

Exploring Disparities in WASH Inclusion Across Socioeconomic Strata in Rural India: Implications for Sustainable Development Goal (2030)

Mihir Kulkarni¹ and Anurag Asawa²

Abstract

Access to Water, Sanitation, and Hygiene (WASH) is not just a matter of convenience but a foundation that significantly impacts health, disease burden, social equity, and economic development. The absence of adequate WASH facilities burdens public health systems and hampers economic productivity. This research paper delves into understanding the disparities in WASH inclusion across different socioeconomic strata in rural India and their implications for sustainable development. We discuss the critical role of socioeconomic inclusion in fostering sustainable development and economic prosperity by using data from the 69th, 76th, and 78th rounds of the National Sample Survey Office (NSSO) conducted in 2012, 2018, and 2021. The study focuses on twenty states to analyse trends and identify the socio-economic groups that have lacked accessibility to WASH over the years. These states are selected based on their representation in the national sample for all three NSSO rounds. The findings highlight uneven progress across states and inequalities among various social groups and expenditure quartiles, revealing that disadvantaged communities, particularly Scheduled Tribes (ST), Other Backward Classes (OBC), and lower expenditure quartiles, lack adequate access to clean drinking water, sanitation facilities, and hygiene practices. We project the percentage coverage of WASH facilities in 2030 - the UN's target year to achieve Sustainable Development Goals, and show the necessary acceleration to reach the 100% coverage target. The study concludes that targeted interventions are urgently needed to address the identified disparities and calls for policy measures that focus on the most vulnerable sections of society to achieve sustainable and equitable growth.

Keywords: Drinking water, Access to latrine, Hand wash, Expenditure, SDG-6

I. Introduction

Adequate sanitation, good hygiene practices, and access to potable water are fundamental pillars of public health, societal progress, and economic prosperity. This introduction explores the profound implications of sanitation, hygiene, and drinking water on health and the economy, highlighting their interdependence and socioeconomic dimensions.

Access to clean and safe drinking water is indispensable for maintaining good health. Contaminated drinking water sources serve as reservoirs for waterborne pathogens, bacteria, viruses, and chemical contaminants, posing severe health risks to communities (Hutton et al., 2018). Gastrointestinal illnesses, waterborne infections, and other health problems arise from consuming contaminated water, affecting individuals' health and well-being (Mills et al., 2018; Rajmohan, 2020). Providing communities with reliable water sources, such as piped water systems, wells, or treated water, is paramount for reducing the risk of waterborne diseases and enhancing overall health outcomes.

The intricate relationship between health and the economy is undeniable, with each exerting a significant influence on the other. A healthy population is more productive, increasing economic output and growth. Good health reduces absenteeism at school and the workplace, improves workforce performance, and fosters economic productivity. Conversely, poor health outcomes lead

¹ Indian Institute of Management, Bangalore. Email: kulkarnimihir11@gmail.com

² Professor, Gokhale Institute of Politics and Economics, Pune. Email: anurag.asawa@gipe.ac.in (Corresponding Author).

to higher healthcare costs, strain public budgets, and undermine financial stability (Augsburg et al., 2023; Augsburg & Rodríguez-Lesmes, 2020). Furthermore, health is essential for social and economic stability, as disease outbreaks can disrupt economic activities, leading to adverse socioeconomic consequences. In essence, health is both an outcome and a driver of financial well-being.

Disparities in access to WASH facilities are stark, particularly between affluent urban localities and impoverished slum areas. Such disparities extend to rural settings, where stagnant water, improper waste disposal, and limited access to drinking water persist (Mishra & Shukla, 2015). Caste identities, gender dynamics, and socioeconomic status further exacerbate disparities in WASH access, underscoring the need for targeted interventions to promote inclusivity and equity (Coffey & Spears, 2017; Mahajan & Sekhri, 2020).

II. Literature Review

Access to Water, Sanitation, and Hygiene (WASH) is a fundamental human right and a critical determinant of health outcomes, economic prosperity, and social equity. The Sustainable Development Goals (SDGs), particularly Goal 6, emphasise ensuring the availability and sustainable management of water and sanitation by 2030. However, socioeconomic disparities significantly hinder progress toward achieving these goals, particularly in developing countries like India.

Despite global efforts to improve WASH access, approximately 892 million people worldwide still practised open defecation as of 2017, highlighting the persistent challenges in achieving universal access (Progress on Drinking Water, Sanitation and Hygiene, 2017). The situation is particularly dire in India, with socioeconomic factors crucial in determining access to WASH facilities (Mondal, 2022). The economic implications of inadequate WASH services are staggering. In India, the economic losses attributed to poor sanitation amounted to 6.4 per cent of the country's GDP in 2006 (Tyagi et al., 2011; Van Minh & Nguyen-Viet, 2011). Health-related economic impacts totalled US\$38.5 billion, while the time lost accessing sanitation facilities and drinking water-related impacts contributed US\$10.7 billion and US\$4.2 billion, respectively. Furthermore, additional sanitation and hygiene interventions in 2006 could have prevented 346,000 deaths and saved at least 1.7 billion days of lost productivity, emphasising the critical link between WASH access and economic prosperity (Tyagi et al., 2011). Investing in WASH facilities yields substantial economic returns. For every US \$1 invested in water and sanitation, an estimated US \$4.30 in economic returns is generated through increased productivity (The Sanitation Economy in India, 2017). Households that invest INR 16,000 (US\$ 248) in a toilet and handwashing station can expect to recoup those costs within two years through the medical expenses saved (Hutton et al., 2007). The financial savings from reduced medical costs and the value of time saved from illness and the need to seek sanitation facilities further highlight the economic benefits of WASH investments (Hutton et al., 2018). Global advisories suggest washing hands with soap and water multiple times a day. However, in India, where 163 million people lack access to clean water, handwashing for 20 seconds is a luxury for some (Jamwal, 2020).

Social and cultural factors also play a significant role in shaping WASH practices within communities. Caste dynamics in certain societies influence sanitation-related tasks, leading to inequities in access to WASH services (Banda et al., 2007; Barnard et al., 2013). A study by Vani Kani Borooah (2020) highlighted that living in a more developed village creates a social milieu in which, regardless of social group, education, or income, households would consider it more unacceptable to be without a toilet than if they had been living in the social environment of a less developed village. People with toilets also face problems with social and cultural norms and values; for example, a man and his daughter-in-law are not allowed to use the same toilet (Shankar et al., 2011).

Gupta et al. (2023) find that UP and Bihar, two states which, due to their population sizes, are quantitatively influential in determining India's overall open defecation rate. Vani and Madheswaran

(2018) found that most BIMARU (Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh) states had low, inequitable access to WASH facilities. The stigma associated with open defecation further complicates efforts to promote hygienic practices and access to sanitation facilities. Findings of multiple case studies conducted in Nepal by Anderson et al. (2022) suggest that adaptations to encourage rapid adoption of toilet construction only sometimes achieve sustained behaviour change. The challenge of ending open defecation requires detailed planning and implementation of sustainable water and sanitation programmes rather than grand declarations of intent. In the absence of such planning, we cannot expect a magic wand that will make open defecation disappear in India ('Raising a Stink', 2016). The public health consequences of inadequate WASH services are dire. Limited access to WASH has been linked to high rates of infant mortality and child stunting, particularly in developing countries where open defecation remains prevalent (Bhutta et al., 2008; Hathi et al., 2017).

Environmental challenges, such as water pollution, exacerbate the WASH crisis, particularly in densely populated urban areas and vulnerable rural communities (SDG India- Index and Dashboard, 2019). Billions of people worldwide still lack essential WASH services, with disparities persisting across regions and socioeconomic groups (Deshpande et al., 2020; The Sustainable Development Goals Report, 2022).

From an economic perspective, investments in sanitation yield significant returns, driving industrial growth, employment, and healthcare improvements ('WASH Economy Yields Monetary Returns, Industrial Growth and Employment', 2022). However, economic prosperity alone does not guarantee equitable access to essential WASH services. Vulnerable populations, including those in poverty and marginalised communities, continue to face barriers to accessing safe water and sanitation facilities (Balasubramanya et al., 2022).

A recent study by Ghosh et al. (2023) measured inequality between Scheduled Castes/Scheduled Tribes (SC/ST) and non-SC/ST groups, revealing disparities of 12 and 23 percentage points in access to improved drinking water and latrines, respectively. A paper by Doron and Jeffrey (2014) identifies Class and Caste as the most critical factors that affect the accessibility of a household to latrines. Mishra and Joe (2020) report significant intergroup inequalities in asset ownership (like improved sources of drinking water and improved, not shared toilet facilities) with particularly disadvantaged ownership profiles for SC, ST and Muslim households. A report by Bonu and Kim (2009) highlighted that Scheduled Tribes (STs) need special attention to provide access to WASH facilities.

A paper by Narayanan et al. (2012) spells out the need to design and deliver context-specific, equitable, and inclusive sanitation and hygiene programmes, including better identification of the poorest and most marginalised groups in rural and urban areas. Financial inclusion is critical for improving access to safe WASH facilities (Acheampong et al., 2024). Kedia (2022) suggests that while drinking water and sanitation facilities are a public good that merits public investment, the government should maximise public value and nudge behaviour change, rather than funding one-time construction of private WASH facilities, which vastly increase the private benefit for those who can build and maintain them.

The elements of successful sanitation adoption depended on three factors (i.e., toilet tripod): (1) multi-scalar political will on the part of both government and NGOs over the long term; (2) proximate social pressure, i.e., person-to-person contact between rural inhabitants and toilets; (3) political ecology, i.e., assured access to water, compatible soil type, and changing land use (O'Reilly & Louis, 2014). The Government of India has on its agenda for the past three decades to provide access to sanitation facilities in rural areas. However, a reinvigorated thrust to provide adequate sanitation facilities in rural India is the need of the hour. This thrust must be accompanied by constant scrutiny and monitoring so as to arrive at apt decisions and policies for further action (Kumar, 2015).

The WASH issue is not a recent one. Researchers have been working on various issues related to it. Existing literature has examined various WASH-related issues, including hand washing

(Jamwal, 2020), toilet and sanitation access (Shankar et al., 2011; Doron & Jeffrey, 2014; Bhutta et al., 2008; Hathi et al., 2017; Mishra and Joe, 2020), WASH and open defecation (ODF) (Bhutta et al., 2008 and Hathi et al., 2017), un-improved source of drinking water (Doron & Jeffrey, 2014 and Mishra and Joe, 2020) issues specific to SC, and ST (Banda et al., 2007; Barnard et al., 2013; Bonu and Kim, 2009; Doron & Jeffrey, 2014; Mishra and Joe, 2020 and Ghosh et al., 2023), the relationship between WASH and health outcomes (Biran et al., 2008; Chattopadhyay et al., 2019; Fan & Mahal, 2011 and Rah et al., 2015), state-specific WASH challenges (Vani and Madheswaran, 2018; Deshpande et al., 2020; Dadhich et al., 2022 and Gupta et al., 2023) and the influence of low income and poor economic situation on WASH access (Narayanan et al., 2012 and Balasubramanya et al., 2022). However, a comprehensive study that addresses all these issues together, particularly in the context of rural India, remains largely absent in the existing literature. Hence, this paper is an attempt to understand the disparities in rural areas in WASH access across different socio-economic strata and geographical regions of India and to Predict the country's trajectory towards meeting the SDG targets by 2030.

III. Data and methods

Data

The analysis is based on NSSO's unit-level data for the 69th (2012), 76th (2018), and 78th (2021) rounds. The three surveys have different timelines and objectives, but we have focused on a few questions common to all three surveys and selected indicator variables aligned with the UN's indicators monitoring the progress of SDG 6 (Table 1). To ensure fair representation and limited variance in population densities across states for analysis, the authors selected only states with more than 0.5 per cent representation in the national sample. As a result, all union territories and northeastern states are excluded from the analysis. This research is only for rural areas, so Delhi has not been considered.

