RESEARCH NOTES

DRINKING WATER QUALITY CHALLENGES OF PAKISTAN

Samina KHALIL*

I. Introduction

There are 884 million people in the world who lack access to safe drinking water; approximately one in eight (3.575 millions) persons die each year from the water-related diseases. The unclean drinking water and filth of sanitation claims more lives by diseases than any war can claim by guns. Poor people living in slums often pay 5-10 times more per liter of water than the wealthy people living in the same vicinity. An American taking a five-minute shower uses more water than the per day use of water by an average citizen living in a slum of a developing country. As majority of diseases are caused by fecal matters, in every 20 seconds one child dies due to water-related illness. Non-availability of water at their home, specially drinking water, women living in remote areas have to carry water from wells, water pumps, canals, etc., and those living in cities slums may have to bring it from the government taps, from nearby wealthy homes, etc., and spend about 200 million hours a day in collecting water for their home use. Though, people have to make extra labour to avail water and face health and hygiene problems due to less availability of water; but there is no priority for access of water; in spite, they have a mobile than a proper toilet. In developing countries, due to lack of interest of the community in welfare and involvement in activities, 50 per cent of the water projects have failed. Less than five per cent of them are visited and far less than one per cent is at far longer-monitoring terms. Investment in safe drinking water and sanitation contributes to the economic growth. For one invested Dollar, the World Health Organization (WHO) estimates return of $3 to $34, depending on the technology used and the region of investment. Almost, two in every three people who need safe drinking water, survive on less than $2 a day and one in three on less than $1 a day. Households, not public agencies, often make largest investment in the basic sanitation, with the ratio of household to government investment, typically as 10:1. Investment in drinking-water and sanitation would result in 272 million more school attendance, in a year. The value of deaths averted, based on discounted future earnings, would amount to US$ 3.6 billion a year.

*Senior Research Economist, Applied Economics Research Centre, University of Karachi. The author is thankful to Sajjad Ali, M. Phil. Student at the AERC, for his valuable assistance and data collection for this research note.

Lack of sanitation and contaminated water are leading cause of infection. Drinking water must be free from outer components and their absorbent in water may adversely affect the human health. Such components include minerals, organic substances and disease causing micro-organisms. A large part of population in developing countries suffer from health problems associated with either the lack of drinking water or due to presence of microbiological contamination in the water. In developing countries, poor quality of drinking water is responsible for death of an estimated 5 million children, a year. Almost 80 per cent of diseases in 'developing' countries are due to unhealthy water, causing some three million early deaths in children. For example, 5,000 children die every day or one every 17 seconds, from diarrhea. The problem is further aggravated due to rapid increase in population resulting poor management for supply of drinking water.

In Pakistan, water from lakes/reserves is routed to canals and later it is supplied to cities, towns, etc., by piped network; but in small towns, villages, and remote areas hand pumps (around 66 per cent) are the main source of water used by households. The need of freshwater for population have tripled over the last 50 years and its demand has increased by 64 billion cubic meters a year.[1] It is estimated that in Pakistan, 30 per cent of diseases and 40 per cent of deaths occurs due to poor quality of water. Diarrhea, a water-borne disease is reported as a leading cause of death in infants and children in the country; while every fifth citizen suffers from the disease caused by the polluted water. Unfortunately, little attention is being paid to the quality issues of drinking-water whereas; quantity remains the priority focus of water supply agencies. There is a lack of monitoring of quality drinking-water and the surveillance programmes in the country. Weak institutional arrangements, lack of well equipped laboratories and the absence of a legal framework for issues of quality drinking-water further aggravate the situation. Above all, the public awareness of this issue is dismally low. Estimate indicate that there are more than three million Pakistanis who suffer from waterborne diseases and each year 0.1 million of them do not survive. The water-borne diseases accounts for nearly 60 per cent of child deaths and daily 630 children die from diarrheal diseases, in Pakistan. Presently, Pakistan does not have quality standards for drinking water and WHO guidelines are not followed.

