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Knowledge, Attitude and Practice: Analysis of Water Consumption Behavior in Urban Vehari

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Abstract

Water is so essential that a human being can only exist for a few days without it. Water is a necessity of life, and it plays a critical role in the social and economic development of a country, particularly in developing countries. In 2007, the gross demand for water in Pakistan for non-irrigation purposes was calculated. Roughly 8.5 billion cubic meters, estimated to rise to over 11.2 billion cubic meters by 2025, following a 1.5 percent growth due to rising urbanization and industrialization. According to the Punjab Bureau of Statistics, 92 percent of the population has access to safe drinking water. To avoid clean water scarcity, water usage behavior must be monitored. The purpose of the proposed study is to evaluate people's clean water drinking habits. The research was quantitative in nature. To collect socio-economic data, measure level of awareness, and water usage behavior, a questionnaire with over 38 items was devised. Data is collected using an interview schedule. The study employed a sample size of 384 people. The collected data is input and coded into SPSS (Statistical Package for Social Sciences), which is then used to perform univariate, bivariate. It is concluded that strong Negative Associations exist between independent variables (Household income, large size of family, type of family, Consumption behavior of water on different activities) and Dependent variables (Availability of Water).

Keywords: Water Resources, Clean Water, Consumption Behavior, Household Size, Income, Indoor Activities

1. Introduction

1.1. Background of the study

Water is required for all forms of human, animal, and plant growth and development. Water management should be a top priority in any area's development and preservation because water is a limited resource that we can never make more of. The fact that 97 percent of the total water available on Earth is salty and only 3% is fresh water, with little more than two-thirds locked in glaciers and polar ice caps is cause for considerable concern. Only a small fraction of the remaining unfrozen fresh water is found above ground or in the air; the rest is mostly found as groundwater. In the world, fresh water is becoming increasingly limited. Water resources are being consumed at a far higher rate nowadays.

According to the United Nations, its regional organizations, and other international organizations, 1.1 billion people do not have sufficient access to water, and 2.4 billion do not have adequate sanitation. By 2025, nearly 3 billion people out of an 8.5 billion population would suffer water shortages, according to current trends. 83 percent of them will live in undeveloped countries, particularly in rural areas where only 20% of the population has access to safe drinking water (Guisse 2014). Water resources are important not only for the survival of species, but also for improving livelihoods, generating income, and alleviating poverty (Grey & Sado 2007).

Pakistan is the world's 6th most populous country, with 2.48 percent of the world's population. The population had increased from 34 million in 1951 to 170 million by 2010. With a population of 58 million people and a density of more than 209 people per square kilometer, the urban population share increased from 17% in 1951 to 36% in 2010. Pakistan, which used to have plenty of water, is now said to be on the verge of experiencing a water scarcity (Sadr *et al.*,2016). Pakistan's non-irrigation water demand was estimated at 8.5 billion cubic meters in 2007, and is expected to climb to 11.2 billion cubic meters by 2025, following a 1.5 percent increase due to population growth (Tabassum *et al.*, 2016; Audi and Ali, 2023).

The United Nations Development Program (UNDP) ranked Pakistan as having one of the main water potentials per person among 130 countries to help it overcome its current water crisis and prevent future ones (IRIN, 2001). In Pakistan, water availability per person fell from 5,000 cubic meters per year in 1951 to 1038 cubic meters per year in 2010, slightly beyond the internationally recognized water shortage criterion of 1000 cubic meters (Haydar et al., 2016). Pakistan's per capita water availability dropped from 2172 to 1014 m3 in 2016, putting the country in a state of high water stress. Population growth and climate change are the two biggest challenges to the country's water security. Agriculture uses 96 percent of the water in Pakistan, while the remaining 4% is used for industrial, residential, and other purposes (Aslam *et al.*, 2012; Ali and Audi, 2018).

