Household Water Use Efficiency and its implication for Sustainable Accessibility: A Case Study

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Abstract

The existential value of water for human survival and sustenance prompted the need to determine factors responsible for water use efficiency (WUE) among twenty-seven households working in Bowen University, Iwo, Nigeria. The households were made up of academic and non-academic staff who, by virtue of their exposure and experience are knowledgeable enough to respond accurately to the insightful questions. Specialized variables of indoor water use were assessed using a structured questionnaire. Estimates of used volume of each variable/day were expressed in litres, the frequency of use and the sources of the used water were obtained. All respondents have tertiary education and are females. The family size ranged from 2 to 5 and they generally source their water (96.37% groundwater) close to their homes and premises. Potential areas of excessive water use in homes were identified, using Factor Analysis, to be laundry, incidental uses and auto-wash which are in the non-consumptive category. The trio constituted 53.33% of all water usage in homes. This is evidently beyond sustainability threshold and demands further attention. Thus, water use efficiency in homes should conservatively address non-consumptive uses by using water-propelled machines at full capacities, water-reuse/recycling and taking sensible responsibilities for resource sustainability.

Keywords: Indoor water use; water use efficiency; households; water demand; water accessibility

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Introduction

Water use efficiency (WUE), according to Gleick (2003) is a precise measure of water conservation. It ascertained how much water was actually used for a specific purpose compared to the minimum amount necessary to satisfy that same purpose. The theoretical maximum WUE occurs when society uses the minimum amount of water necessary for an activity. Water use efficiency is salient to unhindered water availability in homes, and must be emphasized and encouraged (Schuetze *et al.*, 2013; Vieira *et al.,* 2015; Hatfield and Dold, 2019). The significance of water for household cooking, bathing, washing, drinking, cooling agent, cleaning and lawn watering cannot be overemphasized. However, two categories of home water use were identified in this study, namely: consumptive and non-consumptive. Consumptive water use is described in this study as the uses that diminish the source and is not available for any other immediate use (Falkenmark and Lannerstad, 2005; Shaffer and Runkle, 2007; Liu *et al.*, 2009). In their own submission, Torcellini *et al* (2003) defined consumptive water use as 'water lost to the environment by evaporation, transpiration, or incorporation into the product'. Thus, it is sufficed to assert that consumptive water use is that quantity of water used and not immediately available for further immediate use. For instance, water absorbed in the course of food preparation cannot be immediately accessible for any other use while bath water may be collected for further use, probably for flushing toilets or gardening purpose. The concept of consumptive water use is commonly used in agriculture (Liu *et al.*, 2009; Zhang *et al.*, 2019) and power production (Torcellini *et al.*, 2003; Talati *et al.*, 2016). In the other way, non-consumptive use of water also constitutes part of domestic uses of water. which does not diminish the source or impair future and immediate water use, though with a distorted quality (Ajibade *et al.*, 2014; Catarina *et al.*, 2015; Olasehinde and Alabi, 2019). Some of the component uses of water such as drinking, cooking, lawn watering and livestock feeds are categorized as consumptive while others like bathing, washing, cooling agent, cleaning are considered non-consumptive. Every home requires an uninterrupted connection and access to potable water for almost all domestic activities.at the right time and space (Catarina *et al.*, 2015; Ogunbode and Ifabiyi, 2017; Kiliç, 2020; Ogunbode, 2021). The significance of water to man's livelihood reflects in Maslow's hierarchy of water requirements theory which shows that water is one of the basic physiological needs required before any other thing on the pyramid (Maslow, 1943; Davey and Shaw, 2019; White, 2020). This is shown in Figure 1.