To provide safe drinking water, the Government of Pakistan has taken initiatives for provision of the 'Clean Drinking Water to All' (CDWA) which was materialized with the support of USAID. A step ahead the work was accorded to a contractor "Abt and Associates'. The Government of Pakistan also launched a project, 'Pakistan Safe Drinking Water-& Hygiene Promotion Project (PSDW-HPP)' in 31 districts and in Swat, a contract for this purpose was also granted to the 'Environmental Protection Society (EPS).' When toxic substances enter lakes, streams, rivers, oceans, and other water bodies, they get dissolved or remain suspended in water or

[1] One cubic meter = 1,000 liters.

get deposited on the bed. This results in the pollution of water whereby the quality of water deteriorates, affecting aquatic ecosystems. Pollutants can also seep down and affect the groundwater deposits.

Water pollution has many sources. The most polluting of them are the city sewage and industrial waste discharged into lakes, rivers, and the sewerage pipes. The facilities to treat waste water are not adequate in any city of Pakistan. Presently, only about 10 per cent of the waste water generated is treated; and in its same state the rest is discharged into our water bodies. Due to this, pollutants enter groundwater, rivers, and other water bodies. Such water ultimately ends up in our households. Water is often highly contaminated and carries disease-causing microbes. Agricultural run-off, or the water from the field which is drained into rivers, is another major water pollutant as it contains fertilizers and pesticides. Water related diseases are classified as:

1. The waterborne diseases are caused by ingestion of water contaminated by hum an or animal faeces or urine containing pathogenic bacteria or viruses; and include cholera, typhoid, amoebic and bacillary dysentery and other diarrheal diseases.

2. The water-washed diseases are caused by poor personal hygiene and skin or eye contact with contaminated water and include scabies, trachoma and flea, lice and tick-borne diseases.

3. The water-based diseases are caused by parasites found in the intermediate organisms living in contaminated water and include dracunculiasis, schistosomiasis, and other helminthes diseases. The most widespread diseases in this category are schistosomiasis and dracunculiasis. Schistosomiasis disease currently infects 200 million people in 70 countries.

II. Pakistan's National Policy for Drinking Water

Drinking water is the constitutional responsibility of the provincial governments and specific provisional functions have been specially formulated to create agencies in cities, towns and tehsils, municipal administrations, under the local government ordinance 2001. However, in some of the major cities of Pakistan, these bodies have badly failed as water for drinking and household use is obtained by boring system (small water pumps), hand-pumps, tankers, etc. In most of the big cities, it is not the matter of insufficiency of the quantity of water, but it is due to improper management and the tankers mafia who sell these water tankers at high cost to the common households, after filling their tankers (at low cost) from the hydrants. Water obtained by pumps or tankers may be 'sweet water' or 'salty water' depend-

ing on the land where the pump is dugged or the price paid for a (water filled) tank. The dilemma is that all citizens get water but not through the government/houses connection; instead they have to purchase it from the water suppliers at high cost.

III. Goals

In order to acquire clean and hygienic drinking and household usable water, the following goals have been set forth:

1. To ensure pure and safe drinking water for the entire population at an affordable cost in an equitable, efficient and sustainable way.

2. To ensure decrease in incidence of mortality and morbidity caused by the water borne diseases.

IV. Objectives

The objectives of the policy are as under:

1. To provide a supportive policy and legal framework which would facilitate access of pure and safe drinking water to all citizens on sustainable basis.

2. To provide guidelines to the citizens which would allow consistency and conformity between drinking water policy and the overall water sector environmental policy, health policy and drinking water quality standard which will facilitate provision of safe water.

3. To define an institutional framework within which the institutions sector can address the challenges more effectively which they face in acquiring drinking water in all areas of the country.

4. To provide a financial framework within which the provision of water supply can be undertaken in a cost-effective, equitable and sustainable manner.

5. To identify and facilitate the implementation of a set of key strategies which will help in enhancing access to safe drinking water supply.

In spite of all these efforts, Nestle[2] reported that the global water shortage of affordable and safe drinking water is manifested in Pakistan with an estimated 44 per cent of the population without access to safe drinking water. In rural areas, up to 90 per cent of the

[2] Nestle is the world's leading Nutrition, Health and Wellness Company, with its headquarter in Switzerland.

population may lack such access. As one indication of magnitude of the problem, it is estimated that in Pakistan 200,000 children die every year, due to diarrheal diseases alone.

Mineral bottled water is considered as one of the most dynamic sector of food and beverages industry, where consumption in the world increases by an average of 12 per cent each year, in spite of its excessively high price, as compared to the tap water.

