

# Progress of India's Achievement Towards Sustainable Development Goal 6 (Ensure Availability & Sustainable Management of Water & Sanitation for All) in the 2030 Agenda

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## Research Article

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# Abstract

**Background:** Clean water and sanitation are global public health issues. Safe drinking water and sanitation are essential, especially for children, to prevent acute and chronic illness death and sustain a healthy life. The UN General Assembly announced the 17 Sustainable Development Goals (SDGs) and 169 goals for the 2030 Agenda on 25 September 2015. SDG 6 is very important because it affects other SDG (1, 2,3,5,11,14 & 15). The present study deals with the national and state-wise analysis of the current status & to access deficiency of India's achievement towards SDG 6 (clean water and sanitation for all) for the 2030 agenda based on targets 6.1, 6.2,6.4,6.6 from 2012 to 2020.

**Materials & methods:** Data of different indicator of SDG 6 are collected from different secondary sources - NSS 69th (2012) & 76th (2018) round; CGWB annual report 2018-2019 & 2016-2017; NARSS (2019-20); SBM-Grameen (2020). To understand overall achievement towards SDG 6 in the 2030 agenda, the goal score (arithmetic mean of normalised value) has been calculated.

**Major findings:** According to NSS data, 88.7% of Indian households had enough drinking water from primary drinking water sources throughout the year, while 79.8% of households had access to toilet facilities in 2018. As per 2019-2021 goal score for state & UTs in rural India based on SDG 6 indicator, SDG 6 achiever state & UTs (100%) are Sikkim, Himachal Pradesh & Andaman & Nicobar Islands.

**Conclusion:** Drinking water and sanitation for all ensure a healthy life. It is a matter of concern for the government, policymakers, and people to improve the condition where the goal score and indicator value of SDG 6 are low.

## Background

Clean Water and sanitation are global public health issues. "Water collected from sources like - piped water into dwelling, piped water into yard/plot, household connection, public standpipes/tap, boreholes/tube well, protected dug wells, protected springs and rainwater collection and bottled water are considered as improved sources of drinking water. Drinking water collected from improved sources located on-premises, available when needed and free from faecal and contamination is known as safely managed drinking water" (1). "Hygiene refers to conditions and practices that help maintain health and prevent the spread of diseases" (2). Water, sanitation and hygiene are known as WASH. WASH includes the use of safe drinking water; safe disposal and management of human faecal matter, human waste (solid & liquid);

Control of vector-borne diseases, handwashing practices. Open Defecation Free (ODF) is the termination of faecal-oral transmission in an open space or ending open defecation using a toilet. India has progressed in access to safe drinking water (tap/hand-pump/tube well) in the household from 38% in 1981 to 85.5% in 2011. Water, sanitation, and hygiene-related diseases are Infectious Diarrhoea, Typhoid and paratyphoid fevers, Acute hepatitis A, Acute hepatitis E and future F, Fluorosis, Arsenosis, Legionellosis, Methamoglobinemia, Schistosomiasis, Trachomaa, Ascariasis, Trichuriasis, Hookworm,

Dracunculiasis, Scabies, Dengue, Filariasis, Malaria, Japanese encephalitis, Leishmaniasis, Onchocerciasis, Yellow fever, Impetigo & Drowning (3). The United Nations General Assembly declared 2008 the International Year of Sanitation to recognise the critical need for increased political awareness and action on sanitation. The purpose is to promote awareness and speed up progress toward the Millennium Development Goal of decreasing the proportion of people without access to basic sanitation by 2015. Due to poor sanitation, people suffer from bad health, lost income, inconvenience, and indignity. Despite this, billions of people worldwide do not have access to basic sanitation (4, 5). According to WHO (2015), 2.4 billion people lack sanitation facilities, and 663 million people still lack access to safe and clean drinking water facilities (6). WHO (2019) state that 3.3% of global death and 4.6% of DALYs is attributed to inadequate water, sanitation & hygiene condition. "Unsafe sanitation is responsible for 775000 deaths per year, 5% death in low-income countries due to unsafe sanitation, 15% of the world still practising open defecation (7). "Age-standardized death rate attributable to unsafe water, sanitation, and hygiene (WaSH) (per 100,000 population) 268.587 in 1990, 239.719 in 1995, 210.642 in 2000, 180.757 in 2005, 143.453 in 2010 and 104.202 in 2016" (8). So safe drinking water and sanitation are essential, especially for children, to prevent acute and chronic illness death and sustain a healthy life. after the Millennium Development goal, on 25 September 2015, in UN general assembly 17th sustainable development goal (SDG) & 169 targets set up for 2030 agenda (9, 10). "SDG 6 is essential because it affects other SDG (1 – poverty eradication, 2 – ending hunger, 3 – healthy life & well-being, 4 – quality education, 5 – gender equality, 11 – inclusive cities, 14 – life below water & 15 – terrestrial ecosystem)" (11). The present study deals with the national and state-wise analysis of current status & to access deficiency of India's Achievement towards SDG 6 (clean water and sanitation for all) for the 2030 agenda based on targets 6.1, 6.2, 6.4, 6.6 from 2012 to 2020. In this study, special focus is given to rural India.