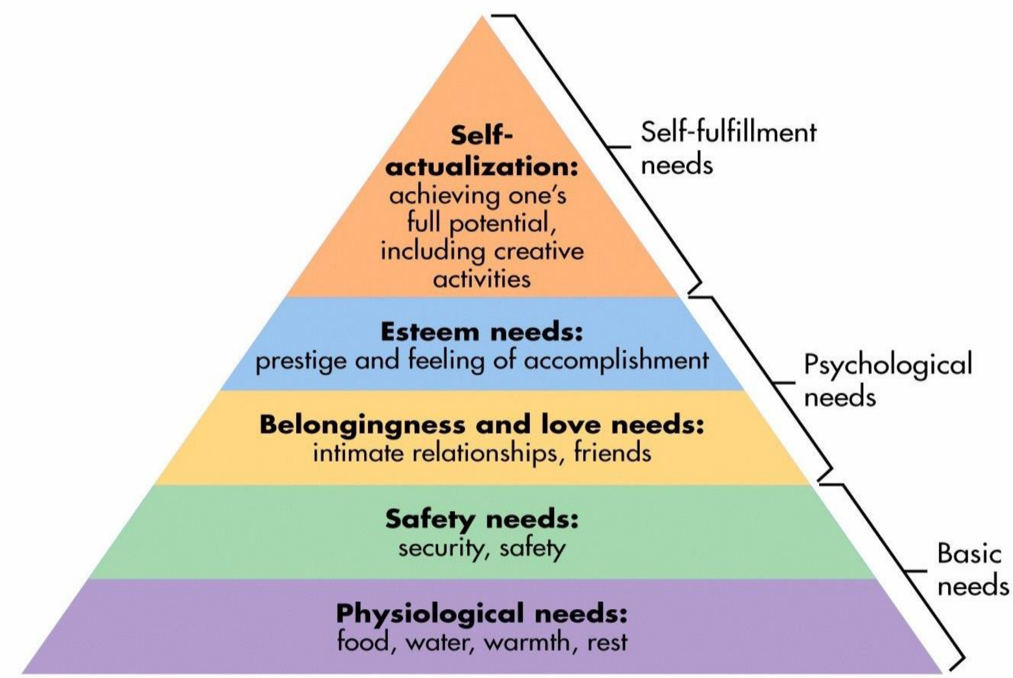

Figure 1: Maslow's Hierarchy of Human Needs

In furtherance, the essentiality of clean water to human life has led man to do all he could to ensure that water is available for his various needs at home (Zigmond*et al.*, 2019). Globally, one of the basic amenities that has received the attention of all and sundry is water till date. No wonder that uninterrupted access to this resource and its sound management were listed as one of the sustainable development goals (SDGs) in SDG 6. Subsection 6.4 states that: By 2030, *substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity*. In view of this necessity, human settlement has often been predicated on the availability and accessibility to water by all means. Some of the efforts of man to ensure the availability of water include construction of dams/reservoirs, groundwater exploitation through hand-dug wells, borehole drillings, rainwater harvesting, collection of water from rivers, streams, brooks, springs, cloud seeding (to induce rainfall), purchase of water, water bottling/packaging and conservation of water in the constructed underground reservoir, use of overhead tanks and other containers of different sizes. It is, however, unfortunate that despite all these pains in this direction, water is still not sufficient for its varied uses in homes (Cosgrove and Loucks, 2015; Ndububa and Adamolekun, 2017), most especially in the underdeveloped world, and particularly in African countries. This is, albeit, attributed to gross inaccessibility to potable water, poor attitude to water conservation, water pollution, misuse of water, waste of water through pipe leakages often without passionate concern, wrong perception about water resources (as free good), poor access or wrong use of technology (Adewumi and Oguntuase., 2016; Manouseli *et al.*, 2019). The aforementioned factors are correlated to the prevailing level of poverty that puts man on the receiving end, whereby, someone that is poorly fed can hardly think of procuring containers to conserve water or water-use efficient appliances for home use (Aruma and Hanachor, 2017)

The problem of water misuse or overuse is therefore of concern and should be controlled to ensure all-time-water availability in homes. Figure 2 shows Maslow's hierarchy of domestic water needs (Maslow. 1943; Aruma and Hanachor, 2017). Maslow's hierarchy of domestic water needs conjectured that drinking use of water has the least volume of all the water used at home (10L/day) followed by cooking (20L/day), washing, bathing, cleaning, garden watering, sanitation follow in that order.