In India, several rounds of NSSO like 69th Round July-December 2012, 76th Round (July-December 2018) and 78th Round (January-December 2020) have collected household data on drinking water, sanitation and hygiene periodically. Due to its methodological robustness and sampling size, the data on NSSO rounds may be considered as the most authentic data source for the relevant parameters. Hence the authors have considered the NSSO for making a qualitative and quantitative assessment of health, sanitation and hygiene in the country.

Table 1: Linkages Between SDG 6 Indicators and Schedules of the three NSSO Rounds

WASH parameter	UN's SDG 6 Indicator	NSSO Surveys		
		69th Round (July-Dec 2012) Schedule 1.2	76th Round (Jul-Dec 2018) Schedule 1.2	78th Round (Jan-Dec 2020) Schedule 5.1
Drinking Water	6.1.1 - Proportion of population using safely managed drinking water services	Block 4; item 1: principal source of drinking water	Block 5; item 01: principal source of drinking water	Block 4; item 20: principal source of drinking water
Sanitation	6.2.1a- Proportion of population using safely managed sanitation services	Block 4; item 23: access of the household to latrine	Block 5; item 25: access of the household to latrine	Block 4; item 25: access of the household to latrine
Hygiene	6.2.1b- Proportion of population using a handwashing facility with soap and water	-	Block 5; item 36: whether household members regularly wash their hands after defecation.	-

Operational definition of the dependent variable

The definition of WASH is too wide, but for the sake of ease, the use of unimproved water, non-access to latrines, and lack of hand washing with soap and water after defecation have been considered as the detrimental factors for access to Water, Sanitation, and Hygiene, respectively. As per World Health Organisation (WHO) unimproved water sources include unprotected wells, unprotected springs, surface water (e.g. river, dam or lake), vendor-provided water, bottled water (unless water for other uses is available from an improved source) and tanker truck-provided water. This parameter is taken for defining unimproved water in this paper.

Independent variables

Due to the non-availability of household income, authors use 'Usual Monthly Consumption Expenditure' as a proxy for capturing the income. We create quartiles for each state and year and determine where the household falls in the expenditure category (Lower, Lower middle, Upper middle, and Upper expenditure quartile). We explore the WASH access, understand the trend and pattern focusing on social groups and expenditure quartiles and identify the linkage, if any, across various socioeconomic strata, expenditure, and access. We also predict WASH coverage for 2030, providing insights into potential advancements.

Statistical analysis

This paper uses bivariate, tri-variate tables and ranking to show cohorts at the intersection of social category and expenditure quartile that lack access to WASH facilities the most. It further measures the growth rate between 2018 and 2021 to predict the expected percentage coverage of WASH across the concerned states in 2030 using a simple linear extrapolation technique.

IV. Results

Unimproved Water, No Access to Latrine and No Habit of Hand Wash

Table 2 represents the states and their ranking considering the use of unimproved water, lack of access to latrines and lack of habit of hand washing after defecation (three issues). Diversity can be seen in the positions of Kerala and UP regarding access to unimproved water and lack of access to latrines across all three years. Every fifth person in the country who uses unimproved water is from Kerala, and around every fourth person who does not have access to a latrine belongs to UP. Other states are not so common in the ranking for the discussed issues.

Ranking of states in Unimproved water, No access to Latrine and No habit of Hand wash by social group

Tables 3, 4, and 5 further examine the ranking of the states by social group. Kerala is the top state for unimproved water use when considering ST, OBC, and others, but for SC, Odisha (2102) and MP (for 2018 and 2021) are the leading states (Table 3). Non-access to latrines shows a different set of states at the top. For the SC and OBC categories, UP is at the top, but for the other category, WB, along with UP, is also at the top for 2012. For the ST category, different states lead. The percentage of people without access to a latrine ranges from 17 to 33 in the top states, again indicating that access varies across social groups (Table 4). An absence of the habit of hand washing shows four different states—Odisha, UP, TN, and WB—at the top for ST, SC, OBC, and other categories, respectively (Table 5). That although access to improved water, latrines, and hand washing has improved, the visible variation across social groups has persisted over the years.

Table 2: Ranking of the state: Unimproved water, No access to Latrine and No habit of Hand wash (in %)

State	Unimproved water					Not Access to latrine						No habit of Hand wash	
	2012	State	2018	State	2021	State	2012	State	2018	State	2021	State	2018
KL	20.06	KL	20.0	KL	22.06	UP	19.56	UP	26.92	UP	19.86	UP	11.85
RJ	10.63	MP	12.9	MP	14.58	BR	11.30	BR	12.55	BR	15.55	TN	11.72
MH	9.81	RJ	9.5	MH	10.81	AP	8.21	OD	8.45	MP	8.14	BR	9.99
MP	8.83	OD	9.0	JH	8.73	MP	8.19	TN	7.27	OD	7.89	AP	8.89
JH	7.83	MH	8.9	OD	7.06	MH	7.15	RJ	6.56	RJ	7.34	WB	7.95
OD	7.02	JH	7.4	RJ	6.53	RJ	6.58	MP	6.22	TN	7.28	OD	7.74
AP	6.23	AS	5.7	AS	5.62	TN	6.57	MH	5.72	JH	5.93	KT	5.92
UP	4.53	KT	4.8	KT	3.75	OD	6.35	WB	5.03	WB	5.75	RJ	5.81
GJ	3.68	AP	3.7	AP	3.22	WB	5.79	KT	4.84	MH	4.59	MH	5.48
WB	3.63	WB	3.6	CG	2.61	KT	5.77	JH	4.23	AP	4.17	MP	4.65
AS	3.53	UP	2.9	WB	2.60	JH	3.90	AP	4.18	GJ	4.06	JH	4.32
TN	3.06	CG	2.7	UP	2.15	GJ	3.85	GJ	3.16	KT	1.16	GJ	3.00
KT	2.01	JK	2.1	GJ	1.84	CG	3.01	CG	0.75	CG	1.01	AS	2.96
BR	1.83	GJ	1.0	BR	1.30	HR	0.80	JK	0.49	JK	0.44	KL	1.28
JK	1.39	UK	0.6	JK	1.20	PB	0.70	PB	0.44	PB	0.37	CG	1.21
HR	1.19	HP	0.3	UK	0.88	AS	0.64	AS	0.28	HR	0.24	JK	0.78
CG	1.03	TN	0.3	TN	0.56	JK	0.62	HR	0.27	AS	0.02	HR	0.69
UK	.68	BR	0.3	HP	0.25	OK	0.36	UK	0.08	UK	0.01	UK	0.28
HP	0.28	PB	0.1	HR	0.02	HP	0.34	HP	0.08	HP	0.00	PB	0.21
PB	0.08	HR	0.0	PB	0.01	KL	0.16	KL	0.03	KL	0.00	HP	0.06

Note: KL- Kerala, RJ- Rajasthan, MH- Maharashtra, MP- Madhya Pradesh, JH- Jharkhand, OD- Odisha, AP- Andhra Pradesh, UP- Uttar Pradesh, GJ- Gujarat, WB- West Bengal, As- Assam, TN- Tamil Nadu, KT- Karnataka, BR- Bihar, JK- Jammu and Kashmir, HR- Haryana, CG- Chhattisgarh, UK- Uttarakhand / Uttaranchal, HP- Himachal Pradesh, PB- Punjab.

Table 3: Ranking of the state according to social groups: Unimproved water

ST						SC						OBC						Other					
Stat*	2012	Stat	2012	Stat	C	Stat*	A	Stat	B	Stat	C	Stat*	A	Stat	B	Stat	C	Stat*	A	Stat	B	Stat	C
OD	15.73	MP	16.1	MP	22.23	KL	14.72	KL	18.09	KL	16.72	KL	26.29	KL	26.0	KL	29.82	KL	28.42	KL	31.8	KL	38.06
JH	14.77	JH	14.7	JH	13.65	AP	13.23	MP	16.80	MH	11.41	RJ	12.42	MP	13.4	MP	13.70	MH	11.69	AS	15.3	MH	13.52
MH	14.34	OD	10.8	MH	11.54	RJ	9.95	RJ	13.28	MP	10.56	MP	8.82	RJ	9.9	MH	9.09	WB	8.42	MH	15.0	AS	9.65
MP	13.50	MH	10.3	RJ	9.26	MP	9.92	OD	9.47	JH	9.80	MH	8.10	OD	8.8	JH	7.45	AP	6.85	OD	6.5	MP	7.18
RJ	12.26	RJ	9.5	OD	8.51	UP	9.73	MH	7.75	RJ	8.81	JH	7.96	KT	8.7	OD	7.44	RJ	5.98	JK	5.5	OD	5.57
GJ	6.19	CG	7.1	AS	6.53	OD	7.21	WB	6.89	UP	6.00	AP	5.84	JH	6.6	KT	5.94	OD	5.55	RJ	5.5	UK	3.27
AS	5.12	WB	5.7	CG	6.36	WB	5.96	JH	5.13	AS	5.65	UP	5.73	MH	5.9	RJ	5.52	AS	5.26	MP	4.2	KT	2.87
CG	2.67	AS	4.4	KL	3.35	MH	5.79	UP	4.61	BR	5.45	GJ	4.74	AP	4.5	AP	3.69	MP	3.72	KT	3.2	JH	2.81
MG	2.55	AP	3.4	GJ	3.21	JH	5.16	AP	4.03	WB	5.41	OD	3.59	UP	3.4	AS	3.46	JK	3.53	WB	2.9	WB	2.72
WB	2.25	KL	3.0	WB	2.60	TN	4.42	KT	3.21	AP	5.24	KT	2.88	AS	3.3	UP	2.84	HR	3.08	AP	2.2	AP	2.67
KL	1.78	JK	2.6	AP	1.85	BR	2.39	AS	2.83	OD	4.70	AS	2.43	WB	1.4	GJ	1.80	JH	2.85	UP	1.8	RJ	2.63
AP	1.35	MG	2.2	JK	1.78	JK	2.34	CG	1.86	KT	4.14	BR	2.06	CG	1.2	WB	1.66	KT	2.75	UK	1.4	JK	2.49
JK	1.09	GJ	2.2	KT	0.74	AS	1.99	UK	1.77	UK	2.46	WB	1.10	GJ	1.1	BR	1.09	UP	2.24	HP	0.8	CG	1.71
MN	0.92	UP	1.8	TN	0.07	GJ	1.47	JK	1.27	CG	1.15	CG	0.92	JK	0.5	CG	0.96	BR	1.96	CG	0.7	HP	1.34
BR	0.78	KT	0.3	BR	0.04	HR	1.40	BR	0.65	TN	0.88	HR	0.73	BR	0.4	JK	0.54	HP	0.87	JH	0.6	UP	0.83
UP	0.66	TN	0.0	HP	0.02	KT	0.82	HR	0.28	JK	0.51	JK	0.13	HP	0.4	HP	0.07	TN	0.77	GJ	0.0	GJ	0.83
KT	0.25	BR	0.0	UP	0.01	HP	0.47	PB	0.04	GJ	0.36	HP	0.02	UK	0.3	UK	0.04	GJ	0.70	BR	0.0	BR	0.58
HP	0.09	HR	0.0	HR	0.00	CG	0.31	GJ	0.03	PB	0.10	PB	0.00	PB	0.1	HR	0.02	PB	0.37	HR	0.0	HR	0.09

Source: Author's calculation based on 69, 76 and 78 round; * State name- KL- Kerala, RJ- Rajasthan, MH- Maharashtra, MP- Madhya Pradesh, JH- Jharkhand, OD- Odisha, AP- Andhra Pradesh, UP- Uttar Pradesh, GJ- Gujarat, WB- West Bengal, As- Assam, TN- Tamil Nadu, KT- Karnataka, BR- Bihar, JK- Jammu and Kashmir, HR- Haryana, CG- Chhattisgarh, UK- Uttarakhand / Uttaranchal, HP- Himachal Pradesh, PB- Punjab; A- 2012, B-2018, C-2021

