

Water Consumption Behavior: A Review with Global Perspective and Special Reference to Developing Country

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Abstract

This paper reviews the literature, dealing with the water consumption behaviour by examining both the theory, and empirical studies from 1930 to 2017. Numerous empirical studies have been conducted to investigate the factors that affect water conservation behaviour. The overall literature is best described as the factors such as family size and number of kids, number of times individuals flush the latrine, indoor base water use, outdoor property size, water resources, cost associated with pot water, water shortage, economic activities, climate change, water pollution, societal values and beliefs towards water consumption, water conservation habits, population and human behaviour effecting water conservation. Literature also discussed that the adoption of efficient water using technologies leads to lower water saving than expected. The studies reviewed, explain that the residential water utilization fluctuates significantly according to the characteristics of family units. Cost assessment assumes a crucial job in arranging and overseeing pot water framework and there is an assortment of financial and noneconomic factors that add to the costs charged for water. The results also show that something more than a new pricing policy for future water investment in the urban setting is required. In a nutshell, consensus has been reached that to improve water conservation behaviour certain measures such as, water utility monitoring, awareness campaigns regarding fair use of water educational programs and arrangements of different information campaigns should be reinforced to improve water conservation habits. It is recommended that there is a need for division of water network into sectors and installation of water meters. Improvement in the standards of water managements and policy and practice are suggested with appropriate ramifications.

Keywords: Water Conservation Behaviour, Consumption, Urban Areas

1. Introduction

Say, "Have you considered: if your water was to become sunken [into the earth], then who could bring you flowing water?" Al Qur'an (Surah Al-Mulk, Episode No 29, Verse 30).

Water is a fundamental human need. In the early days, people had to settle where water was available and move from places where water was scarce. Later on, with technology and for permanently residing in one place, water supply system to distant places was introduced. As more population accumulated in one place, drainage and canal systems were built to carry the fluid waste away from the population for whenever human beings gather, their waste accumulates (Hughes, 2002). As urban areas are over-populated, the problem of waste water became more serious.

(Brown & Flavin, 1999) in *A New Economy for a New Century* said that the real challenge for humanity in 21st century is going to be the shortage and pitiable water quality for consumption. Fresh water availability is one the most underestimated problems of this millennium. With growing world population and with the pressure to feed it, which depends largely on irrigation, earth has become overwhelmed.

For a sustainable living, water conservation is considered as one of the most important pro-environmental activities to be moulded and expanded on this planet. Many rivers do not flow into the ocean. Wetlands have disappeared considerably from the world. Water system is under severe strain i.e. in parts of Mexico, India, China and North Africa, the water tables are tumbling down as much as 1m per year (Somerville and Briscoe (2001) p. 2217).

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To determine the problems faced by humanity on water wastage and scarcity, there is a need to understand the factors that prompt this behaviour in humans, and the advance technological tools that need to be used for the solution of these challenges (Agras, Jacob, & Ledebek, 1980).

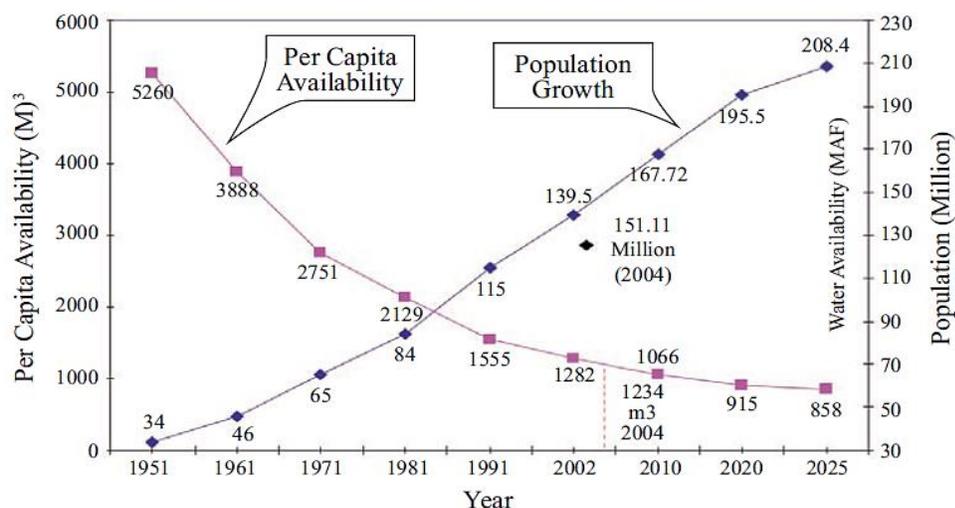
If an individual see another, abusing the resources shared by everyone, s/h is likely to do the same. This concept of *Tragedy of Common* was first introduced by Hardin, (1968). To conserve water, people need to feel motivated. If one thinks that others are wasting water, s/he may be inclined to save water by a lesser degree and consequently, their water consumption increases Corral-Verdugo (2002).

Physical, evaluative and smooth situations also promote water waste or conservation. In Australia, Aitken, McMahan, Wearing, and Finlayson (1994) used the cross-sectional data of 1991 and analyzed the consumption of a household depending upon the number of family members. Their findings say that the larger the number of family members, the more consumption of water than otherwise.