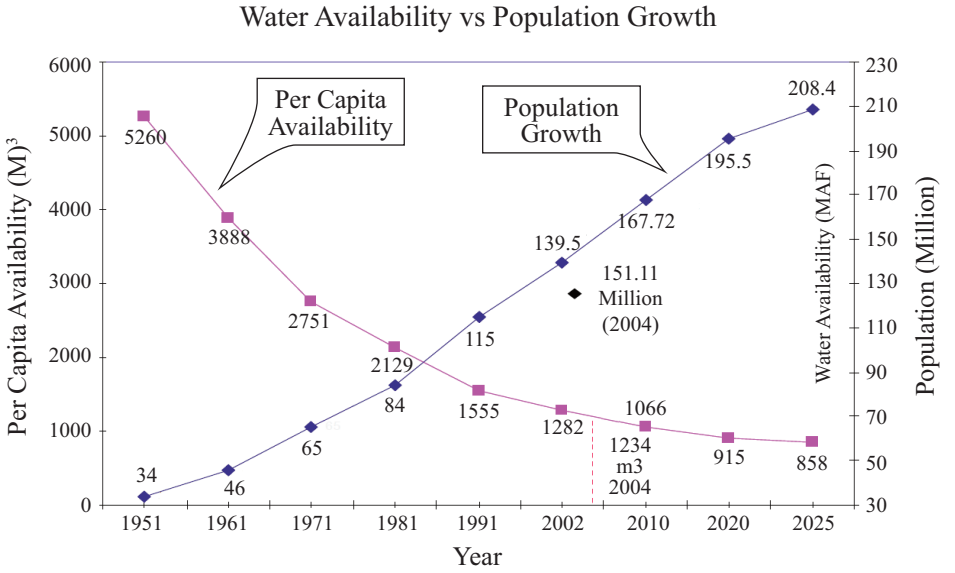
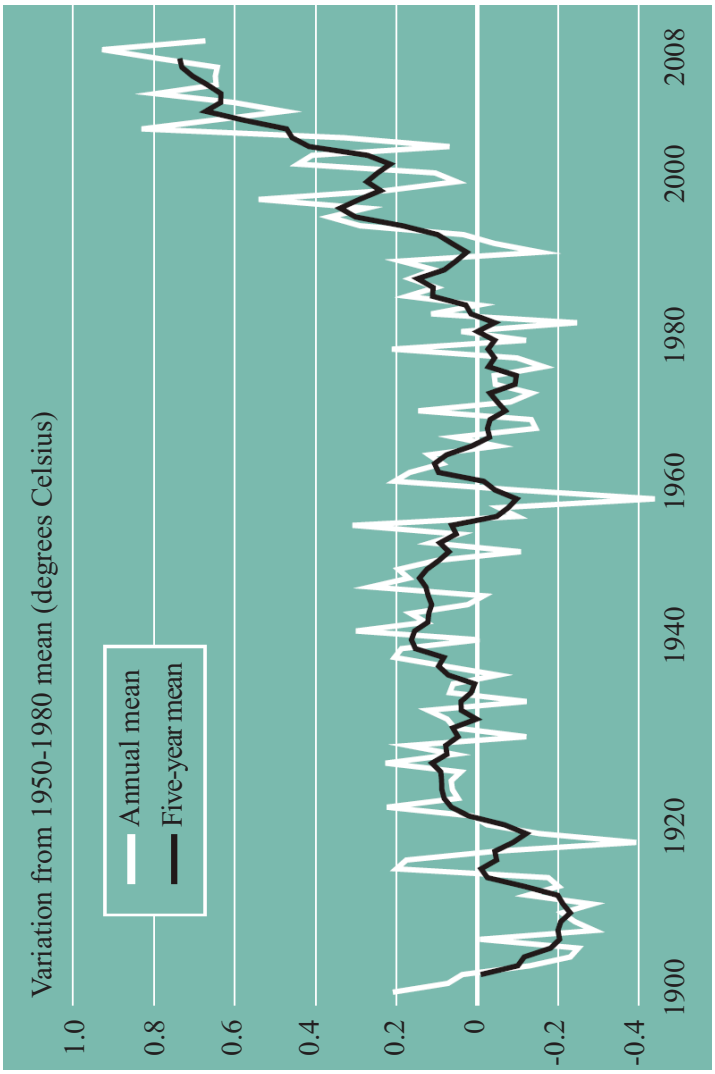


Figure 1

Drinking Water Scenario: An Overview of the World

Figure 1 shows availability of water which is declining day by day all over the world and on the other hand population of the world is increasing, due to which per capita water consumption is also decreasing. It is also predicted by the scholars that in future, it will further decline with an increase in the world population. Agriculture accounts for 70 per cent of water consumption as compared to 20 per cent for industry and 10 per cent for domestic use. In industrialized nations, however, industries consume more than half of the water available for human use. Belgium, for example, uses 80 per cent of their available water for industry.

