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Water Consumption Behaviour of Households in Lahore, Pakistan

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Abstract

This paper focuses on the water consumption behaviour of residents of Lahore, Pakistan. The water consumption behaviour is associated with the attitude and meter tariff because these factors reshape the community behaviour. Attitude is an internal trait of people, while meter tariff is an external factor both factors influence the water consumption behaviour. There is a positive association between the independent variables (attitude and meter tariff) and dependent variables (water consumption). Thereby, considering the internal and external variables for excess water consumption in residential areas, policymakers can control water consumption by focusing on people's attitude towards the usage of water. Presently, people's attitude is anti-environmentalist. Therefore, the current study employed an explanatory approach for the analysis and interpretation of the data. Furthermore, the theory provided a systematic way to conduct the analysis of the water consumption of people living in residential areas. Moreover, this paper unfolds the existing water consumption problem in residential areas of Lahore.

Keywords: domestic, water consumption, attitude, meter tariff, policy makers

Introduction

In contemporary times, urbanization has created pressure on natural resources (water, gas, and other natural resources). The utilization of these resources is dependent on people's usage practices. People's beliefs, attitudes, and social practices are generating disproportion among the availability of water and its demand. The authorities and policymakers can play a vital role in reducing water consumption in society and it has been challenged for them (Essien, 2020; Giguère et al., 2016; Talpin, 2012). The water scarcity threat is one of the leading challenges in many developing countries of the world including Pakistan. The social practices of the

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community like the use of water for different purposes are directly associated with the sustainability of water, people's daily water consumption activities, and usage methods show the attitude and behaviour of people towards water consumption. The social practices in society show/indicate that, people habitually use excess water (Holtz, 2014). The policymakers through the enforcement regimes (rules, laws and institutions) influence on people's actions. The policies can reshape the behaviour, practices, and enhance the rational response in the community regarding water consumption (Kennedy et al., 2015).

The diversified societies like Pakistan, in which different communities live, their practices, beliefs, attitudes, and behaviours are quite different from each other. In Pakistan, individual behaviour of water consumption is excessive because water is almost free for domestic consumption. WASA has the sole responsibility for sanitation and water supply systems in Lahore. WASA tariff is based on a flat rate system; it evaluates the bill on the base of the household area instead of consumption volume. Pakistan is also on the edge of the water scarcity issue. Lahore is the second biggest city in Pakistan based on its population. According to the Pakistan Bureau of Statistics (2017), Lahore population is around 19,398,081, and the number of households are 1,757,691 approx. The Water and Sanitation Agency (WASA) is the only water-providing and regulatory authority operating in Lahore. WASA is providing water in the most populated areas of Lahore, around 491 tube wells were working in Lahore in 2014 and supplying water to households (Fazal & Sansom, 2016).

In 2018, this number increased to 571and due to energy shortfall, WASA shifted 200 tube wells on generators for the continuous delivery of water across the city (Hasnain, 2018). WASA charges the water bills according to the house area. People in residential areas sometimes also use groundwater directly by bore drilling. Private bore drilling provides free of cost water to households. Therefore, different practices of water consumption also reflect the complex scenario of behaviour and attitudes, which exist in society. Still, the critical aspect derived from these practices is this; the community is deriving water from WASA supply line and direct boring method. Various social methods of getting water cannot sustain the water resource. The socioeconomic status of the individual influences in the attitude of water consumption (Katti et al., 2017). To study the independent variables of water resources/ consumption attitude and meter tariff are the

daily practices in society. However, a slight difference exist in both variables, as attitude is a self-internal factor, while meter tariff is an external factor under the control of an organization (WASA). Water consumption is also a daily practice, which is influenced by different factors. Therefore, the current study aims to focus on the two aspects for ascertaining the equivocal aspects of water consumption behaviour in Lahore. This study investigates the role of both independent variables in the consumption behaviour of water. It will explore variables variation in water consumption. It will illustrate, what is a threat for the sustainability of water due to consumption. Thereby, the current research focuses on the residential/domestic water consumption behaviour of communities residing near the industrial areas of Lahore. In accordance with the regulatory authority and the social practices, this study highlights the malpractices and inhabitants behaviours towards the environmental behaviour.

Water consumption among people is a behaviour often practiced wrong in households. Social practice theory provides a systematic way to analyze of social problems and phenomenon. Water consumption is a social problem through this way the relation is existed between the research problem and application theory. This theory provides the systematic way for the interpretation of results in the next sections. The dependent variable (consumption behaviour) and independent variables (attitude and meter tariff) are daily practices in society. Social practice theory provides the rational for the study of these variables.

Research Questions

What is the relationship between the independent variables (attitude and meter tariff) with the dependent variables (water consumption)?

