

# Pattern of Domestic Water Use in Bauchi Metropolis

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## Abstract

Where there is water there is life. Life exist around numerous uses of water which makes it important for survival and luxury. Pattern of domestic water use refers to the use of water for various domestic activities. However, accurate data on pattern of domestic water use are scarce in Nigerian urban centers. This study collected data from randomly selected households in the low , medium and high density residential areas of Bauchi metropolis .The data was analyzed using Microsoft excel and presented in tables The study found out that the pattern of water use at household and per capita level were similar. The pattern were bathing which consume (45%) of total domestic water use at household level, flushing toilet (15%), cooking (5%), drinking (7%), Muslim prayer (10%), Christin prayer (1%),washing cloth (7%), washing dishes (4%), brushing teeth (1%) and so on. However, there is slight variation in the pattern of water use within the density areas where there is no water use for Christian prayer in the low and high density residential areas but only in the medium density area.

**Keywords:** pattern, domestic, water use, density areas.

## 1. Introduction

Where there is water there is life. Life exist around numerous uses of water which makes it important for survival and luxury. It is a part of our biosphere that should not be overused, ignored or taken for granted ( Abrashinsky,2004) The earth's hydrosphere has about 1.36 billion km<sup>3</sup> water and 75% of the earth's surface is covered with water containing 97% salt and 3% fresh water. Only 1% of the fresh water is available for human consumption (Ali & Tarfa, 2012). Nigeria's fresh water resources cover only 3.4% of its total land area of 94,185,000 hectares to meet the demand of 174 million people (National Population Commission (NPC), (2006). Because of water should be conserved to sustain our domestic need for the future.

The increase in demand for water as a result of increase in population and changes in life style and socio-economic activities has put pressure on water supply systems which is considered as leading to shortages in Nigeria's urban centers. (Ayanshola & Salami, 2010) Another reason adduced to this problem is lack of adequate understanding of the pattern of domestic water use.

Pattern of domestic water use refers to water use for usual domestic activities. Donelley and Cooley,(2015),sees domestic water use or household water use to consist of water for drinking, bathing, washing cloths and dishes, flushing toilet and landscaping. World Health Organization (WHO) (2003), defines domestic water use as water used for all usual domestic purposes including bathing and food preparation. This household survey looked at the pattern of domestic water use in Bauchi metropolis a typical Nigerian urban center.

## 2. Materials and Methods

This study examined the pattern of domestic water use and the quantity of water used for each activity at household level in Bauchi metropolis. Structured questionnaire were administered to sampled households in the study area. The target respondent were the head of households who gave the needed information for the analysis. A total of 381 questionnaire were administered to randomly selected households the low medium and high density areas of Bauchi metropolis Data collected were analyzed using Microsoft excel and presented in tables using tools such as averages and percentages.

## 3. Patten of domestic water use

Pattern of domestic water use vary from one community to another. Higher standards of living are changing water demand and water use patterns. This is reflected mainly in increased domestic water use, especially for personal hygiene Most European countries have indoor toilets, showers and bath for daily use. (Krinner & Lanllana, 1999). In U.K and Canada 30% of total water is used for toilet flushing and about 30% for personal hygiene. (Zhang, 1999; Waterwise, 2007).

In India, Shaban and Sharma (2007) studied water consumption patterns in Domestic Households in seven major cities. They found out that at household level, bathing consumes the highest amount of water with about 28% of total consumption. Toilets 20%, washing clothes 18.6% and washing utensil 16.3%.

Otaki *et al.*, (2005) studied domestic water demand analysis of U.S .A, Japan Singapore, Netherlands, etc. found the pattern of water use as toilet flushing, bath and shower, laundry cooking and others. Thomson *et al.*, (2001) mentioned four main types of water use in a typical urban East African household as consumption use (drinking and cooking) (ii) hygiene (bathing, washing clothes, cleaning and flush toilets. (iii) Amenity uses (watering lawns, car washing, garden watering, and other non-essential tasks; (iv) productive use (watering

livestock, brewing and construction of houses).

In Beijing, China, Zhang (1999) found the water use pattern in households to be drinking and cooking, dish washing, clothes washing, and toilet cleaning. Lu, (2007) identified the pattern of water use in Harbin, China to include bathing, washing machines and dish washers. Mini (2013) in their study of domestic water consumption in Los Angeles (U.S.A) found out the pattern of water use as bathing, toilet flushing, cloth washing dish washing and landscape greening. In Barcelona, Spain Corbella & Pujol (2009) found the pattern of water use to include bathing, cooking, cloth washing, toilet flushing.

