

DOMESTIC WATER CONSUMPTION IN DALA LOCAL GOVERNMENT AREA

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ABSTRACT

The aim of this paper is to assess the domestic water consumption and direct measurement of the micro-components of water usage in Dala local government area. The data for this study were collected from a survey of 218 households using a simple random sampling technique. Results of the study revealed that the daily average water consumption for the area was 26.17 litres per capita per day (l/c/d) with an average household size of 9.17 persons. There is a general absence of in-house connection from Kano State Water Board. Consequently, the main water resource of the area is water vendor. Other sources include public boreholes, wells and rain water (during wet season). Domestic water use pattern disaggregated into specific end uses was then determined on the basis of the study results. A Large amount of water consumed in the study area happens to be in bath room and water play an important role in religious activities in the area. This study indicated that for the minimum water requirements to be achieved households must use multiple sources.

KEYWORDS: *Per capita consumption, Unimproved Water Supply, Household, Micro-components*

INTRODUCTION

Water is an indispensable substance for human daily life and survival. The means of water collection importantly characterizes the way of consuming water and regulates other daily activities of local populations (Aiga and Umenai, 2002). When collecting international statistics on access to water, those who buy their water from a vendor are classified as not having reasonable access to an improved water supply, along with people who get their water from unimproved wells or surface-water sources (McGranahan and Kjellèn, 2006). Reliable access to safe water of a sufficient quantity continues to be one of the major problems for many people in Nigeria, particularly in this study area. Kazaure (2005) cited in Yerima (2005) stated that presently less than twenty wards of sixty six wards in six metropolitan local governments have access to potable drinking water and the situation is deteriorating by the day. Basic access within 100 - 1000 m of the home with a 5 - 25 minute collection time provides partial household water security with an average per capita availability of 20 litres per day (World Health Organization, 2004).

Household demand is affected by the efficiency of the distribution systems, water price, household size, income level, consumption habits, Climatic and meteorological factors (Webster, 1997; Garn, 1998; Jochaim and Thomas, 2007; Lu, 2007; Lu and Smout, 2008)). Rajala and Katko (2004) cited Jensen (2001) that what complicates a reliable assessment is that some factors influence consumption with short notice such as meteorological factors, the construction of new development areas, while others influence consumption over a long period of time such as climatic factors, population development. These influences are able to either

intensify each other or balance each other out. Other factors affecting consumption rates include promotional, social, and other aspects. Ethnicity and religion are also two influential factors towards actions and consumption patterns; this though, has been less researched (Smith & Ali, 2006). For the above reason, consumption for religious activities was included. However, explanations to water decline seem to be rather site and case specific (Rajala and Katko, 2004). In Dakar (Senegal), those whose main source is carters and carriers use 11 l per capita per day. Also in Mali, annual water consumption for each standpipe is 10 l/day/person during the dry season. In Paraguay, Consumption is stable at around 19 L/day/resident, not including well and rainwater. While in Kibera (Kenya) the average distance to the nearest kiosk is about 40 meters and consumption ranges from 16 to 20 L/day (Snell, 1998).

The purpose of this research is to collect data on household water usage to determine per capita consumption and identify micro-components of household water use patterns and trends to improve the efficiency of domestic water use in the area. This is due to the absence of data on domestic water consumption and there is a need for establishing a realistic per capita demand in high density areas of Kano. The knowledge of the water consumption behavior will help in designing sustainable water supply.

STUDY AREA

Dala Local Government Area constitutes the study area which lies between latitudes 12° 25' N to 12° 40' N and longitudes 8° 35' E to 8° 45' E of Greenwich Meridian and occupying an area of 19 km². It is the second most populated local government area in Kano with an estimated population of 418,759 people as recorded in 2006 census.

The study area was divided into wards (already there are 11 wards in Dala L.G.) namely; Adakawa, Bakin-Ruwa, Dala, Dogon-Nama, Gwammaja, Gobirawa, Yalwa, Kabuwaya, Kofar-Mazugal, Kofar-ruwa and Madigawa (see Fig.1). For the purpose of this research it was further subdivided into five units because of their proximity with each other namely; Bakin Ruwa/Madigawa, Dala/Yalwa/Dogon-Nama, Gobirawa/Kofar Ruwa, Kabuwaya/Kantudu,

Adakawa/Kofar Mazugal. The climate of the area is the tropical wet and dry type with wet season lasting for 4 - 5 months (May to September). The mean annual rainfall around the metropolis is about 800 mm, while the mean annual temperature is about 26 °C (Maigari, 2005). It is important here to note that there is no river or stream that is presently used by the inhabitants of the study area.