Theoretically, the available water is enough for the current world population if it is distributed homogenously. Though in reality, it is distributed unevenly and many countries are currently suffering from water scarcity. While direct import of water is impossible, virtual water flow between countries through trading food plays an important role (Islam et al 2007).

Along with its scarcity, water wastage is also a determinant in depleting water resource. Not only this, but also the energy consumed to supply that water. To conserve water, cost-effective devices are significantly operative in reducing water consumption Geller, Erickson, and Buttram (1983). Scarcity of water is the most important factor affecting water conservations. The more people think that others waste water, the less their conservation motives, and, therefore, the more their own water consumption takes place. Since it is necessary to make sacrifices to save natural resources, the effort for conserving those resources should be shared by all the members of a community (Corral-Verdugo, 2002).

Figure 1: Drinking Water Scenario: An Overview of the World



Source: Khalil (2013)

Figure 1. Shows the increase in world population and deterioration in water availability around the world, which is making the per capita water consumption decline. People often predict further decline with increase in population. Only 10% of water is consumed domestically, 20% industrially and the rest 70% by agriculture. On the other hand, more than half of the water available in industrial countries is consumed by industries.

Population of the world is estimated to increase by 80 million every year. More consumption of water is now required because of the universal changes in life style. Water demand has also been affected by the increased bio-fuels production. With increasing water demand, the energy demand also seems to rise.

Providing high school students with particular “behavioural knowledge” about saving water can be a guide to water conservation behaviour. It indicates that it is crucial to provide individual with certain skills to save water and reach preservation goal (Middlestadt, Grieser, Hernandez et al.2001). Reasonable water system must be maintained in order to overcome the scarcity, in both nature and people, which therefore should be enough to satisfy the needs under both economic and ecological environment. In general, the past study has shown that the tendency of people to conserve water depends on the rationality and purpose behind it for conserving it.

2. Contextual Discussion

Pakistan being an agricultural country and with a large number of populations, faces the scarcity of water. There are a number of problems faced by Pakistan which are still unresolved. Some of them include climate change, mismanagement of water for domestic use, water scarcity, increase in population, water need for agricultural and industrial purpose, lack of dams and many more. Many years have been passed but no proper actions or formal water policy has been adopted by the multiple democratic and military government of Pakistan. Pakistan faces a huge setback under water economy, which is causing various other problems with in the country. Many drafts have been made which were unseen under the light of day which included the NWP (National Water Policy) which was prepared in 2005. After 5 years of ignorance, it was decided to see the NWP and revise it again in 2010. However, it was further decided to look at the issues related to the water consumption scarcity and to make development under the climate change and water scarcity issues. Pakistan beholds a large population which, therefore, includes a number of basic necessities including water that have to be provided to all the sectors of an economy. In order to provide proper water system to overall economy, a well-developed water system should be maintained in the country in order to safeguard our finite water resources. Steps and policies should be made which will provide benefits as a whole and further define a brief structure with well-defined objectives and aims which can be easily achieved through these policies.

Pakistan is gifted with many natural resources such as land, water, mountains, plains, plateaus, deserts etc. Policies should be made in order to develop these natural resources in a better way so we can reduce the scarcity of water supply. Agricultural sector should have a billion-dollar output for each acre feet of water used (Hisaar Foundation). About 20% of the GDP of Pakistan is based on agricultural system which has been increased at a growth rate of 5.28% in the last decade. Pakistan, being an agricultural country, needs water in a huge quantity and approximately 95% of the surface water and ground water is used in irrigation systems.

Indus basin irrigation networks are being improved by increasing the 22 million acres of irrigated land in the provinces of Pakistan (Punjab, Sindh, Baluchistan, and Khyber Pakhtun Khwa). Policies should be developed in such a way that make current water resource efficiency increase. Replacement of existing system shall be made by developing new water infrastructure and future exploration. Canal water irrigation system of Pakistan stands at 33% in comparison to the developed countries which are at 90%. Out of the world’s average 40%, Pakistan can only save 10% of its annual river flows. The absence of facilities in storing water cause a serious loss and problem. Economy faced a massive downfall in the period from 2010 to 2012 due to natural disasters such as flood. It reduced the growth rate to 2.9% from 6.5%.

Pot water in Pakistan contains many kinds of diseases (up to 40%), which causes income losses up to 58 billion annually. In order to cover these losses and to protect them, new technologies should be developed to filter the Usable pot water for domestic use. About 80% of the pot water is untested in Pakistan

which causes the loss of human life as well. There is a large amount of unhygienic water which constitutes a huge problem. Quality and quantity both sacrifice in terms of water supply in Pakistan.

Saltiness in the earth water is another issue which is not filtered. Salted water is natural which is mixed with dirt due to the shaken of earth. However, this salt is used to produce mineral salts which can be used in home for food after drying it out. 25% of the developed land is harmed by salted water. It is estimated that the whole spill over water request will be about 92%. Water demand is increasing day by day due to the increase in population, whereas, the availability of water assets is decreasing. Healthy drinking water should be provided to all cities of Pakistan. All the underground and surface water found by provincial and federal government of Pakistan in the Sindh districts seems to be unfit for human consumption.

