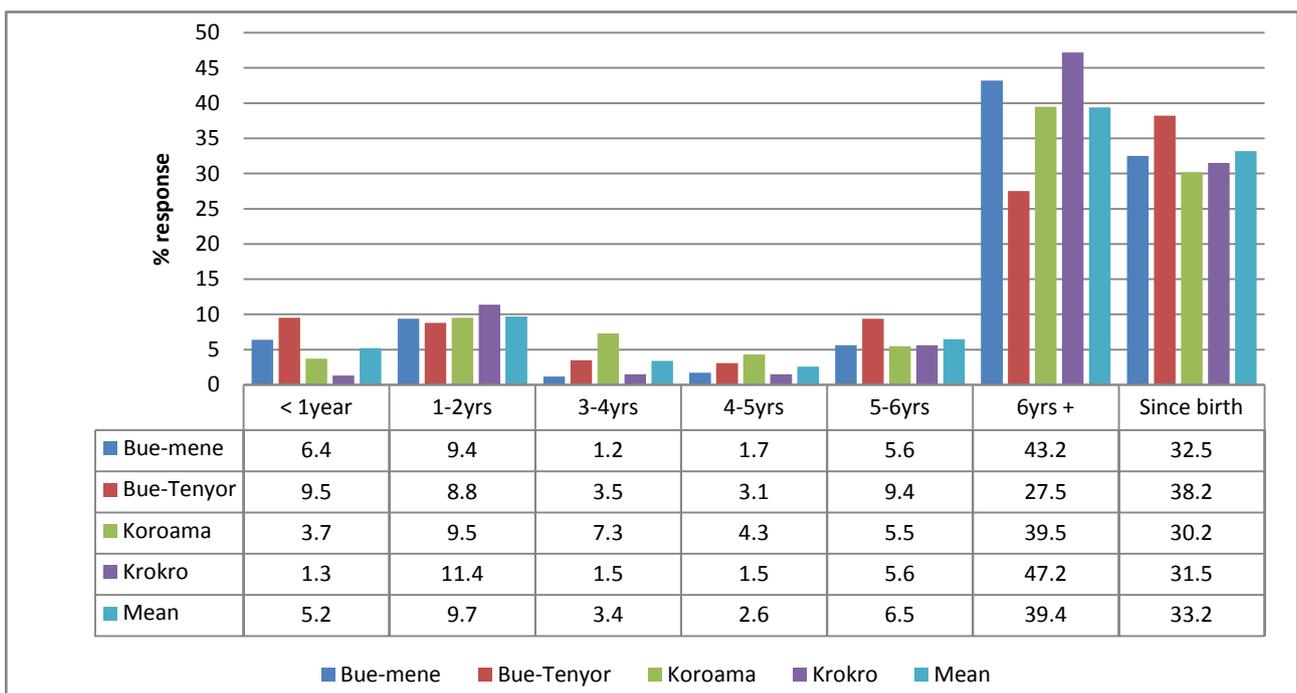
Figure 3. Length of use of water source(s) in Kpite Tai community

The study was also interested in knowing for how long the identified water source(s) have been in use by household members. A significant percent of the householders (39.4%) claimed to have been using the sources of water (hand-dug wells and private boreholes) for the past 6 years and more while a third (33.2%) have used same since birth respectively (Figure 3).

3.2.2. Water infrastructure and Supply

There are two main water facilities in the Kpite Tai community; one provided by the Niger Delta Development Commission (NDDC) and the other by one Hon. Felicia Tani, a politician from that constituency. Both facilities have however, since ceased to function (Plate 1). The NDDC's water facility have both faulty sumo and generating set while that by the honourable member became non-functional as a result of a faulty sumo. The water facility with a 4,000 litres overhead water tank capacity (2 nos. of 2,000 litres each) (Plate 1) was reported to be too small and overall poor quality in implementation which thus contributed to its total breakdown. Key informants and respondents confirmed that when the boreholes were functional, the water demand was so high as to put undue pressure on the borehole facilities. The number of persons who were fetching/collecting water at the same time was claimed to be very high. Long queues and fights amongst those fetching water from the taps were common and at rush ours (mornings and evenings), the number of persons reported to be fetching water from the water facilities numbered between 150-200 persons. This indeed translated to too much pressure on the existing water borehole in the community when it was functional. It was also gathered that private borehole owners do allow individuals to fetch water free of charge. Although, the challenge has been that people can't be allowed to fetch the quantity they ought to fetch. And you can't do otherwise since no one sells water in the community. The private borehole owners in the community do not sell water; ''water is a common natural resource, a necessity to life'' it is reasoned. It is however, not acceptable for many of the people to depend on self-help model of water provision as prevails in the community and across some geo-political zones in Nigeria with greater access to safe drinking water. This model which is prevalent among members of the elite hides the fact that the poor living within and in the vicinity of the elite community suffer from access to potable water because of their inability to provide their own boreholes.

