



## Assessment of Drinking Water Quality and Access: A Comprehensive Study in Village Chirya

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**Abstract:** Access to safe drinking water is a fundamental necessity for human life and a key determinant of living standards. In India, the struggle to provide proper drinking water to the population persists, with significant implications for public health and socio-economic development. The absence or poor quality of drinking water sources can lead to a range of diseases, including diarrhea, fluorosis, cholera, hepatitis A, and trachoma, particularly affecting vulnerable communities and hindering human resource development and productivity. Recognizing the critical importance of drinking water, the 2002 National Water Policy of India emphasizes the provision of sufficient quality drinking water facilities to all citizens, both in urban and rural areas. It mandates the inclusion of drinking water components in irrigation and multipurpose projects, prioritizing human and animal needs. To address this issue, both central and state governments are actively working to increase the coverage of households with adequate and safe drinking water. This includes efforts to improve sanitation services alongside drinking water provision but the issues are not completely addressed. This study specifically examines the drinking water challenges faced by the residents of Chirya village in the Charkhi Dadri district and tehsil of Haryana. Through close observation, the study aims to understand the water consumption patterns and how they are influenced by the socio-economic status of different families. This study analyses several factors contribute to the lack of accessibility to safe drinking water in Chirya village, highlighting the need for targeted interventions to address this pressing issue and ensure the right to clean and safe water for all residents.

**Keywords:** Accessibility, Water Quality, Water resources management, Rural water supply services.

### 1. Introduction:

India struggles to provide proper drinking water to its population. The basic requirement for life is to drink appropriate and safe water. It's a determinant of the standard of life. Poor or no access to safe watersupply can result in many diseases including diarrhea, fluorosis, cholera, hepatitis – A, trachoma, etc. These diseases, especially for the poor, could hamper human resource development and productivity. The significance of drinking water is reflected in the 2002 National Water Policy, which states that all people should be supplied with sufficient quality drinking water facilities at both city and rural level. Where thereis no alternative source of drinking water, the drinking water component should always be included in irrigation and multipurpose projects. The initial charge for each available water should be the human and animal's drinking water needs. However, around 22 percent of households in India does not have access tosafe drinking water sources such as taps, hand pumps and tubewells, according to the 2001 census. Therefore, central and state governments are making significant efforts to increase the coverage of households with adequate and safe drinking water as well as sanitation services in line with the MDGs. The present study particularly focuses on the problem of drinking water in Chirya village (district and tehsil Charkhi Dadri, Haryana). In this study a close observation has been made to understand the waterdrinking patterns and how it is affected by socio-economic status of different families. There are severalreasons behind lack of accessibility of safe drinking water in Chirya village-



**Groundwater Depletion**-Rural Haryana relies heavily on groundwater for drinking water needs. Over-extraction of groundwater, primarily for agricultural purposes, has led to a decline in water tables. This depletion makes it challenging for rural communities to access an adequate and sustainable supply of clean water.

**Contamination of Ground Water**-Many rural areas in Haryana face the issue of groundwater contamination. Agricultural runoff containing pesticides and fertilizers, untreated sewage, and industrial discharge contribute to the pollution of aquifers. Contaminants like nitrate, fluoride, and arsenic often exceed permissible limits, posing serious health risks to the rural population.

**Inadequate Infrastructure**-Rural areas in Haryana often lack proper water supply infrastructure. The absence of piped water systems, storage facilities, and treatment plants contributes to the reliance on traditional water sources, which may be contaminated. Insufficient investment in rural water infrastructure hampers the delivery of clean water to households.

**Dependency on traditional water sources**-Rural communities in Haryana often depend on traditional water sources like ponds, wells, and hand pumps. These sources may not always provide water of sufficient quality, and during periods of drought or water scarcity, these sources may run dry, exacerbating the problem.