Census of India continuously collecting data about drinking water & sanitation from all households in house listing and housing. "The National Statistical Office (NSO) Ministry of Statistics and Programme Implementation (MOSPI), Government of India has been collecting data on housing condition, drinking water, sanitation and hygiene; those were collected by NSO from NSS 7th round (October 1953 - March 1954) to NSS 23rd round (July 1968 - June 1969), 28th round (October 1973 - June 1974), 44th round (July 1988 - June 1989), 49th round (January - June 1993), NSS 54th round (January - June 1998) 58th round (July - December 2002), 65th round (July 2008 - June 2009) and 69th round (July - December 2012), and latest NSS 76th round. The Indian government has undertaken attempts to enhance drinking water and sanitation. 1949: The Environment Hygiene Committee advises that a clean water supply be provided to 90% of India's population within a 40-year timeframe. 1969: The National Rural Drinking Water Supply Program was initiated with UNICEF's technical assistance, and Rs.254.90 crore is spent on 1.2 million bore wells and 17,000 piped water supply systems during this phase. In 1972-73, the Government of India launched the Accelerated Rural Water Supply Programme (ARWSP) to assist states and union territories in expanding drinking water supply coverage. 1986: The National Drinking Water Mission (NDWM) was established. The National Drinking Water Mission was renamed the Rajiv Gandhi National Drinking Water Mission in 1991 (RGNDWM). The 73rd Constitutional Amendment mandates the provision of drinking water by Panchayati Raj institutions (PRIs). 1999: The Total Sanitation Campaign

(TSC) was launched in 1999 as part of the reform principles to provide sanitation facilities in rural regions to eliminate open defecation. Swajal Dhara, a national scale-up of sector reform, was launched in 2002. All drinking water programmers were placed under the RGNDWM's umbrella in 2004. 2005: The Indian government begins the Bharat Nirman Programme, aiming to improve housing, roads, power, telephone, irrigation, and drinking water infrastructure in rural regions (12). In 2009, the ARWSP was renamed the National Rural Drinking Water Programme (NRDWP). One of the goals was to allow all households, to the extent practicable, to have access to and utilise safe and adequate drinking water inside the premises. The current National Rural Drinking Water Programme (NRDWP) was reformed and incorporated under Jal Jeevan Mission (JJM) on 15 August 2019 to provide Functional Household Tap Connection (FHTC) to every rural household, i.e. Har Ghar Nal Se Jal (HGNSJ) by 2024. Jal Jeevan Mission (JJM) is a non-profit organisation.

In 1986, the Central Rural Sanitation Programme (CRSP) was established to provide safe sanitation in rural regions. The Total Sanitation Campaign (TSC) was launched in 1999 to promote local sanitary marts and various technical choices to develop supply-led sanitation. In 2012, The Nirmal Bharat Abhiyan was reformed and renamed (rural sanitation). The Swachh Bharat Mission was launched across the country on 2 October 2014 to achieve the objective of a clean India by 2 October 2019. (PM India).

The goals of SBM(Gmain) are to enhance the general quality of life in rural areas by fostering cleanliness, hygiene, and the elimination of open defecation. The Individual Household Latrines (IHHL) unit cost was increased from Rs. 10,000 to Rs. 12,000 rupees to accommodate for water availability. To meet the Swachh Bharat aim, improve rural sanitation coverage by 2 October 2019. Raising awareness and providing health education encourages communities and Panchayati Raj institutions to adopt sustainable sanitation practices and infrastructure. Encourage the use of cost-effective and suitable sanitation methods that are environmentally safe and long-lasting. Develop community-managed sanitation systems in rural regions, concentrating on scientific Solid and Liquid Waste Management systems for overall cleanliness (13, 14). In New York in 2000, 189 nations approved the Millennium Declaration for 2015, promising to work together to create a safer, more prosperous, and equal world. There are eight objectives, seven of which deal with sanitation and hygiene (target 7. C – Reduce the share of the population without sustainable access to clean drinking water and basic sanitation by 2015). (Millennium Development Goal of the United Nations) Following the millennium development goal (SDG), the United Nations General Assembly approved 17 sustainable development goals and 169 objectives for the 2030 Agenda for Sustainable Development on 25 September 2015.

As the nodal institution for SDGs, NITI Aayog, the Government of India has striven to provide the necessary encouragement and support to forge collaborative momentum among them. Since 2018, the SDG India Index & Dashboard has worked as a powerful tool to bring SDGs clearly and firmly into the policy arena in our States and UTs (15). Ministry of Statistics and Programme Implementation (MoSPI), Government of India developed a National Indicator Framework (NIF), which is the backbone for facilitating monitoring of SDGs at the national level and provides appropriate direction to the policymakers and the implementing agencies of various schemes and programmes (16).

The main objective of this study is to find out the status of SDG target 6.1, 6.2, 6.4 & 6. towards the achievement of SDG 6 in the 2030 agenda in India (National & State level) and to assess deficiency towards the Achievement of clean Water and sanitation for all in 2030 agenda India (National & State level).

## Materials And Methods

The present study is based on secondary data. Data of different indicators of SDG 6 are collected from other sources. Data of improved sources of drinking water & access to latrine facilities in rural, urban and total are collected from NSS 69th (2012) & 76th (2018) round. Data of groundwater extraction (%) & Percentage of blocks/mandals/taluka are safe groundwater extraction are collected from the central ground control board, Department of Water Resources, River Development and Ganga Rejuvenation Government of India annual report 2018–2019. Household accessibility to the toilet, safe disposal of liquid waste, separate toilet for boys & girls in rural India data collected from NARSS (2019-20). Household toilet coverage (%) & open defecation free village (%) data collected from Swachh Bharat Mission Gramin Dashboard,2020. Population having improved source of drinking water data collected from Department of Drinking Water and Sanitation, Ministry of Jal Shakti, January 2021. Different graphs, charts, maps & tables are used. For understanding overall Achievement towards SDG 6 in 2030 agenda based on the indicator of SDG 6, Goal score calculated (arithmetic mean of indicator value) of states & UTs. The percentage of annual groundwater extraction from extractable groundwater resources is calculated by the formula :  $(\text{Yearlytotal} \times 100)\%$ . Different literature reviews were also done for this study. Software like – MS word, MS Excel, Mendeley Desktop have been used to write this article, create graphs, tables, and citation and referencing & Bibliography.