The world population is increasing by roughly 80 million people each year. Changes in lifestyle and eating habits have changed in recent years, requiring more water consumption for per capita use. The production of bio-fuels has also increased sharply in these years with significant impact on water demand. About 1,000 to 4,000 liters of water are needed to produce a single liter of bio-fuel. Energy demand is also accelerating with corresponding implications for water demand.



Note: Calculated using average temperatures in 173 countries, weighted by average population in 1950–2008.
Source: HDRO calculations based on data from the University of Delaware.

Figure 2

Average World Temperature with Upward Trend, 1990 till 2008

Figure 2 depicts the world wide behavior of temperature since 1900 till 2008. It shows upward trend and increase in the evaporation from water resources and decline in its availability, especially in summer.

TABLE 1

MDG Progress on Access to Safe Drinking Water by Region

	1990			2004			2015 Target			On Target?
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total	
Northern Africa.	95	82	89	96	86	91	98	91	95	On Target.
Sub-Saharan Africa.	82	36	49	80	42	56	91	68	75	No progress or deterioriation.
Latin America and the Caribbean.	93	60	83	96	73	91	97	80	92	Target Met or Close to Being Met.
Eastern Asia.	99	59	71	93	67	78	100	80	86	On Target.
Southern Asia.	90	66	72	94	81	85	95	83	86	Target Met or Close to Being Met.
South-Eastern Asia.	93	68	76	89	77	82	97	84	88	On Target.
Western Asia.	94	70	85	97	79	91	97	85	93	Target Met or Close to Being Met.
Oceania.	92	39	51	80	40	51	96	70	76	No progress or deterioriation.
Common wealth of Independent States*	97	84	92	99	80	92	99	92	96	Target Nearly Met in Europe but No Progress or Deterioration in Asia.

*Commonwealth of Independent States comprises Belarus, Republic of Moldova, Russian Federation and Ukraine in Europe, and Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, in Asia

Table 1 shows that according to the medium terms, Asia is a target or close to the target to achieve development goals for safe drinking water in the region. The availability of improved drinking water for rural areas in the region has already shown a rapid rise in trend from 1970 to 2000, but then it slowed, as compared to other parts of the world. Province-wise availability of Safe Drinking Water in Pakistan and the Health indicators are shown in Tables 2 to 4, as under:

TABLE 2

Distribution of Households by Source of Drinking Water in Punjab

(in %age)

Year	Tap water	Hand pump	Motor pump	Dugged well	Others
2004-05	32.00	34.00	31.00	1.00	2.00
2006-07	29.11	35.36	31.29	1.54	2.70
2008-09	28.00	32.00	35.00	1.00	4.00
2010-11	24.00	30.00	39.00	2.00	5.00

Table 2 indicates the percentage distribution of households by source of drinking water. The tap water declined from 32 per cent to 24 per cent , hand pump declined from 34 per cent to 30 per cent, during the years 2004-05 to 2010-11, while through motor pumps it increased from 31 per cent to 39 per cent and dugged-wells from one per cent to 2 per cent, in the same period.

TABLE 3

Distribution of Households by Source of Drinking Water in Sindh

(in %age)

Year	Tap water	Hand pump	Motor pump	Dugged well	Others
2004-05	45.00	36.00	6.00	5.00	8.00
2006-07	46.70	31.67	7.71	4.34	9.57
2008-09	43.00	37.00	9.00	4.00	7.00
2010-11	43.00	34.00	12.00	4.00	7.00

In Table 3, data for Sindh shows the percentage distribution of households by source of drinking water from the tap water. The use of household water has declined from 45 per cent to 43 per cent, hand pump use from 36 per cent to 34 per cent and

dugged well use from 5 per cent to 4 per cent from the years 2004-05 to 2010-11, while its use from motor pumps it has increased from 6 per cent to 12 per cent and from the dugged well from one per cent to 2 per cent over the same period.