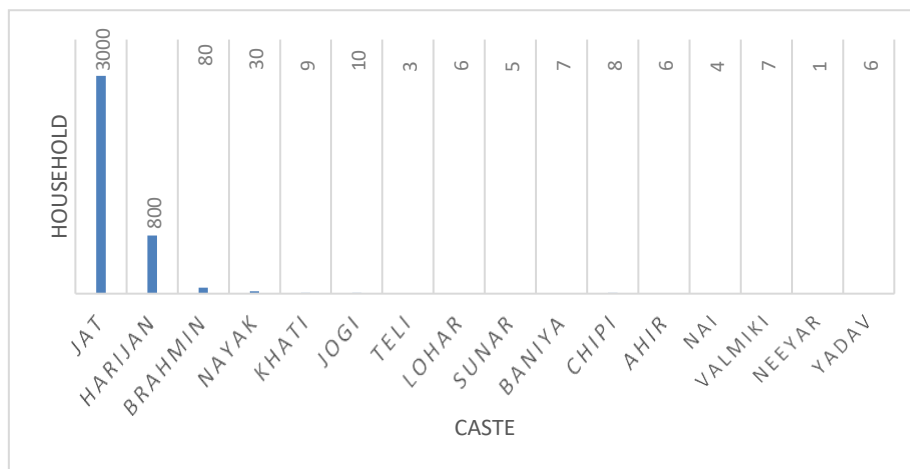
**Geographical Factors**-The geographical features of Haryana, including its semi-arid climate, contribute to water scarcity issues. Erratic rainfall and high evaporation rates further stress the already limited water resources, making it difficult for rural areas to secure a consistent and reliable water supply.



Picture 1: Dry Well in Village Chirya

### **Demography of village Chirya-**

The demography of village Chirya are as follows: Caste has been found in that particular village named Jaat, Harijan, Bramhin, Nayak, Jogi, Khati, Yadav, Cheppi, Baniya, Balmiki, Bairagi, Lohar, Sonar, Barbar, Teli, and Washerman (according to the numerical strength). There was total nine Panchayat Members, six Paane (colony), four Aaganwadi Kendra, five government school, one Primary Health Centre, one Post Office, one Sarvahara Gramin Bank, six chaupal of Jaat, Harijan, Baniya and Backward community, two temples named Baba Prempuri and Dada Sati and One Sarpanch. Majority of men in Jaat and Harijan are government employed in Indian Army and female are working as nurse and school teacher (government/private) and majority of them are indulge in household chores and participating in agriculture activity. In economic activity, seasonal migration occurred from UP and Bihar due to cement industry and agricultural industry which is established in that village. Villagers are continually facing the central issues related to drinking water, water logging and transport problem from Kanina to Dadri. Main food crops are mustered and Millet. Inter- State marriage is happened in Jaat community.



Graph 1: Caste composition of Chirya Village

## 2. Literature Review:

Water is a vital input in all services of human life. The water spread on 70 per cent surface of earth but just one per cent is available to us as a source of potable water. Its utility is not only attached to drinking purpose for all domestic activities get influences all other activities also. Most of the countries today are facing a number of challenges and drinking water supply is one such challenge (Doe, 2007). In addition, increasing water scarcity, population and urbanization contribute prime factors creating fundamental constraints for entire world and pressure for urban supply. During past 7 decades various cities have grown with fivefold consumption due to population growth and also increased demand. India falls lowest in the world regarding water supply and sanitation coverage. India currently is the world's second largest country in terms of population, and is expected to put behind China by 2050, consequently, adding increased strain on water resources (Bansil, 2004).

In rural India, the main sources of drinking water for households vary in terms of accessibility and quality. The majority of rural households, approximately 53%, rely on tube wells or boreholes for their drinking water needs, while about one in eight households obtain water from unprotected wells or springs. Despite only 28% of rural households having access to piped water, tap water remains a sought-after source due to its perceived better quality and reliability. Additionally, rural households may also utilize other sources such as wells, tanks/ponds, rivers/canals/lakes, and springs for their drinking water requirements. The reliance on these diverse sources underscores the importance of improving water infrastructure and management strategies to ensure safe and sustainable drinking water access for rural communities in India.

The problem of water is with everybody, everywhere and perhaps for all time to come (Bansil, 2004). The World Health Organization (WHO) provides guidelines for drinking water quality. These guidelines present maximum acceptable values for a number of contaminants in drinking water, including bacteria, viruses, parasites, chemicals of health significance, pesticides, disinfectants, disinfection byproducts, radioactive constituents, and substances and parameters in drinking water that may give rise to complaints from consumers. The guidelines also provide recommendations for protection and improvement of water quality, including selection of water sources, treatment methods, distribution methods, and emergency measures. Water quality depends on multiple factors like variation in precipitation, soil erosion and agricultural runoff, disposal of untreated or partially treated industrial and domestic effluents and leaching of minerals, geochemical characteristics, climatic conditions etc. (Kashyap et al., 2015).

