FACTORS AFFECTING WATER AVAILABILITY AT HOUSE HOLD LEVEL
A CASE STUDY OF QUETTA BALOCHISTAN

Shaheen Usman Kakar
M.Phil Scholar,
Balochistan Study Center (Social Work)
University of Balochistan, Quetta, Pakistan

Dr. Mumtaz A Baloch
Associate Professor
Department of Social Work
University of Balochistan, Quetta, Pakistan

Dr. Shahida Habib
Assistant Professor
Department of Gender Studies
University of Balochistan Quetta, Pakistan

Abstract

Water is of basic substance for Human development, the water brought environment, economy, civilization, livelihood provisions and well being for the society. Comprehensively understanding factors affecting the availability of water for household the water consumption behavior are required to be designed for efficient and effective water uses. To address the issue we randomly investigated 200 households in five different populated towns of Quetta city. The primary data was collected through household questionnaire survey and observation. On the other hand, secondary data included books, journal articles and websites. Data were analyzed using the Statistical Package for Social Science (SPSS).The findings of this study revealed that type of family, monthly income, major source of water, presence of garden at household and responsible factor of water shortage are significantly correlated with water availability. The survey concludes that the available water resources provided by the government are not enough for the

daily household usage resultantly the respondents struggle hard to managed alternative water resources as per their requirement. The paper recommend to bring awareness for the public sector about their right to water and provision of water sources is core responsibly of Government, especially to draw a policy for new constructions of water resources or by the remodeling of water and sanitation systems.

Key words: Water; availability; factors affecting; household; Quetta, Balochistan

1.   Introduction

Water is always a basic essence for human improvement and well being for the society, it also remained source of support between generations; moreover, the present climate change has made the present day water management very difficult and multifaceted observable fact (Shahid and Ahmed-2008). The basic natural source of water includes rain, snow and hail etc. Rain and snow gives large quality of the available water on the earth and also recharge the ground water level (Saxena, 2015) the multiple use of water for household is basically acquired from groundwater, surface water such as wells and tube well, wetlands, springs and rain which are tapped out for livelihood (Koppen, et al. 2006.). The main aim of the study is to find out the factors influencing domestic water availability of households in the study area and how can the available resources could be recharged specially in context of global warming acute climate change that directly affecting the fluctuation of water table in Quetta City. Pakistan is blessed by nature with adequate surface and ground water resources. Nonetheless, rapid population growth, urbanization and the continued industrial development has placed

immense stress on water resources of the country. Quetta the Provincial capital of Balochistan situated on active seismic section; due the reason earthquakes occur often having no perennial river but Quetta both social and environmental contexts shape the ways in which households deal with resource scarcities (Nasrullah, et al. 2011). Many indexes have been developed for the past 20 years to quantitatively estimate water resources limitation i.e. shortage and water tension. The formula selected from which water is assessed is very much policy decision as is a scientific decision. The general idea of the major water scarcity statistics is focused in this review which leads for political and mutual decision making (Vorosmarty et al.2005).

The household composition, the social and economic capital of household members, and cultural norms particularly with regard to gender roles influence resource collection strategies, as does the time required to collect the resources in scarce supply. Further, these household strategies reflect coping mechanisms in the face of resource shortages and the effectiveness of these strategies shape perceptions of household needs (Ohlsson, et al. 1998). All the factors were taken into consideration while survey was conducted, where the government seems failed to provide the quality as well as quantity of water to the each and every member of the society and were found deprived of their basic domestic need. Therefore the concern is whether the government is formulating any mechanism to provide better facilities for domestic water needs of the area selected, having sufficient amount allocated in every financial year to overcome the water demand for household, despite having advance technologies. South Asian cities are increasingly feeling the pressure of population growth and urbanization where it is estimated that 22 of 32 Indian cities face daily water

shortages. In Nepal's capital, Kathmandu, many local residents have grown habituated to waiting in queues for hours to obtain drinking water from the city's stone waterspouts. In Karachi, Pakistan, water shortages have led to protests and citywide unrest. (Surie, 2015).