3.3. Availability, Accessibility, Quantity and Distance of Water Supply Infrastructure

To satisfy basic needs, water must be not only safe, but also available in quantities sufficient for personal hygiene and a healthful environment. It is generally agreed that 20-40 liters per capita per day is the minimum required to assure adequate supplies for consumption, sanitation, and hygiene, although the requirement is much higher in modern industrial urban areas: 200-500l per person/day, or more [8]. The World Health Organization (WHO) considers 1,000m^3 per person per year to be necessary amount of water for human health and development [9]. But in some countries, most of them in Sub-Saharan Africa and the Middle East, cannot meet the minimum essential water needs of all her citizens. In some countries, the problem is access to *clean* water. In Nigeria for example, an average of 21 per cent depend on unimproved sources while another 10 percent depend on unsafe surface sources of water [3].

The average distance covered by households to and from fetching water from identified source(s) of water supply were also analyzed. This ranges from less than 200 m to about 500 m with an average of 250m. A higher percentage of the households (61.5% on average) covers some 200m distance in fetching water, while over one tenth (16.3) also cover 500 m and more to access water for use. Lower proportions of the population covers distances of 200 m to 500 to get water (Figure 4). When the NDDC and government-sponsored water facilities were functional, the facilities were poorly reticulated; water collecting points are established a few strategic locations outside the facilities. So distance and effort (time) spent in collecting water from the water projects were not necessarily reduced to the barest minimum.

As a corollary of distance covered to fetch water is the amount of time spent by households to fetch water from the facilities. Responses indicated that the time it takes households to go to the facility, fetch water and come back or to fill available water storage containers in the house varies from less than 1hr to over 5 hours. Households of about 54.4% of the respondents spend an average of <1 hour to accomplish the task of collecting water for the house while another one third (32.8%) spend between 1 and 2 hours. The remainder 12.8% of the householders spend significant time periods of 3-5 hours in collecting water for the households. The average time taken however to travel to the nearest water point to collect water and come to the house is about 25-30 minutes (Figure 6). Households also claimed to have varied times because of overcrowding experienced at peak hours; water was made available twice daily, in the morning and evening when the public water facilities functioned. The implication is that it is still very stressful for householders in the Kpite Tai community to get water whenever they want it.