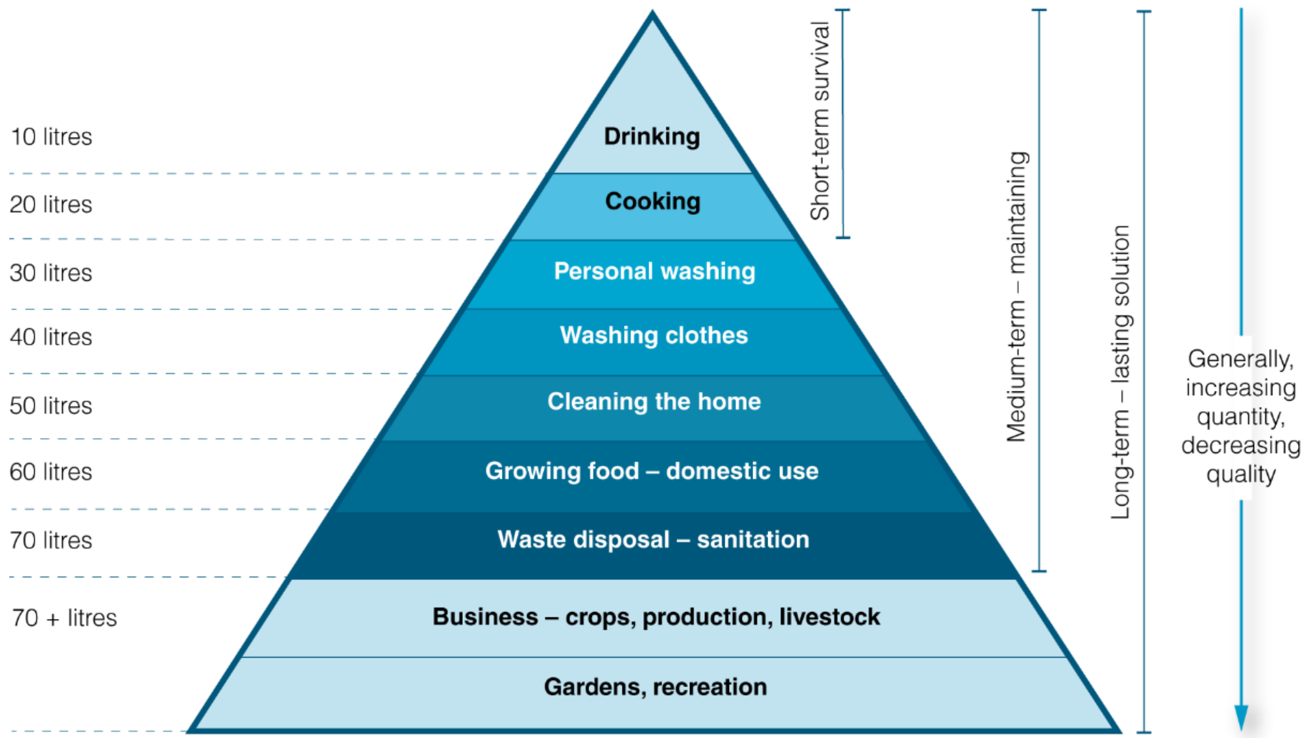

Figure 2: Maslow's Hierarchy of domestic water needs

The Washington Office of Drinking Water (2017) submitted that the entire world is experiencing challenges associated with undue pressure on the available fresh water. There are urbanization problems, unabated increase in population, extensive agricultural programmes to achieve food security, climate change and lately the novel and ravaging COVID-19 disease. While urban expansion demands additional water infrastructure, increasing population requires available water for all to survive. In the same vein, current global campaign for food security suggests that more water is needed if the set target will be met. The climate change scenario around the world also has exacerbated its impact on water resources (Szwedo, 2021; Ogunbode*et al.*, 2022). For instance, the global warming challenge means that more water is needed to sustain human metabolic functions (World Health Organization, 2008). The resource is also useful in managing and mitigating the recent and ravaging Coronavirus that causes COVID-19 disease across the globe (Alzyood*et al.*,2020; Chandler*et al.*, 2020; Cirrincione*et al.*,2020; Almulhim and Aina, 2022). Notably, one of the ways to control the spread of the disease is by washing hands regularly as suggested. Many establishments, public and private, have been mandated to make provision for access to potable water for hand-washing purposes (Ogunbode et al., 2021a; 2021b). The corollary is that man must deliberately consider attitude towards water use efficiency to curtail wastage and enhance availability of this vital resource in time and space (Ogunbode et al., 2023).

The following are extracts from literature, to ensure efficient use of water in homes.

Operation of water-use home appliances such as laundry and dish-washing should be at full capacities (Lee *et al.*, 2011; Parras*et al.*, 2020);

The culture of water reuse and/or recycling should be imbibed in homes (FAO, 2018, 2021);

Occasional breaks in the path of water flow can help checkmate excessive water use, especially when the source is central (FAO, 2021);

Water metering, which implies that homes pay for the volume of water used may be necessary. Annual rates can also be introduced for exploiting groundwater resources for the potential damages done to the natural environment (Hanke, 1982; Mutikanga*et al.*, 2011; Vieira *et al.*, 2018; Malunga, 2016);

Exploitation of groundwater resources may have to be backed up with strict regulations and license from the government as noted by Omole (2013). Apart from the fact that this will help to check unregulated exploitation of ground source of water, it will also curb proliferation of hand-dug well and boreholes which could be detrimental to the sustainability of the natural environment;

General education and enlightenment of people on the need to be conscious of the way we use water to ensure good access to potable water as also noted by Ogunbode and Ifabiyi(2014) and Ezugwu*et al.*,(2021);

Institution of appropriate and relevant legal instrument to protect this resource from unwarranted misuse (Ajai, 2012; Chukwu, 2015; Balogun and Redina, 2019) and

Making good use of rainwater by direct use and also conservation for future uses can partly help protect and conserve groundwater resource (Okpoko *et al.*, 2013; Joshua *et al*, 2019; Villa-Navascues*et al.*, 2020).

There is no doubt that water is susceptible to misuse, especially, when the source is very close and seemed available unlimitedly. For example, an efficient way of using washing machine and dishwasher is to operate at full capacities (Pakula and Stamminger, 2009; Stamminger*et al.*, 2018; Stamminger *et al.*, 2020; Ogunbode et al., 2023). Albeit, this is hardly observed in many homes where people use the machines at half or even lower capacities, which may lead to use of same volume of water which could have been sufficiently used at full capacity. Such scenario may be attributed to house property limits, time economy and also erratic power supply (Okpoko *et al.*, 2013). Water could be used in excess when taking baths or showers due to perceived unhindered and unregulated access. (Makki*et al.*, 2011; Amanda *et al.*, 2017). Other avenues of water misuse are in lawn watering, car wash and other forms of washing. Water drinking does not constitute misuse because the more water one drinks, the urge to continue drinking diminishes with time. On the contrary, all forms of washing in the course of cooking could result in misuse or overuse of water when its use is not metered and so has no price valued on it. Since more water is used in the process of washing, cooking, livestock management, lawn watering without limit (which may not be accurately measured in less developed economies), the resource is excessively wasted. It is evident that all these home use of water induce its inefficient use, especially where the culture of water use efficiency is almost a nil (Sham *et al.*, 2015).