The sense behind human development is simple that if we know how much water is essential to convene human necessity, and then the availability of water to each and every person can provide as estimate of shortage. Furthermore, basic human water requirement needs are: drinking water for livelihood, water for human sanitation, water for cleanliness services, and water reserved for food preparations and other household needs. The availability of water with regard to household requires economic framework which emphasize the family context of demand and supply decisions. However, improved domestic water supply systems are expected to continue being affected by water shortage–a problem that will worsen because of the population increase, economic growth, improve living conditions, and lifestyle changes in receptive areas (Shove, et al. 2010). The survey was very much influenced by the living style in the context of the water consumption, such as single bathroom system at house are almost replaced with attached bathrooms in each and every bedrooms having flush piped sewer systems, which requires plenty of water just to get rid of the wastage to the septic tank as compared to a single joint bathroom in corner of the vicinity having flush directly to septic tank. Furthermore adequate amount of water is used for washing cloths and cleanliness in households, which does not fulfill the requirement and the effective water management causing extra burden over the monthly budget allocated while bowering water from the public water providers. In developing countries, the populations that are afforded access to safe water supply for household have considerably increased from 36% in

1990 to 56% in 2010 (World Bank, 2012). The minimum amount of water needed for household to carry on each is projected as per basic needs of human, the minimum information estimated for drinking water by the National Research Council of the National Academy of Sciences is used for human survival under usual pleasant climates with normal doings is about per day 5 liters per person (Rijsberman, 2006). Moreover, in preview of various advanced technologies used for sanitation the successful elimination of human wastes can be accomplished with small amount of water. Nevertheless, to account for the utmost settlement of combining waste discarding and associated sanitation as well as to permit for cultural and joint preferences, a minimum of 20 liters per day per person is suggested (Rijsberman, 2006).

A clear understanding of water use patterns and the factors that affect water consumption at household is critical to the effective management of water supply and effective design of related public policies. Water use patterns are highly complex processes that are influenced by many factors, including seasonal variability and water availability, Water resource management, water supply restrictions, tariff structure and pricing, household characteristics, Behavioral change and water efficiency, and attitudes and intentions regarding water conservation   (Arouna and Dabbert, 2010). These factors both directly and indirectly drive water consumption and usage behaviors. The government should fully consider the aforementioned factors as it formulates public policies on water management (Jorgensen, et al. 2009). On the other hand warmer temperatures increase the rate of evaporation of water into the atmosphere. Increased evaporation may dry out the areas under study and fall as excess rainfall on other areas. Changes in the amount of rain falling during storms provide evidence that the water cycle is

already changing resulting acute fluctuation in the water table. Warming winter temperatures cause more precipitation to fall as rain rather than snow. Furthermore, rising temperatures cause snow to begin melting earlier in the year. This alters the timing of stream flow in rivers that have their sources in mountainous areas. As temperatures rise, people and animals need more water to maintain their health and thrive. (USGCRP 2014)

This study is focused on basic calculations drawn for human necessity of water assessment in the scarce environment where the government is not bothering for provision of advance resources to the common peoples of the society just to remain dependent on exhausted, inadequate facilities already in their use despite increase in population, hundred time much more then the resources of water for households were installed in the past. This study is attempted to highlight the weaknesses of the service providing institutions with regard to formulate policies and copping mechanism for future requirement of water for daily use. Especially in the area of study which totally comprises on badlands, mountains and scientifically declared seismic zone where climate change is directly influenced by the global warming. No pre-emptive measures are adopted by the government to face the key challenges of water crises of today and for future. Unluckly National Water Policy is still under process and water providing institutions have let the common people to find a way out to meet their water requirement for household at their own, even to afford independently or find the way out of the problem collectively. The policy makers are significantly addressed in this study for helpful research based findings which highlight the main factors involved in water availability for households with regard to actual problems faced by the individual to get his basic need of survival. Furthermore the study contribute to clear the picture for decision makers /

policy makers, planners and all the stakeholder directly or indirectly relate to enhance the achievements for development of water resources, the storage to meet the requirement and develop a copping mechanism for water wastage, recharge and reuse in preview of environment and usage of advance technologies already adopted in the world level.