## Result And Discussion

Result of households having access to Drinking Water (SDG 6.1) in India (National level & state level) as per National Sample Survey (NSS) data. Figure 1 depicts the sources of safe drinking from which households access the drinking water throughout the year. **[Fig. 1 Pasted]**

India 2018 most of household collect safe drinking water from hand pump 30.5% followed by piped water into dwelling 21.4%, piped water to yard / plot 12.3%, tube well 10.7%, public tap / standpipe 9.2%, bottled water 6.8%, protected well 2.5%, piped water from neighbour 1.0%, private tanker truck 0.4%, public tanker truck 0.3%, protected spring 0.2% & rainwater collection 0.2%. In urban areas, the higher percentage of households using piped water into the dwelling (40.9%), piped water into yard/plot (16.0%), bottled water (12.2%), public tanker truck (0.8%), private tanker track (0.5%) than a rural area. In rural area higher percentage of household using hand pump (42.9%), tube well (10.9%), public tap / standpipe (10.3%), protected well (2.9%), protected spring (0.3%) & rainwater collection (0.2%) (17).

"Bottled Water piped water into dwelling, piped water to yard/plot, piped water from a neighbour, public tap/standpipe, tube well, hand pump, protected, public tanker truck, private tanker truck, protected spring and rainwater collection are considered as improved sources of drinking water (17). "Bottled water, piped water into dwelling, piped water to yard/plot, public tap/standpipe, tube well/borehole, protected well, protected spring and rainwater collection are considered as improved sources of drinking water" (18). As of 2018, 88.7% of households have access to drinking water from principal drinking water sources throughout the year, but 95.5% of household's access improved drinking water sources in India. In contrast, the urban area has a higher percentage of access to principle (90.9%) and improved (97.4%) drinking water sources throughout the year than the rural area 87.6% & 94.5%, respectively. In India, 1.7% of principle sources and 4.9% improved drinking water sources increased from 2012 to 2018. As of 2018, 11.3% of households have a deficit in case of access principle sources of drinking water, and 4.5% of households have an obligation in case of access to improved sources of drinking water throughout the year for achieving safe and affordable drinking water for all (SDG 6.1) in 2030 agenda. Table 1 showing the percentage of households with access & deficit to drinking water with resident type in India. [Table 1 Pasted]

Table 1  
Percentage of households with access & deficit to drinking water with resident type in India

Years	Percentage of households having access to drinking water			Share of household having deficit to reach SDG 6.1 in 2030 agenda		
	Rural	Urban	All	Rural	Urban	All
The principle source of drinking water throughout the year						
2018	87.6	90.9	88.7	12.4	9.1	11.3
2012	85.8	89.6	87.0	14.2	10.4	13.0
Improved principal sources of drinking water throughout the year						
2018	94.5	97.4	95.5	5.5	2.6	4.5
2012	88.5	95.3	90.6	11.5	4.7	9.4
Sources: NSS 76th round (July - December 2018) & 69th round (July - December 2012), table calculated by the author						

From Fig. 2, we can say the performance of states & UTs in India towards the Achievement of SDG 6 of target SDG 6.1 by using the percentage of households having access to improved sources of drinking water indicator. As per 2018, SDG 6.1 target achiever ( 100%) states & UTs are Chandigarh, Daman & Diu

& Sikkim; Front Runner (65%– 99%) states & UTs are Bihar, Haryana, Punjab, Delhi, Goa, Tamil Nadu, Dadra & Nagar Haveli, Puducherry, Group of UTs, Uttar Pradesh, Gujarat, Telangana, Arunachal Pradesh, West Bengal, A & N Islands, Himachal Pradesh, Andhra Pradesh, Uttarakhand, Mizoram, Maharashtra, Karnataka, Chhattisgarh, Rajasthan, Madhya Pradesh, Assam, Odisha, Jammu & Kashmir, Meghalaya, Jharkhand, Group of NE States, Tripura, Nagaland, Lakshadweep & Manipur; performer state (50% – 64%) in Kerala. Kerala has lower access to improved safe drinking water sources. Deficit of performance to achieve SDG 6.1 target based on the above indicator for states & UTs in India are Bihar 0.1%, Haryana 0.1%, Punjab 0.1%, Delhi 0.2%, Goa 0.2%, Tamil Nadu 0.2%, Dadra & Nagar Haveli 0.4%, Puducherry 0.6%, Group of UTs 0.7%, Uttar Pradesh 0.8%, Gujarat 0.9%, Telangana 0.9%, Arunachal Pradesh 1.2%, West Bengal 1.8%, A & N Islands 1.9%, Himachal Pradesh 1.9%, Andhra Pradesh 2.6%, Uttarakhand 2.8%, Mizoram 3.7%, Maharashtra 3.8%, Karnataka 4.6%, Chhattisgarh 4.8%, Rajasthan 7.4%, Madhya Pradesh 8.5%, Assam 8.6%, Odisha 8.8%, Jammu & Kashmir 9.1%, Meghalaya 9.1%, Jharkhand 12%, Tripura 12.2%, Nagaland 15.5%, Lakshadweep 24.1%, Manipur 25.1%, & Kerala 43.3%. Although Kerala has a higher socio-economic development performance, Kerala faces a water crisis. "Urbanisation, modernisation, increasing material prosperity, the disintegration of traditional joint family structure, pressure on land, replacing open dug well with bore well, overexploitation of groundwater contribution to the water crisis in Kerala" (19). "Kerala received 80% less rainfall than normal after a flood. So more dry spells and drops in groundwater levels are one of the reasons for the water crisis." (V P Dineshan). In terms of households having toilet facilities, all northeastern states exceed the national average. However, except with Arunachal Pradesh and Sikkim, all northeastern states are below the national average regarding access to improved drinking water sources. **[Fig. 2 Pasted]**

Similarly, the percentage of villages in Arunachal Pradesh, Assam, Manipur and Meghalaya where the "Village Health and Sanitation Committee" exist is less than the national figure. Efforts should be made to form a "Village Health and Sanitation Committee" in an increasing number of villages. Financial assistance should promote family toilets and provide safe drinking water (20).

Result of households having access to latrine facility (SDG 6.2) in India (National level & state level) as per National Sample Survey (NSS) data.