In the tropics, water is often abundantly used during the rainy season but sparingly during the dry season when availability is at its lowest level and people are constrained to ration, reuse and perhaps engage all sorts of efforts to minimize wastage. While most publications focused on water supply and demand, determinants, and so on, few works are available in the area of water use efficiency at household level. Investigation into indoor water use efficiency at household level in developing countries is still limited in literatures whereas the current global pursuit in water resources is its efficient use in homes, even where there seems to be good water supply. This is partly to ensure sustainable access to the resource for home use in the light of rise in population, increasing pressure on the available water resource and also, the prevailing climate change scenario. With the prevailing variability in the pattern of rainfall caused by climate change, more is required in term of research efforts to ensure water accessibility through efficient use of water. This work is expected to expand the frontiers of knowledge on home water use in efficient manner by blocking or minimizing every medium through which leakage occurs or minimize home uses that encourage undue excessive use/s. This study, therefore, examined the level of water uses in various indoor activities, within the selected households to track areas of excessive use. Hopefully, this shall improve sustainable access to water in line with the global SDG goal 6 target dwelling on clean water and sanitation (United Nations (UN), 2020). Specific objectives are to: (i) identify various uses of water in homes (ii) quantify the identified domestic water uses and (iii) identify those areas of household water uses that are potential water wastage outlets. The ultimate goal is to promote more efficient uses of water in homes for sustainable access.

Method of Study

Study Area

The study was carried out in Bowen University, Iwo, Osun State, Nigeria which is located within Iwo township (Fig. 3) between Latitude: 7° 35' 57" north and Longitude: 4° 11' 19" east. It shares boundaries with Oluponna and Ile-Ogbo, both in Ayedire LGA of Osun State. The University has an area of 933.34ha with an estimated population of 6000, both students and staff. Records from the Works and Maintenance Unit of the University puts an average consumption of water per day at 700,000litres from groundwater outlets, mainly boreholes. The selection of the University community was based on the need to ensure that educated people with tertiary education are used for the survey. Bowen University is also connected with the pipe-borne water network of Aiba Water Works (AWW), but the supply from it is erratic, hence ground water forms the major source of water for household uses and for other uses within academic areas such as cleaning, sanitation, input in laboratory and any other aspect of teaching and learning.

Data Collection

The questionnaire that was administered was considered fairly technical and targeted towards senior staff of the University including academic and non-academic staff. For in-depth understanding of water use efficiency in homes, twenty-seven (27) households among the thirty-three (36) identified top–ranked female staff, mostly in academics, were randomly selected and interviewed. Their selection was based on the assumption that such category of personnel will have better exposure with technical comprehension needed to complete the questionnaire, awareness of associated issues and capability to acquire the basic essentials of life. The bias for women was their traditional role in African homes.