Karachi is one of the most populated cities of Pakistan. It constitutes about 16 million of the population (Pakistan Bureau of Statistics 2017). Karachi is a center through which facilities are easily available which make one motivate to live in Karachi. Besides advantages of living in Karachi, there are some drawbacks also. One of the major problems arising now a days is water supply. People do not even have proper drinking water available. Only 60% of the population of Karachi have proper pipeline water supply system (City District Government Karachi 2007). Due to the increasing population, demand for water is increasing but government is unable to satisfy the needs of people. According to the research by PCRWR 2007, it was analysed that water in Karachi is unsafe to drink as it contains coliforms and E coli which are harmful for the human body. The existing water supply network in Karachi is over 100 years old and has become out dated and defective (ADB, 2004).

Areas of Karachi i.e. Defence, Lyari, Gulistan-e- Johar, Gulshan-e-Iqbal, Landhi, Malir, Korangi, Orangi, Jamshed Road, New Town, Saddar, North Nazimabad, North Karachi, New Karachi and many other localities are facing the issue of water supply. Due to hot summer season prevailing in Karachi, people need ample amount of water to keep themselves hydrated and clean. People are not provided even with pure water. Salty water with dirt particles is distributed in different areas of Karachi which affects the health of individuals and new born babies. Karachi contains most of the population which belongs to poor families where they are unable to pay a huge amount for clean water. After air, water is the basic need of life without which, one cannot even live. Two years back in 2016, Karachi faced an issue of heat stroke where people did not have much water to consume due to scarcity. That incident took the lives of almost thousands of people. Karachi's population needs an average of 1000 million gallons of water daily (Pakistan Bureau of Statistics 2017). After the electricity shortage issue, the economic hub of Pakistan, Karachi is all set for another big problem.

In urban areas, especially big cities like Karachi, Lahore and Islamabad, where fresh water supply is limited, to manage this vast population's water supply is a huge task that needs advanced management and supervision. The resources needed for cities like Karachi where population of this small country is gigantic. The maintenance of heavy traffic and populated areas especially in narrow streets and contracted apartments is even more intricate. (Bashir Ahmed. 2011).

Secondly, there is no distinctive system for different water usage. The potable water system is used for bathing or washing as well which leads to valuable drinking water being utilized for chores such as gardening that can be done with unhygienic water, (Bashir Ahmed, 2011). Moreover, the accountability system for wastage of water is next to nothing. With trifling water tax, the privileged race has unrestricted supply of water according to their approach in society, while in the same colony the underprivileged race does not even have drinking water. (Bashir Ahmed, 2011).

Pakistan's water can be classified in agriculture, industrial and domestic uses. Pakistan as largely agrarian economy, irrigation consumes about 97% of the total capacity available and contributes 25% (approximately) in our GDP. This indicates that out of total available drinkable water, 3% is available for industrial and domestic use. The problem concerning drinkable water is more prominent in cities where

population has grown out of proportion such as Karachi, Lahore, Faisalabad, Rawalpindi and Islamabad. Considering the population of Karachi, it needs 1000 gallons of water per day to satisfy the drinking needs.

Table 1: Total Water Requirement and its Availability

Water Available	Water Required	Water Shortage
125.56 MAF	164.48 MAF	-38.92 MAF

*MAF (Million Acre Feet)

*Source (WAPDA study paper, 2009)

Table 1 shows the total water requirement in Pakistan that is 164.48 Million Acre Feet. Whereas, the availability of current water in Pakistan is just 125.56 Million Acre Feet. Hence, the shortage of 38.92 Million Acre Feet is needed to be covered.

Table 2: Various Sector Water Requirements in Pakistan

Irrigation	Domestic Sector Use	Industrial Use	Likely to Increase to
159.54 MAF	3.82 MAF	1.1 MAF	12.1 MAF

*MAF (Million Acre Feet), Source: (Planning Commission, 2010)

Table 2 shows the various sector water requirements in Pakistan. Irrigation system needs 159.54 MAF of water, Domestic sector need 3.82 MAF of water, Industrial use need 1.1 MAF of water and it is likely to increase by 12.1 MAF.

Table 3: Per-Capita Availability of Water

Year	Population (in Millions)	Water Availability (Cubic Meter)
1951	34	5260
1961	46	3950
1971	65	2700
1981	84	2100
1991	115	1600
2000	148	1200
2001	172	1078
2013	207	850
2025	221	659

Source: Ministry of Planning and Development, 2005.

Table 3 shows the per capita availability of water from 1951 to 2025. Population is increasing from year to year having numbers from 34m to 221m. However, water availability is decreasing each year from 5260 cubic meter to 659 cubic meter. At present, our water availability is less than 850 cubic meter. The situation is getting worse than before in coming years. Thus, solution is needed for the above-mentioned scarcity of water.

After more than 72 years of Pakistan statehood and independence, what is crucial to survival is a comprehensive National Water Plan (NWP) as opposed to stress water issue as part of national climate change and national drinking water policy. Especially big over populated cities should know how to utilize water in the most cost-effective manner and determine the factors of mismanagement of water.