TABLE 4

Distribution of Household by Source of Drinking Water in KPK

(in %age)

Year	Tap water	Hand pump	Motor pump	Dugged well	Others
2004-05	48.00	10.00	7.00	14.00	20.00
2006-07	44.19	10.89	8.88	14.02	22.02
2008-09	50.00	12.00	10.00	12.00	16.00
2010-11	45.00	13.00	11.00	10.00	20.00

The figures in Table 4 depicts the percentage distribution of household by source of drinking water of the tap which has declined from 48 per cent to 45 per cent. The use of dugged well declined from 14 per cent to 10 per cent for the years 2004-05 till 2010-11, while through the motor pump there is an increase from 7 per cent to 11 per cent, hand pump from 10 per cent to 13 per cent and for motor pump from 7 per cent to 11 per cent over the same period.

TABLE 5

Distribution of Household by Source of Drinking Water in Baluchistan

(in %age)

Year	Tap water	Hand pump	Motor pump	Dugged well	Others
2004-05	40.00	4.00	4.00	18.00	34.00
2006-07	37.20	5.89	3.18	15.98	37.74
2008-09	38.00	4.00	2.00	17.00	39.00
2010-11	35.00	10.00	2.00	16.00	37.00

Table 5 shows the percentage distribution of household by source of drinking water. The use of tap which declined from 40 per cent to 35 per cent, motor pump from 4 per cent to 2 per cent and dugged well declined from 18 per cent to 16 per cent in the years 2004-05 to 2010-11, while the water-use by hand pump increased from 4 per cent to 10 per cent, over the same period.

TABLE 6

Incidence of Typhoid: All Areas, Urban and Rural Areas

(in % age)

Year	All Areas			Urban Areas			Rural Areas		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
2001	6.57	5.35	7.97	4.80	3.68	6.12	7.71	6.44	9.15
2003	2.83	2.61	3.10	3.05	2.69	3.52	2.69	2.55	2.85
2006	2.40	2.04	2.85	1.26	0.84	1.85	2.79	2.48	3.17
2007	3.72	2.54	5.39	3.74	3.66	3.88	3.71	2.11	5.84

Table 6 shows the incidence of typhoid which declined during 2001 to 2007 in both rural and urban areas and in both males and females.

TABLE 7

Incidence of Dysentery: All Areas, Urban and Rural Areas

(in % age)

Year	All Areas			Urban Areas			Rural Areas		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
2001	1.17	0.73	1.68	0.33	0.00	0.72	1.71	1.21	2.29
2003	0.26	0.12	0.44	0.51	0.30	0.78	0.11	0.00	0.24
2006	1.93	1.50	2.47	0.98	0.60	1.51	2.25	1.82	2.77
2007	1.24	1.07	1.48	1.01	0.81	1.35	1.33	1.18	1.52

According to data in Table 7 the incidence of dysentery has increased in urban males and females and declined in both the rural males and females, from 2001-2007.

TABLE 8

Incidence of Diarrhea: All Areas, Urban and Rural Areas

(in % age)

Year	All Areas			Urban Areas			Rural Areas		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
2001	4.10	2.79	5.59	4.14	2.76	5.76	4.07	2.82	5.49
2003	5.00	4.86	5.17	4.92	5.99	3.52	5.05	4.12	6.18
2006	3.08	3.31	2.81	2.62	2.30	3.08	3.24	3.67	2.72
2007	3.72	2.54	5.39	3.74	3.66	3.88	3.71	2.11	5.84

Table 8 shows an incidence of diarrhea has increased in urban males and rural females whereas, it has decreased in urban females and rural males from 2001-2007.

V. Conclusion

The above analysis illustrates water scarcity as one of the growing concerns of Pakistan. Not only low precipitation rate and high rate of evaporation is the cause of water shortage but also the water pollution is one of the major factors for it. More than 50 per cent of the population lack access to safe drinking water which is a very serious issue as most people die due to water born diseases, every year, especially children under the age of 5 years. Water pollution is one of the causes of malnutrition in growing generation but there is no serious consideration for it, until now. There are treatment plants which are not being operated and in most of the urban areas sewerage and drinking water line run side by side; and often water caused supply of very bad quality of water due to mixing of sewerage water with the drinking water. This is especially common in major cities of Pakistan. We have passed 67 years of independence but are still unable to solve this basic problem.

Applied Economics Research Centre,
University of Karachi,

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