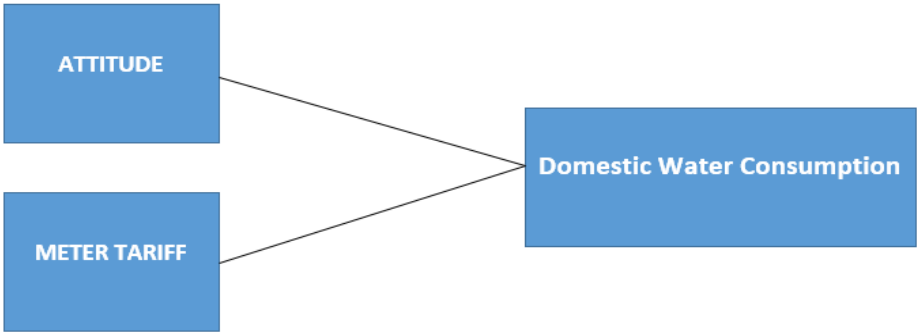
Literature Review

Conceptual Framework

The current study focuses on certain factors which are derived from the social practice theory for the investigation of the routine behaviour of households regarding their water consumption (Browne, 2015; Chappells et al., 2011; Hand et al., 2005; Head & Muir, 2007; Moy, 2012; Pullinger et al., 2013; Turner et al., 2010; Shove, 2003; Syme et al., 2004: Lindsay & Supski, 2017). This approach profoundly studies nature, transformational, individual daily practices, supply systems, and institutional roles (Warde, 2005). Many researchers have focused on the internal (house) and

external (garden) usage of water in daily routine life (Askew & McGuirk, 2004; Delaney & Fam, 2015; Gardiner, 2010; Head & Muir, 2007; Moy, 2012).

Figure 1
Theoretical Model



This paper eliminates the factor of external use of water in the residential level because different aspects are associated with the external consumption of water, like the weather and which type of seeds and trees are growing in the garden of house. Indeed, these practices can consume more water. This study focuses on the water consumption behaviour which is connected with the basic need of people like consumption for wash, cook and other usages under the roof of house. The tariff is the exercise of power by government institutions to control this anti-environmental behaviour and attitude of individuals. In taking rational decision, people also look at the cost of their choice, for example, people use electricity rationally because they have to pay high bills but in the context of water it is opposite due to low charges, people consume and waste water in huge volume. The practical based intervention by the government can change the practices in society. Thereby, the suggested model of this paper is shown in Figure 1.

Influence of Attitude on the Consumption of Resources

Scholars have studied the factors, which have influenced water consumption behaviour that includes social and economic factors (Koop et al., 2019). Usually, the attitude of an individual is shaped by socioeconomic factors that influence decision-making. (Koop et al., 2019). Individual experiences, cognitive understanding, knowledge, social learning, feelings and many other factors in social and economic surroundings. Attitude is a

psychological construct, and this study offers to analyze this construct by observing households' daily water usage practices. This study conducts a residential analysis of water consumption behaviour to analyze the psychological construct (attitude regarding water consumption) in households of Lahore. It was observed that people's attitudes towards water consumption can be extravagant, particularly their domestic consumption behaviour which is different from industrial consumption behaviour (Randolph & Troy, 2008). At household/residential level, people use water for fulfilling the personal needs but at commercial level people get financial benefits by the water like selling of clean drinking water, car washing services and many others. One pays for these pure commercial activities for it and one receive money for the services.

Individual attitude towards water consumption is highly dependent on the level of awareness among people. Institutions also play a vital role in changing the psychosocial behaviours of individuals, but in a country like Pakistan where the institutions are weak, the main point of investigation is that which type of water consumption attitude people have adopted (Koutiva et al., 2016). Therefore, lack of awareness and knowledge about water conservation, and water pricing influences the attitude of people regarding this issue. A significant method to reestablish the practices of water consumption behaviour is the installation of meters at residential level (Randolph & Troy, 2008).

Consumption can lead to society being safe from the water scarcity (Adams, 2014). Water scarcity is one of the major challenge for policymakers in Lahore because of continuous depletion of the water level. Therefore, the current study argued that there is a strong relationship between public policy and individual attitudes towards the usage of resources. The utilization of water-consumption efficient appliances at home reflects a positive attitude towards the consumption of resources. Thereby, it becomes another way of analyzing the consumption attitude of people. The user's routine of water use in homes explains the human psychology about water consumption. This discussion shows the relationship between attitude and domestic water consumption. The above review also highlighted that some economic factors are also crucial for the analysis because people also make cost-effective decisions. The following relationship of the variables can present a more accurate analysis for policymakers instead of providing a normative view of the issue.