Water use in the country is predicted to increase by 10% each year, reaching 338 billion cubic meters by 2025. According to the survey, Pakistan ranks 80th out of 122 countries in terms of drinking water quality (Azizullah *et al.*, 2011). The global water consumption pattern has changed as a result of urbanization, population growth, and industry. Governments and commercial entities have attempted to increase per capita water use. Water availability per capita has been decreasing globally, and particularly in Pakistan. In 1956, per capita water availability in Pakistan was 5,000 m3, but by 2005, it had dropped to 1,100 m3. It was slightly higher than the globally acknowledged level of scarcity (Ahmad *et al.*, 2010).

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Pakistan's water supplies are under severe strain as a result of the country's rapidly increasing population (Shair et al., 2023a, Shair et al., 2023b). A growth in population necessitates the production of additional food, yet there are no new water resources available to meet this demand. Pakistan is the world's sixth most populous country, with a population of 220 million people expected by 2025. Pakistan has been a water-stressed country in the last ten years. Pakistan's per capita water availability is projected to be 1,090 m3, according to the United Nations. The government of Pakistan has designated water scarcity as the most difficult of all concerns because water is essential for both indoor and outdoor purposes.

The population and other statistics for Vehari urban area, which has a population of 145464 people, are based on estimates from the Punjab Provincial Government. The city's population is expected to grow at a 2.72 percent annual rate, with a population of over 195739 by 2023 and 224066 by 2030. With such rapid population growth, ensuring adequate water supplies has proven difficult both in terms of infrastructure and resource development. In 2015, the existing water supply capacity was 6424750 gallons, or 77% of the total water demand of 9637125 gallons. The current water delivery capacity is estimated to be 3212357 gallons insufficient. Due to a lack of water resources and a lack of water delivery infrastructure, only 75% of the homes in the city's current service area have access to municipal water. The rest of the area is without it, and residents rely on their own water supplies, which are largely powered pumps. Some parts of the city are only partially serviced. For water supply and sewerage bills, the Tehsil Municipal Authority (TMA) employs a volumetric pricing structure as well as a fixed tariff system (a fixed rate system by lot area). Water is delivered to the city via a rising main under the system. The survey focused on the city's southern periphery.

1.2. Hypotheses

H1 #1: There is association between Household Income and Water Consumption Behavior.

H1 #2: There is association between Household Size and Water Consumption Behavior.

1.3. Objectives of the Study

- To assess the factors affecting the clean water consumption behavior.
- To assess the water consumption practices of respondents.
- To explore the appropriate strategies to develop the proper clean water consumption behavior.

2. Literature Review

Shankhwar *et al.,* (2015) stated that household sizes, social and economic status, as well as seasonal and climatic fluctuations, are three important factors that determine domestic water use. According to Abedin & Rakib (2013) middle-class families in Dhaka used 200 to 300 liters of water per day on a daily basis. Richter and Stamminger (2012) studied that Small families consume much more water per person and per day than bigger households, According to the survey, dishwashing appears to be the most water-intensive household activity at the kitchen sink, absorbing more than half of the total water utilized.

Keshavarzi *et al.,* (2006) reported that descriptive variables like "household size" and "age of household's head" were also found to be substantially linked to water use. Garden area, greenhouse dimension, and garden watering times per month with tap treated water are all linked to water use in rural families, according to the findings of multivariate analysis. Syme (2004) explored that socio-demographic factors such as block size and swimming pool ownership have an impact on water utilization.

Kaur (2014) discovered that people's income has a big influence on how much water they consume. The amount of water used in a residence is inversely related to the household income. The High and Middle Income Groups have the highest water usage due to the availability of more water-using devices. Hota (2014) found that People consume more water than they need because they are unaware of the condition. According to the current study, home water usage is strongly linked to income levels. In the top and middle income categories, the maximum water usage is higher. For domestic functions, such as cooking, gardening, and car washing, people in higher and middle-income groups utilize a significant amount of water.