In Melbourne Australia an average family uses 19% of their total water for flushing toilets and 35% for garden and lawn watering; 26% in bathroom, 15% laundry, kitchen 4%, 1% drinking. (Abrashinsky, 2004). In Nakemate Town Ethiopia Ali & Terfa, (2012) found that drinking and cooking were the largest users of water, 12.5 litres per day at household levels followed by utensil cleaning, bathing, cloth washing, house cleaning and gardening, toilet and others.

Ayanshola & Salami (2010) found the pattern of water use in Ilorin to be cooking laundry, dish washing, toilet flushing. Okeola & Sule, (2010) showed the pattern in Offa to be for bathing, washing clothes, cooking, drinking and car washing. In Bauchi Istifanus, (1995) found the pattern of water use in the domestic sector to be bathing, cooking, car wash, drinking, washing cloths and washing dishes. Kagu *et al.*, (2013), showed that the patterns of water use in Maiduguri include Bathing, washing, food preparation and others. Uzoamaka, (2010) in a study of Qualitative Analysis of drinking water in Enugu urban areas found the pattern of use as bathing, cooking, cloth washing, dish washing, and toilet fluding.

#### 4. Results and Discussions

In Bauchi metropolis, the pattern. of domestic water use at household level are bathing which account for 45% of total domestic water use, flushing toilet 15%, Muslim prayer (10% ), Christian prayer (1% ), cooking 5%,washing dishes 4%,washing clothes 7%,drinking 7% ,brushing teeth 1% and carwash/watering garden 1%. The pattern in the low, medium and high density areas show similar trends with bathing constituting the highest water use of 48%, 45% and 49% respectively. However, some variations exist in water use in the densities. While 13% of water is used for used for flushing toilets in high density areas, 19% is used for flushing toilets in low density areas. For religions activities 10% is used in high density areas while 4% is used in the medium density. For cooking 3% of water is used in low density while 5% is used in high density areas.

In low density 3% of water is used in kitchen tap while only 0.4% is used in high density areas. This could be attributed to water use appliances which are available in flats in low density and very little in high density where houses are predominantly compound type and room and parlour. For washing cloth 8%, 5% and 7% of water is used in the medium, low and high density In term of absolute quantity of water use bathing use 87,620 litres, flushing toilets 29,207 litres, religious activities 20,781 litres, cooking 8,930 litres, washing dishes 8,182 litres, washing clothes 1,352 litres, drinking 14,152 litres, brushing teeth 2,238 litres, and car wash/gardening 2,345 litres and so on. There are also large variations in the quantity of water use for various domestic activities. At household level the range is 87620 litres (bathing) to 1282 litres (Christian prayer) in the metropolis. In the density areas is 0 litres (Christian prayer) to 21,708 litres (bathing), 560 litres (brushing teeth) to 24,250 litres (bathing) and 0 litres (Christian prayer) to 41,662 litres (bathing) in the low, medium and high density areas respectively (Table 1).

**Table 1: Pattern of Water Use in Sampled Household in Bauchi Metropolis**

| Water Use            | Low Density  |      |               |      | Medium Density Per |    |               |      | High Density Per |     |               |     |               |            |
|----------------------|--------------|------|---------------|------|--------------------|----|---------------|------|------------------|-----|---------------|-----|---------------|------------|
|                      | Total        | %    | Per Household | %    | Total              | %  | Per Household | %    | Total            | %   | Per Household | %   | Total         | %          |
| Flushing Toilet      | 8604         | 18   | 155           | 19   | 9710               | 17 | 77            | 18   | 10893            | 12  | 56            | 13  | 29207         | 15         |
| Bathing              | 21708        | 47   | 387           | 48   | 24250              | 42 | 189           | 45   | 41662            | 47  | 212           | 49  | 87620         | 45         |
| Kitching Tap         | 1450         | 3    | 22            | 3    | 1580               | 3  | 14            | 3    | 335              | 0.4 | 2             | 0.4 | 3365          | 2          |
| Dining Tap           | 1105         | 2    | 15            | 2    | 1300               | 2  | 12            | 2    | 230              | 0.3 | 1             | 0.3 | 2635          | 1          |
| Cooking              | 1600         | 3    | 25            | 3    | 2815               | 5  | 24            | 5    | 4515             | 5   | 23            | 5   | 8930          | 5          |
| Washing Dishes       | 2255         | 5    | 37            | 4    | 3085               | 5  | 36            | 4    | 2842             | 3   | 14            | 5   | 8182          | 4          |
| Washing Cloths       | 2300         | 5    | 38            | 5    | 4500               | 8  | 37            | 8    | 6725             | 8   | 35            | 7   | 13525         | 7          |
| Drinking Muslim      | 3103         | 7    | 52            | 6    | 3234               | 6  | 26            | 5    | 7815             | 9   | 41            | 8   | 14152         | 7          |
| Prayers Muslim       | 3937         | 8    | 68            | 6    | 3512               | 6  | 28            | 4    | 12050            | 13  | 62            | 10  | 19499         | 10         |
| Prayers Christian    | 0            | 0    | 0             | 0    | 1282               | 2  | 10            | 0.05 | 0                | 0   | 0             | 0   | 1282          | 1          |
| Other Spiritual Need | 78           | 0.16 | 1.4           | 0.07 | 1074               | 2  | 8             | 0.8  | 581              | 0.6 | 3             | 0.3 | 1733          | 1          |
| Brushing Teeth       | 306          | 0.6  | 52            | 0.6  | 560                | 1  | 4             | 1    | 1372             | 2   | 7             | 2   | 2238          | 1          |
| Car wash/Gardening   | 1120         | 2    | 17            | 2    | 820                | 1  | 6             | 1    | 405              | 0.4 | 2             | 0.4 | 2345          | 1          |
| <b>Total</b>         | <b>47566</b> |      | <b>878</b>    |      | <b>57722</b>       |    | <b>439</b>    |      | <b>89425</b>     |     | <b>458</b>    |     | <b>194713</b> | <b>100</b> |