The problem of drinking water is common in developing country like India. The most common and deadly pollutants in the drinking water in developing countries are of biological origin, including pathogenic bacteria, viruses, protozoa, and parasites. These contaminants cause waterborne diseases that are responsible for over 28 billion disease episodes annually. In addition, many developing countries lack access to safe drinking water, with about 25% of the developing world's population (1.1 billion people) lacking access to safe drinking water according to WHO standards in 1994. The lack of access to safe drinking water is often due to inadequate infrastructure, poor water management, and insufficient financing.



According to a report by the National Institution for Transforming India (NITI Aayog), about 600 million people in India face high to extreme water stress, and 200,000 people die every year due to inadequate access to safe water. The report also states that 70% of the water supply in India is contaminated, and the country is facing its worst water crisis in history. The issues faced by Indian citizens regarding drinking water include inadequate infrastructure, poor water management, groundwater depletion, and contamination of water sources due to industrial and agricultural activities.

If we discuss particularly about Haryana, according to a report by the Comptroller and Auditor General (CAG) of India, Haryana is facing a severe drinking water crisis. The report states that 79% of the water supply schemes in the state are not providing safe drinking water due to contamination of water sources, inadequate treatment, and poor maintenance of infrastructure. The report also highlights that the state government has failed to implement the National Rural Drinking Water Programme effectively, resulting in inadequate access to safe drinking water for the rural population. In addition, the state is facing groundwater depletion due to overexploitation, which is further exacerbating the drinking water crisis. As per the report by the Central Ground Water Board (CGWB), Haryana is one of the states in India that is facing a severe groundwater depletion crisis. The report states that the groundwater level in the state has been declining at an alarming rate of 33 cm per year, and about 80% of the state's area is overexploited for groundwater. The report also highlights that the state's groundwater resources are being used for irrigation, industrial, and domestic purposes, and the excessive use of groundwater is leading to a decline in water availability and quality. The state government has implemented various measures to address the groundwater depletion crisis, including rainwater harvesting, artificial recharge of groundwater, and regulation of groundwater use. However, the effectiveness of these measures is yet to be evaluated.

Water quality measurement is also very important to access fresh water. Water quality can be measured by analyzing various physical, chemical, and biological parameters of the water. This includes assessing the pH level, total dissolved solids (TDS), total alkalinity (TA), total hardness (TH), as well as the concentrations of specific ions such as chloride, sulfate, nitrate, and fluoride. Additionally, the presence of harmful bacteria is also an important aspect of water quality measurement. These parameters can be measured using a variety of methods, including laboratory analysis, field testing kits, and online monitoring systems. Regular monitoring of water quality is essential to ensure that it meets the required standards for safe drinking water and to identify any potential health risks associated with the water supply. In Haryana, water quality is measured by analyzing various physico-chemical parameters of the water (Garg et al., 2008). A study conducted in southwestern Haryana collected 275 water samples from deep aquifer-based hand-pumps situated in 37 different villages/towns of the Bhiwani region (Garg et al., 2008). The samples were analyzed for various parameters, including pH, TDS, TH, TA, calcium, magnesium, carbonate, bicarbonate, sulphate, chloride, and fluoride concentrations. The study found that the average TDS content exceeded the maximum permissible limit set by the World Health Organization (WHO) or the Bureau of Indian Standards (BIS), ranging from 1,692 mg/l in Bhiwani block to 2,560 mg/l in Siwani block. Additionally, the presence of fluoride in the groundwater was a major concern, with more than 74.5% of the samples showing concentrations higher than the maximum permissible limit for drinking water. Similarly, every part of Haryana should be analyzed for improving the quality of water.

### **Strategy For the Safe Water Supply-**

Both the Government of India and the State Governments have been trying to provide safe drinking water to the rural populations since the implementation of the First Five Year Plan began. Despite the huge allocation of funds provided by the Center throughout the plans, water supply remains a distant dream for the millions of rural people. The earliest strategy to provide water for 90 percent of the rural population within 40 years failed, as a majority of the villages under the schemes remained uncovered. It was during 1972-73 (the Fourth Five Year Plan), however, that serious thought was given to the problem of Rural Water Supply. Successive plans and shifts in the strategies proposed and implemented in the water sector can be appreciated better as we look into the policies and programmes launched by the Governments under the following programmes:

### **Accelerated Rural Water Supply Programme-**

The Government of India introduced the Accelerated Rural Water Supply Programme (ARWSP) in 1972-73. The focus was physical coverage of all rural habitations with the facility of drinking water as per certain norms fixed for the purpose. The strategy adopted was two-pronged: a) To identify problem villages and, 111 Drinking Water, Sanitation and Rural Health Care b) To accelerate the coverage of problem villages. The Central Government



assisted the States and Union Territories with a 100 percent grant-in-aid to implement the schemes in problem villages. The ARWSP, however, was withdrawn with the introduction of the Minimum Needs Programme (MNP) during the Fifth Five Year Plan (1974-75). Despite the huge investment, the progress under the scheme was found to be unsatisfactory. As a result, ARWSP was reintroduced in 1977-78. The ARWSP is implemented by the State Governments. Now, they have the power to plan, sanction, and implement programmes.