Plate 1. Existing non-functional borehole water facilities in Kpite Tai community
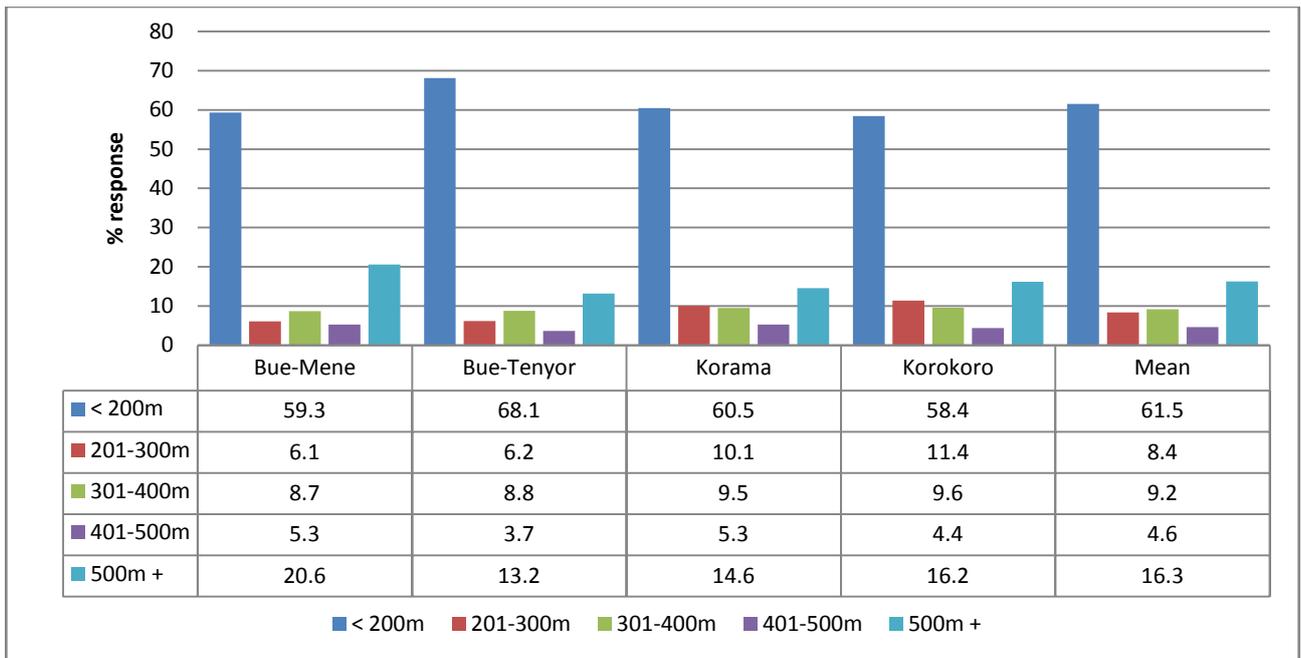
Figure 4. Distance covered from water source

	Bue-Mene	Bue-Tenyor	Korama	Korokoro	Mean
< 200m	59.3	68.1	60.5	58.4	61.5
201-300m	6.1	6.2	10.1	11.4	8.4
301-400m	8.7	8.8	9.5	9.6	9.2
401-500m	5.3	3.7	5.3	4.4	4.6
500m +	20.6	13.2	14.6	16.2	16.3
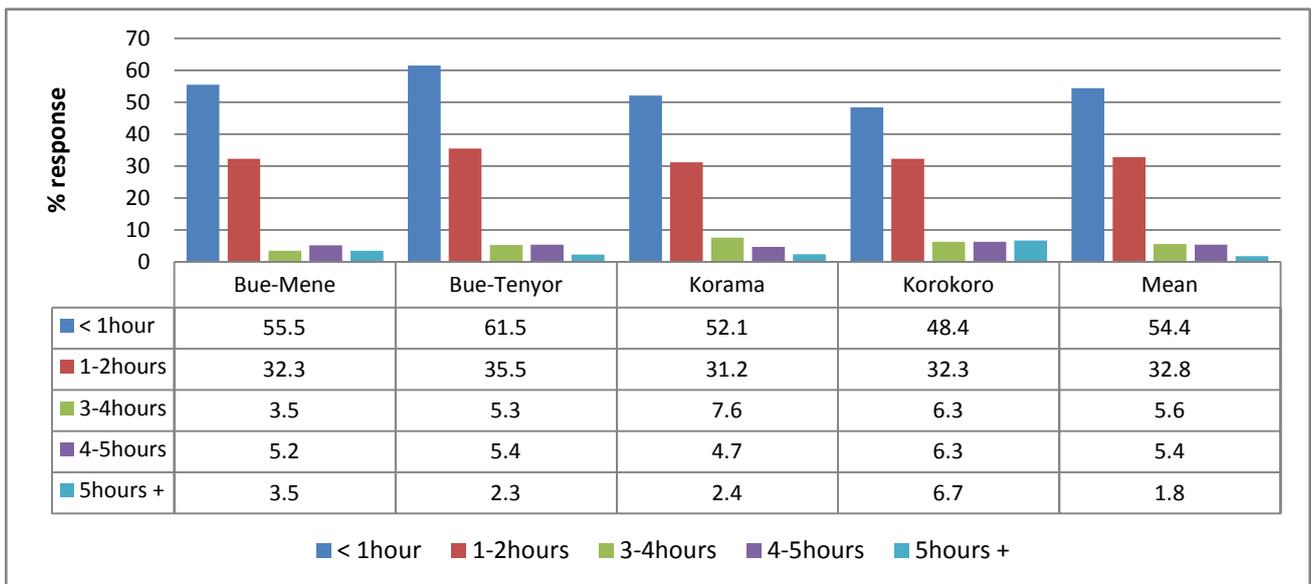
Figure 5. Time spent in fetching water from source