Water Consumption in the Presence of Water Tariff

This research shows the relation between two variables, which are price and consumption. Government use pricing as a tool to shape water conservation behaviour. Studies have also argued that pricing water does not help in the reduction of water consumption at the residential level (Deyà-Tortella et al., 2016, 2017). Previous study of Tortajada et al. (2018) stated that the habits of less water consumption encourage the people to use efficient water appliances in home, but price can also use as a strategy. This strategy also encourage people towards the use of efficient water appliances at home for the less consumption of water. It means that consumption behaviour can be monitored in three different aspects, for the level of awareness in society regarding the use of water resources, to identify the type of water devices and their usage, and the water consumption attitude of people. The water meter with a fixed billing, (Flat rate system) method is existed in society. The flat rate system does not evaluate consumption because it charges according to the household area. It is observable that the fixed or flat rates have two problems. Firstly, that these rates do not cover the complete cost and secondly, it does not change the consumption pattern (Deyà-Tortella et al., 2016).

The rapid urbanization and increasing population in Lahore, has increased the demand for an efficient and sustainable water system for urban households. Price elasticity plays a vital role in developing countries for policy formulation (Ahmad et al., 2017) because policymakers use price elasticity techniques as a tool in shaping people attitudes. It is imperative, therefore, to analyze the behaviour of communities where different income groups live under the same structural arrangements. The higher-income group uses a higher of water, and a low-income group uses a low quantity of water. This policy can affect the equity aspect of one group, if the government focuses on the high-income group and decides the price of water according to this group than it would negatively affect the low-income group. If government decides the cost for a new meter connection and bill higher for the higher income group so it would be a barrier for the low-income group (Rietveld et al., 2000). The efficient price mechanism should be based on the principle of the equity aspect and it is the only way, which can increase the equivalent water consumption behaviour in groups.

In Lahore city scenario, it could be observed that the price mechanism is creating difficulties for the regulatory agency related to financial

collection from the consumer, and the private pumping system, which is rising day by day. The lack of collection from the consumers is creating pressure on the WASA. The ability of agency is decreasing day by day in maintaining the efficient water system for the city (Bhatti & Nasu, 2010). The private pumping practices are creating two types of groups in society, one that are regular bill payers, and the other one those are non-regular bill payers. There is also a difference between the consumption behaviour of monthly bill payers and non-bill payers. The price does not affect the non-bill payers, but past bill, experiences do influence the consumption behaviour of regular bill payers (Rauf & Siddiqi, 2008). Various dimensions of this relationship is applicable to the household as well as on the businesses.

Hypotheses

H_A: Attitude has a positive impact on the domestic water consumption behaviour of households.

H_A: Meter tariff has a significant impact on domestic water consumption behavior of households.

Methodology

This study employs a quantitative and explanatory approach used for the analysis for the interpretation of data. Explanatory approach highlights the cause and effect relationship of variables. Few studies are available about the exploration of relationship between these variables. Primary sources are used in this study to conduct the analysis. The primary data was obtained through questionnaires. The questionnaire was based on the 27 questions, including demographic, dependent, and independent variables.

Area

Union Council (UC) 214 Allama Iqbal Town of Lahore city selected for the collection of data. In these area10, Marla households are situated. The exact number of population is missing in the government documents, but around 900 houses were available for the collection of data.

Questionnaire and Measurement

The questionnaire was based on the six demographic variables as well as on six questions of dependent variable water consumption behaviour derived from the study of Grafton et al. (2011). Eight items of independent

variable attitude were derived from the study of (Fan et al., 2013), and the water tariff part had based on the four questions. The Likert scale questionnaire used in this study in which option 1 was strongly disagree and option 5 was strongly agree. The value of Cronbach Alpha values of the questionnaire was .802. The value of Cronbach Alpha of each variable was checked individually, as shown in Table 1.

Table 1
Reliability of questionnaire

Variables	No. of Items	Cronbach Alpha
Domestic Water Consumption Behavior	6	0.825
Attitude	8	0.774
Meter Tariffs	5	0.773
Complete Questionnaire	19	0.802

Data Sampling

The primary data collected through the questionnaire from the locality of Allama Iqbal Town, Lahore. For this purpose, 65 Participants participated in this survey, but only 50 questionnaires were useful for this study. Some participants did not fill complete survey those questionnaires did not use in this study—the data collected from males and females. The participants participated in this survey on their own will and filled the questionnaire. For the reliability of the data, participants verified on the email about their participation.