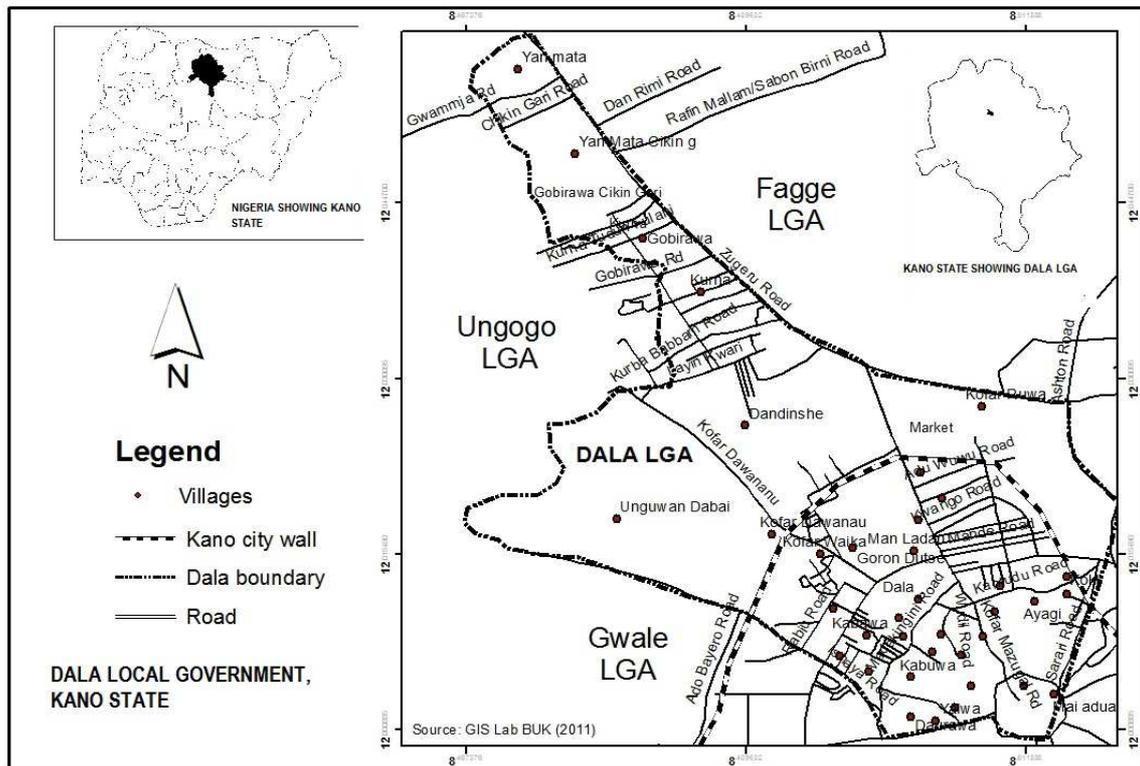


Fig.1 Map of the Study Area

METHOD

In the case of developing countries, methods for measuring water consumption are classified into three groups. The first one is the direct measurement of the water used. The second method obtained estimations through interviews (Little, 1996). The third method is to collect time-series data of total residential water consumption and to calculate it for each component by the water flow pattern (Otaki et al. 2008). In Kano, people usually collect water in containers to cope with the lack of water and the intermittent water supply from public utilities. Thus, the time-series data method is not suitable. For surveys in such countries, either direct measurement method or the interview method is used. Hence, the second method was chosen over the first one because of the lack of intermittent supply from Kano State Water Board. Similarly, it was reported that the

most satisfactory method is using questionnaires to be filled in by enumerators (Osuala, 2005). The fieldwork involved structured interviews and focus group discussion (FGDs). A simple random sampling was performed to households of 11 wards of Dala L.G. area. Households in each ward were selected randomly. The total number of samples selected was 250 households that is an average of 22 samples in each ward. 218 complete responses were used and the rest were discarded due to obvious inconsistencies in the respondent's answers. Considering the set-up of the area and how the houses in the wards are intertwined, the 11 wards are merged to become 5 for easy analysis, and the fact that in reality you can hardly differentiate areas like Adakawa and Kabuwaya or Kantudu, Dala and Dogon-Nama on the other hand. The data were collected between July and October, 2009 by structured interview.