Few studies have been done about the water management in Pakistan's context such as: The role of municipalities in waste water management in Bahawalpur City Pakistan (Adila Shafqat 2011), Agricultural Water Management; A study of Agricultural production, water usage and food availability in Pakistan its Historical trends, and projections to 2050 (Mac Kirby et al 2017), Water management in the Indus basin in Pakistan; challenges and opportunities (Qureshi 2011). The Pakistan development review; Water resources and conservation strategy of Pakistan (Ahmed et al 2007), Variability in water use, crop water

productivity and profitability of rice and wheat in Rechna Doab, Punjab, Pakistan (Usman et al 2012), Determinants of a Household's Choice of Drinking Water Source in Punjab, Pakistan (Rauf et al 2015), Determinants of Safe Drinking Water Supply in Nowshera District of Khyber Pakhtunkhwa (Israr et al 2017).

The study is to present overall water consumption behaviour and its demand and supply issue in Karachi, Pakistan. As no study has been conducted before, in the context of Karachi, therefore, this study is the initiator to examine the overall water consumption behaviour in Karachi.

Table 4: District Wise Population (Households) of Karachi

District	House Holds	Proportion of House Holds
CENTRAL DISTRICT	539,127	19.45%
EAST DISTRICT	509,647	18.39%
SOUTH DISTRICT	327,518	11.82%
WEST DISTRICT	634,459	22.89%
KORANGI DISTRICT	421,618	15.21%
MALIR DISTRICT	338,257	12.20%
Total	2770626	100%

Source: Pakistan Bureau of Statistics 2017 census.

Table 4 shows the district wise population (households) of Karachi. Karachi is divided into six districts named mainly; Central, East, South, West, Korangi and Malir district. Proportion of the household under Central district is 19.45%, under East district is 18.39%, under South district is 11.82%, under West district is 22.89%, under Korangi district is 15.21% and under Malir district is 12.20%.

3. Theory

Water is crucial to life. As an outcome, it is a definitive inexhaustible asset on Earth. Be that as it may, the manner in which we oversee it appears to be obscure to fulfil both present and future requests. In his most recent book, *The Hydro politics of Dams: Engineering or Ecosystems?* biological communities' researcher, Mark Everard puts forth a convincing defense for the need of an increasingly feasible connection amongst humankind and the water cycle.

Water protection is picking up command far and wide as the most critical methodology for water arranging and the executives for the future decades. In the urban territories of the created world, water protection has, to a limited degree, accomplished the goal of controlling utilization, particularly in the more minimized European urban areas. Urban water preservation relies upon changing practices by water clients, which might be impacted by close to home components (identified with factors, for example, age, pay, instruction, and so forth.) or may pursue upgrades originating from financial (i.e., estimating), innovative, or open mindfulness.

As a component of the activity, we are likewise assembling a quick agent stage where these discussions can be transformed into substantial and comprehensive coordinated efforts that assist scale developments and guarantee that the Fourth Industrial Revolution is useful for our planet and its kin, not simply the robots. A decent beginning stage towards the zero-squander perfect is the roundabout economy display related with different ideas, for example, the "support to support" structure and mechanical biology. The thought here is that rather than items in the long run being covered or consumed, as in most straight models of generation, their parts are planned from the earliest starting point to be re-utilized and prepared for re-entry into the creation cycle (Environment, 2013).

In Europe, Philips has 22 administration associations that are gathering 40% of lights that contain mercury. The organization has a reusing rate which is more noteworthy than 95% in the market. Philips additionally began to pitch lighting as an administration to improve the gathering of their lighting hardware. They expect to achieve more clients as the organization holds responsibility for lighting hardware so clients

don't need to pay for lighting forthright. What's more is that Philips ensures extensive ecological administration relating to the reusing of their lighting gear.

Reports have featured accomplishing supportable water use to be among the preeminent worldwide monetary, social and ecological difficulties. Financial and populace development are relied upon to expand future water request from agribusiness, family units and industries. This may put water assets under expanding pressure. Water contamination and environmental change may present extra difficulties. The reserve holds an enhanced portfolio over countless and markets. For the store, externalities from unsustainable water use may in itself present a hazard to the portfolio's long-haul esteem. Water assets for industry are seldom estimated to reflect shortage esteem. All else measured up to; we don't anticipate that such understood endowments should be economical in the long haul. To address this sort of hazard, the reserve has a general enthusiasm for economical water, the board and proficient water control crosswise over various parts and topographies.

The dependency of economy, society and environment impact positively if abundant, and negatively if scarce, and the change in climatic condition has been examined universally to show an influence on hydrological resource (e.g. Alcamo et al., 1997) which is an inductive reason for economic development and social well-being. The climatic variation is one of the compulsive factors in water resources and its management within subsequent years and eras (Gleick, 1998).

The redundant consumption of groundwater resources severely destructs environment in number of ways such as deterioration of water quality, land subsidence and rapid depletion of water (Anand Chiplunkar, 2012).

Many causes for the scarcity of water resource, insufficient fresh water supply increase its shortage across countries, specifically household activities of humans are due to wastage of ground water, water pollution affects both surface and ground water, increasing urban population being a major cause of water shortage which may deplete quality of water and ineffective development projects on remaining water resources. This not only declined per capita water availability but also brought a struggle and disturbances among various sectors (Nallathiga, 2008).

Growing population and development combined with environmental change has lessened water supply, but if we keep a nontoxic environment, improvise health & hygiene and save human, natural and financial resources, sustainable urban water and wastewater system can be achieved (Daniel Hellstroma, 2000). The overwhelming issue of water shortage is a much more prominent issue than any war in the world, as its scarcity has adverse effects on human life, as well as it devastates social and monetary improvement. (Daniel Hellstroma, 2000).