2.   Study area

We selected Quetta Balochistan. Balochistan the province of Pakistan, the largest province regarding area. The population of Quetta is 1.172 million as of 2017 census, rainfall varying from 12-14 inches in the North to 4-6 inches per annum in the South. (GoB, 2005) Quetta has near surface water resources such as streams, lakes and underground water channels called Karez (Nasrullah, et al. 2011). The Government installed 335 tube-wells over the past few years which dried up within a few months after the installation. The main Government water providing institutions for household through piped water supply system in Quetta City are Water and Sanitation Authority (WASA), Public Health Engineering (PHE) Department and Metropolitan Corporation. To meet the requirement some Non-governmental organizations (NGOs) have installed tube-wells for resident, which are still their source of water supply. The people are installing hand pumps to cope the scarcity of water without any support of the government (GoB,2015). Now a days the most suitable and convenient option to fulfill the water demand available at doorstep is private water tanker at a costs of Rs. 1500 is a call away from them. (Shahid, 2008). Overall the climate of the study area is mostly dry and the Summer starts in late May and continues until early September with average temperatures ranging from 24 °C (75 °F) to 26 °C (79 °F) and Winter starts from the first week of October and ends in late March, with average

temperatures near 4 °C (39 °F) to 5 °C (41 °F). The principle mode of precipitation in winter is snow, falls mostly in December, January, and February and sometimes even in March, which actually raise the ground water level. District Quetta consists of 67 union councils and Quetta is distributed to two towns as chiltan and Zarghoon town.

3.   Research Methodology

The study is essentially descriptive and explainatory in the nature in view of both primary and secondary sources of information where the research data is qualitative as well as quantitative. The major sources for data collection were collected through questionnaire, key informants and observation of the study area. The questionnaire surveys on the water resources at household level perceptions were carried out among 200 respondents from five different clusters of the Quetta city of Balochistan which includes A-one city, Saryab road, Satellite town, Jinnah town and Nawa Killi using clusters sampling techniques. Further random sampling techniques were applied for example in Satellite Town Quetta, we selected every third household. Variable changes are determined by the water supply and demand; and incorporated rapidly and simply. Certain standards are determined to achieve the goal of water demand, acceptable for welfare and quality of life. Result acquired with the distribution of frequency and percentage as information provided by the respondents. The real possibilities and weaknesses of each region are re-examined which relates to the shortage of water resources.

Table 1

Population		
Respondents background	Frequency	Percent
A-one city (Phase-1)	34	17.0
Sariab Road (Shafi Colony)	41	20.5
Satellite Town (Block 1)	39	19.5
Jinnah Town (Phase 1)	49	24.5
Nawa Killi (Zarghoon Town)	37	18.5
Total	200	200

4.   Results

Findings of the study showed the names of the town of Quetta city, which has been selected for the collection of data where 24.5% the maximum number of respondents which shared the information from Jinnah Town Quetta and 17% minimum numbers of respondents were from A-one city Brewery Road Quetta. Moreover it reveals that 40.5% of the respondent was graduates and 29.5% were with post graduate studies and only 1.5% was illiterate. 50.5% respondents were Government Servants and 24.5% were private workers and only 18.5% have their own business. 53% respondents were living in joint family system and 46% were nuclear families. The maximum age of respondents was 82 and minimum age was 24. Number of maximum number of people in the household was 20 and 2 minimum. Respondent's profile

Table 2

Education		
Primary	8	4.0
Secondary	19	9.5
Intermediate	30	15.0
Graduate	81	40.5
Post Graduate	59	29.5
Illiterate	3	1.5
Total	200	200
Occupation		
Government Servant	101	50.5
Private	49	24.5
Wage Labour	5	2.5
Agriculture	8	4
Business	37	18.5
Total	200	200
Type of family		
Nuclear	92	46.0
Joint	108	54
Total	200	200
Major source of water		
Government water supply	137	68.5
Tube Well	28	14.0
Bore well / Hand Pump	12	6.0

Public Tap	3	1.5
Private Water Purchase	20	10.0
Total	200	200

Source = Field Survey, 2016

Table 2

Variables in the Equation

Variable	Description	B	S.E.	Wald	Df	Sig.	Exp(B)
X1 Literacy	If 1 literate, 0 otherwise	-.695	.693	1.004	1	.316	.499
X2 Type of family	If 1 joint, 0 otherwise	-.599	.297	4.087	1	.043	.549
X3 Monthly_Income	Scale data	.-0.022	.010	5.265	1	.022	.978
X4 Water availability from major source	If 1 every day, 0 otherwise	-.616	.218	7.967	1	.005	.540
X5 Garden at home	If 1 yes, 0 otherwise	-.598	.338	3.131	1	.077	.550
X6 How water used for sanitation	If 1 running water, 0 otherwise	.041	.177	.053	1	.817	1.042
X7 Type of toilet	If 1 flush, 0 otherwise	-.143	.247	.336	1	.562	.867
X8 Help to get water	If 1 yes, 0 otherwise	.147	.325	.205	1	.651	1.159
X9 Responsible factors of water shortage	If 1 Government Institution, 0 otherwise	0-.915	.304	9.045	1	.003	.401
X10 Water providing institutions	If 1 WASA, 0 otherwise	.140	.176	.628	1	.428	1.150
Constant		4.325	1.319	10.757	1	.001	75.530