As per 2018, in India, 79.8% of households have access to latrine facilities, whereas urban area has a higher percentage of household having access to latrine facility 96.2%, than rural areas (40.6%) given in the Fig. 3. From 2012 to 2018, India had a 23.2% improvement in accessing latrine facilities, where the urban area has 5%, and the rural area has 30.7% improvement. As of 2018, in India, 20.2% of households have a deficit in accessing latrine facilities towards achieving SDG 6.2 in 2030, whereas in an urban area, it is a low deficit of 3.8%. In rural areas, it is a higher deficit of 28.7%. **[Fig. 3 Pasted]**

As per NSS 76th round, it is seen that in 2018 in India, 2.8% of the population never used toilet although household having latrine facility, it is higher in rural area 3.5% and lower in urban area 1.7% persons said different reasons behind not using the toilet are 2.8% no superstructure, 8.2% not clean or insufficient water, 3% malfunctioning of the latrine, 0.5% shortage of latrine, 1.3% used for other purposes, 0.5% lack

of safety, 6.3% personal preference, 0.6% cannot afford charges of paid latrine and another reason is 76.9. It is also observed female population are more using the toilet than the male population. 74.1% of households wash their hand with water & soap/detergent & 13.4% of households wash hands with only water after defecation (17). Infrastructure is inadequate in the rural sanitation sector that must be addressed through immediate legislative reforms and government subsidies to develop appropriate and adequate facilities (21).

Figure 4 showing the Percentage of households having access to latrine facilities. A higher percentage of households having access to latrine facilities is found in Manipur, Mizoram, Nagaland, Sikkim, Lakshadweep, etc. A lower percentage of households below the national level are found in Odisha, Uttar Pradesh, Jharkhand, Bihar, Rajasthan, Madhya Pradesh & Tamil Nadu. Inadequacies in rural infrastructure are undoubtedly a significant source of the 'failure.' It has multiple causes, which can be baffling at times. Government-subsidized latrines in rural areas are often inappropriate, especially for women, due to a lack of roofs, doors, walls, buried pits, and adequate spatial dimensions, each of which depends on the convenience of latrine usage and, more crucially, privacy (21). Performance of states & UTs in India towards the Achievement of SDG 6 of target SDG 6.2 by using the percentage of households having access to latrine facility indicator. [Fig. 4 Pasted]

As per 2018, SDG 6.2 target achiever (100%) states & UTs are Manipur, Mizoram, Nagaland, Sikkim, Chandigarh & Lakshadweep; front runner (65%–99%) states & UTs are Daman & Diu, Kerala, Delhi, Tripura, Meghalaya, Uttarakhand, Assam, Himachal Pradesh, Haryana, A & N Islands, Punjab, Goa, Chhattisgarh, Dadra & Nagar Haveli, Jammu & Kashmir, West Bengal, Arunachal Pradesh, Puducherry, Telangana, Maharashtra, Gujarat, Andhra Pradesh, Karnataka, India, Tamil Nadu, Madhya Pradesh, Rajasthan, Bihar & Jharkhand; performer (50–64%) states are Uttar Pradesh & Odisha. As per 2018, deficit of performance towards achievement of SDG 6.2 target in 2030 agenda in states & UTs in India are Daman & Diu 0.1%, Kerala 0.2%, Delhi 0.5%, Tripura 0.6%, Meghalaya 1.5%, Uttarakhand 2.1%, Assam 2.2%, Himachal Pradesh 2.6%, Haryana 2.7%, A & N Islands 3.4%, Punjab 3.9, Goa 7%, Chhattisgarh 7.4%, Dadra & Nagar Haveli 7.7%, Jammu & Kashmir 11.7%, West Bengal 11.9%, Arunachal Pradesh 12%, Puducherry 12.5%, Telangana 12.7%, Maharashtra 12.8%, Gujarat 14.2%, Andhra Pradesh 16%, Karnataka 18.5%, Tamil Nadu 21.5%, Madhya Pradesh 22.5%, Rajasthan 26.3%, Bihar 32.8%, Jharkhand 33.6%, Uttar Pradesh 37.7% & Odisha 45.1%. The result of the Percentage of blocks/mandals/talisie safe extraction of groundwater (SDG 6.4 & 6.6) in India (National level & state level) as per NSS 76th round data. Infections and illnesses tend to be exacerbated by a lack of latrine facilities. Women and girls are usually disadvantaged due to several socio-cultural and economic factors that deny them equal rights with males. They have distinct physical needs from males, but they also have a greater need for privacy and safety regarding personal cleanliness. Actions such as going long distances in search of a good defecation site and carrying water are a sign of added load, which may be physically unpleasant and hard for women, particularly pregnant women (22).

Figure 5 showing the Percentage of blocks/mandals/talisie safe extraction of groundwater. As per 2017, the Performance of States and UTs in India towards the Achievement of SDG 6.4 & 6.6 in 2030 agenda



based on indicator percentage of blocks/mandals/taluka are safe extraction of groundwater (groundwater extraction does not exceed the total annual groundwater recharge, which is below 70% extraction) shows achiever (100%) states & UTs are Arunachal Pradesh, Assam, Goa, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Dadra & Nagar Haveli; Front Runner (65%-99%) are Andaman & Nicobar Islands, Odisha, Jharkhand, Total UT's, Chhattisgarh, Bihar, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Andhra Pradesh, Uttarakhand, West Bengal, Lakshadweep, Uttar Pradesh; performer (50%-64%) are India, Karnataka, Daman and Diu, Puducherry; aspirant (0%-49%) are Telangana, Himachal Pradesh, Tamil Nadu, Haryana, Punjab, Rajasthan, Delhi & Chandigarh. in India 63% blocks/mandals/taluka are safe extraction of groundwater. [Fig. 5 Pasted]

Result of the percentage of groundwater extraction (SDG 6.4) in India (National level & state level) as per 2017:

As per the "National Compilation on Dynamic Ground Water Resources of India (2017)" report by the CGWB, groundwater extraction below 70 per cent is considered a Safe extraction. Over extraction of groundwater annually (groundwater extraction exceed extractable groundwater annually) is found in Punjab (165.80%), Rajasthan (139.87%), Haryana (136.91%) & Delhi (120.00%); safe groundwater extraction is found in Karnataka, Telangana, Gujarat, India, Uttarakhand, Madhya Pradesh, Maharashtra, Kerala, Daman and Diu, Lakshadweep, Bihar, West Bengal, Chhattisgarh, Andhra Pradesh, Odisha, Goa, Jammu & Kashmir, Ladakh, Dadra & Nagar Haveli, Jharkhand, Assam, Tripura, Mizoram, Andaman & Nicobar Islands, Manipur, Meghalaya, Nagaland, Arunachal Pradesh & Sikkim. In India, 63.33% of groundwater is extracted annually as per 2017. the states & UTs with safe groundwater extraction achieve the SDG 6.4 target based on the indicator – the annual percentage of groundwater extraction from extractable groundwater resources. Figure 6 showing the Percentage of groundwater extraction from extractable groundwater resource annually in States & UTs. [Fig. 6 Pasted]

"In India as per 2017 Total Annual Groundwater Recharge is 431.86 billion cubic meters (bcm) out of which Annual Extractable Ground Water Resource is 392.7 bcm and Current Annual Ground Water Extraction is 248.7 bcm" (CGWB annual report 2019–2020).

**Result of the overall performance of SDG 6 in India (National level & state level) 2019–2021: [Table 2 Pasted]**

Table 2  
Overall performance of Rural India towards Achievement of SDG 6, 2019–2021

Target	SDG 6.1	SDG 6.2	SDG 6.2	SDG 6.2	SDG 6. a	SDG 6
Year	2021, January	2020	2020	2019– 2020	2019– 2020	2019– 2021
Chandigarh	Null	100	100	Null	Null	100
Daman and Diu	Null	100	100	Null	Null	100
Delhi	Null	100	100	Null	Null	100
Lakshadweep	Null	100	100	Null	Null	100
Ladakh	100	100	100	Null	Null	100
Sikkim	100	100	100	100	99.3	99.9
Goa	100	100	100	96.2	100	99.2
Himachal Pradesh	100	100	100	100	95.9	99.2
Haryana	99.7	100	100	96.3	99.1	99
Gujarat	100	100	100	97.8	95.9	98.7
Tamil Nadu	99.4	100	100	97.4	95.4	98.4
Puducherry	95.9	100	100	100	91	97.4
Kerala	99.4	100	100	95.8	89	96.8
Rajasthan	92.3	100	100	95.1	93.6	96.2
Punjab	92.4	100	100	91.3	94.1	95.6
Karnataka	100	100	100	89.2	86.2	95.1
Uttarakhand	99.3	100	100	84.2	90.8	94.9
D & N Haveli	Null	100	100	100	78.8	94.7
Maharashtra	90.7	100	100	92.7	90	94.7
Mizoram	100	100	100	73.1	99.8	94.6
A & N Islands	100	100	100	100	72.7	94.5
Chhattisgarh	99.6	100	100	83.4	89.3	94.5
Telangana	100	100	100	79.4	92.2	94.3
Jharkhand	99.7	100	100	95.1	75.7	94.1

Target	SDG 6.1	SDG 6.2	SDG 6.2	SDG 6.2	SDG 6. a	SDG 6
India	97.4	100	100	86.7	85.4	93.9
Odisha	98.1	100	100	77.4	91	93.3
Uttar Pradesh	99.6	100	100	93.7	69.5	92.6
West Bengal	95.5	100	100	97	69.4	92.4
Jammu & Kashmir	99.9	100	100	75	79.4	90.9
Andhra Pradesh	99.8	100	100	76.6	77	90.7
Meghalaya	100	100	100	56.5	96.9	90.7
Madhya Pradesh	99.7	100	100	72	79.3	90.2
Arunachal Pradesh	92.6	100	100	73.7	84.1	90.1
Bihar	96.3	100	100	79.1	70.6	89.2
Assam	74.7	100	100	75.1	86.6	87.3
Tripura	84.8	100	100	63.8	79.2	85.6
Nagaland	100	100	100	44	83.7	85.5
Manipur	100	100	100	16.7	77.4	78.8
Target	100	100	100	100	100	100

Sources: Department of Drinking Water and Sanitation, Ministry of Jal Shakti, January 2021; Swachh Bharat Mission Gramin Dashboard,2020; NARSS round 3, 2019–2020; table computed by author.  
Notes: Achiever (100%) Front Runner (65%-99%) Performer (50%-64%) Aspirant (0%-49%)

\*note

SDG 6.1 Population having improved source of drinking water

SDG 6.2 Percentage of individual household toilets constructed against target (SBM(G))

SDG 6.2 Percentage of districts verified to be ODF (SBM(G))

SDG 6.2 The school has a separate toilet for boys & girls (%)