On per capita basis an average of 31 litres is used for bathing, 10 litres for flushing toilets, 3 litres for cooking, 2.8 litres for washing dishes, 2.7 litres clothes washing, 5 litres for drinking, 7 litres for Muslim prayer, 0.4 litres for Christian prayer, 0.7 litres for brushing teeth, and so on. Within the densities for example 46.3 litres, 30 litres and 26 litres are used for bathing in the low, medium and high density areas respectively. On per capita basis, the variation for Bauchi is 0.4 litres (Cristian prayer) to 31 litres (bathing), while in the density areas, the range is 0 litres (Christian prayer) to 46.3 litres (bathing), 0.7 litre (brushing teeth) to 30 litres (bathing) and 0 litres (Christian prayer) to 26 litres (bathing) in the low, medium and high density areas respectively (Table 2).

**Table 2: Per Capita Water Use in Sampled Households in Bauchi Metropolis**

| Water Use            | Density    |     |           |    |           |     |           |            |
|----------------------|------------|-----|-----------|----|-----------|-----|-----------|------------|
|                      | Low        | %   | Medium    | %  | High      | %   | Bauchi    | %          |
| Flushing Toilet      | 19         | 19  | 11        | 17 | 7         | 12  | 10        | 15         |
| Bathing              | 46.3       | 46  | 30        | 42 | 26        | 46  | 31        | 45         |
| Kitchen Tap          | 3          | 3   | 2         | 3  | 0.2       | 0.0 | 1         | 1.5        |
| Dining Tap           | 2          | 2   | 2         | 3  | 0.1       | 0.0 | 1         | 1.5        |
| Cooking              | 3          | 3   | 3         | 4  | 3         | 5   | 3         | 4.4        |
| Washing Dishes       | 5          | 5   | 4         | 6  | 2         | 4   | 2.8       | 4          |
| Washing Cloth        | 5          | 5   | 6         | 8  | 4         | 7   | 2.7       | 7          |
| Drinking             | 7          | 7   | 4         | 6  | 5         | 9   | 5         | 7.3        |
| Prayers Muslim       | 9          | 9   | 4         | 6  | 8         | 14  | 7         | 10.2       |
| Prayers Christian    | 0          | 0   | 2         | 3  | 0         | 0   | 0.4       | 0.6        |
| Other Spiritual Need | 0.0        | 0   | 1.3       | 2  | 0.4       | 1   | 0.6       | 1          |
| Brushing teeth       | 0.7        | 0.7 | 0.7       | 1  | 0.9       | 1.5 | 0.7       | 1.3        |
| Car wash/Gardening   | 2          | 2   | 1         | 1  | 0.3       | 0.5 | 0.8       | 1.2        |
| <b>Total</b>         | <b>102</b> |     | <b>71</b> |    | <b>57</b> |     | <b>68</b> | <b>100</b> |

## 5. Conclusion and Recommendation

Domestic water use pattern in Bauchi metropolis is similar to what obtain in other urban centers in respect of bathing and flushing toilets as the leading consumers of domestic water. However the domestic water use pattern in Bauchi slightly differ with some other urban centers due to the significant influence of culture (religion). Religious water use, particularly water use for Islamic prayer is a prominent activity at both individual and household level since it is the third most consuming water activity after bathing and flushing toilet. This pattern of water use in Bauchi metropolis has implication for water supply. It will guide policy makers and water managers in supplying water to the various residential density areas of Bauchi metropolis.

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