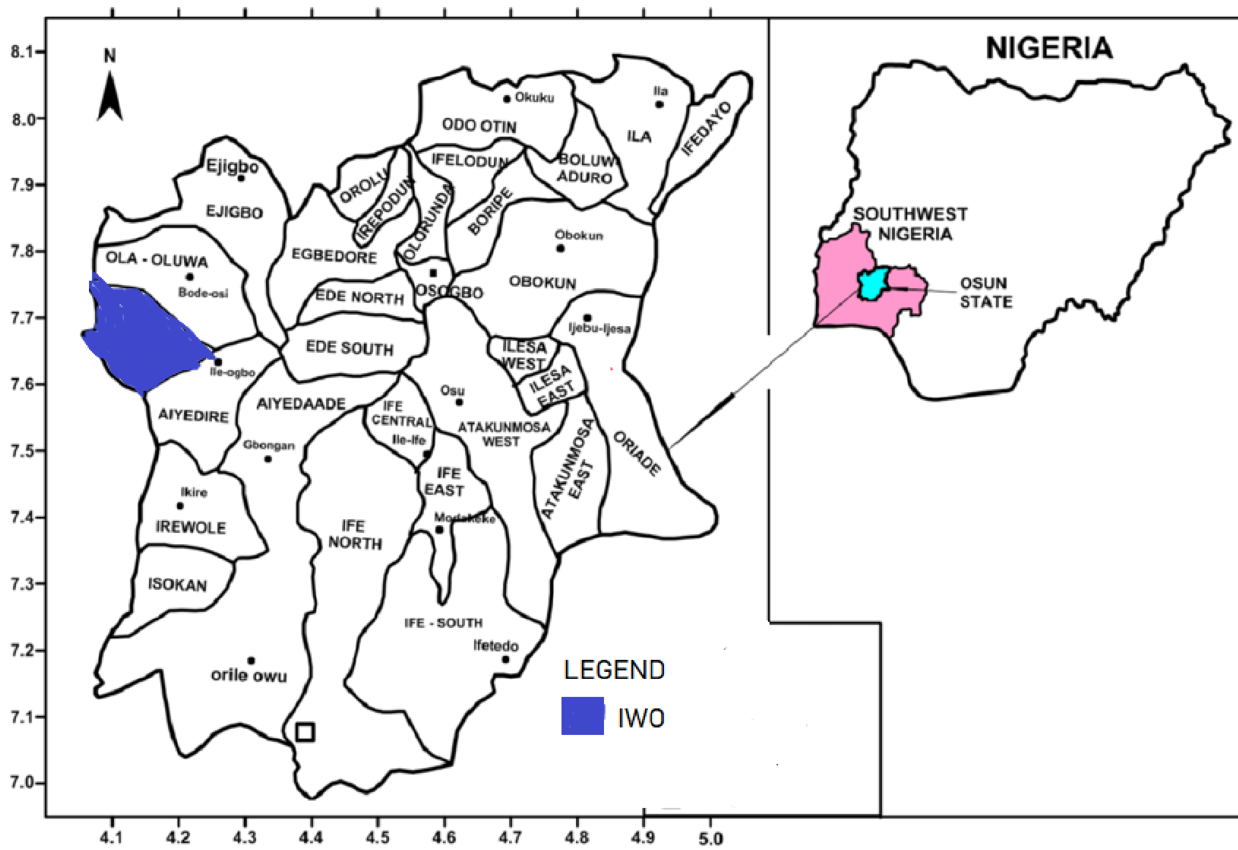

Fig. 3: Map showing Iwo LGA in Osun State (Inset: Map of Nigeria showing Osun State)

It is generally known that women are more burdened with water availability in homes for various purposes, so it is expected that water-related information are better sourced from women rather than men (Ogunbode et al. (2021). Questionnaires were administered by visiting each respondent in their respective offices with further enlightenment on how to complete the questionnaire. Each respondent was given about forty-eight to seventy-two hours to complete the questionnaire. This sample was closely monitored to achieve reliable results from the respondents.

Structured Questionnaire

The questionnaire was seventeen short structured questions under two sections. Section A consists of personal details of the respondents including name, level of education, income level, marital status, age, household size, religion and questions bothering on attitudes towards repairing water related fixtures. Section B is a single table which was used to generate data on the various uses of water. It has five major columns given different names for the purpose of this study. These are: (1) major water use component (also tagged Action); (II) subcomponent (also tagged Specific Uses), (III) action frequency per day/person *(f)* which specifies the number of times each subcomponent is carried out per day; (IV) water use estimate for each subcomponent in litres/day/person and finally; (V) the sources of water used for each component which could be either hand-dug well (W) and borehole (B) – generally classified as groundwater; pipe-borne water (P), rivers/streams (S) - typically called surface waters). Rainfall was purposefully excluded from the study because its use for domestic purposes is highly limited by seasonal fluctuations in the study area.

Action components described:

Drinking: Water use for drinking has no sub-component.

Cooking: This component has subcomponents which include water use level in cooking various kinds of food which may not be the same all through. The subcomponents include quantity of water in preparing some food in various household such as rice, beans, soup and so on;

Bathing: Water use for bathing could vary among those that use shower system and those that fetch with the use of buckets. The values provided by the respondents are considered as valid estimates.

Washing: Water use for washing has subcomponents like mechanical or manual- laundry; washing of shoes, dishes, floor, pots, toilets and so on. The estimate here was taken as valid for either manual or mechanical method where both values are given, the mean of the two is valid;

Cleaning: This component is differentiated from washing. It includes water used for cleaning toilets, drainages, walls, rails, windows, pavements and other substructures;

Auto-wash: Water use for cleaning cars, lorries, motorcycles, bicycles;

Lawn/Gardening watering: This component may be by automation and/or manual to supply water for green spaces;

Machine or Engine Chillers: Water can be used in homes that have machines for cooling effects and better performance such as car radiators, power turbines, air moisturizers etc.;

Incidental Uses: These are usually unplanned cultural uses that feature by the way. Such uses include hair cleaning, leg washing, hand washing, shaving and face washing etc;

Livestock management: Water use for livestock is also an essential component in homes that engage in keeping domestic animals and birds. Uses here include drinking water for the animals and birds, cleaning and washing of the pens/sheds/piggeries and other tools used in taking care of the animals/birds

Other Uses: This column takes care of those home uses that are inadvertently omitted in the major components listed which the respondents are freely allowed to include.

II. **Action Frequency per day** implies how many times a particular subcomponent is carried out per day.

III. **Water Use estimates for each subcomponent (Litres/day)** is the volume of water in that unit used in each day for each subcomponent.

IV. **Source/s of Water** indicates the respective source/s of water to carry out each activity

Data analysis

Descriptive and Inferential Statistics were used in data analyses. Factor Analysis was used for data reduction to determine the dominant use or uses of water. Jia *et al*, (2016, Liang *et al.*, (2020) and Ogunbode et al. (2023) conjectured that factor analysis is very relevant for appraising water use efficiency.

Results and Discussion

Occupational distribution of the respondents in the survey showed that the respondents are mostly lecturers (81.5%). The distribution was biased against lecturers who have higher university degrees and of greater faculty to better understand the technicality involved in the questionnaire. However, 18.5% of the respondents were technologists; who were involved by virtue of their academic qualifications and their long-time experience in the job. There is a very high correlation between the level of education and occupation distribution (Khamis *et al.*, 2010) The age of 19 to 45 years formed 44.4 % while those in the category of 46 to 65 years was 55.6%. The survey considered the agility, interaction level and time availability on the part of all respondents so that the questionnaire can be completed within the schedule. There was an assumption too that, the age above 65 years may not be contemporary with water provision experience for her home use, while other members of the household do it for her (Istifanus et al, 2019)

96.3% of the respondents got water from groundwater sources through hand-dug wells or boreholes while only 3.7% got water from pipe-borne networks. In the same vein, all respondents obtained water within their home premises. This is in agreement with the observation of Omole (2013) and, Ogunbode and Ifabiyi (2017) on water accessibility in the study area.