	Bue-Mene	Bue-Tenyor	Korama	Korokoro	Mean
< 1hour	55.5	61.5	52.1	48.4	54.4
1-2hours	32.3	35.5	31.2	32.3	32.8
3-4hours	3.5	5.3	7.6	6.3	5.6
4-5hours	5.2	5.4	4.7	6.3	5.4
5hours +	3.5	2.3	2.4	6.7	1.8
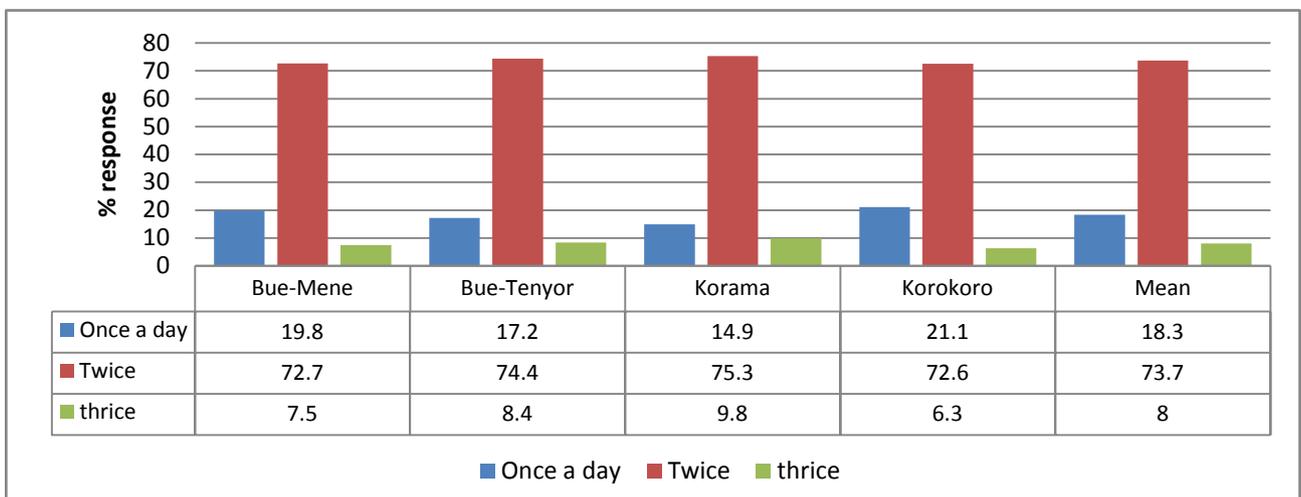
Figure 6. No of times water is fetched from source

	Bue-Mene	Bue-Tenyor	Korama	Korokoro	Mean
Once a day	19.8	17.2	14.9	21.1	18.3
Twice	72.7	74.4	75.3	72.6	73.7
thrice	7.5	8.4	9.8	6.3	8