Jethoo (2011) explored that family water use is directly related to the income of various classes. As a result of changing lifestyles, consumption is increasing. Climate change has an impact on water use as well, as rising temperatures encourage people to use more water for gardening and personal hygiene. Harlan (2009) found that household income had a statistically significant positive impact on consumption, which was mediated by house size. The size of the irrigated area and the landscape style had a significant impact on consumption. More indoor water facilities, such as spas, fountains, exotic aquariums, and icemakers, are more likely to be found in larger homes, as well as more plumbing that is prone to leaks and the likelihood of irresponsible water usage.

Domene and Saur (2006) emphasized that household size and dwelling type appear to be important predictors of consumption. Families with fewer members use more water per person than families with more members, while single-family dwellings use more water due to exterior uses, such as gardens. Morote *et al.,* (2018) concluded that the people from all socioeconomic backgrounds engage in unlawful consumption. It should be noted that, because to the high levels of consumption caused by watering gardens and filling swimming pools, detached home properties have the highest volume of water and the highest amount of deception every household.

3. Methodology

The research design of this study was quantitative. A self-designed questionnaire was used for collection of data from urban areas of Vehari in this study. The collected data was analyzed statistically. In this study population was the urban housing areas of Vehari. The urban population of Vehari consists of four Union councils. The Urban Population of Vehari is 145464. The population of urban Vehari is consisting of 23212 households. 96 samples were collected from each Union Council by using a systematic random sampling technique. The available population size for this study was 384 samples were collected for the sake of research. Morgan Proportion Formula was used to determine the sample size (Krejcie & Morgan 1970). A systematic sampling technique were used for the selection of respondents. A household survey were conducted by using a systematic random sampling technique.

4. Results and Discussion

Table 1 shows the socio-economic status of the respondents. Table one shows that majority ofthe respondents were male belongs to middle income family living in 1350 square feet household withnuclear family having 5 to 8 family members. The socio-economic characteristics of respondents indicated that the majority of them belongs to middle class families with medium family size. The review of literature suggested that the middle-income families used more water than poor class and lessthan high income families, literature also suggested that family size is positively associated with waterusage.

Table 1: Socio-economic characteristics of the respondents (384)

Characteristics	Number	%
Age		
16-22	70	18.2
23-29	185	48.2
30-36	74	19.2
37-43	26	6.8
44-50	29	7.6
Gender		
Female	138	35.9
Male	246	64.1
Education		
Illiterate	12	3.1
Primary	25	6.5
Middle	42	10.9
Matric	76	19.8
Intermediate	84	21.9
Graduation	105	27.3
Masters	34	8.9
M.Phil.	6	1.6
Household Income		
Up to 20,000	89	23.2
40,000	90	23.4
60,000	82	21.4
Above 60,000	123	32.0
Size of House in Marla.		
Up to 5	166	43.2
6-10	158	41.1
11& above	60	15.6
Family Type of Respondent.		
Single/Nuclear	149	38.8
Joint	188	49.0
Extended	47	12.2

Table 2 shows the availability and quality of available water as per the opinion of respondents.The table statistics shows that 42.2% of respondents have opinion that the color of the supplied drinkingwater by Water and Sanitation Authority is good and 37.2% have opinion that the color of the water ispoor. The majority of the respondents (46.1%) identify that the taste of the water is poor and 32.8% of respondents have the opinion that the taste is good. 41.4% respondents have opinion that the pressure of the supplied drinking water is good but with mere difference 36.7% respondents said that the pressure of water is poor. Majority of respondents (38.3%) indicated that the purity of water is very bad, 30.5% said it is poorand 22.4% were satisfied with the purity of water and have opinion that the purity of the water is good.

