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# Accessibility and Availability of Drinking Water in Rural Areas of Hisar District

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***Abstract***— *The accessibility and availability of drinking water in rural areas of Hisar district play a crucial role in ensuring sustainable development and public health. This study examines spatial and regional variations in drinking water sources across different Community Development (CD) blocks of Hisar district. The research utilizes data from the Public Health Engineering Department (PHED), Haryana, along with GIS mapping techniques, to analyze the distribution of treated and untreated tap water sources, as well as reliance on hand pumps. The findings highlight significant disparities among blocks in terms of water accessibility and quality. Hisar I, Hisar II and Narnaund exhibit the highest reliance on untreated tap water, whereas Hisar I and Hisar II lead in access to treated water, reflecting advanced infrastructure. Meanwhile, traditional sources like hand pumps remain crucial in many blocks, especially in areas with inadequate piped water supply. The study emphasizes the need for targeted infrastructure development, improved water treatment facilities and policy interventions to ensure equitable access to clean and safe drinking water across all rural areas of Hisar district.*

***Keywords***— ***Drinking Water, Rural Accessibility, Water Availability, Hisar District, Community Development Blocks.***

## I. INTRODUCTION

Access to clean and safe drinking water is a fundamental requirement for human well-being and socio-economic development. In rural areas, the availability and accessibility of potable water remain significant challenges due to infrastructure gaps, environmental constraints and regional disparities. Hisar district, located in northwestern Haryana, comprises a diverse rural landscape with 268 villages distributed across multiple Community Development (CD) blocks. The region's dependence on various water sources, including treated and untreated tap water, as well as traditional hand pumps, reflects the complexities of water accessibility. The study aims to analyze spatial and regional variations in the availability of drinking water across different blocks of Hisar district. By utilizing data from the Public Health Engineering Department (PHED), Haryana and GIS-based mapping techniques, this research provides insights into the patterns of water accessibility, highlighting disparities and challenges faced by rural households. A comparative assessment of treated and untreated tap water sources, along with reliance on hand pumps, is conducted to understand the factors influencing water supply and consumption in different areas.

**Objectives of the Study:**

i. To analysis spatial and regional variations in the availability and accessibility of drinking water in district Hisar.

**Study Area:**

Hisar district is the one of the 22 districts of north western Haryana. Hisar was founded in 1354 AD by Firoz Shah Tughluq and later became an important Mughal Centre. Hisar was constituted a municipality in 1867. Hisar is known as the steel city because of the Jindal Stainless Steel Factories. It is also the largest producer of

galvanized iron in India. Hisar district lies at 28°53’45"N to 29°34’50"N latitude and 75°19’44"E to 76°18’15"E longitude. It is located about 164 km away from New Delhi and 235 km away from state capital Chandigarh. Hisar district is sharing border with Bhiwani district to the South, Fatehabad district to the North, Jind district to the East.

Hisar district, located in the state of Haryana, comprises a total of 268 villages, which are distributed across several Community Development (CD) blocks. Each block consists of a varying number of villages, contributing to the overall rural landscape of the district. Adampur block accounts for 38 villages, representing a significant portion of the district’s rural settlements. Agroha block, on the other hand, has a comparatively smaller number, with only 19 villages. Barwala block, one of the larger administrative divisions in the district, includes 48 villages, making it one of the more densely populated rural areas.

The two subdivisions of Hisar block, namely Hisar I and Hisar II, collectively account for a substantial number of villages, with Hisar I having 51 villages and Hisar II comprising 42 villages. Together, they play a crucial role in the administrative and developmental framework of the district. The Uklana block, though smaller in terms of village count, includes 22 villages that contribute to the overall agricultural and socio-economic activities of the district. Similarly, Narnaund block, which consists of 36 villages, adds to the agrarian and industrial landscape of the region. Moving towards the Hansi sub-region, the Hansi I block contains 42 villages, whereas Hansi II block has 22 villages. These two blocks are vital in terms of historical and economic contributions to the district. When combined, the total number of villages across all these blocks reaches 268, reflecting the vast rural expanse of Hisar district. These villages serve as the backbone of the district’s economy, with agriculture, dairy farming and small-scale industries playing a crucial role in the livelihoods of the local population. Understanding this block-wise distribution is essential for planning developmental projects, infrastructure enhancements and governance initiatives tailored to the diverse needs of each region.