### **Rajiv Gandhi National Drinking Water Mission-**

Recognizing the enormity and urgency of providing safe drinking water to rural areas, the ARWSP was given the shape of the National Drinking Water Mission (NDWM) 1986, which was renamed as Rajiv Gandhi National Drinking Water Mission (RGNDWM) in 1991. Under RGNDWM some major reforms have been introduced to bring about sustainability in the water sector in rural India. The programmes of RGNDWM may be classified into two categories, namely A) Main Programmes: It comprises i) Accelerated Rural Water Supply Programme (ARWSP), and ii) Sector Reform Programmes. The policy signifies a paradigm shift from a centralized, government oriented, and supply-driven programme to a decentralized, people-oriented, and demand -driven programme. B) Supportive Activities: the supportive activities provided under the programme includes Human resource development, Information, education, and communication, Management information system. For these activities, 100% of funding is provided by the central government. Besides it also makes provisions for the management information system, monitoring and investigation units, monitoring and evaluation, and development.

### **Jal Jeevan Mission-**

This mission was launched on 15th August 2019, with the aim of providing drinking water through individual household connections by 2024 to all households in rural India. The programme will also implement source sustainability measures as mandatory elements, such as recharge and reuse through greywater management, water conservation, rainwater harvesting. The Jal Jeevan Mission is based on a community approach to water and it includes extensive information, education, and communication as a key component of the mission. The broader objectives of the mission are:

- To provide Functional Household Tap Connection (FHTC) to every household.
- To prioritize the provision of FHTCs in quality affected areas, villages in drought-prone and desert areas, Sansad Adarsh Gram Yojana (SAGY) villages, etc.
- To provide FHTC to Schools, Anganwadi centers, GP buildings, health centers, wellness centers, and community buildings.
- To monitor the functionality of the tap connection.
- To promote and ensure voluntary ownership among the local community by contribution in cash, kind and/ or labour, and voluntary labour.

Component of JJM Jal Jeevan Mission aims for the development of in-village piped water supply infrastructure to provide tap water connection to every rural household 115 Drinking Water, Sanitation and Rural Health Care along with the development of reliable drinking water sources and augmentation of the existing source to provide long-term sustainability of water supply system. For achieving these purposes technological interventions for removal of contamination is an issue are required and therefore greywater management is an important component of the mission. JJM, wherever necessary, makes provision for the bulk water transfer, treatment plants, and distribution network to cater to every household. Also, it includes the component of support activities like IEC, HRD, training, development of utilities, water quality laboratories, water quality testing, and surveillance, knowledge center, capacity building of communities, etc. An earlier existing programme like Rural water supply and sanitation project for low-income states, national water quality sub-mission, Swajal, Water quality monitoring, and surveillance, and support activities for erstwhile NRDWP are subsumed under JJM.

Water is an important natural resource required for survival of human kind and has a significant impact on human development. The role of water in human development cannot be underestimated as it required for each and every aspect of people's lives and livelihoods. The ever-increasing population growth and urbanization create pressure on water resources resulting in threat to climate change affecting the complex relationship between water and human beings. Water and human development is closely linked. According to United Nations (UN) General Assembly, safe and clean drinking water has been a Human Right since 2010. Water is unquestionably having social significance as it plays an important role in social dynamics, economics and overall development.



Water assumes a central role in the policy debates and it is increasingly argued that the growth and development of a society and nation is determined by the level of awareness and sensitization about water. The present unit discuss about the significant aspects of water harvesting conservation, policy initiatives and effective ways and initiatives to deal with the question of water and sustainable development in the 21st century in the context of development communication.