Source = Field Survey, 2016

Table 2 shows logistic regression elucidated that X2, X3, X4, X5 and X9 were statistically significant with p-values of .043, .022, .005 .077 and .003 respectively. X1, X6, X7, X8 and X10 found statistically insignificant.

Results of analysis reflected that the joint family system significantly affected the water resources of household level. The Monthly income is significantly affected the water resources of household level, findings showed that most of respondents were poor and their average annual income was Rs.100,000/-. On the other hand that how often the people get water from the major source in the area for household, which denotes that 40% respondents get weekly water from their major source, 31% twice a week and only 17.5% will get water every day from major source and in this analysis its p-value is

.005. The factor of water requirement for garden is also taken into consideration where those mostly buy water from the private water tankers, result shows that only 31% of the respondents have garden in their houses and all of those 24.5% were of the view that they are buying water to irrigate the garden, moreover, 59.5 % houses have no garden the last the factor which is significantly influenced is the responsible factor for shortage of water for household, where data was also acquired either the government institution will stand responsible or mismanagement in duration of water from the main sources, where 55.5 % respondents fixed the responsibility at government institution and its significance level was .003.

5.   Discussion

Provsion of water for houshold is the core responsibility of the Government and the government providing institution should ensure the stability to each and every people of the country as per chalked water policy mandatory for well being of the society. The general comparison of the factors that significantly influencing the water resources for household level like type of family, in this research, all independent variables have positive relationships with household water consumption, where an increase in household size / family size will cause household water usage to increase while keeping all other variables constant. The findings have also shown that over-population is the main contributing factor in influencing household water consumption in the Quetta City, moreover, the average income of the people is very low and many are hand to mouth, so they work very hard to minimize the poverty level. The household water availability is followed by the household income. Nonetheless, the significance of household income towards household water consumption is very small and it is a major factor in

this analysis since its p-value was only .022. The findings further showed that household where the supply of water was not ensured every day, and in most of the areas were people get weekly water from major source resultantly faced severe water scarcity which is clear mismanagement of government as it is unawareness of respondents they can't agitate for their water need. Average water provided by the service provider at a time is less than the original need of the household therefore the head of the family is dependent upon the private water suppliers and buy water which is and extra financial burden over his pocket. Domestic consumption of water from other household purposes including garden. The findings showed remarkable percentage of respondents have garden at their household and they manage from their available water, provided by institutions, it shows the clear picture that the availability of water has been significantly affected due to garden availability at household, where the factors which stand responsible for shortage of water is significantly affected are government institutions who fail to provide water from the water source at household level as per requirement of the people.

Conclusion and Recommendation

The research conducted in the different areas of Quetta city to analyze the factors influencing the water availability from the major sources and its provision as well as practice at household level in Quetta, whereby the most considerable significant factors was the type of family or we can say the family size as much as the size increase the demand of water also increases and it is also correlated with the income of the household head, the respondents are dependent on resources of water provided by the government and the areas where government failed to provide water resources are reliant

on the private water providers, such as tankers mafia for water usage at household for sanitation or even has the garden, because the water availability from the main source is not enough to fulfill the requirement therefore private water providers would be called. Moreover, the government water sources are also unable to provide water on daily basis, twice a week or weekly. Respondents are often getting water of low quality from their major sources and facing scarcity throughout the year especially in summer season where water use is also affected by climate change, since rising of temperature lead to increase in water consumption for gardening. The findings of the articles depicted that the available water resources provided by the government are not enough for the household and are very much insufficient for their daily usage all the respondents have to struggle hard to acquire water and spent a reasonable amount to overcome the shortage of daily requirement which is basic need for each and every member of their family. In many of the areas in Quetta city peoples have independently managed alternative water resources as per their requirement. The paper suggest to bring awareness for the public sector about their right to water and provision of water sources is core responsibly of Government, especially to draw a policy for construction of new water resources or by the remodeling of water and sanitation systems.

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