## II. RESULTS AND DISCUSSIONS

The results of this study on the accessibility and availability of drinking water in rural areas of Hisar district reveal significant disparities among different villages. Data collected from surveys and field observations indicate that while some villages have access to government-installed pipelines and hand pumps, others rely on distant water sources, increasing the burden on residents, particularly women and children. The quality of available water varies, with some areas reporting contamination issues such as high salinity and fluoride content, posing health risks. Additionally, seasonal variations affect water supply, with shortages being more severe during summer months.

### Access to Tap Water through Untreated Sources:

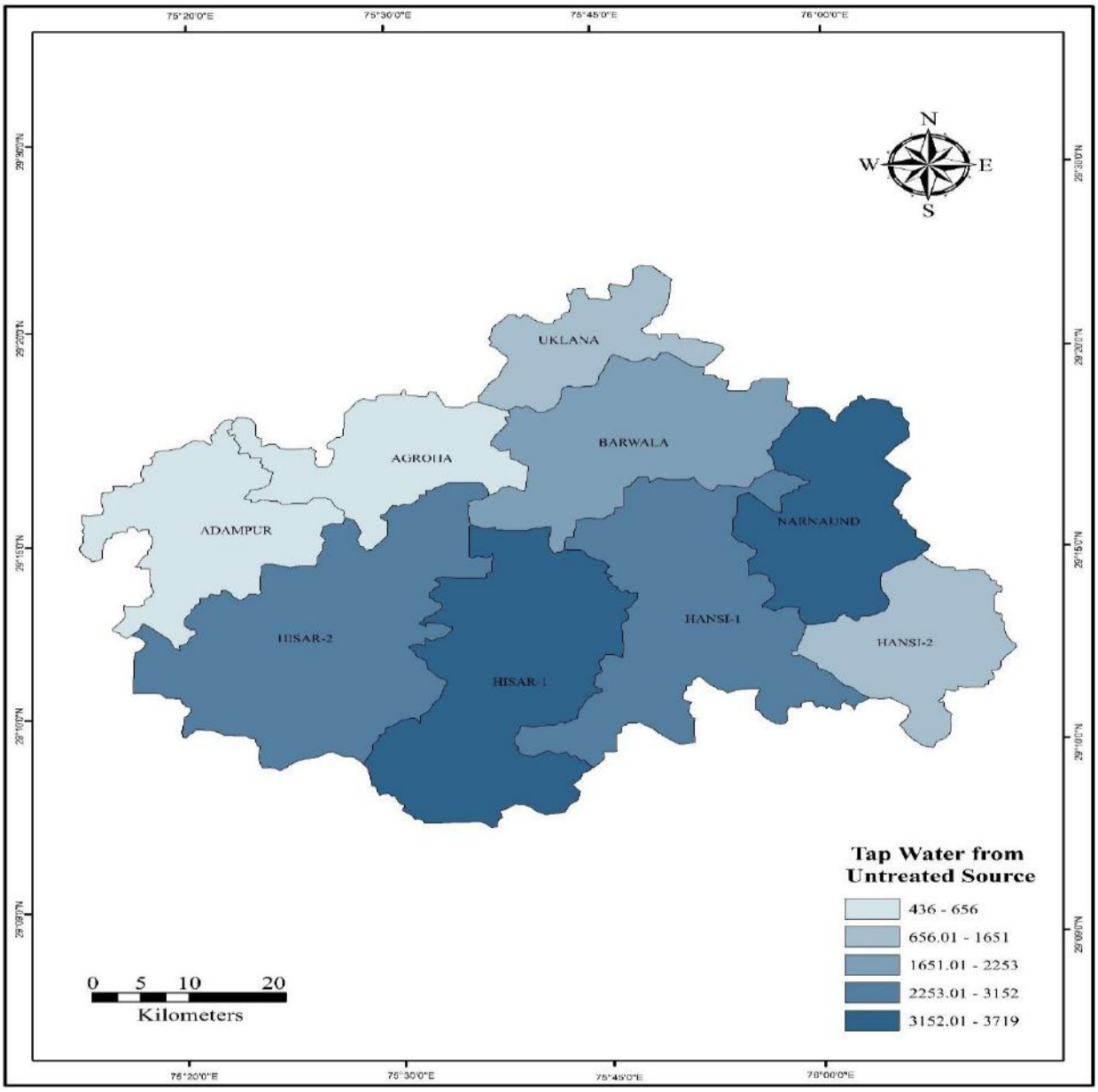
The number of households in different community development blocks varies based on factors such as population density, availability of resources and infrastructure development. Some areas have witnessed a steady increase in households due to urbanization and economic opportunities, while others remain largely rural with slower growth. The distribution of households also reflects disparities in access to basic amenities such as water, electricity and sanitation. Analyzing these patterns helps in understanding regional development trends and planning for better resource allocation and policy implementation.