To design the strategy for urban water saving, crucial factor is to develop an understanding of motives for saving water. The consumption and attitude of people towards water saving are vital indicators for planning water saving (Corral-Verdugo et al, 2003). This has been previously recognized that attitude and beliefs of people and consumption level are significant variables to determine the demand of water (Hassell and Cary, 2007). To comprehend the behaviour of people, 'Theory of Reasoned' (TRA) was implemented which assisted in developing a sense and association on people's behaviour and attitude and their water consumption (Ajzen and Fishbein, 1980).

Viable water checking methods are fundamental for understanding residential water utilization behaviour (Stewart et al, 2010). Numerous water specialists gave data on how to peruse a water meter to customers with the conviction that information of water utilization will help in moderating water. Assurance of water utilization inside a family, be that as it may, requires information on how, where, when and who expands water utilization. At first, deciding such components of utilization depended on the trustworthiness and alertness of natives through journal recording strategies. Water utilization thinks about a journal recording strategy to set up conclusion on water utilization. The journal strategy includes a part of the family noticing down each water utilization expanding occasion i.e. a shower, can flush or tap utilization. The assigned recorder would too note who carried out the occasion and the occasion's length (CSIRO. 2002;

Cordell et al, 2003). Problems such as the subjectivity of estimations, stability of individuals to record all data and the impact on behaviour through recording strategies will drive to the advancement of a less interfering and more exact estimation strategy within the shape of shrewd metering (Cordell et al., 2003). The starting of shrewd water metering, empowered water utilization will be to check a utilization level, that will come about with the recognizable proof of person and water utilization occasions, such as shower, latrine flushing, tap utilization or water system through the utilize of fitting computer program (Willis et al., 2009; Willis et al, 2011). Intelligent metering includes the application of a high frequency water meter and an information meter checker to get a ceaseless record of precise water utilization information. This shrewd metering approach has been utilized and conducted around the world.

Water preservation awareness and practice includes understanding the effectiveness, chances and impacts of certain water sparing exercises as well as the crave to persistently diminish utilization (Nancarrow and Syme, 1989; CSIRO, 2002; Gilg and Barr, 2006; Heinrich, 2007). Water preservation relating to concern for water as a rare asset was examined in a major ponder by (Nancarrow et al, 1996), who decided from the examination that the ways individuals think about water does not foresee their water utilization, negating the discoveries from other ponders within the field (Middlestadt et al., 2001; CSIRO, 2002). Nancarrow and co-workers contemplated that this result may be due to the embraced strategy of recording water utilization information at a family level through a journal approach, whereas study information was collected as person reactions. Middlestadt et al., 2001 essentially investigated the relationship of knowing or having the information on how to preserve water and whether this is interpreted into genuine conduct. Investigation decided that learners who were instructed and caught on water preservationist practices more routinely performed these practices. The CSIRO, 2002 carried out a research in Perth, using both journal and conclusion on utilization checking strategies, to decide reaction of user and water utilization with examinations demonstrating that attitudinal factors influence outside or open-air water utilization (CSIRO., 2002). Tragically, the interface between attitudinal variables and indoor conclusion on water utilization was not a detailed one. Through broad survey of writing, nine markers were revealed that serve to speak and determine water preservation knowingness and calculate the mindfulness of openings to spare water in family, mindfulness of the water sparing benefits of retrofitting to water effective installations and apparatuses, water meter perusing competency, checking of water utilize, mindfulness of the relationship between conduct and water utilization, water sparing know-how, recognition on proficiency of family water utilize practices/behaviours, looking for nonstop investment funds in water utilization over the longer term and normal water meter perusing.

The interface between common natural convictions and preservation conduct has been pointed by (DECC 2007), (Kordiatas et al., 2004) and (Corral-Verdugo et al., 2003). Studies embraced by (Kordiatas et al., 2004) decided that demeanors towards natural issues were in truth solid indicators of natural conduct. (Corral-Verdugo et al, 2003), drawing on the instrument commonly utilized the natural convictions to be specific. The Unused Environment Paradigm-Human Exemption Worldview (NEP-HEP), solely examined the relationship between common natural convictions and water preservation conduct. In Sonora, Mexico, overviews were embraced to set up natural convictions in common as well as natural convictions in particular to the association of water as a characteristic asset, in conjunction with statistic subtle elements with water utilization recorded and assessed through a journal approach (Corral-Verdugo et al, 2003). The outcome bolstered the theory that common natural convictions essentially impact residential water utilization conduct when convictions and practices are evaluated at a comparing level of specificity (Corral-Verdugo et al., 2003). More as of late, Gilg and Barr (2006) carried out a ponder of 1,265 families in Devon, UK investigating the relationship between natural states of mind and practices focusing on adding up to urban water utilization as essential element. The investigation inspected off the chance that there were substantive joins between natural activities and water sparing behaviour to decide behavioural varieties related to natural extremist classification (Gilg and Barr, 2006. Outcome about demonstration that committed earthy people and primary stream naturalists were most likely to lock in in vitality and water sparing exercises frequently. Later longitudinal investigation by (DECC., 2007), evaluating open demeanors to the environment counting water related issues over Australia, has decided a developing concern for

natural and water issues with respondents recognizing a readiness to attempt maintainable activities or behaviour.