Water is a critical input as a natural resource for every form of life in the Universe. Water plays a vital role in each and every aspect of human and nation development such as socio-economic development as well as maintenance of healthy ecosystems. Water is the principal natural resource and covers almost two third earth’s surface. Only 3% of water is freshwater, of which just one third is accessible for human use that may be for domestic, industry or agriculture. The importance of water cannot be ignored with the evaluation of this planet and it is a fact that almost all the civilizations move around water i.e. appeared on the banks of the big rivers. The importance of water is mentioned in all religious literature. Water is one of the five panchmahabhutas or great elements of life even in the ancient Indian tradition. Early Indian literature belonging to different religious literature including Hinduism, Buddhism, Jainism, and other traditions had highlighted the importance of water and its conservation. In Ayurvedic Literature water is defined as jiva (life) and has countless treatments on water. However, this tonic of life is becoming increasingly scarce due to due to different reasons.

**3. Research Question:**

What are the problems existing related to drinking water facility in village Chirya?

**4. Research Objective:** To identify the problems of drinking water facility in village Chirya.

**5. Research Methodology:**

This research work is primarily based on quantitative research design to systematically collect and analyze data. The selected participant is chosen through the technique of purposive sampling. The unstructured interview schedule is used to collect data. The total no. of participant interviewed is 7 from the village Chirya. The name of respondent is changed to maintain confidentiality.

The list of interviewed participants and collected data is given below:

Sr. No.	Name	Age	Gender	Caste	Family Type	Family Occupation	BPL(Yes/No)
1	Vimla Devi	60	F	Brahmin	Joint	Agriculture	Yes
2	Amit	35	M	Brahmin	Nuclear	Govt Job – Army	No
3	Kamla Devi	70	F	Jaat	Joint	Retired Doctor	No
4	Preeti	24	F	Jaat	Nuclear	Agriculture	Yes
5	Meer Singh	58	M	Jaat	Joint	Retired Sub-Naik Indian Army	No
6	Darshna	55	F	Jatav	Nuclear	Agriculture	Yes
7	Satyawan	31	M	Jatav	Joint	Industrial Labour	Yes

Table 1: List of Respondents

**6. Data Analyses:**

Case 1: The respondent told their whole family drink supply water since birth. Both male and female go to village canal to bring drinking water. She complained that they face several health issues because of bad water quality like: Skin allergies, Hair fall, teeth related problems etc. On the special occasions they ask for water to Nagar Nigam. She has no



idea about the various water quality measures like TDS.

Case 2: This respondent also told that they bring drinking water from canal but only females of his house go to bring water. That place is also very far from her house. When researcher ask him about RO water, he respond that he doesn't like the taste of RO water. He also mentioned about her health problems related to bone.

Case 3: This respondent responded that she drinks RO water regularly and she also has very good knowledge about all the water quality measures. The main reason behind this is she belongs to a strong socio-economic background. Family member of this respondent is well educated and works in hospitals.

Case 4: This respondent also doesn't like the taste of RO water and she knows about water quality measures. Her whole family drink supply water and has no health issues. She also has this prejudice that RO water leadsto cancer.

Case 5: This respondent replied that they drink RO water regularly since 2003. His family is completely fine and has no health problems because of water.

Case 6: This respondent is aged (around 55 years). She has water storage at her home because se is notable to go canal regularly. The situation of her storage place was not clean.



Picture 2



Picture 3



Picture 4

(Water storage system at houses)



Case 7: This respondent also store water at home. The situation of storage system was not clean and he also face various health problem related to bone. Family members are also affected with the same health issues.



Picture 5: Researchers in the field

## 7. Finding and Discussion:

This study has particularly analyzed the drinking water condition of Chirya Village. In this village most of the population is dependent on village canal for drinking water which has a very high TDS. The water quality measures are not well known to the village people. The canal is very far from their place so they struggle to gather water at home. This leads to many challenges in their daily life activities. The water supply in their homes is also not regular, so they wait every day for the water supply and their activities depend on that. The situation also shows the traditional patriarchal system in the society, where only women go to bring water from the canal on their feet, and if men require to go in some situation(s), they take use of bike or scooter. The water quality is also the reason of health issues such as Skin allergies, Grayness of hairs, Joint pain etc. People avoid consumption of RO water as they do not like the taste of it, also they have prejudices that long term consumption of RO water leads to incurable chronic disease such as cancer. It has also been found that many people of the village are unaware of the water quality measures and the consequences of regular consumption of unpurified water. This study clearly suggests that drinking water quality has appeared as a major health threat for Village Chirya in the Charkhi Dadri District of Haryana, and increasing cases of ill health especially related to bone health, hair loss and dermatological issues, and has warranted to take steps before conditions became more critical and dangerous.

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