*Table 1: The Number of Households in Community Development (CD) Blocks of Hisar District with Access to Tap Water from Untreated Sources in the Year 2023*

| Sr. No. | Name of Block | Tap Water from Untreated Source |
|---|---|---|
| 1 | Adampur | 656 |
| 2 | Agroha | 436 |
| 3 | Hisar I | 3603 |
| 4 | Hisar II | 3152 |
| 5 | Barwala | 2253 |
| 6 | Narnaund | 3719 |
| 7 | Hansi I | 2751 |
| 8 | Hansi II | 1651 |
| 9 | Uklana | 1101 |

Source: Public Health Engineering Department (PHED), Haryana report

*Map No. 1: Tap Water from Untreated Source*




Source: Prepared by Researcher with ArcGIS

Table no. 1 illustrates the distribution of tap water sourced from untreated supplies across various blocks, shedding light on the prevalence of reliance on such water sources. Nine blocks are detailed, each displaying a diverse extent of dependency on untreated tap water. Hisar I emerges as the block with the highest usage, reporting 3,603 units, reflecting a substantial reliance on untreated water resources. Closely following is Narnaund with 3,719 units, signifying a similar trend of high dependency. Hisar II also demonstrates a considerable figure, with 3,152 units, underscoring the broader need for improved water treatment infrastructure in the region. Barwala, with 2,253 units and Hansi I, with 2,751 units, highlight moderate levels of reliance compared to the leading blocks. Meanwhile, Hansi II, reporting 1,651 units and Uklana, with 1,101 units, showcase relatively lower figures but still contribute significantly to the overall dependency on untreated sources. Adampur and Agroha display the least reliance, with 656 and 436 units, respectively, indicating some level of differentiation in access to water treatment or alternative sources.

**Access to Tap Water through Treated Sources:**

The number of households in different community development blocks varies due to factors such as population growth, urbanization and availability of resources. Some areas have seen a rise in households due