Table 4: Ranking of the state according to social groups: Access to latrine

ST						SC						OBC						Other					
Stat*	2012	Stat	2018	Stat	2021	Stat*	2012	Stat	2018	Stat	2021	Stat*	2012	Stat	2018	Stat	2021	Stat*	2012	Stat	2018	Stat	2021
MP	17.47	OD	18.30	OD	16.30	UP	25.89	UP	33.20	UP	26.22	UP	22.57	UP	32.32	UP	24.08	WB	17.82	UP	21.58	UP	17.63
OD	14.43	RJ	13.46	RJ	15.57	BR	12.56	BR	16.35	BR	20.76	BR	14.81	BR	14.80	BR	18.14	UP	16.04	WB	18.55	WB	16.86
RJ	11.45	MP	11.57	MP	14.96	WB	8.87	TN	11.06	TN	9.51	TN	9.51	TN	8.65	TN	10.03	MH	13.55	MH	12.88	MH	13.15
MH	10.15	JH	11.14	JH	10.43	AP	8.22	OD	6.43	WB	7.14	AP	8.71	RJ	6.25	MP	7.50	BR	7.90	OD	10.36	BR	11.49
GJ	9.17	MH	10.24	GJ	9.66	TN	7.81	WB	5.43	RJ	5.45	MP	7.57	OD	5.92	OD	6.23	AP	7.57	KT	7.83	MP	9.02
CG	8.57	GJ	7.44	MH	8.15	RJ	6.03	MP	4.36	OD	5.29	KT	6.82	MP	5.87	RJ	5.96	OD	6.90	BR	7.78	OD	7.42
JH	8.22	WB	6.73	WB	5.89	MP	5.98	RJ	4.24	MP	4.67	MH	6.07	KT	5.57	JH	5.89	KT	5.56	MP	4.73	AP	5.00
AP	7.19	AP	4.09	AP	4.12	OD	5.31	KT	3.85	MH	4.27	RJ	5.94	AP	4.45	AP	5.16	RJ	4.66	AP	4.38	RJ	3.66
KT	4.41	UP	3.21	CG	3.71	KT	4.72	AP	3.72	JH	4.14	JH	4.36	MH	4.06	KT	4.91	MP	4.56	RJ	3.76	KT	3.58
WB	3.22	CG	2.93	BR	2.97	MH	3.84	MH	3.32	AP	3.94	OD	4.23	JH	3.84	MH	3.97	JK	2.81	GJ	2.84	GJ	3.23
UP	2.36	KT	2.53	KT	2.66	CG	2.18	JH	2.35	KT	3.86	GJ	3.82	GJ	3.24	GJ	3.86	AS	2.29	JK	1.62	JH	3.15
BR	1.09	BR	2.18	TN	0.89	PB	1.96	PB	1.21	GJ	1.59	CG	2.47	WB	1.20	WB	2.23	GJ	2.14	AS	0.84	JK	2.93
TN	0.74	TN	1.02	UP	0.65	GJ	1.77	GJ	0.78	PB	0.79	WB	1.35	CG	0.35	CG	0.55	HR	1.99	JH	0.62	PB	0.82
JK	0.43	JK	0.98	JK	0.36	JH	1.65	CG	0.41	HR	0.57	HR	0.55	AS	0.28	PB	0.13	JH	1.90	PB	0.53	AS	0.59
AS	0.30	AS	0.32	AS	0.33	HR	1.04	JK	0.41	CG	0.27	AS	0.47	HR	0.22	AS	0.09	PB	1.16	HP	0.22	HR	0.45
HP	0.12	HR	0.18	UK	0.17	JK	0.62	HR	0.40	JK	0.24	UK	0.20	JK	0.11	UK	0.08	UK	0.91	HR	0.21	HP	0.35
UK	0.10	KL	0.02	HP	0.03	OK	0.52	UK	0.20	AS	0.16	HP	0.19	PB	0.09	HP	0.07	HP	0.90	CG	0.17	CG	0.21
KL	0.08	HP	0.01	KL	0.02	HP	0.44	HP	0.13	UK	0.14	KL	0.12	HP	0.04	HR	0.07	TN	0.53	UK	0.16	UK	0.17
HR	0.04	PB	0.00	HR	0.00	KL	0.24	KL	0.08	HP	0.10	PB	0.10	UK	0.03	JK	0.06	CG	0.52	TN	0.12	TN	0.07
PB	0.00	UK	0.00	PB	0.00	AS	0.22	AS	0.05	KL	0.00	JK	0.03	KL	0.01	KL	0.02	KL	0.20	KL	0.00	KL	0.01

Source: Author's calculation based on 69, 76 and 78 round*State- KL- Kerala, RJ- Rajasthan, MH- Maharashtra, MP- Madhya Pradesh, JH- Jharkhand, OD- Odisha, AP- Andhra Pradesh, UP- Uttar Pradesh, GJ- Gujarat, WB- West Bengal, As- Assam, TN- Tamil Nadu, KT- Karnataka, BR- Bihar, JK- Jammu and Kashmir, HR- Haryana, CG- Chhattisgarh, UK- Uttarakhand / Uttaranchal, HP- Himachal Pradesh, PB- Punjab.

Table 5: Ranking of the state according to social groups: Hand wash (2018)

States	ST	States	SC	States	OBC	States	Others
OD	16.10	UP	17.14	TN	16.85	WB	23.29
MP	10.40	TN	16.04	UP	13.96	MH	10.39
JH	9.84	BR	14.45	BR	12.07	AP	10.09
RJ	9.22	WB	9.68	AP	9.98	AS	9.70
MH	8.71	AP	8.78	KT	7.82	UP	7.59
GJ	8.58	OD	5.88	RJ	6.30	OD	7.07
WB	7.00	KT	5.01	OD	5.89	BR	5.87
AP	5.21	RJ	4.27	JH	4.24	KT	5.69
CG	3.75	MP	3.61	MH	4.11	JK	3.36
AS	3.47	MH	3.11	MP	3.67	RJ	3.12
KT	2.60	JH	2.59	WB	2.39	MP	2.80
UP	1.53	HR	1.22	GJ	2.26	GJ	2.36
TN	1.11	GJ	1.03	AS	1.86	KL	2.24
JK	1.03	AS	0.88	KL	1.60	JH	1.24
BR	0.93	KL	0.85	CG	0.91	HR	1.17
KL	0.29	PB	0.67	HR	0.49	UK	0.63
UK	0.06	CG	0.66	JK	0.18	PB	0.27
HP	0.00	UK	0.63	UK	0.04	HP	0.26
HR	0.00	JK	0.26	HP	0.02	CG	0.16
PB	0.00	HP	0.06	PB	0.00	TN	0.14

Source: KL- Kerala, RJ- Rajasthan, MH- Maharashtra, MP- Madhya Pradesh, JH- Jharkhand, OD- Odisha, AP- Andhra Pradesh, UP- Uttar Pradesh, GJ- Gujarat, WB- West Bengal, As- Assam, TN- Tamil Nadu, KT- Karnataka, BR- Bihar, JK- Jammu and Kashmir, HR- Haryana, CG- Chhattisgarh, UK- Uttarakhand / Uttaranchal, HP- Himachal Pradesh, PB- Punjab

Unimproved Drinking Water

Tables 6 and 7 show the position of the states (top five and bottom five) regarding the use of unimproved water and non-access to latrines in rural areas for different social groups. The names above the Indian average and in the top five states show the poor situation. In parentheses, the figure shows the percentage of the rural population without access to the mentioned aspects of WASH. The result indicates that the percentage of rural households using unimproved drinking water sources has decreased over the years for most states. In 2012, in Kerala, the rural population was seven times the Indian average and depended on unimproved water, whereas in 2021, it was ten times the Indian average. Residents of Kerala state are leading in all three surveys, followed by Jharkhand. Apart from Chhattisgarh and Karnataka, all other states are above the Indian average in all three surveys.

Regarding the ST category, Chhattisgarh and Jharkhand consistently appear in the top five states. In contrast, for the SC and Other Categories, households with unimproved water access issues are not concentrated in a particular state, as only UP, J&K, Haryana & WB appear twice in the top five states. For OBC, southern states, viz. Tami Nadu, Kerala and Karnataka, need to work more. Intriguingly, most households using unimproved drinking water sources belong to the OBC category (Table 8).

Expenditure quartiles are used to identify the most marginalised socio-economic group of each state. Households in the lower expenditure quartile within the ST category in Uttar Pradesh, Maharashtra, Andhra Pradesh, Madhya Pradesh, Karnataka, Rajasthan, and Kerala are the most vulnerable in terms of access to improved drinking water. Households in the lower and lower-middle expenditure quartiles in Uttarakhand, Assam, and Jammu & Kashmir are the most vulnerable within the SC category. Households in the lower expenditure quartile in the Others Category in rural Jharkhand are the most susceptible. Households belonging to the lower middle expenditure quartile and upper middle expenditure quartile in West Bengal and Chhattisgarh, respectively, are the most marginalised in the Others Category (Appendix A1).

Table 6: Use of Unimproved Drinking Water: Status of states in comparison of India

2012	2018	2021	2012	2018	2021
Above the India			Below the India		
India(11.64)	India(4.52)	India(4.45)	India(11.64)	India(4.52)	India(4.45)
Kerala(71.12)	Kerala(44.8)	Kerala(45.9)	Gujarat(11)	Uttarakhand (3.99)	AP (3.23)
Jharkhand(35.61)	Jharkhand(13.94)	Jharkhand(14.99)	AP (8.08)	AP (3.88)	Gujarat(2.64)
Rajasthan(23.15)	J & K(11.92)	MP (12.52)	Haryana(7.44)	WB (2.2)	HP (1.56)
J & K(19.33)	MP (11.53)	Assam(9.9)	Tamil Nadu(6.07)	HP (1.91)	WB (1.25)
Odisha(17.62)	Odisha(10.32)	Odisha(8.04)	Chhattisgarh(5.17)	Gujarat(1.5)	UP (0.69)
MP (16.71)	Assam(9.71)	Maharashtra(7.36)	WB (4.89)	UP (0.99)	Bihar(0.69)
Assam(14.92)	Rajasthan(9.48)	J & K(7.19)	Karnataka(4.84)	Tamil Nadu(0.27)	Tamil Nadu(0.52)
Maharashtra(14.53)	Maharashtra(6.59)	Rajasthan(6.18)	HP (4.18)	Punjab(0.18)	Haryana(0.07)
	Chhattisgarh(5.92)	Chhattisgarh(5.42)	UP (3.42)	Bihar(0.15)	Punjab(0.04)
	Karnataka(5.66)	Uttarakhand(4.87)	Bihar(2.31)	Haryana(0.12)	
		Karnataka(4.46)			

Table 7: Non access to Latrine: Status of states in comparison of India

2012	2018	2021	2012	2018	2021
Above the Indian average			Below the Indian average		
India(59.35)	India(4.5)	India(4.5)	India(59.35)	India(4.5)	India(4.5)
Jharkhand(90.51)	Odisha(50.68)	Jharkhand(41.23)	AP (54.34)	Haryana(4.24)	Punjab(4.05)
Odisha(81.26)	UP (47.96)	Odisha(36.35)	Maharashtra(53.98)	Uttarakhand(2.86)	Haryana(3.29)
MP (79.01)	Jharkhand(41.9)	Bihar(33.53)	J & K(44.3)	HP (2.67)	Uttarakhand(2.77)
Chhattisgarh(76.7)	Tamil Nadu(37.2)	MP (28.31)	WB (39.72)	Assam(2.47)	HP (2.5)
UP (75.29)	Bihar(36.25)	Rajasthan(28.12)	HP (25.7)	Delhi(0.82)	Delhi(1.65)
Rajasthan(73.02)	Rajasthan(34.23)	Tamil Nadu(27.54)	Haryana(25.44)	Kerala(0.35)	Assam(1.44)
Bihar(72.83)	Karnataka(30.08)	UP (25.82)	Punjab(22.23)		WB (1.25)
Karnataka(70.8)	MP (28.97)	Gujarat(24.27)	Assam(13.7)		Kerala(0.1)
Tamil Nadu(66.37)	Gujarat(24.21)	Karnataka(19.53)	Kerala(2.81)		
Gujarat(58.69)	AP (22.63)	AP (18.61)	Uttarakhand(0)		
	WB (16.27)	Maharashtra(15.66)			
	J & K(14.76)	Chhattisgarh(8.49)			
	Chhattisgarh(8.59)				
	Punjab(6.57)				