The examination of earlier inquiry helped in setting up an inferred figure speaking to natural concern, comprising of eight pointers being; security of characteristic environment for future eras, community duty for decreasing water utilization, concern for natural issues, joint duty of government and community to guarantee water security, affirmation of water being an important asset, affirmation of one's part in making an economical water future, esteeming reusing, composting and other ecologically economical exercises, and affirmation of people part as caretaker for environment.

3. Literature Survey of Empirical Studies

Several empirical studies have tried to explain the water consumption behaviour globally, in developed and developing world (see Table 2.1). A detailed literature survey on the water consumption behaviour has been outlined in this section. As it can be seen in most of these studies, different techniques and strategies have been used to determine the water conservation behaviour and how to make an effective and proper water management and distribution system.

Table 5: Water Consumption Behaviour: Literature Survey

No.	Studies	Work	Outcomes and Policy Recommendations
1.	Israr et al (2017)	The goal of the study is to access to safe drinking water supply.	The establishment of safe drinking water is still a task for the citizens. It is suggested that it can be overcome by the increasing number of the awareness campaigns. There is a need of monitoring of water quality along with different innovative methods of water treatment.
2.	Masmoudi et al (2016)	The study demonstrates the calculation of water used for drinking along with the supply of the water in Algeria.	In the distribution network there is insufficient number of water meters along with the discontinuation of water supply due to which the water loss rate is high. It is recommended to divide the network into a number of all sectors and install general water meters so that the government will be able to easily locate the defective solutions.
3.	Rauf et al (2015)	Aim of the research is the determinants of option of drinking water supply by the families in Punjab territory of Pakistan.	Results shows that family size and quantity of kids in a house strongly affect decision of drinking water source. Area of the respondents (rural/non-rural) is profoundly noteworthy and positively affects the decision of drinking water source. The investigation prescribes that providing quality drinking water through open course of action as faucet water can spare families significant time and vitality, and this spared time can be utilized in other gainful exercises.
4.	Urdiales (2015)	The purpose is the effect on residential water consumption of several environmental behaviors.	It is concluded that water conservation habits help reduce water consumption, the adoption of efficient water-using technologies leads to lower water savings than expected, resulting an increase in water consumption in some scenarios. The study recommends that there is a lot of need of Educational programs and arrangements of different information campaigns should be reinforced to improve water conservation habits.
5.	Wojdalski et al. (2013)	The study explains the determinants of water consumption in dairy industry.	It is concluded that the most consumption of water was highly correlated with the plant equipment of the dairy milk powder which means that there is need to optimize dairy plants. It is recommended that There is a need of improvement in the standards of water

			managements and the applications of the standards of hygiene in the dairy industry.
6.	Sathyamurthi (2013)	The scope of research is the residential water consumption in India by urban perspective.	The result is that there are many respondents nearly 76.7% who do not know the water usage of their houses. It is recommended that with the help of training and development, image of the government service delivery should be enhanced so that many of them start using the public water supply.
7.	Singh and Turkiya (2013)	The study explores the need of water in semi-arid village of Hisar district area, so that improvement can be made.	Study stated that the reason of decline of water availability is the population and the economic activities which consume high amount of water. It is suggested that the awareness campaigns regarding fair use of water plays a big role in this regard.
8.	Khalil (2013)	The motive of the research is the drinking water quality challenges in Pakistan. It is revealed that in Pakistan water scarcity is one of the most problematic issue.	The highest rates of evaporation is not the only issue, in fact water pollution is one of the biggest issue. In Pakistan there is no supply of safe and clean water to almost 50% of the citizens.
9.	Usman et al (2012)	The study explains the profitability along with the productivity of crop and the water use for it.	The actual estimation was higher at tail as compared to the head for ground. The tail was higher as compared to head when it comes to wheat and rice yield per hectare.
10.	Bogale and Urgessa (2012)	The objective of the research is the ability of regional households' units for better water management in Haramaya locale, Ethiopia.	Fundamental determinants of WTP were family unit salary, training, sex, time spent to bring water, water therapy exercise, nature of water and consumption of water and age of the respondent.
11.	Lema and Beyene (2012)	In the Goru-Gutu region of Eastern Ethiopia, the WTP for improved water benefit is the goal of the study.	The surveyed mean and median eagerness to remuneration was seen to be Birr 6.83 and 5.87 per family consistently.
12.	Otaki et al. (2011)	The scope of the research is the Comparison of uptown indoor water utilization designs in Thailand.	The Water utilization for latrine usage was altogether more in Chiang Mai than of Khon. It is additionally discovered that the distinction in utilization for toilet use can utilize might be inferable from the diverse number of times that individuals flush the latrine utilizing the vessel.
13.	Willis et al. (2011)	The Study determines the impact of ecological	This study proves that if a society in actual values water at large and is alarmed regarding how the water is consumed on daily basis, everyone will be able to