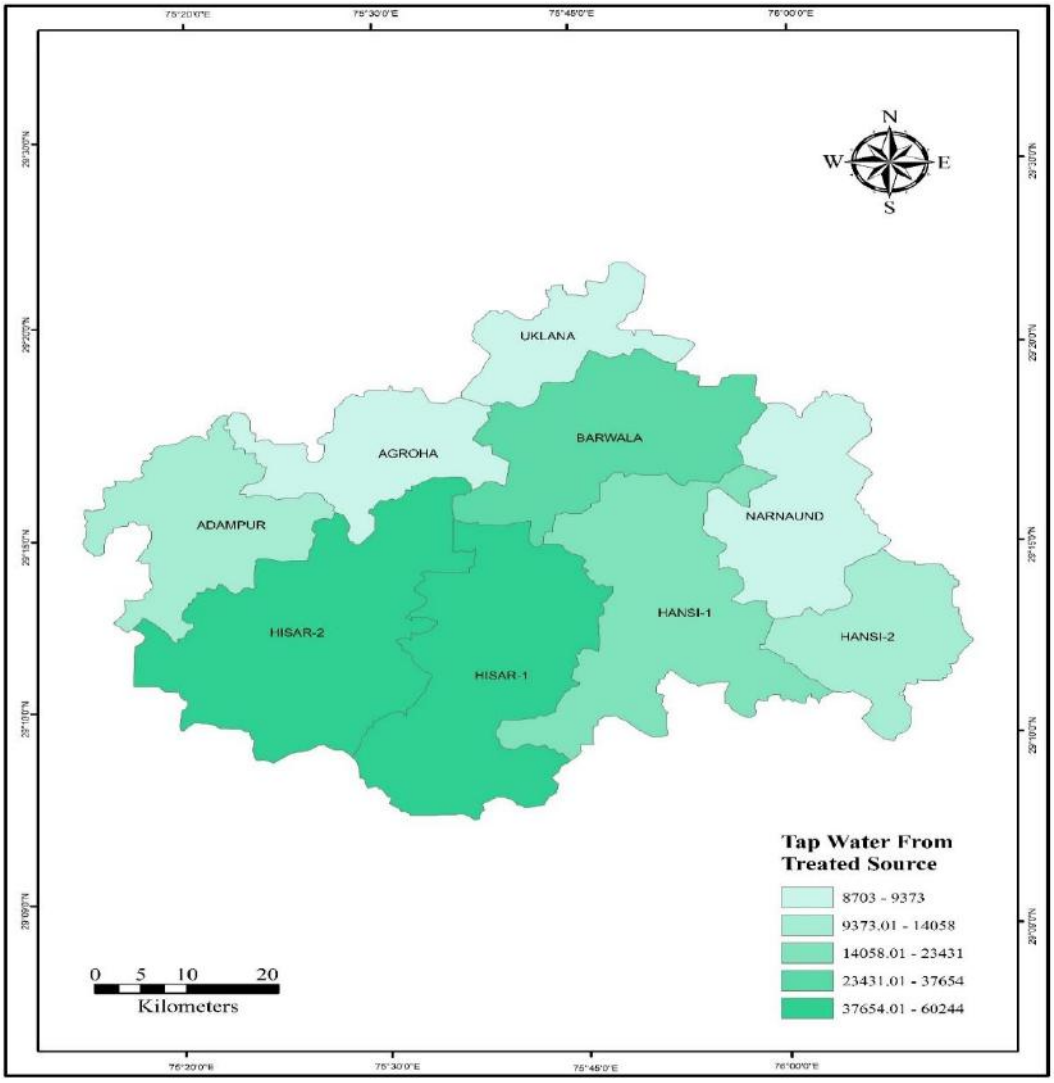
to economic development, while others remain stable with a rural character. The distribution reflects disparities in access to essential services like water, electricity and sanitation. Understanding these variations helps in planning for infrastructure, resource allocation and policy implementation to improve living conditions.

*Table 2: The Number of Households in Community Development (CD) Blocks of Hisar District with Access to Tap Water from Treated Sources in the Year 2023*

| Sr. No. | Name of Block | Tap Water from Treated Source |
|---|---|---|
| 1 | Adampur | 13084 |
| 2 | Agroha | 8724 |
| 3 | Hisar I | 60244 |
| 4 | Hisar II | 52713 |
| 5 | Barwala | 37654 |
| 6 | Narnaund | 8703 |
| 7 | Hansi I | 23431 |
| 8 | Hansi II | 14058 |
| 9 | Uklana | 9373 |