Table 8: Unimproved water: State and Social Groups

2012		2018		2021	
Top Five State	Bottom Five State	Top Five State	Bottom Five State	Top Five State	Bottom Five State
ST					
Chhattisgarh(52.74)	Tamil Nadu(0)	Chhattisgarh(66.56)	Bihar(0)	Chhattisgarh(67.68)	Punjab(0)
Odisha(45.69)	Punjab(0)	Gujarat(54.43)	Punjab(0)	Gujarat(48.44)	Haryana(0)
Jharkhand(38.47)	Haryana(0)	Jharkhand(50.96)	Haryana(0)	Jharkhand(43.4)	Uttarakhand(0)
Gujarat(34.32)	Uttarakhand(0)	WB(41.16)	Uttarakhand(0)	MP 42.32)	UP (0.11)
MP (31.18)	Kerala(1.8)	J & K(32.27)	HP(0)	J & K(41.14)	Bihar(0.93)
SC					
UP (31.47)	Uttarakhand(0)	Haryana (100)	Tamil Nadu(0)	Punjab(100)	Haryana(0)
AP (31.12)	Punjab(2.77)	Uttarakhand(41.67)	HP(0)	Bihar(56.33)	HP(0)
J & K(24.68)	Chhattisgarh(4.32)	Bihar(33.62)	Gujarat(0.39)	UP (37.56)	Gujarat(2.61)
HP(24.31)	Gujarat(5.83)	WB(28.17)	Assam(7.25)	Uttarakhand(37.45)	J & K(5.76)
WB(24.04)	Karnataka(5.95)	UP (23.2)	J & K(8.97)	WB(25.38)	Chhattisgarh(5.95)
OBC					
Tamil Nadu(73.44)	Punjab(0)	Tamil Nadu(99.02)	Haryana(0)	Tamil Nadu(75.12)	Punjab(0)
Karnataka(61.95)	Uttarakhand(0)	Punjab(89.86)	J & K(10)	Karnataka(67.18)	Uttarakhand(2.06)
Kerala(56.77)	HP(2.87)	Karnataka(76.15)	WB(16.14)	Kerala(57.38)	HP(11.57)
Gujarat(55.75)	J & K(4.1)	Bihar(66.38)	Uttarakhand(18.38)	UP (55.98)	Chhattisgarh(15.67)
UP (54.84)	WB(13.15)	Kerala(54.42)	Chhattisgarh(19.02)	AP (48.59)	J & K(19.14)
Others					
Punjab(97.23)	Uttarakhand(0)	J & K(48.76)	Tamil Nadu(0)	HP(86.57)	Tamil Nadu(0)
HP(66.15)	Gujarat(4.1)	Assam(48.62)	Bihar(0)	Haryana(69.83)	Punjab(0)
Haryana(56.22)	Chhattisgarh(4.46)	HP(48.09)	Punjab(0)	Uttarakhand(60.48)	Jharkhand(5.27)
J & K(55.13)	Tamil Nadu(5.46)	Uttarakhand(39.95)	Haryana(0)	J & K(33.96)	UP (6.35)
WB(50.2)	Jharkhand(7.87)	Maharashtra(30.27)	Gujarat(0.39)	WB(28.41)	Rajasthan(6.6)

Note: States 100 percent against one category indicate that only the mentioned category people use the unimproved water in the particular year in the state. Ex- in 2018, in Haryana, only SC category people uses the unimproved water.

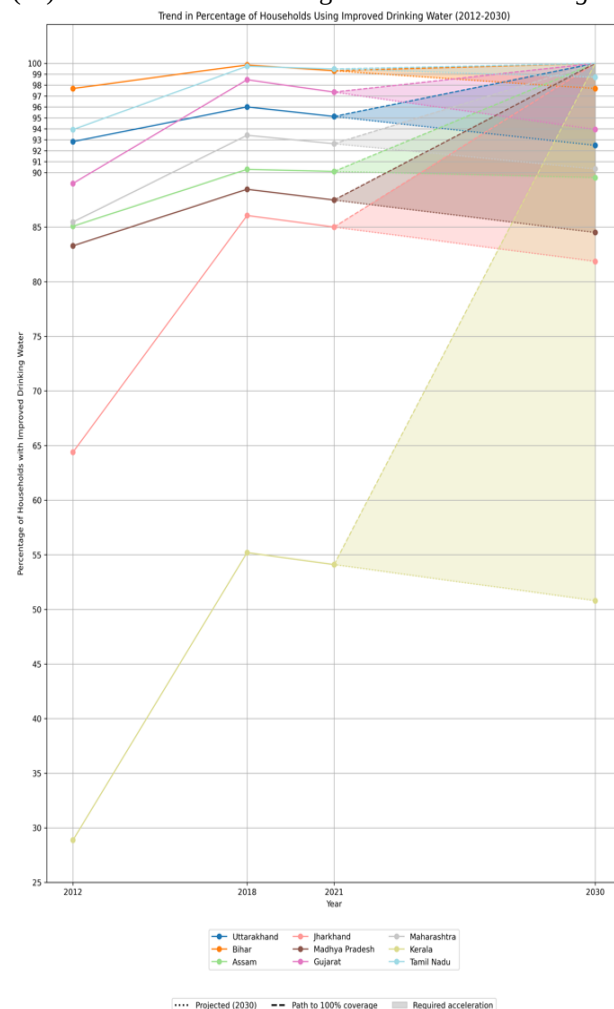
Table 9: Non Access to Latrine: Sate and Social Groups

2012		2018		2021	
Top Five state	Bottom Five state	Top Five state	Bottom Five state	Top Five state	Bottom Five state
ST					
Chhattisgarh(41.2)	Punjab(0)	Chhattisgarh(60.81)	Punjab(0)	Chhattisgarh(66.93)	Punjab(0)
Gujarat(34.42)	Uttarakhand(0)	Jharkhand(41.2)	Uttarakhand(0)	Gujarat(42.16)	Haryana(0)
Odisha(32.86)	Haryana(0.7)	Gujarat(36.87)	HP(1)	Rajasthan(38.62)	UP(0.59)
MP(30.85)	Bihar(1.39)	Odisha(33.88)	UP(1.86)	Odisha(37.6)	Tamil Nadu(2.23)
Jharkhand(30.44)	Tamil Nadu(1.63)	Rajasthan(32.13)	Tamil Nadu(2.19)	MP(33.44)	Bihar(3.48)
SC					
Punjab(69.93)	Uttarakhand(0)	Punjab(78.71)	Assam(4.77)	Haryana(70.43)	Kerala(5.97)
WB (38.01)	Assam(8.57)	Kerala(75.24)	Gujarat(7.04)	Punjab(64.19)	Chhattisgarh(8.16)
Kerala(37.85)	Jharkhand(10.46)	Uttarakhand(67.62)	Chhattisgarh(15.6)	Bihar(40.37)	Gujarat(11.49)
UP(32.82)	Gujarat(11.43)	HP(47.3)	Jharkhand(15.81)	UP(39.92)	J & K(16.56)
Haryana(32.29)	Maharashtra(13.33)	Tamil Nadu(43.22)	Maharashtra(16.52)	Tamil Nadu(39.51)	MP(17.33)
OBC					
Tamil Nadu(67.74)	Uttarakhand(0)	UP(54.93)	Punjab(8.91)	Kerala(60.26)	J & K(5.84)
Bihar(61.3)	J & K(2.51)	Tamil Nadu(54.42)	J & K(10.48)	Tamil Nadu(58.16)	Haryana(12.13)
Karnataka(55.27)	Punjab(6.72)	Bihar(53.96)	WB (10.91)	UP(51.17)	Punjab(15.11)
UP(53.98)	WB (10.94)	Karnataka(52.7)	Kerala(13.25)	Karnataka(51.06)	WB (16.33)
Jharkhand(52.28)	HP(26.45)	AP(48.73)	Uttarakhand(13.59)	AP (47.5)	Assam(18.65)
Other					
J & K(62.97)	Uttarakhand(0)	WB (37.5)	Kerala(0)	J & K(62.48)	Tamil Nadu(0.09)
Assam(50.43)	Tamil Nadu(1.13)	J & K(34.02)	Tamil Nadu(0.17)	HP(32.78)	Chhattisgarh(1.91)
WB (43.01)	Chhattisgarh(2.41)	Assam(30.96)	Jharkhand(1.48)	West Bengal (27.48)	Rajasthan(4.67)
HP(36.65)	Jharkhand(6.82)	HP(29.21)	Chhattisgarh(2.32)	Assam(27.25)	Jharkhand(4.98)
Haryana(34.88)	Gujarat(7.76)	Maharashtra(22.93)	Rajasthan(5.84)	Maharashtra(21.69)	Bihar(6.92)

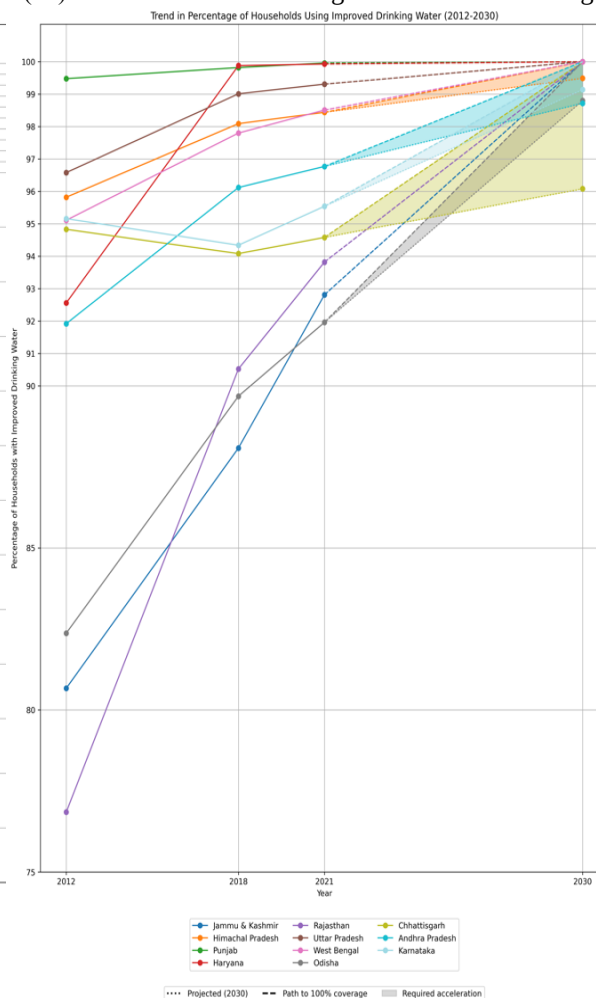
Graph 1a shows the percentage coverage for usage of Improved Sources of Drinking Water from 2012 to 2021. The projection for 2030 at current rates, and the acceleration required to reach 100% coverage is shown by shaded region for Uttarakhand, Jharkhand, Maharashtra, Bihar, Madhya Pradesh, Kerala, Assam, Gujarat, and Tamil Nadu. These are the states where the percentage coverage in 2021 is less than that in 2018, meaning that the growth rate is decreasing. Kerala, Jharkhand and Madhya Pradesh are the states that require the maximum acceleration to achieve the goal. Graph 1b shows the same as 1a for the states where the percentage coverage in 2021 is more than that in 2018. However, at the current rates, without any acceleration, Chhattisgarh, Andhra Pradesh, and Himachal Pradesh would not be able to achieve 100% coverage.

Graph 1: State-wise percentage coverage for usage of Improved Sources of Drinking Water from 2012 to 2021, projection for 2030 at current rates and acceleration required to reach 100% coverage by 2030.

(1a) for states where current growth rate is *decreasing*



(1b) for states where current growth rate is *increasing*



Sanitation

In India, in 2012, almost sixty per cent of the rural population did not have access to a latrine, but the percentage drastically came down to 4.5 per cent in 2018 and this percentage has remained constant in 2021. The list of 9 states Above-India average for non-access to latrines remained the same in all three years, except Jharkhand. It confirms that the last mile hurdle seems complicated to remove, and reaching the 100 per cent target by 2030 may be a real challenge after achieving unprecedented success (Table 7).