SDG 6. a % of Household Safe Disposal of Liquid waste

SDG 6 Goal score of the indicator

Table 2 shows the achievements towards the of SDG 6 of all States and UTs. All the states & UTs in Rural India achieve the target (100%) SDG 6.2 based on indicator Percentage of individual household toilets constructed against target (SBM(G)) & percentage of districts verified to be ODF (SBM(G)) as per 2020. Ladakh achieves target (100%) SDG 6.1 & 6.2 based on indicator Percentage of individual household toilets constructed against target (SBM(G)), Percentage of districts verified to be ODF (SBM(G)) & Percentage of the rural population having improved source of drinking water as per 2021. Overall goal score of the indicator - Percentage of the rural population having improved source of drinking water (SDG 6.1), percentage of individual household toilets constructed against target (SBM(G)) (SDG 6.2), percentage of districts verified to be ODF (SBM(G)) (SDG 6.2), the school having a separate toilet for boys & girl (%) (SDG 6.2), % of Household Safe Disposal of Liquid waste (SDG 6.a) reveal that states & UTs belonging in front runner stage are Sikkim, Goa, Himachal Pradesh, Haryana, Gujarat, Tamil Nadu, Puducherry, Kerala, Rajasthan, Punjab, Karnataka, Uttarakhand, Dadra & Nagar Haveli,, Maharashtra, Mizoram, Andaman & Nicobar Islands, Chhattisgarh, Telangana, Jharkhand, India, Odisha, Uttar Pradesh, West Bengal, Jammu & Kashmir, Andhra Pradesh, Meghalaya, Madhya Pradesh, Arunachal Pradesh, Bihar, Assam, Tripura, Nagaland & Manipur. as per January 2021, performance of states & UTs in Rural towards Achievement of SDG 6.1 based on indicator Percentage of rural population having improved source of drinking water shows achiever states & UTs are Ladakh, Sikkim, Goa, Himachal Pradesh, Gujarat, Karnataka, Mizoram, Andaman & Nicobar Islands, Telangana, Meghalaya, Nagaland & Manipur ; front runner are Jammu & Kashmir, Andhra Pradesh, Haryana, Jharkhand, Madhya Pradesh, Uttar Pradesh, Chhattisgarh, Tamil Nadu, Kerala, Uttarakhand, Odisha, India, Bihar, Puducherry, West Bengal, Arunachal Pradesh, Punjab, Rajasthan, Maharashtra, Tripura & Assam.as per 2019-20 performance of states & UTs towards Achievement of SDG 6.1 based on indicator school having separate toilet for boys & girl (%) express that achiever are Dadra & Nagar Haveli, Sikkim, Himachal Pradesh, Andaman & Nicobar Islands & Puducherry ; performer are Tripura & Meghalaya and aspirant are Nagaland & Manipur. As per 2019–2020, in case of % of Household Safe Disposal of Liquid waste ('flows into a common system' and 'kitchen garden & soak pit') target achiever state is Goa; except Goa other states & UTs are belonging in front runner stage. based on SDG 6.1 & SDG 6.2 it is observed that in Rural India achiever (100%) state is, Sikkim, Himachal Pradesh & Andaman & Nicobar Islands in 2019–2021. The state & UTs have no information about an indicator; we do not consider those states and UTs for performance towards SDG 6. Figure 7 showing the spatial distribution of households having access to improved sources of drinking water and Fig. 8 showing the spatial distribution of households having access to latrine facility (%) in states & UTs in India. [Figs. 7 & 8 Pasted]

### Major Findings:

As per NSS data in 2018, 30.5 % of households collect safe drinking water from the hand pump; in the case of urban areas, 40.9% of households use piped water into the dwelling, and in rural areas, 42.9 % of households use the hand pump. 88.7% of households have access to a principle source of drinking water, and 95.5 % use improved drinking water sources throughout the year. 100% of households having access to improved sources of drinking water (SDG 6.1 target achiever) in Chandigarh, Daman & Diu & Sikkim and Kerala has the lowest percentage 56.7 %. In India, 79.8 % of households have access to latrine

facilities, whereas urban area has a higher percentage of household having access to latrine facility 96.2 %, than rural areas (40.6 %). The female population are more using toilets than the male population. 100 % of households have access to latrine facilities (SDG 6.2 target achiever) in Manipur, Mizoram, Nagaland, Sikkim, Chandigarh & Lakshadweep, and the lowest found in Odisha 54.9 %. Safe groundwater extraction from extractable groundwater resources annually (SDG 6.4 target achiever) in States & UTs in India, 2017 are found in Karnataka, Telangana, Gujarat, India, Uttarakhand, Madhya Pradesh, Maharashtra, Kerala, Daman and Diu, Lakshadweep, Bihar, West Bengal, Chhattisgarh, Andhra Pradesh, Odisha, Goa, Jammu & Kashmir, Ladakh, Dadra & Nagar Haveli, Jharkhand, Assam, Tripura, Mizoram, Andaman & Nicobar Islands, Manipur, Meghalaya, Nagaland, Arunachal Pradesh & Sikkim. In India, 63.33 % of groundwater is extracted annually as per 2017. As of 2020, all the States & UTs in Rural India 100 % individual household toilets constructed against target (SBM(G)) & 100 % districts verified to be ODF (SBM(G)) (SDG 6.2 target achiever). As per January 2021, 100% rural population has improved source of drinking water (SDG 6.1 target achiever) in Ladakh, Sikkim, Goa, Himachal Pradesh, Gujarat, Karnataka, Mizoram, Andaman & Nicobar Islands, Telangana, Meghalaya, Nagaland & Manipur. as per 2019-2020, 100% school having a separate toilet for boys & girl (SDG 6.2 target achiever) in Dadra & Nagar Haveli, Sikkim, Himachal Pradesh, Andaman & Nicobar Islands & Puducherry. Goa achieves 100 % safe disposal of liquid waste. Overall goal score expresses all the states belong to front runner stage (65% to 99%). Based on SDG 6.1 & SDG 6.2, it is observed that in Rural India achiever (100%) state is Sikkim, Himachal Pradesh & Andaman & Nicobar Islands in 2019-2021.

## Conclusion

After lunch of Swachh Bharat Mission and other programmes related to sanitation and drinking water, sanitation coverage and accessibility of drinking water rise which has reinforcement substantially in accelerating the Achievement of Sustainable Development goal 6. state and UTs having the lower status of sanitation, drinking water, groundwater & hygiene need to improve those condition by increasing availability, accessibility and affordability of the WASH facility. Localisation or bottom-up approach by giving responsibility to rural and urban local body enforced Achievement of SDG 6. To prevent and reduce acute and chronic illness death and sustain a healthy life, we need to increase awareness and facilities to access safe and adequate drinking water, sanitation and hygiene. For raising awareness, different days are celebrated on 22 March as World Water Day for Water, 19 November as World Toilet Day for sanitation and 15 October as Global Handwashing Day for hygiene. Still, we need to maintain safe drinking water, sanitation and hygiene all day.

## Abbreviations

**NSS- National Sample Survey**

**SDGs – Sustainable Development Goals**

## Declarations

## **Ethics approval and consent to participate:**

Since it is secondary data and it is available in the Public domain for free in NSS website. There is no need for ethical clearance. The manuscripts didn't need any report experiments involving the use of human embryos and gametes, human embryonic stem cells and related materials. All methods were carried out in accordance with relevant guidelines and regulations.