Source: Public Health Engineering Department (PHED), Haryana report

*Map No. 2. Tap Water from Treated Sources (2023)*




Source: Prepared by Researcher with ArcGIS

The table provides an overview of the distribution of tap water sourced from treated supplies across nine blocks, indicating the extent of access to safer water sources. Hisar I leads significantly with 60,244 units, highlighting its advanced water treatment infrastructure and widespread accessibility. Hisar II follows closely with 52,713 units, reinforcing its strong water management capabilities. Barwala also exhibits a substantial figure of

37,654 units, reflecting notable progress in providing treated water to its residents. Among the remaining blocks, Hansi I reports 23,431 units, showing a moderate level of access, while Hansi II records 14,058 units, indicating a smaller but still significant reliance on treated water sources. Adampur, with 13,084 units and Agroha, with 8,724 units, demonstrate varying degrees of access, suggesting room for improvement in water treatment and distribution systems in these areas. Narnaund, with 8,703 units and Uklana, with 9,373 units, report the lowest figures, pointing to potential gaps in infrastructure and the need for targeted interventions.

**Access to Hand Pump Sources:**

The number of households in community development blocks varies based on factors such as population density, economic activities and infrastructure development. Some areas have experienced growth due to increasing settlement patterns, while others show a stable or slower rate of change. The distribution of households reflects access to basic amenities and regional development trends. Analyzing these variations helps in effective planning and resource allocation for sustainable growth.

*Table 3: The Number of Households in Community Development (CD) Blocks of Hisar District with Access to Hand Pump Sources in the Year 2023*

| Sr. No. | Name of Block | Hand Pump |
|---|---|---|
| 1 | Adampur | 1264 |
| 2 | Agroha | 844 |
| 3 | Hisar I | 17141 |
| 4 | Hisar II | 14997 |
| 5 | Barwala | 10712 |
| 6 | Narnaund | 9811 |
| 7 | Hansi I | 10286 |
| 8 | Hansi II | 6171 |
| 9 | Uklana | 4113 |

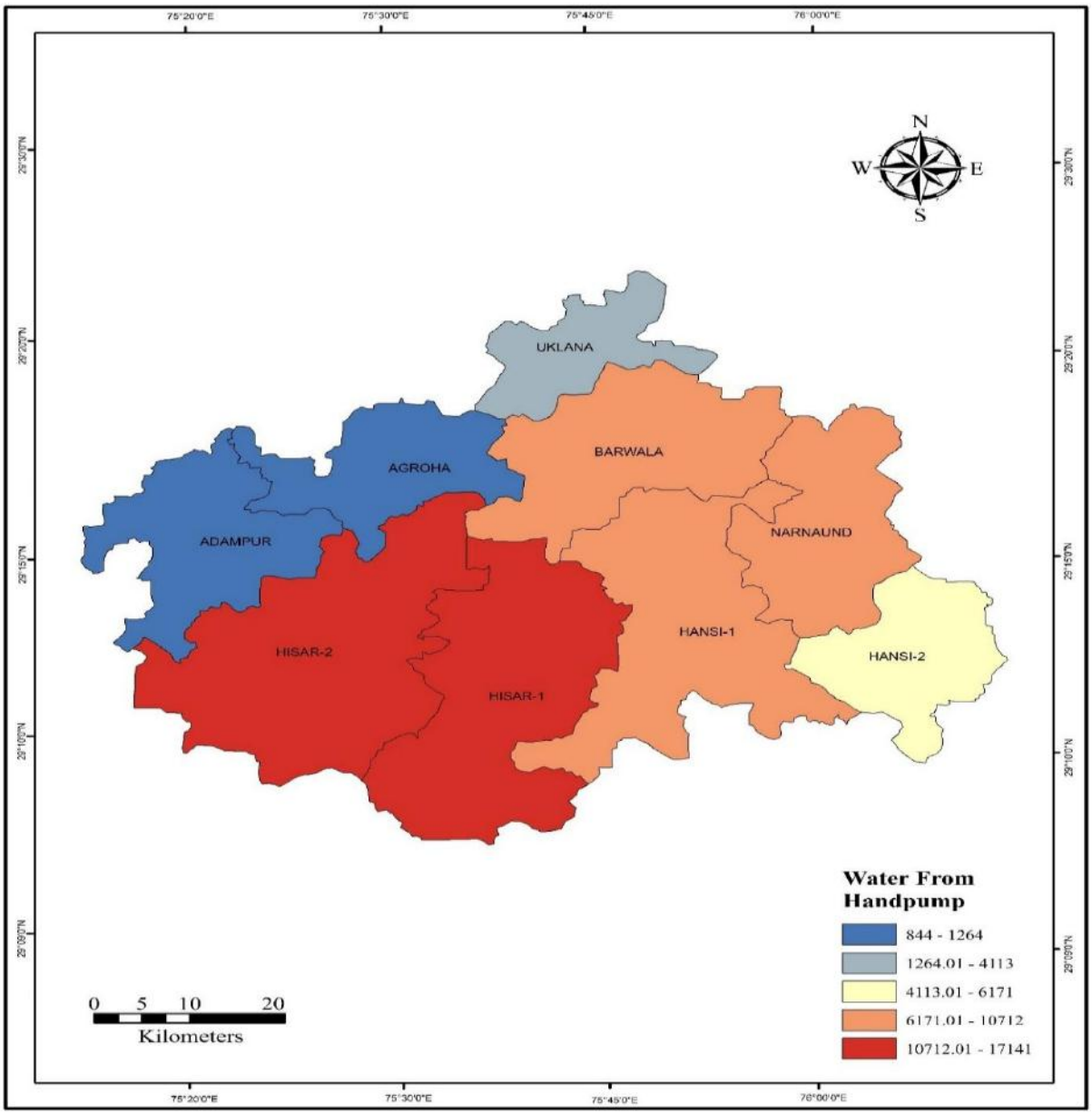
Source: Public Health Engineering Department (PHED), Haryana report