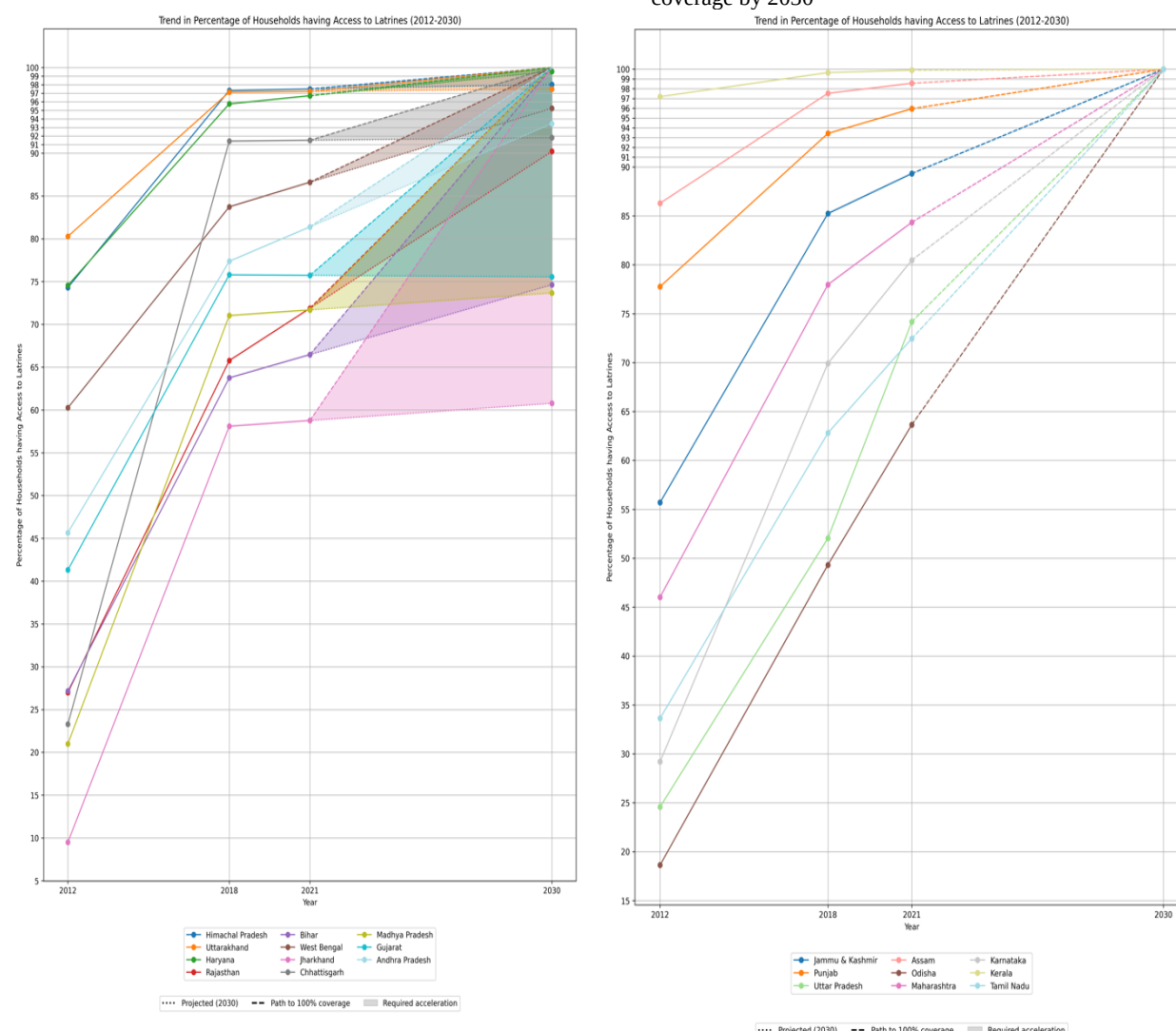
Considering the ST category, Chhattisgarh, Odisha, and Gujarat have continuously fallen behind in all three surveys as these states are in the top five. Rajasthan, Odisha, and MP are other states that need attention to improve the latrine facility for the ST category people. Punjab is the only state that appears in all three surveys among the top five states where the latrines for rural SC are lacking. Tamil Nadu, Karnataka, and UP must work for the OBC category, as these states appear in the top five list of all three surveys. For the other category, four states, J & K, HP, Assam and WB, consistently could not improve access to latrines (Table 9).

The households with the least access to latrines consistently fall within the lower expenditure quartile across various states, though the social group most affected varies by region. Specifically,

Scheduled Tribe (ST) households are the most disadvantaged in Odisha and Chhattisgarh, while Scheduled Caste (SC) households face the greatest deprivation in Kerala, Punjab, Haryana, and Uttarakhand. In Uttar Pradesh, Maharashtra, Andhra Pradesh, Tamil Nadu, Bihar, Madhya Pradesh, Karnataka, and Gujarat, it is the Other Backward Class (OBC) households that have the least latrine access, whereas in West Bengal and Assam, households belonging to the "Other" category record the lowest access. Across all these cases, the socially marginalized groups with the least latrine access are concentrated in the lower expenditure quartile (Appendix A2). Graphs 2a and 2b (similar to Graphs 1a and 1b) show the trends in households having access to latrines from 2012 to 2021. States like Jharkhand, Bihar, Gujarat, and Madhya Pradesh require urgent acceleration to achieve SDG 6. Graph 2b shows that the growth trajectory of Jammu & Kashmir, Assam, Karnataka, Punjab, Orissa, Kerala, Tamil Nadu, Maharashtra and Uttar Pradesh indicates that there is no need for acceleration to achieve the target by 2030.

Graph 2: State-wise percentage of households having access to latrines from 2012 to 2021, projection for 2030 at current rates and acceleration required to reach 100% coverage by 2030.

(2a) States needing acceleration to achieve 100% coverage by 2030 (2b) States needing no acceleration to achieve 100% coverage by 2030



Hygiene

Himachal Pradesh (3.4%) and Tamil Nadu (69.3%) emerge as the best and worst performing states, respectively, in terms of the proportion of households that do not wash hands after defecation.

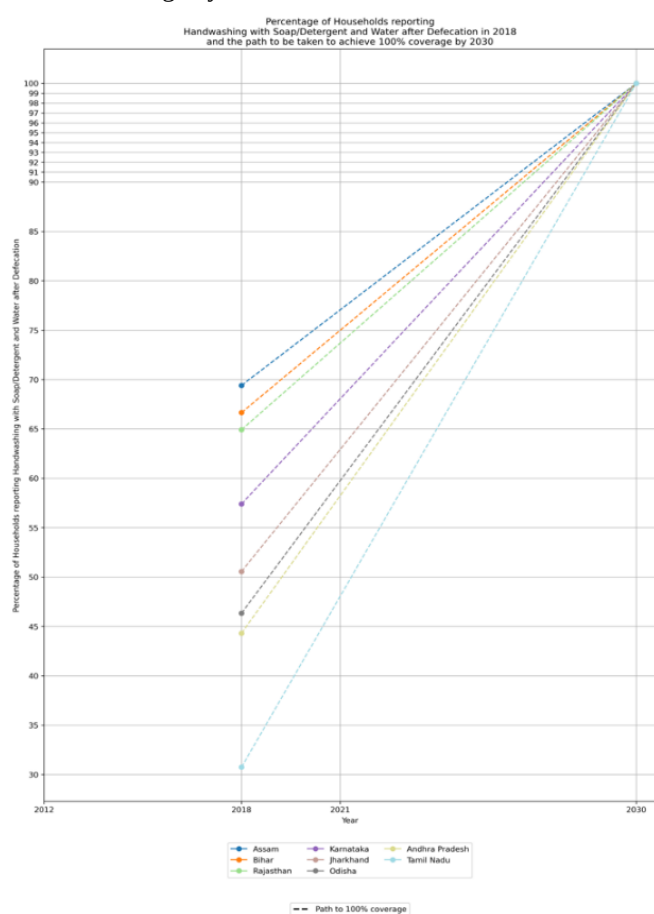
Notably, approximately one in every three rural households either does not wash hands after defecation at all, or does so using only water, sand, or ash, rather than soap.

Regarding the most vulnerable social groups in terms of handwashing with soap after defecation, ST households in Madhya Pradesh, Gujarat, Odisha, and Chhattisgarh are the most at risk, followed by SC households in Punjab, Haryana, and Uttarakhand. OBC households are most vulnerable in Uttar Pradesh, Maharashtra, Andhra Pradesh, Tamil Nadu, Bihar, Karnataka, Rajasthan, Kerala, and Jharkhand, while households belonging to the "Others" category face the greatest deprivation in West Bengal, Jammu & Kashmir, Assam, and Himachal Pradesh.

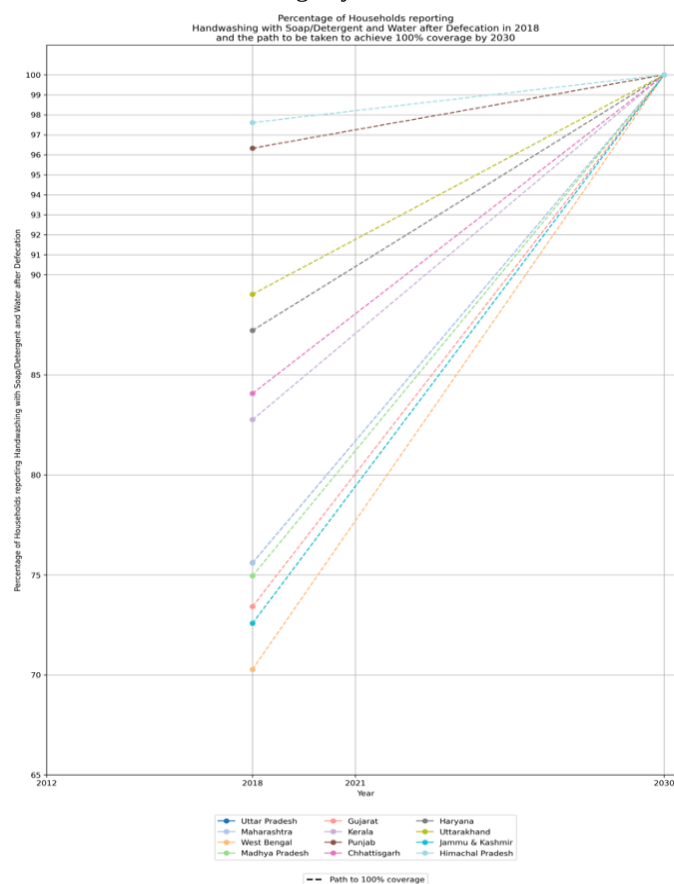
In terms of economic status, ST households in the lower expenditure quartile are the most deprived in Madhya Pradesh and Odisha, whereas in Gujarat, the lower-middle expenditure quartile is most affected, and in Chhattisgarh, it is households in the upper-middle expenditure quartile that have the least access to soap for handwashing. Among SC households in Punjab, Haryana, and Uttarakhand, those in the lower expenditure quartile are the most vulnerable. Similarly, OBC households in the lower expenditure quartile across Uttar Pradesh, Maharashtra, Tamil Nadu, Bihar, Kerala, and Jharkhand exhibit the least tendency to wash hands with soap after defecation. In West Bengal and Assam, "Others" category households belonging to the lower expenditure quartile follow a comparable pattern (Appendix A3). Graph 3 presents the state-wise percentage of households reporting handwashing with soap and water after defecation in 2018, with dashed lines indicating the trajectories that states need to follow in order to achieve 100% coverage by 2030.

Graph 3: Percentage of Households reporting Handwashing with Soap/Detergent and Water after Defecation in 2018 and the path to be taken to achieve 100% coverage by 2030.