The instrument was aimed to establish the socio-economic aspects of the people in the study area and the current water resources. Household details were obtained such as the position of the interviewee in the household, age, educational level, employment status, average annual income, household size, location and age of residency. Other questions pertain to household sources of water supply, quantity of water used in each household, distance of the water source, average time spent in fetching water, perception of the water quality and the health episodes. Several predetermined responses were included in the original instrument, but only options that had response frequencies greater than 1, meaning those that were applicable to one or more interviewee, are presented in the results. There is also another instrument dealing with the total water used for activity i.e. End-Use Analysis (EUA). Domestic consumption was disaggregated into specific end uses such as toilets, baths, cooking, ablution, washing and others. Water

consumption was estimated through interviews. Focus Group Discussions were held with the elders in the community. These are facilitated group meetings made of selected individual from the target population.

Statistics used in this study were; frequency, percentage, means and standard deviation.

RESULTS AND DISCUSSIONS

Sources of Water Supply

Table 1 shows the current water supply in Dala L.G. for drinking, washing and bathing in both dry and wet seasons. The major source of water is water vendor for drinking, washing and bathing during dry season. But the major source during wet season is rainwater, eventhough vendors have significant role in water supply even during the wet season (34.3%). The lowest supply is from Kano State Water Board. It is then followed by well, the reason being that the wells around Dala, Kabuwaya, Kantudu, Adakawa, Kofar Mazugal, Yalwa have low yields.

Table 1 Water sources for Drinking, Washing and Bathing during wet and dry seasons in Dala L.G

Types of water sources	% Drink (dry)	% Drink (wet)	% Bath & Wash
Piped water from KNSWB	3.2	4.1	5.7
Rainwater	0	41.3	53.5
Public borehole	22.0	11.0	22.8
Water vendor	63.0	34.3	41.3
Well	4.7	4.1	11.4
Others e.g. sachet water	7.1	4.7	-

Source: Field Survey July-Oct., 2009

Per capita Consumption in the Study Area

The per capita consumptions in various areas in Dala are presented in the table 2 below. It can be seen that Gobirawa has the highest per capita of 26.98 L/c/d, this is due to the proximity to the water supply; in this case water vendors. Most of *Gidan ruwas* are situated in this area. Sandiford et al., (1990) investigated the effect of distance from the source of water supply on domestic water consumption in rural areas of developing countries. It was also found that a decrease in the distance to the water source from 1000 to 100m is associated with an increase in per capita consumption of 20% (Kershavarzi et al., 1990). Another factor is the household size; the average household size in the area is 5.84 persons. The size of household is small because of the age of the houses, as the area is new (most of them are newly married) and therefore cannot be expected to have larger families. The mean total consumption in the four largest households at any of the areas came to be 12.35 l, while the four smallest households consumed 31.77 l. Dala (19.13 l/c/d) and Kabuwaya (18.60 l/c/d) have the lowest per capita consumption due to their distance from the source and also the household size. It was also confirmed during the Focus

Group Discussions (FGDs) that the wells in Dala and Kabuwaya have dried away, and the available boreholes cannot supply efficiently the water need of the areas because of the too much pressure on them, they easily breakdown or get spoiled. Comparing this result with middle income households in Gwammaja, they have enough money to buy water from vendors and can complement these water with the one they can get from either Kano State Water Board (KNSWB) or own private boreholes. But in almost all the areas the average water use for all purposes was close to or above the minimum 'basic needs' figure of 25 l per capita per day (Juan, 2003). For households with access to KNSWB, it was still observed that the supply is inefficient, inadequate and intermittent, so they found it more easy to use the alternatives. So use was similar to that found when only other sources are available.

Household Water Consumption in the Study Area

A typical household in this study area uses about 21% of total water use for toilet, 52% for bathing, 13% Kitchen, 12% religious activities (five daily prayers) and 2% for others. The micro-components use of water is presented in table 3.

Table 2 Average Per Capita Consumption for Various Areas within Dala L.G.