I. Descriptive Analysis

Table 1 presents the attributes of the respondents involved in the survey

Categorization		*Distribution*	
		Sample size	% of total in the category
A	Occupation		
	Technologists	5	18.5
	Lecturers	22	81.5
B	Level of Education		
	First Degree	0	0
	Master's Degree	5	18.5
	PhD Degree	22	81.5
C	Age range		
	19 to 45	12	44.4
	45 to 65	15	55.6
D	Sources of water for Respondents		
	Pipe-borne	1	3.7
	Deep well/borehole	26	96.3
	Rivers/Streams	0	0
E	Relative distance of water source to respondents		
	Within house premises	27	100
	Outside house premises	0	0

II. Total household water use

Household water use among the respondents is shown in Figure 4. The highest area of water use among the respondents per day is Washing (85.94%) while the least use was recorded for lawn watering (0%). The reason could be that many residential buildings do not have green lawns in the compounds which are either bare or concretized. Water is dominantly used for washing clothes, dishes, drainages, cars among the respondents. Zero water use for cooling engines could result from limited women's knowledge in this aspect. The respondents may not understand water as a cooling agent for car radiators as these routine checks are often attended to by their husbands or auto-mechanics. That water wastage is higher in washing than in other uses supports Maslow's hierarchy of human's need (Davey and Shaw, 2019).

The use of water in livestock keeping was rated 6.96% probably because livestock keeping at home was not embraced by the respondents. This is also not unexpected considering the environment where the respondents reside (Ogunbode and Ifabiyi, 2017). Engaging in livestock keeping may involve ensuring cleanliness of the entire compound which may be difficult and demanding.

Incidental uses of water for hair cleaning, face cleaning, hand washing and others had a proportion of 16.54% while water use for drinking and cooking are 5.68% and 5.37% respectively. It was evident that more of water was used for drinking than for cooking. Indeed, water is taken either to be hydrated for effective body metabolism or part of the other meals.

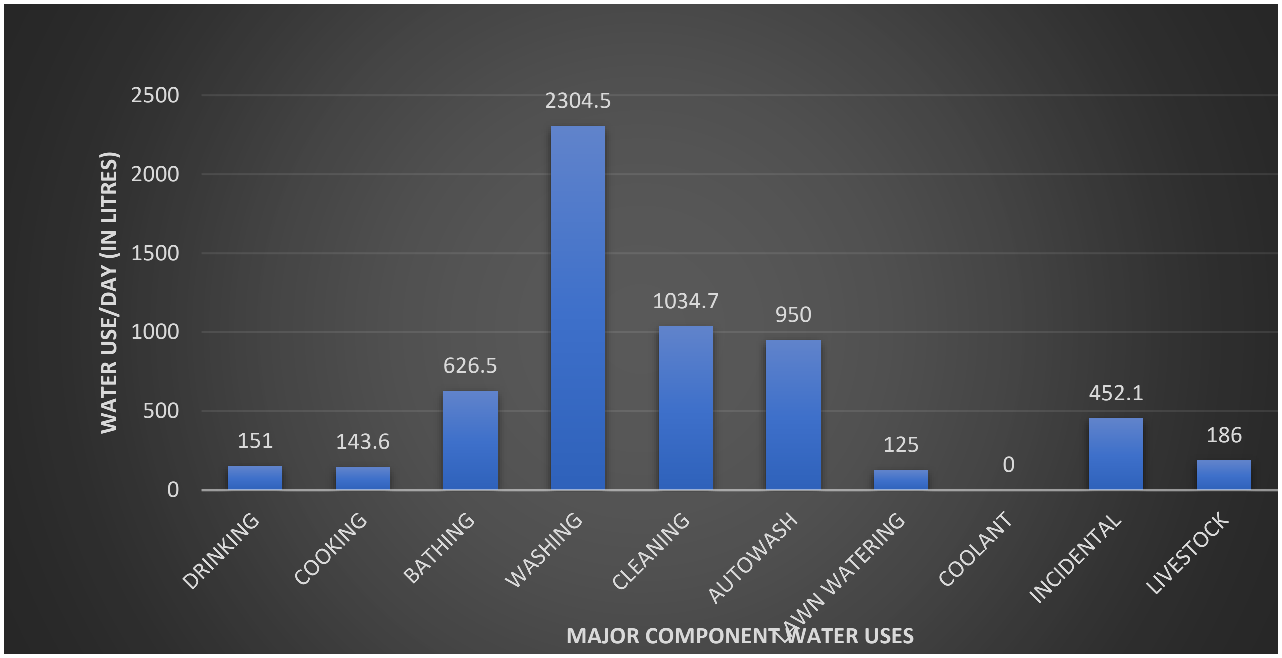

Figure 4: Household component water use per day (in Litres)

III. The Estimated Total Water Use Per Day

Table 2 reveals that ETWU/Day ranges between 68.7L/Day in the Household Number 3 and 414.2L/Day in the Household Number 11, also shown in Figure 5. The wide range could be attributed to the household size, property possessed and proximity to water source among others.

Table 2: Component distribution of household water use by respondents on average.