## **Consent for publication:**

Not Applicable.

## **Availability of data and material:**

The study is based on secondary data analysis. No data was collected for this study. The datasets generated and/or analysed during the current study are available in the NSS (Download Reports | Ministry of Statistics and Program Implementation | Government Of India), Central ground water control board (Department of Drinking Water and Sanitation, GOI ([jalshakti-ddws.gov.in](http://jalshakti-ddws.gov.in))), NARSS (Department of Drinking Water and Sanitation, GOI ([jalshakti-ddws.gov.in](http://jalshakti-ddws.gov.in))) NITI Aayog (Reports on SDG | NITI Aayog) repository.

## **Competing interests:**

We declare that We have no competing interests.

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We did not receive any grants from any funding agency in public, commercial, or non-profit sectors for conducting this study.

## **Authors' contributions:**

All authors contributed to the manuscript. SB, BD, AA and LNS have contributed to the conception, design, data analysis and interpretation of the data. They drafted and critically revised the manuscript. All have contributed toward data analysis and reviewing the manuscript. Moreover, all authors read, revised and approved the final manuscript for submission.

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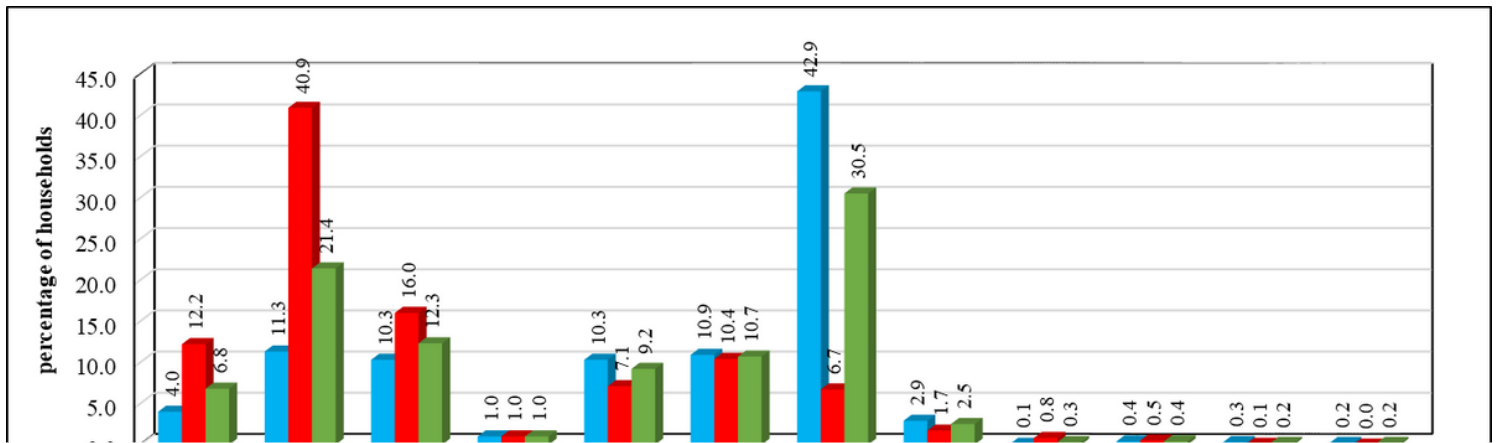
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## Figures





**Figure 1**

Percentage of households with access to principle sources of safe drinking water in India with resident type, 2018

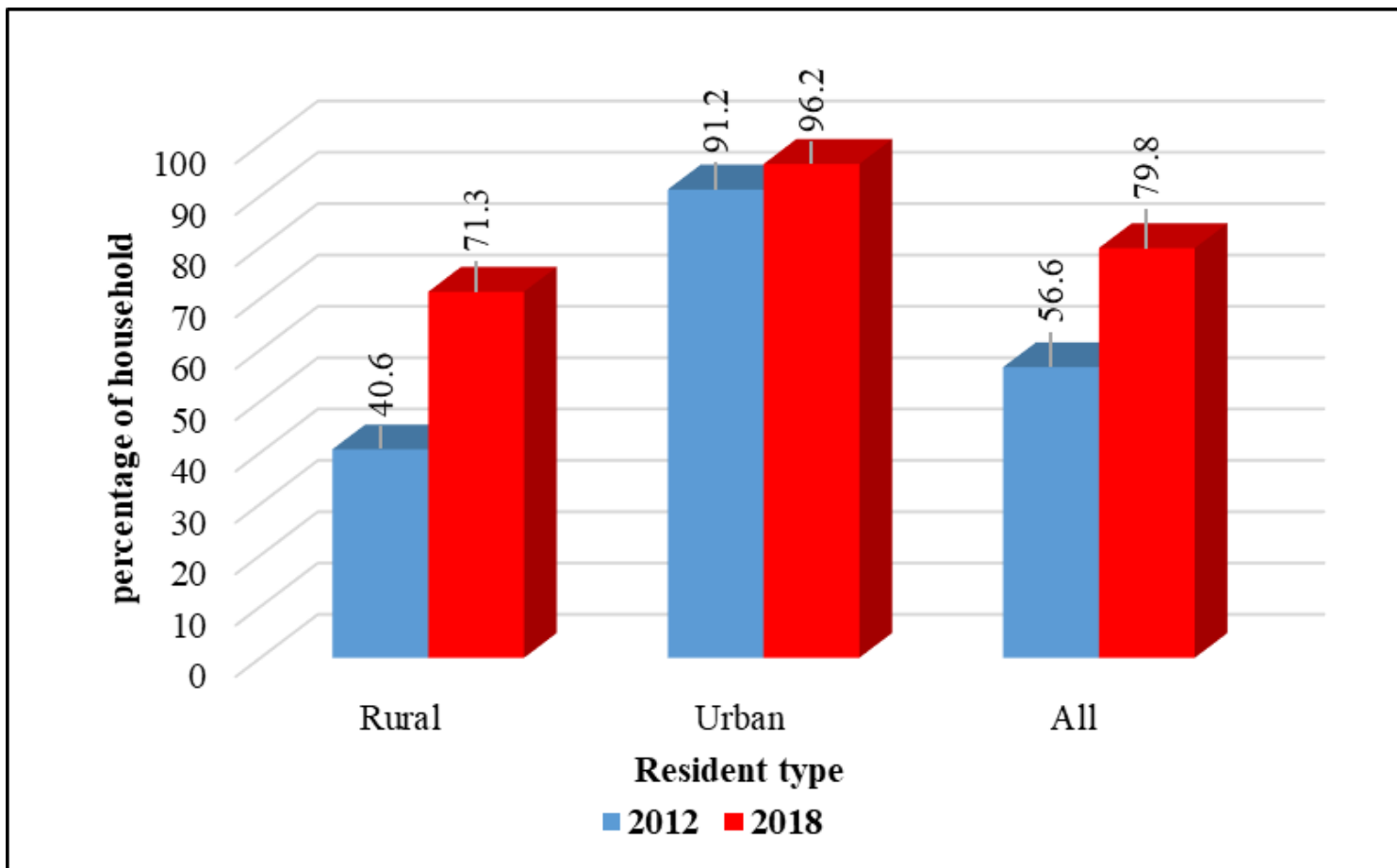
Source: NSS 76th round (July - December 2018), graph prepared by the author.