(3a) States needing acceleration to achieve 100% coverage by 2030



(3b) States needing acceleration to achieve 100% coverage by 2030



VIII. Conclusion

Healthier and more prosperous society can be promoted by achieving the Sustainable Development Goals (SDGs). This can be done by identifying marginalised communities that need targeted interventions to bridge existing gaps. The present study examined how access to WASH services varies across different states among various social groups and expenditure quartiles. The analysis reveals that though there has been a positive trend in accessibility to WASH, there is substantial variation across states and socio-economic groups, emphasising the urgent need for equitable WASH access. In rural India, around 11.64 per cent of the residents used unimproved water in 2012, which has come down drastically to 4.45 per cent in 2021, but Kerala is a state which consistently appears at the top of the list of states. Considering the social groups, different states show poor situations. For drinking water, Chhattisgarh, Andhra Pradesh and Himachal Pradesh need to work more to achieve the SDG Goal. India has done unprecedented work in sanitation and access to latrines as a nation, but Punjab is the point of concern for the SC category. The percentage of households where members wash their hands with soap and water after defecation ranges between 30.7% and 97.6% for the concerned states. Lower-expenditure quartile households consistently lack access to improved drinking water and sanitation facilities, emphasising the intersectionality of socio-economic factors in determining access to water and sanitation. Access to the WASH facilities needs to be more equitable. Different social groups in different states have been left behind compared to other groups. These households are not concentrated in a particular state. They are spread over different states. Different states must do their jobs to achieve the goal. At a national level, the households in the OBC category emerge as the most vulnerable in all the WASH parameters.

Addressing the complex challenges of WASH requires a holistic approach that integrates social, cultural, environmental, and economic considerations. A one-size-fits-all policy at the central level won't suffice; the policies need to be altered to fit the requirements of the states. These policies should address state-wise disparities, social group vulnerabilities, and behavioural challenges to achieve sustainable progress toward SDG 6 targets. Investments in WASH infrastructure, behavioural change interventions, and policy reforms are essential to ensure universal access to safe water, sanitation, and hygiene. The local governance bodies and the stakeholders, such as gram panchayats and municipal corporations, should be responsible for advancing the inclusion of WASH facilities. The central government should also mobilise the local bodies by providing adequate resources. Such policy targets would empower vulnerable and marginalised groups and provide them equal access, opportunities, and standing within the social fabric. By prioritising WASH as a fundamental human right and a cornerstone of sustainable development, societies can foster healthier communities. Empowering and enabling the socially and economically disadvantaged groups by giving inclusive accessibility would be critical to paving the way for a prosperous and progressive nation.

References

- Acheampong, A. O., Opoku, E. E. O., & Tetteh, G. K. (2024). Unveiling the effect of income inequality on safe drinking water, sanitation and hygiene (WASH): Does financial inclusion matter? *World Development*, 178, 106573. <https://doi.org/10.1016/j.worlddev.2024.106573>
- Anderson, D. M., Gupta, A. K., Birken, S. A., Sakas, Z., & Freeman, M. C. (2022). Adaptation in rural water, sanitation, and hygiene programs: A qualitative study in Nepal. *International Journal of Hygiene and Environmental Health*, 240, 113919. <https://doi.org/10.1016/j.ijheh.2022.113919>
- Augsburg, B., Baquero, J. P., Gautam, S., & Rodriguez-Lesmes, P. (2023). Sanitation and marriage markets in India: Evidence from the Total Sanitation Campaign. *Journal of Development Economics*, 163, 103092. <https://doi.org/10.1016/j.jdeveco.2023.103092>
- Augsburg, B., & Rodríguez-Lesmes, P. (2020). Sanitation dynamics: Toilet acquisition and its economic and social implications in rural and urban contexts. *Journal of Water, Sanitation and Hygiene for Development*, 10(4), 628–641. <https://doi.org/10.2166/washdev.2020.098>
- Balasubramanya, S., Stifel, D., Alvi, M., & Ringler, C. (2022). The role of social identity in improving access to water, sanitation and hygiene (WASH) and health services: Evidence from Nepal. *Development Policy Review*, 40(4), e12588. <https://doi.org/10.1111/dpr.12588>

- Banda, K., Sarkar, R., Gopal, S., Govindarajan, J., Harijan, B. B., Jeyakumar, M. B., Mitta, P., Sadanala, M. E., Selwyn, T., Suresh, C. R., Thomas, V. A., Devadason, P., Kumar, R., Selvapandian, D., Kang, G., & Balraj, V. (2007). Water handling, sanitation and defecation practices in rural southern India: A knowledge, attitudes and practices study. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 101(11), 1124–1130. <https://doi.org/10.1016/j.trstmh.2007.05.004>
- Barnard, S., Routray, P., Majorin, F., Peletz, R., Boisson, S., Sinha, A., & Clasen, T. (2013). Impact of Indian Total Sanitation Campaign on latrine coverage and use: A cross-sectional study in Orissa three years following programme implementation. *PloS One*, 8(8), e71438. <https://doi.org/10.1371/journal.pone.0071438>
- Bhutta, Z. A., Ahmed, T., Black, R. E., Cousens, S., Dewey, K., Giugliani, E., Haider, B. A., Kirkwood, B., Morris, S. S., Sachdev, H. P. S., Shekar, M., & Maternal and Child Undernutrition Study Group. (2008). What works? Interventions for maternal and child undernutrition and survival. *Lancet (London, England)*, 371(9610), 417–440. [https://doi.org/10.1016/S0140-6736\(07\)61693-6](https://doi.org/10.1016/S0140-6736(07)61693-6)
- Bonu, S., & Kim, H. (2009). *Sanitation in India: Progress, Differences, Correlates, and Challenges*. Asian Development Bank.
- Boroah, V. K. (2020). *Sanitation and Hygiene in India*. 47.
- Coffey, D., & Spears, D. (2017). *Where India Goes*. Harper Collins, India. <https://www.ias.asia/the-review/where-india-goes>
- Deshpande, A., Miller-Petrie, M. K., Lindstedt, P. A., Baumann, M. M., Johnson, K. B., Blacker, B. F., Abbastabar, H., Abd-Allah, F., Abdelalim, A., Abdollahpour, I., Abegaz, K. H., Abejie, A. N., Abreu, L. G., Abrigo, M. R. M., Abualhasan, A., Accrombessi, M. M. K., Adamu, A. A., Adebayo, O. M., Adedeji, I. A., ... Reiner, R. C. (2020). Mapping geographical inequalities in access to drinking water and sanitation facilities in low-income and middle-income countries, 2000–17. *The Lancet Global Health*, 8(9), e1162–e1185. [https://doi.org/10.1016/S2214-109X\(20\)30278-3](https://doi.org/10.1016/S2214-109X(20)30278-3)
- Doron, A., & Jeffrey, R. (2014). Open Defecation in India. *Economic and Political Weekly*, 49(49), 72–78.
- Ghosh, P., Hossain, M., & Sarkar, S. (2023). Inequality Among Social Groups in Accessing Improved Drinking Water and Sanitation in India: A District-Level Spatial Analysis. *Professional Geographer*, 75(3), 361–382. <https://doi.org/10.1080/00330124.2022.2124181>
- Gupta, A., Khalid, N., Deshpande, D., Hathi, P., Kapur, A., Srivastav, N., Vyas, S., Spears, D., & Coffey, D. (2023). Revisiting Open Defecation. *Economic and Political Weekly*, 55(21).
- Hathi, P., Haque, S., Pant, L., Coffey, D., & Spears, D. (2017). Place and Child Health: The Interaction of Population Density and Sanitation in Developing Countries. *Demography*, 54(1), 337–360. <https://doi.org/10.1007/s13524-016-0538-y>
- Hutton, G., Haller, L., & Bartram, J. (2007). Global cost-benefit analysis of water supply and sanitation interventions. *Journal of Water and Health*, 5(4), 481–502. <https://doi.org/10.2166/wh.2007.009>
- Hutton, G., Odhiambo, F., Osbert, N., Kumar, A., & Patil, S. (2018). *Financial and Economic Impacts of the Swachh Bharat Mission in India*. UNICEF. <https://www.unicef.org/india/media/1206/file/Financial-and-Economic-Impacts.pdf>
- Indicator 6.1.1 “Proportion of population using safely managed drinking water services”. (n.d.). UN-Water. Retrieved 14 February 2024, from <https://www.unwater.org/our-work/integrated-monitoring-initiative-sdg-6/indicator-611-proportion-population-using-safely>
- Indicator 6.2.1 “Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water”. (n.d.). UN-Water. Retrieved 14 February 2024, from <https://www.unwater.org/our-work/integrated-monitoring-initiative-sdg-6/indicator-621-proportion-population-using-safely>
- Jamwal, K. (2020). Rethinking Right to Water. *Economic and Political Weekly*, 55(24), 5.
- Kedia, M. (2022). Sanitation policy in India – designed to fail? *Policy Design and Practice*, 5(3), 307–325. <https://doi.org/10.1080/25741292.2022.2069650>
- Kumar, A. (2015). Discrepancies in Sanitation Statistics of Rural India. *Economic and Political Weekly*, 50(2), 13–15.
- Mahajan, K., & Sekhri, S. (2020). *Access to Toilets and Violence Against Women*.
- Mills, F., Willetts, J., Petterson, S., Mitchell, C., & Norman, G. (2018). Faecal Pathogen Flows and Their Public Health Risks in Urban Environments: A Proposed Approach to Inform Sanitation Planning. *International Journal of Environmental Research and Public Health*, 15(2), Article 2. <https://doi.org/10.3390/ijerph15020181>
- Mishra, U. S., & Joe, W. (2020). Household Assets and Wealth Quintiles, India 2006–16. *Economic and Political Weekly*, 55(6).
- Mishra, U. S., & Shukla, V. (2015). Provisions of Basic Household Amenities in India: A Progress Report. *Social Change*, 45(3), 421–439. <https://doi.org/10.1177/0049085715589463>

- Mondal, D. (2022). Access to Latrine Facilities and Associated Factors in India: An Empirical and Spatial Analysis. *Indian Journal of Human Development*, 16, 097370302211412. <https://doi.org/10.1177/09737030221141248>
- Narayanan, R., van Norden, H., Gosling, L., & Patkar, A. (2012). Equity and Inclusion in Sanitation and Hygiene in South Asia: A Regional Synthesis. *IDS Bulletin*, 43(2), 101–111. <https://doi.org/10.1111/j.1759-5436.2012.00314.x>
- O'Reilly, K., & Louis, E. (2014). The toilet tripod: Understanding successful sanitation in rural India. *Health & Place*, 29, 43–51. <https://doi.org/10.1016/j.healthplace.2014.05.007>
- Progress on drinking water, sanitation and hygiene: 2017 update and SDG baselines*. (2017). World Health Organization (WHO) and United Nations Children's Fund (UNICEF). <https://iris.who.int/handle/10665/258617>
- Raising a Stink. (2016). *Economic and Political Weekly*, 51(25). https://www.epw.in/system/files/pdf/2016_51/25/raisingastink.pdf
- Rajmohan, N. (2020). Groundwater Contamination Issues in the Shallow Aquifer, Ramganga Sub-basin, India. In M. Kumar, D. D. Snow, & R. Honda (Eds.), *Emerging Issues in the Water Environment during Anthropocene: A South East Asian Perspective* (pp. 337–354). Springer. https://doi.org/10.1007/978-981-32-9771-5_18
- SDG India- Index and Dashboard*. (2019). United Nations, NITI Aayog. <https://www.niti.gov.in/sites/default/files/2020-07/SDG-India-Index-2.0.pdf>
- Shankar, H., Mishra, C., & Singh, G. (2011). Practices and Coverage Regarding Safe Water Supply, Sanitation and Personal Hygiene in Rural Community of Varanasi, India. *Indian Journal of Preventive and Social Medicine*, 42, 177–182.
- The Sanitation Economy in India*. (2017). Toilet Board Coalition. https://www.toiletboard.org/media/38-The_Sanitation_Economy_in_India.pdf
- The Sustainable Development Goals Report* (Annual Report ISBN 978-92-1-101448-8). (2022). United Nations. <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf>
- Tyagi, A., Hutton, G., & Sen, S. (2011). *Economic Impacts of Inadequate Sanitation in India* (Flagship Report 68159). Water and Sanitation Program-World Bank. <https://documents1.worldbank.org/curated/en/820131468041640929/pdf/681590WSP0Box30UBLIC00WSP0esi0india.pdf>
- Van Minh, H., & Nguyen-Viet, H. (2011). Economic Aspects of Sanitation in Developing Countries. *Environmental Health Insights*, 5, 63–70. <https://doi.org/10.4137/EHI.S8199>
- Vani, B. P., & Madheswaran, S. (2018). Inequalities of Human Opportunities in India: A State-level Analysis. *Indian Journal of Human Development*, 12(2), 248–264. <https://doi.org/10.1177/0973703018791385>
- WASH economy yields monetary returns, industrial growth and employment: Hitesh Vaidya, NIUA - ET Government. (2022, March 24). *ETGovernment.Com*. <https://government.economictimes.indiatimes.com/news/economy/wash-economy-yields-monetary-returns-industrial-growth-and-employment-hitesh-vaidya-niua/90420544>