Table 2: Scores on Availability of water Scale (384)

Characteristics	Number	%
Color		
Excellent	38	9.9
Very Good	29	7.6
Good	162	42.2
Poor	143	37.2
Very Bad	12	3.1
Taste		
Excellent	32	8.3
Very Good	31	8.1
Good	126	32.8
Poor	177	46.1
Very Bad	18	4.7
Pressure		
Excellent	26	6.8
Very Good	41	10.7
Good	159	41.4
Poor	141	36.7
Very Bad	17	4.4
Purity		
Excellent	14	3.6
Very Good	20	5.2
Good	86	22.4
Poor	117	30.5
Very Bad	147	38.3

Table 3 shows the WASA water usage other than drinking purpose. Table shows that only 9.6% respondent Let water run all the time While brushing teeth, 67.4% majority of respondent Close the tap and 22.9% adopt Both behavior (Let water run all the time & close the tap) While brushing teeth. 40.6% respondent Let water run all the time While taking a shower, 26.8% Close the tap and 32.6% adopt Both behavior (Let water run all the time & close the tap) While taking a shower. 23.7% respondent Let water run all the time While washing clothes, 40.6% majority of respondent Close the tap and 35.7% adopt Both behavior (Let water run all the time & close the tap) While washing clothes. 45.3% respondent Let water run all the time While Dish washing 32.6% Close the tap and 22.1% adopt Both behavior (Let water run all the time & close the tap) While Dish washing.

Table 4 shows the water usage behavior of respondent in different activities. Table illustrates that majority of respondent 51.3% were using Twice a Day water for the Dish Washing, 32.88% respondent Many Times a Week, 15.9% respondent Not Sure. 59.1% respondent were using water Many times a week for the Bathroom Cleaning, 40.9% respondent Not sure for the Bathroom Cleaning. 8.7% use twice a day water for the House Cleaning, 44.5% respondent many times a week,27.3% respondent use Few times a month water for the House Cleaning and 19.5% respondent were not sure about using of water for the house cleaning purpose. 72.1% use many times a week water for the Cloth washing, 1.6% respondent Twice a day and 26.3% respondent use Few times month water for the Cloth washing. 33.1% use never water for the Washing Vehicles, 33.3% respondent Not sure, 33.6% respondent Few times a month, for the Washing Vehicles. 33.9% use never water for the

Watering plant, 32.2% respondent Not sure, 33.9% respondent Few times a month, for the Watering plant**.** 35.9% use never water for the Watering Lawns, 27.9% respondent Not sure, 36.2% respondent Few times a month, for the Watering Lawns.

Table 3: Household water uses for following activities other than Drinking (384)

Characteristics	Number	%
While brushing your teeth		
Water run all Time	37	9.6
Close the Tap	259	67.4
Both, it Depends	88	22.9
While taking a shower		
Water run all Time	156	40.6
Close the Tap	103	26.8
Both, it Depends	125	32.6
While washing clothes		
Water run all Time	91	23.7
Close the Tap	156	40.6
Both, it Depends	137	35.7
While Dish washing,		
Water run all Time	174	45.3
Close the Tap	125	32.6
Both, it Depends	85	22.1

Table 4: Respondents' water uses behavior for following activities (384)

Characteristics	Number	%
Dish Washing		
Twice a Day	197	51.3
Many Times, a Week	126	32.8
Few times a month	0	0.0
Never	0	0.0
Not Sure	61	15.9
Bathroom Cleaning		
Twice a Day	0	0.0
Many Times, a Week	227	59.1
Few times a month	0	0.0
Never	0	0.0
Not Sure	157	40.9
House Cleaning		
Twice a Day	33	8.7
Many Times, a Week	171	44.5
Few times a month	105	27.3
Never	0	0.0
Not Sure	75	19.5
Cloth washing		
Twice a Day	6	1.6
Many Times, a Week	277	72.1
Few times a month	101	26.3
Never	0	0.0
Not Sure	0	0.0
Washing Vehicles		
Twice a Day	0	0.0
Many Times, a Week	0	0.0
Few times a month	129	33.6

Never	127	33.1
Not Sure	128	33.3
Watering Plants		
Twice a Day	0	0.0
Many Times, a Week	0	0.0
Few times a month	130	33.9
Never	130	33.9
Not Sure	124	32.2
Watering Lawns		
Twice a Day	0	0.0
Many Times, a Week	0	0.0
Few times a month	139	36.2
Never	138	35.9
Not Sure	107	27.9

Part # 2

Hypothesis #1: There is an association between Income and Water Consumption Behavior