	Bue-Mene	Bue-Tenyor	Korama	Korokoro	Mean
< 20 liters	3.5	2.3	2.4	3.7	2.9
20-30 litres	5.2	5.4	4.7	6.3	5.4
31-40 litres	10.5	16.5	15.1	14.4	14.1
41-50 litres	32.3	30.5	28.2	30.3	30.3
50 litres +	48.5	45.3	49.6	45.3	47.3
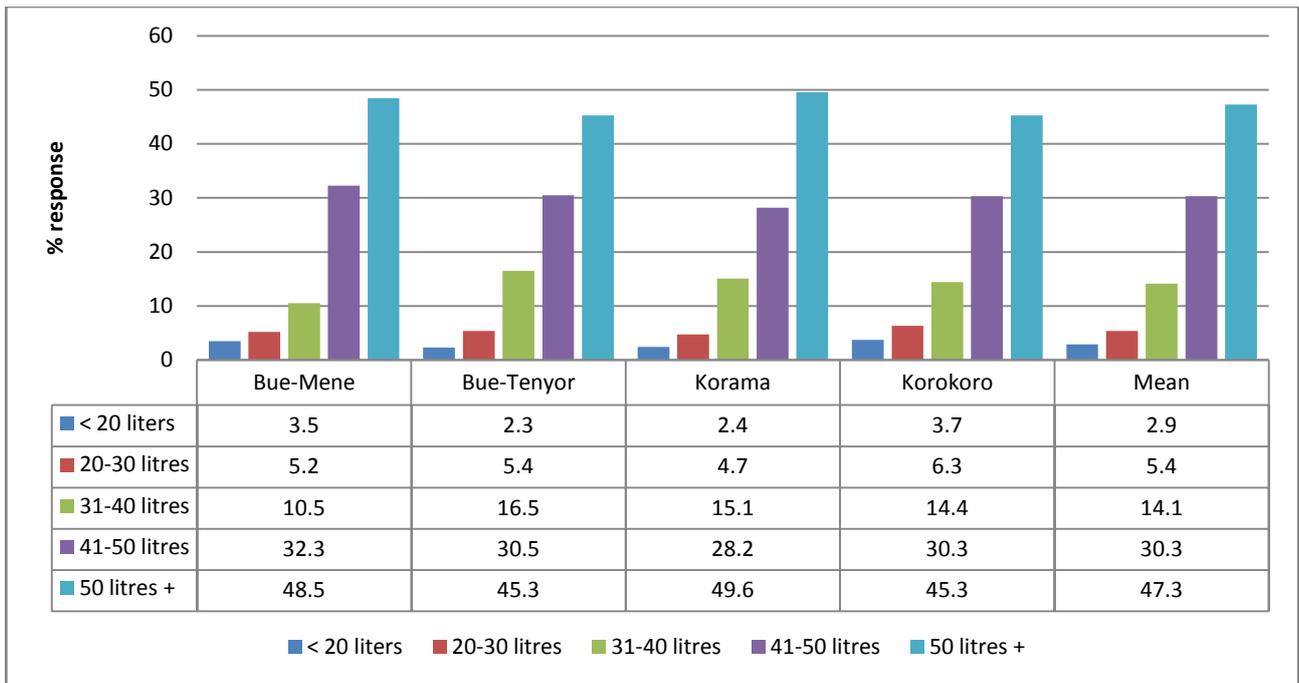
Figure 7. Quantity of water fetched each time (in liters)

As to the frequency of water collection for use from existing water source(s), the analysis further revealed that a significant percentage of the population (73.7%) fetches water twice a day, corresponding to times when the facilities were probably operated/opened for use in the morning and evening hours respectively. Another 18.3% of the respondents' fetches water once in a day while an insignificant proportion (8%) claimed to fetching water thrice/day (Figure 5). The quantity of water fetched by the households each time from water supply point were revealed thus; 2.9% fetches less than 20 liters, 5.4% (21-30liters), 14.1% (31-40 liters), and 30.3% (41-50 liters) while 47.3% uses 50 liters respectively. The number of persons in a household (household/family size) determines the size of container used as well as the quantity of water used in a day by each household. (Figure 6). Research

shows clear findings for the relationship between some demographic variables and household water use. Not surprisingly households with more residents use more water [10,11,12,13].

The survey analysis further revealed that quantification of amount of water used by householders presented a serious challenge for many. Statistically however, only a handful (6.5%) of the respondent were unable to ascertain the quantity of water used by their households. Some 39.5% of the respondents claimed to use 100 litres and above amount of water per day. A quarter (25.2%) of sampled respondents also consume between 81-100litres of water per day while some 13.1 percent uses 61-80 litres (Figure 7). Insignificant percentages of the respondents use less than 20liters to 60 litres of water in a day.