Data Analysis

The Statistical Package for Social Sciences (SPSS) software was used for the analysis of the data. Data entered in the SPSS was collected from 50 participants. Descriptive statistics and multi regression linear model method was used for the analysis of the collected data. Among them 56% were males and 44% were females. A tiny variation was noticed among gender responses. The large population is literate and holds master ’s degree very thin lines of people have learned until intermediate. The minimum education was intermediate in this community. The large population of participants belongs to the 20-30 age bracket. Almost all participants of the maximum age groups participated in this survey. Due to variations in the ages, the reflection of a specific age group could not influence the findings of the study. The family size of the households, it means how many people

are living in each household. Only 34% families consist of four members, while 30% households consist of five members in each house. However, 6% families are based on seven members and only 2% of homes are based on two members. 56% users were using water without a meter and 44% of households have install their water meter in the house. According to the data 52%, participants own motorbikes and 48% participants own cars. The participant's income groups. Around 54%of people are in the bracket of 36000-45000. Only 6% participant's income is higher than in 45000. The major population salary is not more than 45000.

Multiple Regression Linear Model

Table 2

Model Summary

Model Summary	
Model	1
R	0.817
R Square	0.667

There is 67.7% of the variation in this model's dependent variable domestic water consumption is explained by the independent variables.

Table 3

ANOVA

	Regression	Residual	Total
Sum of Squares	78.851	35.324	106.18
df	9	40	49
Means of Square	7.872	0.883	
F	8.914		
Sig	0.00		

Since *p*-Value .000 is less than 0.05 than it means that, our model is significant.

Table 4

Multiple Regression Analysis Results

	B	Std. error	*β*	*t*	Sig
Constant	3.836	1.45		2.654	0.012
Attitude	0.419	0.101	0.411	4.154	0.00
Meter Tariffs	-0.415	0.102	-0.39	-4.084	0.00

The above table shows that attitude and meter tariff influence in water consumption behaviour. The present attitude type is the reason for more water consumption, which is why the results show that one unit increase in attitude is likely to increase .419 units of domestic water consumption. From the perspective of social practice theory, the result is explaining that people's attitude is the cause of more water consumption. This attitude is developed in society based on daily practices regarding water consumption. On the other hand meter tariff reduces the water consumption at the domestic level because it applies the limitation on utilization and results showed that, one unit increase in meter tariff is like to decrease .415 units of water domestic consumption. The results indicate that meter tariff is controlling behaviour at the household level and it explores that increase in meter tariff rate will decrease the water consumption at the household level.

Discussion

The above discussion indicated that people's attitude is the cause of the excess use of water because people's attitude is developing on the basis of the current government policies. The government policy of water flat rate system is establishing anti-environmental behavior. There is no constraint existed for controlling the attitude of high volume consumption of water. The reason is the flat rate system, which does not charge the bill from the households as per the water consumption that is why People use more water due to their attitude. Attitude is an internal trait, which is very important regarding water consumption. It is an egoistic approach, which does not focus on environmental damages. This kind of attitude exists in society, which is the cause of depletion. Policymakers use the meter tariff as a tool to control consumption. People pay for their use but in Lahore, the flat rate tariff system exists which does not evaluate the consumption of the users. The results show that mater water reduces water consumption. People use less water because they have to pay for the utilization. Still, the meter tariff consumers use less water for avoiding the high bills but this ratio is too low. The first hypothesis is analyzing that is there any positive relationship between people's attitudes and the water consumption behaviour of households. People use more or less water due to attitude factors or not. The second hypothesis is analyzing that is there any positive relationship between meter tariff and the water consumption behavior of households. People use more or less water due to the meter tariff factor or not.

Conclusion

The current study focused on the domestic water consumption behaviour of households. The empirical evidence also highlighted that the role of attitude is also significant and meter tariff can control this water consumption behaviour. The following study indicated that people consume more water in their houses because of their social positions

Through the lens of social practice theory, it is indicated that water consumption behaviour is anti-environmentalist, indicating egoistic behavior which is not in the favor of water sustainability. Many areas in Lahore are facing a dearth of water due to the excess of water, especially those residential areas that are closer to the industrial area. This research contributes to the existing literature because very limited research has been conducted in Pakistan from this particular perspective.

Recommendations

The policymakers can make policies not only for regulating the water consumption behaviour but as for reshaping the attitude of households regarding this issue. The regulatory agency is collecting a minimal amount for this commodity. The weak collection mechanism is also increasing deficit issues for the department. The policymakers should also focus on the social practices of families regarding water consumption as well as the nature of households' attitudes. Through this process, policymakers can make effective public policy.

Still, future research is required on the existing topic about the price of water in Lahore's residential areas. The current situation is arising here because one independent variable is meter tariff, which is based on the price. In depth, analysis of this variable in the context of WASA Lahore will explain the price perspective through which it will analyze that which segment of society is effecting from the price perspective. There is a dire need for further research on this perspective.

Limitations

This study was conducted on a limited scale due to time problem and financial constraints. Demographic variables were added in this research instead of controlled variables. For the controlled variables, more participants were required but due to certain obstacles author could not manage to reach to such number of participants.

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