Appendix

A1: Unimproved water: Sate, social groups and expenditure quartiles

State	Yr	ST				SC				OBC				Others			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UP	A	70.2	29.8	0.0	0.0	48.0	33.7	6.8	11.5	43.2	23.1	16.5	17.3	15.5	28.1	16.5	40.0
	B	90.1	9.9	0.0	0.0	62.6	11.3	24.3	1.8	31.8	40.0	23.2	5.0	22.3	17.6	31.5	28.6
	C	100.0	0.0	0.0	0.0	39.1	28.7	21.9	10.4	20.7	29.9	19.9	29.5	68.9	5.9	16.5	8.8
MH	A	50.7	42.8	6.4	0.0	66.1	28.6	4.1	1.2	38.4	45.2	15.7	0.8	27.3	33.0	33.7	6.1
	B	67.3	23.8	8.9	0.0	56.6	34.8	8.6	0.0	52.8	36.4	10.0	0.8	42.5	35.7	18.5	3.3
	C	50.0	37.2	11.8	1.0	48.0	25.1	13.7	13.2	31.8	39.8	19.1	9.3	38.3	40.1	15.5	6.1
AP	A	56.2	32.7	10.9	0.2	16.1	40.7	32.7	10.4	29.0	40.0	25.8	5.2	23.8	10.9	28.4	36.9
	B	73.8	18.9	7.3	0.0	37.7	19.9	42.4	0.0	29.5	48.2	10.3	12.1	10.6	9.5	11.0	68.9
	C	16.9	19.4	59.9	3.8	35.5	25.9	22.0	16.6	27.7	32.9	27.8	11.7	31.8	21.1	30.1	17.1
WB	A	40.2	41.1	18.8	0.0	28.2	24.3	35.6	11.8	38.6	14.9	22.8	23.7	23.9	36.8	28.4	10.9
	B	42.5	27.0	27.8	2.8	28.7	27.4	25.0	18.9	54.0	16.4	24.0	5.6	34.0	33.0	25.1	8.0
	C	34.7	44.0	16.4	5.0	29.0	55.9	10.2	4.9	31.7	45.1	14.8	8.4	37.1	29.8	22.2	10.9
TN	A	0.0	0.0	0.0	0.0	20.9	45.6	28.8	4.7	25.6	30.5	34.1	9.9	48.7	12.2	39.1	0.0
	B	20.0	40.0	40.0	0.0	0.0	0.0	0.0	0.0	35.2	15.2	47.5	2.1	0.0	0.0	0.0	0.0
	C	39.6	26.0	7.7	26.8	67.1	23.4	4.4	5.0	83.7	4.8	4.8	6.6	0.0	0.0	0.0	0.0
BR	A	4.4	0.0	47.8	47.8	64.5	16.4	19.1	0.0	28.8	25.2	31.8	14.2	28.4	0.5	46.7	24.4
	B	0.0	0.0	0.0	0.0	0.0	66.7	33.3	0.0	38.0	27.9	19.8	14.3	0.0	0.0	0.0	0.0
	C	30.3	29.6	22.9	17.2	15.1	31.6	16.3	37.1	13.8	11.9	26.0	48.3	6.7	15.5	0.7	77.1
MP	A	54.4	21.9	20.6	3.1	56.1	19.7	21.0	3.3	38.5	30.7	22.2	8.6	14.3	43.7	35.2	6.9
	B	39.8	35.4	17.4	7.4	52.4	23.9	20.6	3.1	30.5	33.8	23.9	11.8	37.7	33.7	26.6	1.9
	C	39.7	30.2	16.0	14.1	38.7	26.1	20.6	14.5	27.5	34.3	26.8	11.4	20.9	23.1	43.6	12.4
KT	A	34.1	64.6	1.3	0.0	72.4	27.6	0.0	0.0	38.3	24.6	21.6	15.5	24.9	54.2	20.9	0.0
	B	92.1	7.9	0.0	0.0	14.6	55.0	30.3	0.0	20.6	26.2	38.3	14.9	31.3	4.6	35.0	29.1
	C	18.5	32.5	36.8	12.3	26.1	24.5	27.2	22.3	10.7	17.3	36.4	35.7	26.5	26.3	24.7	22.5
RJ	A	60.4	22.3	11.4	6.0	20.0	31.0	36.0	13.1	18.5	25.9	36.2	19.5	21.3	26.1	27.0	25.6
	B	53.9	28.0	14.4	3.8	19.3	33.1	37.4	10.3	23.8	32.2	25.7	18.4	17.8	33.9	23.1	25.2
	C	45.6	16.3	13.0	25.2	22.7	23.9	24.2	29.2	24.4	16.0	24.3	35.3	27.2	26.0	25.5	21.3
GJ	A	15.4	42.3	26.7	15.6	49.8	37.6	0.0	12.7	10.9	31.5	43.9	13.8	0.4	7.4	59.8	32.4
	B	6.9	55.0	28.0	10.1	100.0	0.0	0.0	0.0	18.9	14.0	22.8	44.3	15.2	0.0	0.0	84.8
	C	7.0	27.2	32.2	33.6	84.8	0.4	14.9	0.0	27.9	31.0	34.3	6.8	29.7	19.6	6.8	43.9
OD	A	53.1	26.1	10.4	10.5	49.2	34.5	11.7	4.5	22.5	22.6	36.0	18.8	7.1	15.1	46.3	31.5
	B	43.4	26.4	22.9	7.4	26.3	31.8	32.0	9.9	21.6	25.3	34.6	18.5	18.2	30.1	24.4	27.4
	C	32.1	36.6	26.3	5.0	38.2	45.3	7.6	8.9	19.6	29.8	35.6	15.0	26.7	17.7	9.1	46.4
KL	A	61.4	25.9	12.6	0.2	35.8	42.6	16.9	4.6	17.6	31.6	32.6	18.2	22.1	22.9	30.3	24.7
	B	65.5	22.6	4.9	7.0	38.3	28.1	17.5	16.0	29.3	27.2	22.8	20.8	26.2	20.6	22.0	31.2
	C	62.7	26.1	7.6	3.6	38.7	27.5	20.7	13.1	29.4	30.7	25.8	14.1	28.6	24.0	23.4	24.0
JH	A	36.7	38.9	17.8	6.6	22.3	47.5	12.1	18.2	29.6	27.4	31.9	11.1	8.8	18.2	36.7	36.4
	B	45.5	30.4	19.0	5.1	22.8	59.2	18.0	0.0	27.4	28.5	26.6	17.5	75.2	0.0	0.0	24.8
	C	39.7	28.9	23.6	7.9	24.5	25.5	32.6	17.4	29.4	29.5	23.4	17.8	12.8	30.6	22.4	34.2
PB	A	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	29.9	0.0	62.8
	B	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	C	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
AS	A	27.1	33.4	27.5	12.0	18.0	37.4	31.8	12.8	31.3	29.2	20.5	19.0	23.7	46.5	16.0	13.9
	B	20.9	29.3	42.0	7.9	35.1	37.3	14.7	13.0	28.9	35.1	18.7	17.3	22.7	33.4	30.8	13.1
	C	36.9	33.3	17.0	12.9	30.2	49.3	20.4	0.2	46.8	28.1	18.7	6.4	34.1	35.1	16.4	14.3
CG	A	16.8	30.0	39.7	13.5	5.7	0.0	68.8	25.6	12.7	54.8	21.2	11.3	0.0	45.7	15.4	38.9
	B	23.6	39.1	25.6	11.7	23.9	30.4	45.7	0.0	25.0	29.4	43.5	2.1	0.0	0.0	100.0	0.0
	C	44.1	30.2	16.3	9.4	51.0	48.0	1.1	0.0	36.8	19.2	29.9	14.1	24.2	36.6	25.9	13.3
HR	A	0.0	0.0	0.0	0.0	52.7	4.6	32.7	10.1	45.9	8.3	26.1	19.7	28.4	25.9	36.8	8.9
	B	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	81.0	19.0	0.0
UK	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	B	0.0	0.0	0.0	0.0	41.6	55.2	3.3	0.0	0.0	66.7	0.0	33.3	4.0	80.7	0.0	15.3
	C	0.0	0.0	0.0	0.0	52.5	11.3	15.9	20.3	37.5	37.5	25.0	0.0	42.2	23.7	26.2	7.8
JK	A	19.0	44.8	29.9	6.4	53.6	32.2	14.3	0.0	10.4	47.7	37.8	4.2	34.3	21.4	20.7	23.7
	B	51.5	19.7	27.3	1.6	14.8	28.2	47.1	9.9	55.1	23.5	16.0	5.4	28.5	27.6	31.5	12.4
	C	6.9	40.7	46.3	6.1	7.3	85.4	7.3	0.0	0.6	14.6	15.2	69.7	12.2	40.0	22.4	25.4
HP	A	6.1	93.9	0.0	0.0	25.9	0.0	36.4	37.7	0.0	100.0	0.0	0.0	22.6	36.2	35.3	6.0
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.8	23.5	8.2	28.6	29.6	50.7	16.2	3.6
	C	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	21.3	7.5	3.0	68.2
India	A	44.1	31.5	17.2	7.2	37.1	33.8	21.0	8.0	26.2	30.7	29.3	13.9	22.0	26.6	30.4	21.0
	B	45.1	29.2	19.3	6.5	36.1	29.4	24.3	10.2	27.3	27.9	25.2	19.6	25.8	25.8	23.2	25.1
	C	39.4	29.9	19.2	11.5	33.7	30.1	20.0	16.2	26.3	28.9	25.6	19.2	28.7	25.6	22.5	23.2

Source: Calculated by the authors based on the NSSO 69, 76 and 2021 round data

Yr- Year: A- 2012, B-2018, C-2021; 1: Lower Expenditure Quartile, 2: Lower Middle Expenditure Quartile, 3: Upper Middle Expenditure Quartile and 4: Upper Expenditure Quartile