	Not know exactly	< 20 litres	20-40 litres	41-60 litres	61-80 litres	81-100 litres	100 litres +
Bue-Mene	5.6	1.7	1.2	9.4	12.5	26.4	43.2
Bue-Tenyor	9.4	3.1	3.5	8.8	18.2	29.5	27.5
Korama	5.5	4.3	7.3	9.5	10.2	23.7	39.5
Korokoro	5.6	1.5	1.5	11.4	11.5	21.3	47.2
Mean	6.5	2.6	3.4	9.7	13.1	25.2	39.5
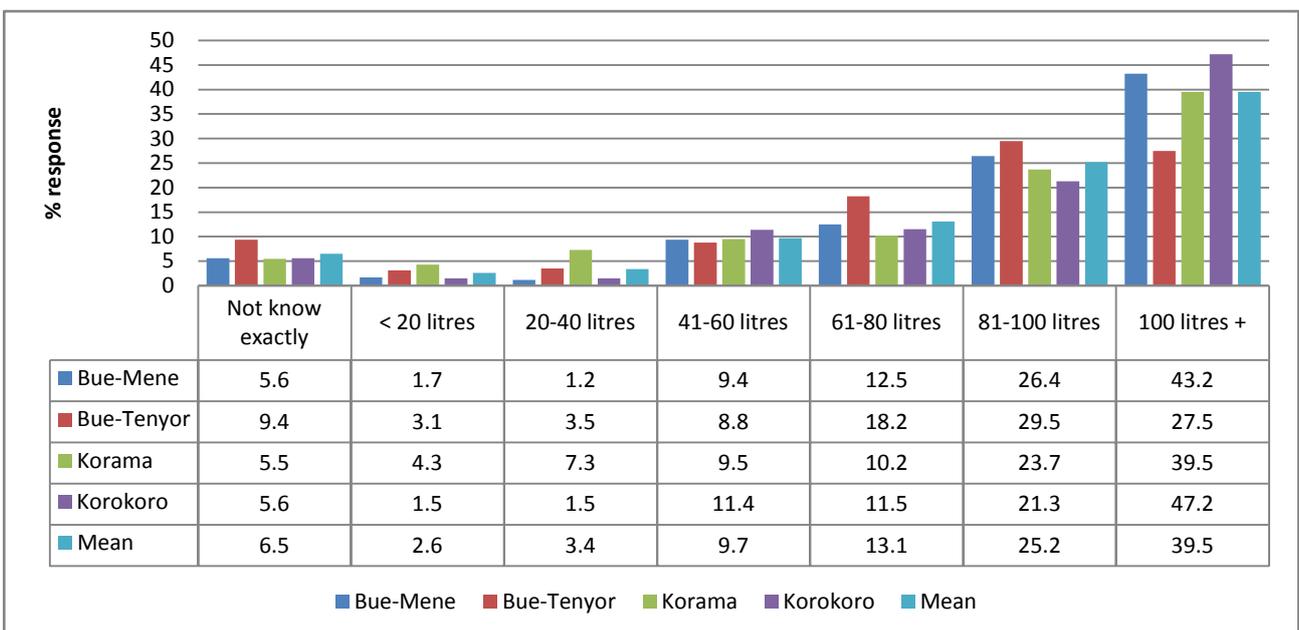
Figure 8. Quantity of water used per day

4. Conclusion and Policy Implications of Findings

The study was started without knowledge that a company was already on site at the Kpite Tai community for a proposed water facility project. Interactions with key informants and other community stakeholders revealed a satisfactory outlook with the proposal. But it was advised that such a project should be planned with the population of the community been a part of project implementation. In other words, participatory planning is recommended. Previous water projects in the community could not serve the population well because there was too pressure on the facilities which thus cut short the lifespan of the water project. Planning adequately for the water project, according to the community members will enable the water project to endure and serve the increasing population who are always in need of water. A robust water project in the community will go a long way in alleviating the suffering of the community in sourcing for water daily. The lack water amenity it was reported caused some NYSC members (youth corps' members) posted to the community to relocate their posting out of the community.