Table no. 3 presents data on the reliance on hand pumps as a source of water across nine blocks, showcasing significant variations in their usage. Hisar I stands out with the highest number of hand pumps at 17,141, indicating a considerable dependence on this traditional water source. Hisar II follows with 14,997 hand pumps, reflecting similar patterns of reliance. Barwala, with 10,712 hand pumps and Hansi I, reporting 10,286, also exhibit a notable preference for this method, underlining the continued importance of hand pumps in these regions. Narnaund records 9,811 hand pumps, indicating moderate usage. In comparison, Hansi II, with 6,171 and Uklana, with 4,113, report lower figures, pointing to a reduced reliance on hand pumps, possibly due to the availability of alternative water sources. Adampur and Agroha report the lowest numbers, with 1,264 and 844 hand pumps, respectively, suggesting relatively limited use, likely due to better access to other water supply systems. The data reflects the persistent role of hand pumps in meeting water needs, especially in areas with less developed water infrastructure. It also underscores the need for improved water supply systems in blocks with high dependence, while maintaining and upgrading existing hand pump facilities to ensure reliable access.

## III. CONCLUSION

The study highlights significant spatial and regional disparities in the accessibility and availability of drinking water across rural areas of Hisar district. While some blocks, such as Hisar I and Hisar II, demonstrate better infrastructure with high access to treated water, other regions continue to rely heavily on untreated sources and hand pumps. Blocks like Narnaund and Barwala exhibit a substantial dependence on untreated water, indicating the need for improved water treatment facilities and distribution systems. Findings suggest that targeted policy interventions, investment in water supply infrastructure and enhanced community engagement are essential to bridge the gap in water accessibility. Expanding piped water supply, upgrading existing hand pump facilities and implementing water purification measures are crucial for ensuring safe drinking water for all rural households. This research underscores the importance of regional planning in addressing water accessibility issues and contributes to the ongoing discourse on sustainable water management in rural India. Future studies can further explore the socio-economic impact of water availability on rural livelihoods and the effectiveness of government water supply schemes in improving drinking water quality in underserved areas.

*Map No. 3: Water Source from Handpump (2023)*




Source: Prepared by Researcher with ArcGIS

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