Component	*Category*	*Litres/day*	*% of Total*
Drinking	C	5.78	2.58
Cooking	C	5.47	2.45
Lawn watering	C	4.81	2.15
Livestock	C	6.96	3.11
Bathing	NC	23.33	9.99
Washing	NC	85.94	38.45
Cleaning	NC	39.29	17.57
Auto wash	NC	35.38	15.83
Cooling agent	NC	0	0
Incidentals	NC	16.54	7.4
Total		223.5	100

C = Consumptive use; NC = non-Consumptive use

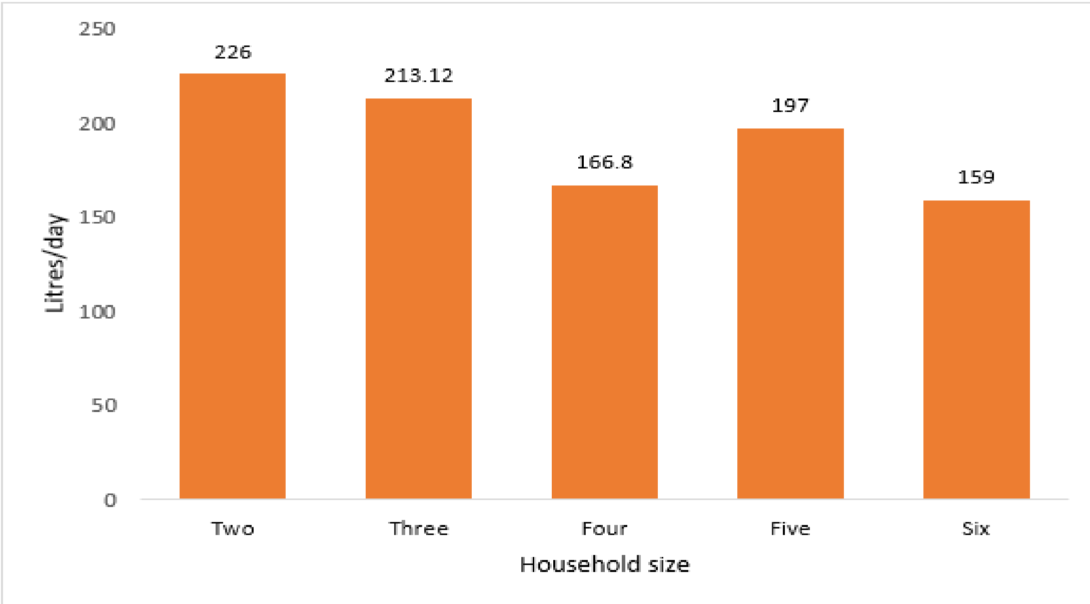

Figure 5: Household water use (HWU) per day among Bowen University staff

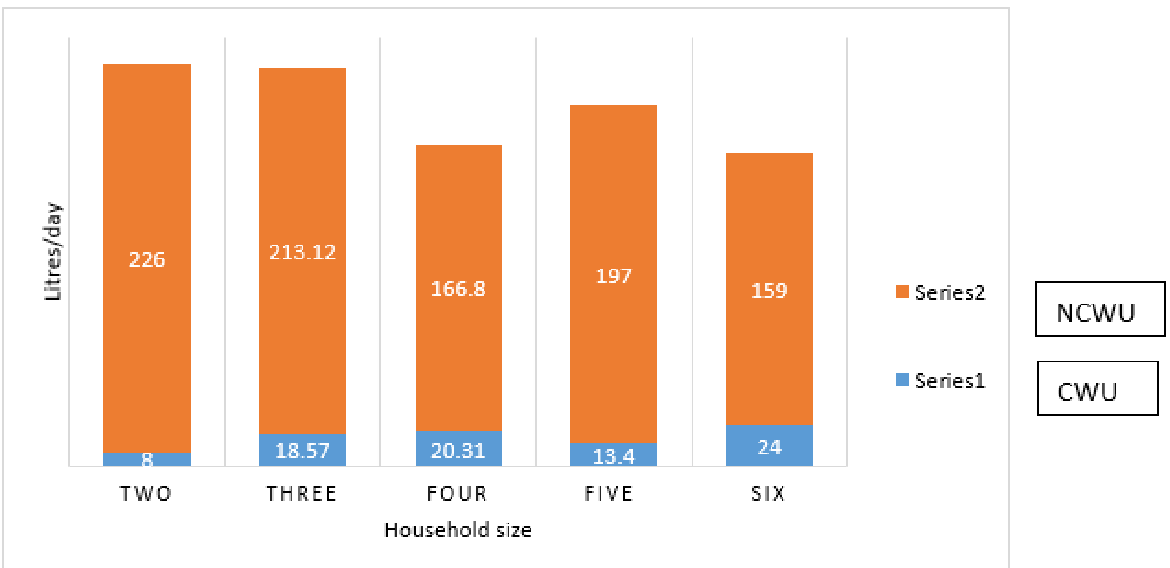

Figure 6: Proportion of consumptive (CWU) to non-consumptive (NCWU) water use per day among Bowen University staff

Figure 6 shows the proportion of household water engaged for consumptive and non-consumptive uses by the respondents. The proportion of consumptive uses such as drinking, cooking, lawn watering and livestock management was 9.02% while the remaining volume of water (90.98%) was utilized for non-consumptive purposes such as washing, bathing, auto-wash, engine coolant and incidental uses. This showed that water wastage among the respondents was greater in non-consumptive uses than in consumptive uses. This result corroborated the findings of Meyer *et al.,* (1999) and Beal *et al.* (2011) in their studies carried out in North America and Australia respectively. They both discovered that a large proportion of household water use was in different kinds of washing and gardening/lawn watering.