More than two-thirds of the world's households have to fetch water from outside the home. This is heavy work, which affects other productive activities. Improved access to convenient, reliable sources of safe water has an impact on health through reducing the time and energy burden on the household. This benefit is of particular significance to women and children, who bear the principal responsibility for seeking, drawing, and carrying water in the developing world. Indirect benefits of improved domestic water supply and sanitation may be even more important than the direct benefits listed above. For instance, some have suggested that the rate at which girls drop out of school is directly linked to the burden of domestic responsibilities they bear; carrying water competes directly with school attendance since it can take anywhere from one-half hour daily in urban areas to 4-6 hours in difficult terrain, during dry seasons, or when numerous trips and substantial waiting time are required. Without doubt therefore, improved public systems could bring many benefits to these poor families. Evidently, water supply service has significant socio-economic benefits and easy, reliable accessible water supply has the potential of increasing the income of households [14,15]. Like other infrastructures, water infrastructure provision is central to poverty reduction and/or elimination.

In line with Nigeria's commitment to improve the lives of the poor, and in view of the fact that the country joins the rest of the global community in adopting the Post-2015 Development Agenda, Nigeria should be more than ever devoted to the new developmental agenda. A key consideration is to ensure that all the processes and mechanisms are well-integrated into both national and state–level development strategies and plans for seamless execution. The experience from the implementation of the MDGs reveal that the nationalization and localization of the SDGs would require strong multi-sectoral partnerships and collaboration. Of special note is the fact that while the SDGs are probably rightly premised as global and universal in content, there are indications that a set of 17 Goals, 169 Targets and more than 300 Indicators may be overwhelming for many UN Member Nations to implement unless concerted efforts are made to deliberately own, adopt and adapt them for use at the national and sub-national levels. The issue of prioritization of the SDGs is important for phased implementation. The SDGs 6 bearing on providing water for households amongst others should be vigorously addressed in the first years of implementation.

References

[1] United Nations (UN). (2018). Sustainable Development Goal 6 Synthesis Report 2018 on Water and Sanitation, New York.

[2] United Nations Development Programme (UNDP). (2006). Niger Delta Human Development Report. UNDP, Nigeria, Abuja.

[3] UNICEF and World Health Organization. (2015). Progress on sanitation and drinking water –2015 update and MDG assessment.

[4] NPC (1991). National Population Commission. Census '91 Final Results, Rivers State.

[5] Population Reference Bureau (PRB). (2014). 2014 World Population Datasheet, Washington, DC, USA.

[6] National Population Commission (NPC) (2009). 2006 Population and Housing Census of the Federal Republic of Nigeria: National and State Population and Housing Tables, Priority Tables (Volume I) National Population Commission, Abuja, Nigeria.

[7] Ojile, M.O. (2015). Development Needs Assessment in Ogoniland and Surrounding Communities Study *(Draft Final Report)* submitted to Environmental Resources Managers Ltd. (ERML) Lagos. 128*pp*.

[8] Lucas, A.O. and Gilles, H.M. (1990). A New Short Textbook of Preventive Medicine for the Tropics, Third Edition, Edward Arnold.

[9] World Health Organisation (WHO) (2002). The World Health Report, 2002; *Reducing Risks, Promoting Healthy Life*, Geneva, Switzerland.

[10] Aitken, C. K., H. Duncan, and T. A. McMahon. (1991). A cross-sectional regression analysis of residential water demand in Melbourne, Australia, Appl. Geogr., 11, 157-165.

[11] Aitken, C. K., T. A. McMahon, A. J. Wearing, and B. L. Finlayson. (1994), Residential water use: Predicting and reducing consumption, J. Appl. Soc. Psychol., 24(2), 136-158.

[12] Gregory, G. D., and M. Di Leo. (2003). Repeated behavior and environmental psychology: The role of personal involvement and habit formation in explaining water consumption, J. Appl. Soc. Psychol., 33(6), 1261-1296.

[13] Jeffrey, P., and M. Gearey. (2006). Consumer reactions to water conservation policy instruments; In Water Demand Management, Butler, D. and Memon, F. A. (eds.), pp. 303–329, IWA Publ., London.

[14] James, A. (2003). Linking water supply and rural enterprise: issues and illustrations from India. In P. Moriarty, J. Butterworth, B. van Koppen, (Eds). Beyond Domestic: Case studies on poverty and productive uses of water at the household level. Delft, the Netherlands, IRC International Water and Sanitation Centre. (Technical Paper Series; no. 41). pp. 199-216

[15] Ahmeddbad, I.O. (2006) Multiple Use of Water in Urban Areas. IRC International Water and Sanitation Centre Delft, the Netherlands.