		and water protection frames of mind on family unit end use water utilization.	see the considerable reduction in the level of consumption. Urban water requests the executives arranging, policy and practice are suggested for appropriate ramifications.
14.	Khalil (2011)	The objective of the study is the Untreated wastewater is used for irrigation in Pakistan.	Untreated wastewater is utilized for water system in over 80% of Pakistani communities with a populace of more than 10,000 occupants. The outcomes demonstrated a high increment in hookworm contaminations among wastewater consumers and a clear over-utilization of supplements through wastewater.
15.	EJA et al (2011)	The purpose of the study is the non-rural water supply as an impulse for socio-economic development of the municipal.	Results revealed that the inefficient operation of the Water Corporation/management is a factor to discourage people from connecting to private water and it's relevant to state that efforts for better non-rural water supply should incorporate aims to curtail distance to source of supply in terms of operations and management it plays a vital role in socio-economic transformation.
16.	Strengers (2011)	This paper draws on two elective conceptualizations of utilization to comprehend the role and viability of utilization input conveyed through an in-home presentation (IHD).	This paper has looked to comprehend this fluctuation and the job of IHDs in decreasing family unit vitality and water demand drawing on conceptualizations of utilization that go beyond presumptions of individual and discerning basic leadership. The study expresses that for socio specialized frameworks of water arrangement alongside the vitality progressively pertinent to every day householders' lives combined with discussions and question non-debatable practice, in-home presentations (IHD) can assume a critical job.
17.	Forsman and Price (2011)	The scope of the study is the water consumption by red tree voles.	It is observed that the trees voles which are non-breeding, they consume slight allowed water and they can exist without water for a longer period of time. These trees drink less water per day, there is considerable variation among individuals and is based on the average consumption of water.
18.	Olajuyigbe and Fasakin (2010)	The motive of the research is that the variables that disclosed natives' ability to pay in Ado Ekiti.	Empirical assessments demonstrate that factors that fundamentally influence ability to pay for improved reasonable water supply incorporate; principle wellspring of local water utilized by family unit, access to improved wellspring of water, remove from primary source to house, normal time spent to get from principle source, sufficiency of supply from primary source, amount of water utilized per individual every day, amount of water obtained every day, assault by water-borne maladies, execution of supply from assigned water foundation and normal sum spent on water amid the dry season.
19.	Peters et al. (2010)	The research explores the impacts of urban structure, social demographics and atmosphere on	The research concluded that the base use, speaking to indoor water use, is subject to family unit measure and that occasional use, speaking to outer water use is reliant on both training level and the extent of the property's outdoor space.

		private water utilization of Poland.	
20.	Ahmed et al (2007)	The motive of the study is the water resources and conservation strategies for Pakistan.	The investigation gave general direction to organizing between sub sectorial interests in groundwater advancement, seepage, hydroelectric power, rural sources of info and monetary area arranging. It is prescribed that there is a need to examine the current water assets and thorough preservation and the board procedure in perspective on providing food the arranging prerequisites for what's to come.
21.	Banda et al. (2007)	The aim of the study is that a Tobit model to break down components.	The result states that that families' pay, accessibility of water, family units' entrance to tap and water for every capital, month to month water utilization were huge determinants of WTP.
22.	Domene and Sauri (2006)	The study explores that determinants of Urbanization and water utilization, affecting variables in the metropolitan district of Barcelona.	The outcomes demonstrate that residential water utilization fluctuates significantly as according to the characteristics of family units.
23.	Verdugoa et al (2003)	The goal of the investigation is the observations of private water utilization at two northern Mexican urban communities.	The auxiliary model uncovered that universal natural conviction integrally impacted the improvement of explicit convictions with respect to water: Utilitarian water convictions were decidedly influenced by HEP, while environmental water convictions were emphatically affected by 'limits' convictions and were contrarily identified with HEP. Utilitarian water convictions, thus advanced water utilization, while the biological water convictions hindered that conduct.
24.	B N Navalawala (2000)	The objective of the study is the Urban Water Supply.	The outcome demonstrates that there is no noteworthy effect of various nations water supply the executives' arrangements yet the expense of water supply actualized by their use of various areas.
25.	Renzetti (1999)	The research explores the relationship and built up the cost of supply and assess the valuing practices of metropolitan water supply and sewage treatment utilities.	The outcomes demonstrate that that the water and sewage costs are incapable. In the event that water utilities are worried about boosting social welfare, at that point moving to minimal cost estimating is essential with a properly determined yearly expense to recover any misfortunes suggested by negligible cost valuing under expanding come back to scale.
26.	Yang Yaliang (1996)	The focus of the study is the Water Supply, Sewerage treatment and Waste Disposable Strategies for practical growth.	Result Indicate that ebb and flow water asset the board ought to be remade, water supply, supply advancement and assurance must be organize and other regulatory choices will be taken.