IV. Tracking areas of excessive use of water at household level using Factor Analysis

Factor Analysis was used to determine the possible sources of leakage and water wastage through the extraction of the dominant water uses. The data was subjected to KMO Test and Barttlett's Test of sphericity to test for the factorability and autocorrelation of the data. The result of the test showed that the data was factorable with KMO value of 68.3 at $p \leq 0.005$ significance level. The ranking value, (eigen value) was set at the maximum of 1. This indicated that any of the variables that has eigen value less than 1 was not considered as significant in the explanation of areas of excessive water use in homes in the study area. The statistic extracted three factors (water uses) out of the nine (9) uses. (Note that the "Other Uses" and "Coolant" components were not included because of their zero variance). The result of the analysis is presented in Table 3.

Table 3: Total variance explained using Factor Analysis

S/N	Water Components	Initial Eigenvalues			Extraction Sums of Squared Loadings		
		Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	Drinking	2.167	24.08	24.08	2.167	24.08	24.08
2	Cooking	1.526	16.952	41.031	1.526	16.952	41.032
3	Bathing	1.107	12.301	53.332	1.107	12.301	53.333
4	Washing	0.985	10.942	64.274			
5	Cleaning	0.928	10.311	74.585			
6	Auto-wash	0.845	9.392	83.978			
7	Lawn Watering	0.697	7.741	91.718			
8	Incidental	0.454	5.043	96.762			
9	Livestock	0.291	3.238	100			

Source: SPSS-generated Total Variance Table

The result revealed that three (3) uses of water explained the variance in the household water use. The identified and extracted variables were obtained from the rotated component matrix (RCM). The variable with highest proportion in the matrix was selected as being the extracted one.

Table 4: Extracted variables and their respective details.

S/No	Extracted Variable	RCM	Rank (Eigen value)	%Variance Explained	% Cumulative Variance Explained
1	Washing	771	2.167	24.08	24.08
2	Incidental uses	0.665	1.526	16.952	41.032
3	Carwash	713	1.107	12.301	53.333

RCM-Rotated Component Matrix

Source: SPSS-generated Tables

Table 4 revealed the extracted variables with their respective weightings and ranks. The factor with the highest loading was washing (0.771) under the component matrix. This was followed by incidental uses of water with a matrix loading of 0.665 and the third one with a matrix loading of 0.713 was auto-wash use of water. The above three uses of water explained a total variance of 53.33% in the household uses of water as presented in Table 4. Furthermore, the explained variance showed that the use of water for washing purposes ranked first with eigen value of 2.167 and also gulped 24.080% of the variance extracted. This is a major potential source of wastage in household water use. The fact that the respondents in the survey obtain water from ground sources most of which are owned by them could be the reason for these results (Makki et al., 2011; Ogunbode et al., 2023). Excessive use of water for washing because water is not paid for by the users neither do they obtain any license for the exploitation Incidental uses was ranked second with eigen value of 1.526 and explained 16.95% of the variance noticed in household water use. Similarly, the third variable with eigen value of 1.107 was the household use of water for car wash activity among the respondents. It explained 12.30% of the total variance. Generally speaking, it would be noted that the three (3) water uses extracted by the multivariate analysis were part of the non-consumptive component uses of water in homes. It is concluded therefore, that excessive use of water is dominated by non-consumptive uses, thus, efforts towards efficient use of water in homes should focus on the volume of water used for this purpose. Nkwocha and Iheukwumere (2018) had made similar observation in Awka, Nigeria where it was recommended that centralized wastewater treatment should be established to encourage the reuse of wastewater so as to enhance environmental quality as suggested by Mustapha *et al.* (2020).

Conclusions and Recommendations

Efficient use of water at household level among twenty-seven (27) Bowen University staff members was studied. The major uses of water were drinking, cooking, lawn watering and livestock management, otherwise classified as consumptive uses while bathing, washing, cleaning, auto wash, cooling agent for engines and even incidentals fell into the non-consumptive use category. Descriptive analysis revealed that the respondents were in the category of doctoral degree holders (81.5%) and were all connected with the water source which was majorly groundwater (96.3%). Factor Analysis showed that only three factors viz: washing, incidental uses and auto-wash actually explained 53.33% of the total variance and these are components of non-consumptive uses of water. The implication of these findings was that water wastage and misuse in homes were grossly made up of non-consumptive water use component, which could have possibly been induced by their proximity to the source. It is, therefore, suggested that efforts should be directed towards checkmating excessive uses for washing through reuse and/or recycling. Investment in wastewater treatment is not likely to be in futility because it can enhance the recycling of the wastewater in toilet flushing and irrigation farming, thus contributing to sustainable water access. Relevant authorities in water management should probably consider public enlightenment and water use metering to place price value on per capita water use to curtail unending use of the resource in homes.

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