Notes: 0.0 % indicate the least or negligible Percentage of household

**Figure 2**

Percentage of households having access to improved sources of drinking water in states & UTs in India, 2018

Source: NSS 76th round (July - December 2018), graph prepared by the author.



**Figure 3**

Percentage of households having access to latrine facility with resident type, 2012 & 2018

Sources: NSS 76th round (July - December 2018) & 69th round (July - December 2012), graph prepared by the author

**Figure 4**

Percentage of households having access to latrine facilities in states & UTs in India, 2018

Source: NSS 76th round (July - December 2018), graph prepared by the author.

### **Figure 5**

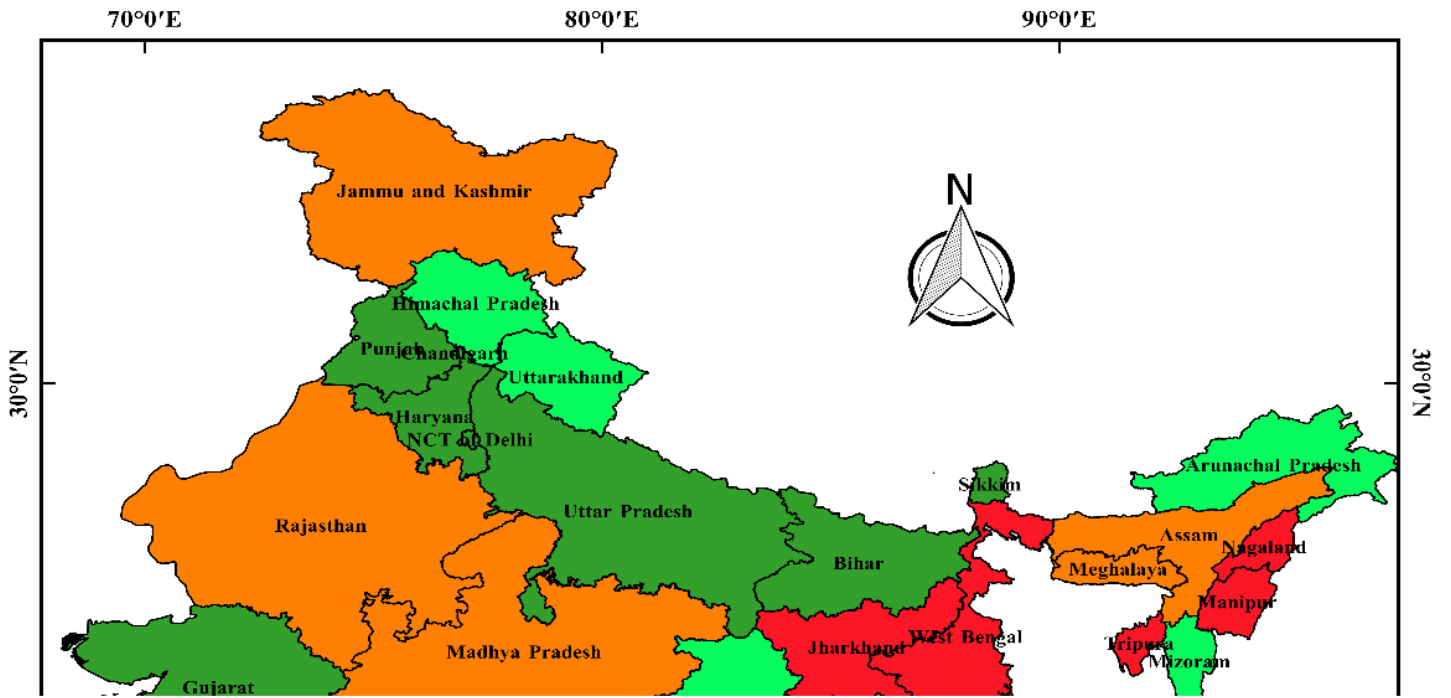
Percentage of blocks/mandals/taluka are safe extraction of groundwater in States & UTs in India,2017

Source: CGWB annual report 2019-2020, graph prepared by the author.

### **Figure 6**

Percentage of groundwater extraction from extractable groundwater resource annually in States & UTs in India,2017

Source: CGWB annual report 2019-2020, graph prepared by the author



**Figure 7**

Spatial distribution of households having access to improved sources of drinking water (%) in states & UTs in India, 2018

Source: NSS 76th round (July - December 2018), graph prepared by the author.

## Figure 8

Spatial distribution of households having access to latrine facility (%) in states & UTs in India, 2018

Source: NSS 76th round (July - December 2018), graph prepared by the author.