27.	Rosegrant and Gazmuri (1995)	The goal of research is the reforming water allocation policy.	The examination presumed that the water strategies in developing countries experience few genuine difficulties that is to rise water productivity is all uses, assist the water management, to strongly diminish the large amounts of financial assets speculated in state-managed water policies; and to expand the adaptability and responsiveness of asset portion.
28.	Rathore et al (1994)	The study intent the exploration of the urban water supply in Rajasthan issues and prospects.	Result demonstrates that through different proportions of variable that is Relate to the expanding water supply and productivity in conveyance, Conservation of water and monetary use, People Participation and Management and improvement.
29.	Howe and Griffin (1993)	The objective of the study is to explore the relationship between the water system reliability and water supply.	Result indicated in the study that positive relation exists in between the water system reliability and water supply in particular. Reliability is a sort of the key dimension of non-rural water supply and it also relates with temporary water shortages that can have Socio-economic consequences.
30.	Michelsen and Young (1993)	The goal of the examination is the optioning agrarian water rights for urban water supplies amid dry spell in 1991	Results revealed that the computed present value indicates that dry year alternatives are an economic variable methodology under a wide scope of financial conditions.
31.	Milliman (1993)	The target of the study is the policy prospects for the future urban water supply.	The result shows that something more than new pricing policy for future water investment in the urban setting is required.
32.	Mertens et al. (1990)	The purpose of the research is the determinant of water traits, obtainability and utilization in Kurunegala, Sri Lanka.	The outcome indicates that the improved source of water endures less or lower dimension of faecal sullyng.
33.	Sandiford et al. (1989)	The aim of the analysis is the determinants of drinking water quality in provincial Nicaragua.	That water quality in secured wells isn't in every case superior to that in unprotected wells, however the reasons are not by any stretch of the imagination clear. More research is expected to decide the savviest methods for ensuring hand burrowed wells.
34.	Hirrel (1986)	The scope of the examination is the determinants of mechanizing water utilization data manipulation.	It is recommended that the water demand programming is a progression of PC projects and informational indexes that permit recorded client utilization data and anticipated growth data to be controlled in a configuration reliable with water framework arranging and modelling.
35.	Clark (1983)	The study explains the need for water supply cost.	Result show that the cost assessing assumes a crucial job in arranging and overseeing drinking water framework.

36.	Hollman and Boyet (1975)	The objective of the study is the Experimental inspection of Water-Price Determinants in tiny districts.	Outcomes propose that there are assortments of financial and noneconomic factors that add to the costs charged for water.
37.	P.K.Saha (1971)	The scope of the analysis is the Self-Financing Urban Water Supply.	Results demonstrate that there is improvement to the general dimension of financial prosperity of the urban purchasers and water supply framework must be upheld.
38.	Dietrich and Henderson (1965)	The focus of the research is on the Non-rural Water impart Conditions and needs in Seventy-Five underdeveloped Countries.	The development of water supplies within the framework of economic growth needs specific timing that is to meet the needs and to avoid shortages there must be effective supply systems and modifying existing schemes where required. Hence the studies suggested on the development purpose of giving better access to water and sanitation is steady with the city's general improvement framework and longstanding socio-economic development aims.
39.	Searcy and Furman (1961)	The study elaborates about the water utilization.	The examination proposed that for the foundations considered, and flow factors that might be utilized to change over normal readings to wanted plan criteria. Allowances any case, ought to be made for extraordinary issues or conditions that may influence water utilization rates in different areas.
40.	Walter E.General (1955)	The intention of the study is to answer to activity and support of the southerly sewerage treatment plant.	The result of the experiment shows the adverse connection between water hardware and water supply.
41.	Ruggles (1930)	The purpose of the research is the peak 24-hours water utilization in various urban communities.	Results indicated that the initial 10 years from 1917-1926 utilization of water is normal and for the following three years 1927 to 1929 utilization of water is high because of populace vulnerability as it is about 10 years from the last census.

4. Conclusion and Policy Recommendations

This literature provides an extensive review on the 'on water' consumption by examining both the theory, and empirical studies published from 1930 to 2017. A consensus has been reached that scarcity of water resources, climate change, water pollution, environmental beliefs and values, human behaviour directly relate to water conservation.

A few contradicted that human behaviour is related to identifying the water consumption, that the way people think about water doesn't predict their water consumption, while most of the studies found relation between human behaviour and water consumption, that is, if the behaviour to conserve water is taught and understood by individual, the chances are that the activity will be performed regularly.

Other studies found that the environmental values and beliefs significantly influence water consumption behaviour; people are willing to start sustainable behaviour and actions if the environmental and water problem arises. Human attitude is a reliable predictor of environmental behaviour. Change in climate is one of the pressures on water resources. Other factors are pollution, urban over-population, ground water wastage and access to potable water.

According to the water consumption study in Pakistan, climate change is one of the main factors that cause the scarcity of resources. Ground water, water pollution and increasing the number of populations are other factors affecting the water scarcity that have been described in the above research. Above all, these factors have a huge impact on the population, both, physically and mentally. Attitude of government and society towards the water issue is also one of the main predictors of the cause of problem. Research also proves that students happen to use the water in the way they are being taught.

Water being the basic necessity for living is important to every individual. With an increasing population of Pakistan, the demand of water is increasing which is unable to be met over the time. People need clean water for the domestic purpose which is unavailable. Unhygienic water for drinking purpose mainly is unhealthy and dangerous for both, human and animals. Natural disasters such as flood and earthquake result in the serious damage to human lives, property and assets of the private and public sectors.

Lastly, in order to overcome the problem, dams shall be constructed to save the water from flood and high rainfall. New technologies should be developed such as Blue Revolution, to meet the challenge of water scarcity. Proper canal and irrigation systems should be introduced to save more water so that we can develop our economy and use the saved water for best alternative purposes.

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