HOUSING LOCATION	AHS	TAWU	AVERAGE PER CAPITA CONSUMPTION (L/c/d)
BAKIN RUWA/MADIGAWA	10.54	345.83	23.65
DALA/YALWA/DOGON-NAMA	9.50	175.00	19.13
GOBIRAWA/KOFAR RUWA	5.84	146.43	26.98
KABUWAYA/KANTUDU	9.83	162.50	18.60
ADAKAWA/KOFAR MAZUGAL	10.14	250.12	24.66

Source: Field Survey July - Oct., 2009

Key: AHS = Average household size, TAWU = Total amount of Water used/day

Table 3 Micro-components of residential use in Dala Local Government

Activities	L/c/d	% Water Used
Toilet	5.43	21
Bath	13.63	52
Kitchen	3.52	13
Religious	3.15	12
Others	0.44	2

Source: Field Survey July-. Oct., 2009

All households use water for their basic consumption needs: drinking, cooking, bathing and washing clothes and utensils. The amounts used in various places are almost the same for the basic consumptions even though it varied somewhat according to the quality (*Ruwan dadi or Ruwan zarts*) and proximity of the water supply and the size and wealth of households.

Water consumption for toilet

The consumption for toilets in Dala L.G. is 5.43 l/c/d. The typical toilet in the study area consists of a pit latrine or Squat toilets. In case of pit latrine only water is needed to wash away the part of the body affected and for the squat toilet People flush water down the toilet by using kettle or bucket, though there are few with flush toilet. The quantity of water used in the study area for toilets falls within the range of the quantity of water used in other countries that used similar facilities like Chiang Mai (4 l/c/d) in Thailand (Otaki et al., 2008).

Water Consumption for Bath

According to the survey data, 72 % of households in Dala have either no bath basin or a shower, respondents said they use bucket in taking their bath. Most of the buckets are 10-15L. The water consumption for bath use was expected to depend on the temperature, and not just the season. Even though the temperature is hot, but because of the unavailability of the water in this study area people find it difficult to bath more than once a day. Thus, water consumption for bath did not have a higher level there only 13.63 l/c/d (S.D. = 6.01). Most households used 13-20 l/c/d, which is similar to some European cities (Note that the similarity is because it is bath not shower). The quantities of water required for hygiene of 13.90 l/c/d is almost met in the study area for household without in-house connection (Thompson et al., 2001).

Water Consumption for Cooking and Drinking

In Dala L.G., there are typically big water jars in the houses that are used to store water for cooking and

drinking, and in some households, sachet "pure" water is used for drinking. Dirty dishes are soaked in the washing-up bowl and then washed later. The average water used in the study area is 3.52 (S.D. = 1.71), which falls within the ranges of 1.9 and 6.0 l/c/d with smaller variation (S.D. =1.31) (Aiga, 2003). Similarly, 80% of the households used under 5 l/c/d, which are similar to the average consumption in Bangkok (4 l/c/d), and was the same as the consumption for dishwashers in US cities (Otaki et al., 2008). Even though people in Bangkok usually do not cook at home, 95% of surveyed households in Dala usually have breakfast, lunch and dinner at home, so the similarity in consumption could only be attributed to the difference of water resources but not because of the culture of not cooking at home and the size of the household.

Water Consumption for Laundry

In Dala L.G. some household heads take their clothes to local washman. However, others wash their clothes by hand and that of small children or infants and it was established during the survey that they used an average of 4.99 l/c/d. There was a general absence of washing machine; hence only hand-washing amounts have to be measured for laundry use.

Water consumption for Religious activities

It can be said that the inhabitants of Dala are predominantly Muslims, they need water for five daily prayers and therefore water for religious activities will not be underestimated. It was found that an individual will require an average of 3.17l of water every day for his five daily prayers, that is 12% of the total water used in a day.

Comparing this with the studies by Hadjer (2005) in the strongly Islamic village of Bougou, almost 7% of total water consumption was used for religious washing. The value is almost close to that one will require for kitchen in the study area.

CONCLUSIONS

The results of the fieldwork carried out indicated that the domestic water consumption in Dala Local Government was found to be 26.17 l/c/d which falls within the limit of 25 l/c/d prescribed by WWC (2003) and the average household size was found to be 9.17. Micro-components of water usage were also determined. Water consumption was also found to be related with household size; in households with larger families average water consumption per person is reduced. Also, the results showed that distance, income level, water availability is associated with water consumption. Important

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- findings from this survey were not only the detailed data of water consumption but also the knowledge of the lifestyle and traditional water use patterns. It was also learned that most of the households in the study area still use old-fashioned appliances. For example, only 10% of households used flush toilets, washing machine is still unpopular, and households did not use showers. It is recommended that households must use multiple sources before achieving minimum water requirement. Further studies should be carried out for a long period of time to ascertain the degree to which these variables affect water consumption in the study area.
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