A2: Non access to latrine: Sate, social groups and expenditure quartiles

States	Year	ST				SC				OBC				Others			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UP	A	45.5	27.8	21.4	5.3	37.1	33.0	23.2	6.8	30.8	31.6	25.3	12.3	20.0	27.0	33.3	19.7
	B	71.7	21.1	1.3	5.9	49.6	31.5	15.8	3.1	35.5	34.1	23.2	7.2	35.8	27.2	27.2	9.8
	C	60.2	30.0	9.6	0.2	39.8	31.5	19.4	9.3	36.2	28.5	23.8	11.5	26.1	28.5	28.1	17.3
MH	A	55.0	33.9	11.0	0.1	49.3	34.4	14.5	1.8	36.1	37.7	21.5	4.8	35.9	32.1	27.2	4.9
	B	53.1	36.5	9.6	0.8	60.3	34.0	4.5	1.2	59.0	30.8	8.0	2.2	39.4	46.8	11.8	2.0
	C	54.5	35.5	9.0	1.1	51.6	28.2	17.6	2.6	50.9	29.7	15.6	3.9	55.5	26.0	15.9	2.6
AP	A	36.8	30.3	19.5	13.5	35.9	37.2	24.3	2.6	36.8	27.1	27.1	9.1	36.4	33.2	26.4	4.0
	B	55.2	32.9	10.4	1.4	41.1	32.1	18.4	8.4	37.7	33.5	19.4	9.4	52.3	21.8	15.1	10.7
	C	43.2	35.0	18.5	3.4	40.4	28.8	19.9	10.9	39.3	34.8	19.8	6.2	46.0	29.9	22.5	1.6
WB	A	43.53	46.31	10.16	0	41.58	39.35	17.28	1.78	35.64	40.75	16.85	6.76	37.4	32.79	24.5	5.31
	B	47.4	33.9	15.0	3.7	48.1	34.2	13.6	4.1	43.0	30.5	13.3	13.2	40.7	36.4	18.1	4.8
	C	49.9	36.6	10.4	3.1	54.1	31.6	12.7	1.7	44.7	37.9	12.8	4.6	49.0	30.3	13.4	7.4
TN	A	37.4	26.1	23.2	13.4	29.0	41.4	24.6	5.0	34.0	34.8	24.8	6.5	76.5	14.4	0.0	9.2
	B	35.3	43.7	14.6	6.5	39.0	42.5	15.7	2.8	47.5	31.4	18.3	2.9	38.8	61.2	0.0	0.0
	C	42.8	42.7	13.5	1.1	36.2	38.5	19.0	6.4	44.3	34.3	17.4	4.0	100.0	0.0	0.0	0.0
BR	A	39.2	9.6	27.3	23.8	42.0	32.3	18.3	7.4	31.5	23.5	30.7	14.3	23.6	22.2	35.8	18.3
	B	29.9	41.4	13.2	15.6	47.4	28.0	18.0	6.6	38.2	31.7	20.2	9.9	30.1	37.9	19.2	12.8
	C	29.0	31.3	22.0	17.7	31.6	31.8	19.6	17.0	29.1	26.6	23.6	20.8	26.0	31.8	16.2	26.0
MP	A	44.8	28.1	23.8	3.3	44.9	29.3	19.5	6.3	30.8	29.3	27.9	12.0	15.8	24.6	37.3	22.3
	B	51.3	30.8	15.2	2.7	54.1	28.4	15.9	1.6	40.7	31.0	21.1	7.2	31.0	26.5	34.7	7.8
	C	44.9	32.4	12.9	9.8	40.7	32.5	18.5	8.3	31.5	34.8	20.5	13.2	25.2	17.8	21.6	35.4
KT	A	31.2	35.3	24.8	8.7	36.2	33.0	23.2	7.7	39.3	31.5	21.8	7.4	29.5	34.3	27.0	9.3
	B	51.0	24.1	18.4	6.5	47.3	36.8	11.6	4.3	45.9	34.6	16.4	3.2	51.7	31.3	14.4	2.6
	C	46.1	28.6	17.8	7.4	32.8	30.4	29.5	7.3	39.1	26.6	25.9	8.5	42.9	33.7	17.8	5.7
RJ	A	50.4	26.2	17.6	5.8	28.8	29.6	30.1	11.6	20.6	31.5	32.2	15.7	19.4	36.0	26.8	17.9
	B	48.1	30.9	17.3	3.7	37.1	30.4	27.1	5.5	29.1	30.6	28.9	11.5	34.8	34.5	19.9	10.8
	C	39.9	30.6	16.2	13.3	34.6	33.0	24.2	8.3	36.7	27.1	22.5	13.7	43.1	22.3	18.1	16.5
GJ	A	35.3	35.8	22.6	6.3	40.4	37.3	18.1	4.3	31.6	33.5	28.1	6.7	23.3	29.3	27.8	19.6
	B	31.6	27.9	26.7	13.7	53.4	35.7	5.9	5.0	41.0	30.4	21.0	7.6	34.8	27.3	33.0	5.0
	C	29.3	30.8	30.6	9.3	32.8	32.7	24.0	10.4	32.7	31.1	25.0	11.3	27.5	39.3	26.5	6.7
OD	A	46.8	30.4	17.1	5.7	36.2	31.4	24.7	7.7	27.6	27.7	29.5	15.2	12.4	27.8	37.5	22.3
	B	39.3	32.0	20.8	7.9	33.6	30.2	27.7	8.6	34.2	31.4	26.5	7.9	24.2	30.0	32.7	13.1
	C	43.1	31.0	18.8	7.1	39.5	30.4	24.9	5.2	34.9	32.2	21.8	11.2	27.5	42.8	21.1	8.5
KL	A	64.1	35.9	0.0	0.0	39.2	21.5	39.3	0.0	48.6	25.6	20.0	5.7	88.6	11.1	0.2	0.0
	B	55.6	39.3	5.1	0.0	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	C	100.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
JH	A	39.7	35.2	19.0	6.2	30.2	32.4	27.6	9.9	26.9	28.5	32.5	12.2	28.7	13.1	35.4	22.7
	B	50.6	31.6	15.0	2.9	29.4	42.2	25.3	3.2	36.0	30.6	22.5	11.0	27.5	22.6	26.9	23.1
	C	37.1	32.7	23.8	6.4	30.3	20.7	34.6	14.3	27.3	33.6	26.6	12.5	20.0	23.4	36.1	20.6
PB	A	0.0	0.0	0.0	0.0	33.5	44.8	17.4	4.4	38.3	31.2	16.1	14.4	27.7	37.3	26.7	8.4
	B	0.0	0.0	0.0	0.0	65.2	15.7	9.7	9.4	72.5	27.5	0.0	0.0	84.4	15.6	0.0	0.0
	C	0.0	0.0	0.0	0.0	54.9	31.2	13.9	0.1	69.7	17.0	13.3	0.0	39.9	21.7	31.2	7.2
AS	A	23.6	30.0	15.4	31.1	36.2	45.2	14.8	3.8	32.0	33.6	26.0	8.5	15.7	26.5	39.1	18.7
	B	36.9	27.2	35.9	0.0	62.6	37.4	0.0	0.0	23.4	36.5	30.4	9.7	51.4	13.9	31.2	3.6
	C	37.5	35.4	22.1	5.0	2.1	15.4	7.4	75.1	44.4	31.0	22.0	2.6	48.9	7.7	24.2	19.2
CJ	A	43.7	25.4	25.2	5.7	49.4	17.6	18.7	14.3	32.0	28.7	28.2	11.1	6.9	65.1	9.5	18.5
	B	50.4	24.6	19.2	5.9	58.0	22.0	20.0	0.0	43.3	26.9	29.8	0.0	0.0	100.0	0.0	0.0
	C	48.6	36.9	10.5	4.0	53.0	35.0	12.0	0.0	62.9	17.4	16.3	3.4	1.7	42.4	55.9	0.0
HR	A	0.0	13.0	87.0	0.0	54.0	29.3	13.6	3.2	48.8	26.2	17.2	7.8	45.7	31.3	19.2	3.8
	B	100.0	0.0	0.0	0.0	50.2	36.1	13.7	0.0	36.8	47.1	12.6	3.6	71.0	0.0	29.0	0.0
	C	0.0	0.0	0.0	0.0	52.4	37.0	7.8	2.9	20.4	43.5	29.2	6.8	22.6	30.8	30.1	16.5
UK	A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	B	0	0	0	0	41.59	55.15	3.26	0	0	66.67	0	33.3	4	80.67	0	15.3
	C	0.0	0.0	0.0	0.0	52.5	11.3	15.9	20.3	37.5	37.5	25.0	0.0	42.2	23.7	26.2	7.8
JK	A	18.3	38.7	27.9	15.1	49.9	32.8	10.6	6.7	49.1	1.4	36.4	13.0	36.3	26.6	20.6	16.6
	B	50.4	21.1	28.2	0.4	22.5	32.2	12.0	33.3	47.5	27.9	11.1	13.5	25.1	44.3	25.8	4.8
	C	14.6	2.4	16.2	66.8	15.2	22.5	62.3	0.0	18.2	38.8	34.0	9.1	17.4	21.7	35.8	25.2
HP	A	27.2	30.2	42.6	0.0	26.6	29.4	26.8	17.2	32.9	33.2	19.3	14.5	45.1	18.8	28.2	7.9
	B	14.1	85.9	0	0	27.02	28.89	44.09	0	25.89	0	74.11	0	67.73	16.14	16.14	0
	C	51.1	48.9	0.0	0.0	28.7	57.0	14.3	0.0	21.2	48.9	29.9	0.0	12.6	31.9	54.0	1.6

Source: Calculated by the authors based on the NSSO 69, 76 and 2021 round data

Yr- Year: A- 2012, B-2018, C-2021; 1: Lower Expenditure Quartile, 2: Lower Middle Expenditure Quartile, 3: Upper Middle Expenditure Quartile and 4: Upper Expenditure Quartile

A3: Lack of habit of hand wash after defecation: Sate, social groups and expenditure quartile

Year 2018	ST				SC				OBC				Others			
States	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UP	83.3	10.6	0.0	6.1	52.1	30.9	14.0	3.1	39.7	30.5	22.4	7.5	27.9	23.2	31.7	17.2
MH	56.0	35.0	8.3	0.8	55.3	36.5	7.2	1.1	49.8	34.1	12.7	3.5	36.6	41.0	16.0	6.5
AP	50.2	25.7	16.3	7.8	40.1	30.7	19.4	9.9	31.2	33.3	22.3	13.2	37.1	21.5	22.2	19.2
WB	40.6	35.6	19.7	4.2	42.3	35.7	16.6	5.4	27.2	31.0	28.5	13.3	39.9	33.0	20.7	6.4
TN	42.5	37.4	13.8	6.4	35.4	39.9	19.8	4.9	37.1	31.5	24.4	6.9	32.1	34.3	0.0	33.6
BH	38.7	32.2	8.2	20.8	46.6	27.6	17.5	8.3	40.0	29.0	20.5	10.6	23.7	33.7	24.0	18.7
MP	49.2	32.5	14.8	3.6	51.5	30.0	15.2	3.3	44.2	31.3	18.8	5.7	31.1	42.7	17.4	8.7
KT	44.2	33.1	21.2	1.6	34.9	35.9	22.7	6.5	37.6	34.1	23.4	4.9	40.2	30.2	22.5	7.0
RJ	47.3	29.4	18.5	4.9	34.1	28.6	29.2	8.2	24.1	27.7	32.5	15.6	19.8	32.1	27.9	20.3
GJ	30.5	31.0	28.2	10.3	57.6	23.5	18.9	0.0	38.8	30.9	23.8	6.5	44.3	24.0	23.6	8.1
OD	41.2	29.7	21.1	8.0	33.5	30.8	28.5	7.2	32.1	31.2	26.8	9.9	23.1	27.7	33.9	15.3
KL	26.8	52.7	13.2	7.4	48.8	35.5	13.8	1.9	42.7	32.5	17.2	7.6	43.5	24.7	19.3	12.5
JH	42.9	35.4	17.4	4.3	28.5	43.4	23.9	4.2	35.5	28.6	25.2	10.7	31.6	39.1	20.7	8.6
PB	0.0	0.0	0.0	0.0	72.4	12.5	15.0	0.0	0.0	0.0	0.0	0.0	55.6	0.0	44.4	0.0
AS	24.9	30.5	29.9	14.7	40.1	27.1	22.4	10.3	38.6	27.4	23.4	10.6	29.5	26.3	27.2	17.1
CH	33.1	28.5	34.3	4.1	44.5	17.4	29.3	8.8	21.8	30.1	41.8	6.2	0.0	5.0	95.0	0.0
HR	0.0	0.0	0.0	0.0	56.3	28.7	8.6	6.4	35.4	28.1	30.4	6.1	52.0	9.1	33.1	5.9
UK	0.0	0.0	100.0	0.0	53.2	31.9	13.6	1.4	72.7	27.3	0.0	0.0	62.2	26.8	9.5	1.6
JK	43.1	18.2	29.5	9.3	29.7	18.1	43.4	8.8	31.9	21.0	21.7	25.5	25.7	29.1	34.9	10.4
HP	0.0	0.0	100.0	0.0	63.7	0.0	36.3	0.0	44.3	0.0	55.7	0.0	11.7	31.1	31.1	26.1

Source: Calculated by the authors based on the NSSO 76 round data

1: Lower Expenditure Quartile, 2: Lower Middle Expenditure Quartile, 3: Upper Middle Expenditure Quartile and 4: Upper Expenditure Quartile