In this table chi-square value 93.983 at significance level of 0.000 shows a strong association between Household Income and Water Consumption Behavior. The gamma value -.240at significance level of 0.000 shows the strong Negative relationship between Household Income and Water Consumption Behavior. If we look at the content of table, we come to know that with the increase in Household Income there is clear decrease in the percentage of Water Consumption Behavior. Water use in the household is associated directly with the income of diverse groups. Consumption is increasing as a result of changes in lifestyle (Jethoo, 2011). People's income has a significant impact on their water use. Water usage in homes is inversely proportional to household income. Due to the availability of more water-using equipment, the highest water usage has been recorded in the High- and Middle-Income Groups. These two income categories, on the other hand, are responsible for a considerable amount of water use in kitchen gardens/lawns and car washing (Kaur 2014).

Table 5

Household Income of the respondent. (Monthly)* Water Consumption Behavior Cross tabulation					
Household Income of the respondent. (Monthly)		Water Consumption% (Frequency)			
		Always	Occasionally	Never	Total
1	up to 20,000	45 (11.7%)	9 (2.3%)	2 (0.5%)	56 (14.6%)
2	40,000	35 (9.1%)	14(3.6%)	23(6.0%)	72(18.8%)
3	60,000	54(14.1%)	15(3.9%)	17(4.4%)	86(22.4%)
4	80,000	62 (16.1%)	10 (2.6%)	16 (4.2%)	87 (22.9%)
5	Above 80,000	18 (4.7%)	50 (13.0%)	14 (3.6%)	82 (21.4%)
Total		214 (55.7%)	98 (25.5%)	72 (18.8%)	384 (100.0%)
Chi-Square: 93.983,Sig. Level: 0.000, Gamma: -.240, Sig. Level: 0.000					

This table shows the association between Household size and Water Consumption. The value (27.167, sig 0.000) of chi-square as described in table indicates the significant association between variables and the value of Gamma (-0.243, sig 0.000) illustrate the strong negative relationship between independent (Household size) and dependent (Water Consumption) variables. Descriptive variable such as "Size of household and ‘age’ of household's head" were also found to be strongly associated with water use. Findings of factorial feature analysis revealed that garden area, greenhouse dimension, and garden watering times per month with tap treated water are related to water use in households (Keshavarzi *et al*., 2006).

Hypothesis #2: There is an association between Household Size and Water Consumption

Table 6

Size of House (in Marla)		Water Consumption			
		Always	Occasionally	Never	Total
1	Up to 5	115 (29.9%)	41 (10.7%)	39 (10.2%)	195 (50.8%)
2	6-10	87 (22.7%)	35 (9.1%)	31 (8.1%)	153 (39.8%)
3	11& above	12 (3.1%)	22 (5.7%)	2 (0.5%)	36 (9.4%)
Total		214 (55.7%)	98 (25.5%)	72 (18.8%)	384 (100.0%)
Chi-Square: 27.167, Sig. Level: 0.000, Gamma: -0.243, Sig. Level: 0.000					

5. Conclusion

The study was conducted in the Vehari, Punjab, Pakistan to assess the factors affecting the clean water consumption behavior and assess the water consumption practices of respondents. After analysis of data study explored that socio-economic characteristics and water consumption practices of respondents effect the availability of water. The current study investigates the relationship between household water usage and income. Consumption is increasing as a result of lifestyle changes. The maximum water usage is pragmatically higher in the upper-income and middle-income groups. The majority of families are dissatisfied with the duration of water service. It has also been shown that the majority of responders are unaware of limited water resources. Individuals with higher incomes and middle-incomes are responsible for consuming a considerable amount of water for household purposes such as cooking, gardening, and vehicle washing, among other things. Study concluded that large family size negatively affects the Availability of Water. Results indicate that consumption per capita increases with the number of household. Compared to cleaning dishes, personal hygiene and home cleaning, domestic household usage has shown a higher volume of water for bathroom and cloth washing. In the estimation of household water consumption, family size and household taps showed significant indications, and households with many people and a large number of taps often had greater water consumption.

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