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Correlates of access to sanitation facilities and benefits received from the *Swachh Bharat Mission* in India: analysis of cross-sectional data from the 2018 National Sample Survey

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ABSTRACT

Objective Equitable and affordable access to improved sanitation facilities is linked to health and is among the priority areas of development programmes in a country like India. This study assesses the level of different sanitation facilities accessed by households and attempts to understand the socioeconomic characteristics of the households that received financial benefits from the *Swachh Bharat Mission* (*Swachh Bharat Abhiyan*), a Government of India flagship programme.

Design Cross-sectional study.

Setting and participants The study extracted data from the 76th round (2018) of the National Sample Survey, consisting of 106 837 households in India.

Outcome measures Sanitation services and benefits received from the Swachh Bharat Mission in the last 3 years preceding the survey were the two outcome variables of this study. Bivariate and multinomial logistic regression analysis were performed to identify factors associated with the outcome variables.

Results Findings show the existence of state and regional disparities, along with rural–urban gaps, in the accessibility of sanitation facilities. Half of the households (52%, n=55 555) had access to safely managed sanitation facilities, followed by basic services (14.8%, n=15 812), limited services (11.4%, n=12 179) and unimproved services/open defecation (21.8%, n=23 290). Limited and unimproved facilities decreased significantly (p<0.001) with increase in economic status, although poor and less educated households received the maximum benefit from the Swachh Bharat Mission.

Conclusion The mission has been successful in increasing access overall; however, many people continue to lack access to improved sanitation and there remains a need to follow up poor and rural households to determine their usage of and the current state of their sanitation facilities.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Estimates of accessibility of the different types of sanitation services are based on an exhaustive information collected from a household survey and by adopting the JMP sanitation ladder.
⇒ The study uses large-scale data covering all states of India.
⇒ Some information such as washing hands with soap and water after defecation and receiving benefits from the *Swachh Bharat Mission* may be affected by reporting bias.
⇒ The study could not explore the reasons for not using safely managed sanitation services by individuals after receiving benefits from the *Swachh Bharat Mission*.

INTRODUCTION

Sanitation is a public good that ensures improved health and social well-being in any country. Only 68% of the world's population use improved sanitation facilities, with Sub-Saharan Africa and Southern Asia having only 30% and 47%, respectively. About 13% of the world's population live without any form of sanitation and practise open defecation.[1] Women and disabled people particularly are the worst affected by poor and unimproved sanitation services. In 2015, around 39% of the global population used safely managed sanitation services, 5 billion had at least basic sanitation and 600 million had limited sanitation facilities, while around 892 million still defecated in the open or had unimproved sanitation facilities.[2] Kvarnström *et al*[3] discussed the importance of the sanitation ladder in providing a more detailed overview of shifting towards improved sanitation from unimproved sanitation.

Various steps have been taken in the past to increase access to sanitation; however, billions of people, mostly in rural areas, still do not have the privilege to use improved sanitation services. A study conducted by Deshpande *et al*[4] mentioned that, despite improvement in access to sanitation services in some regions, the presence of geographical disparity in access as well as in the quality of sanitation

facilities remains a barrier to achieving the universal Sustainable Development Goal (SDG) target.[4] About 52.1% of the rural population and 7.5% of the urban population in the country still defecate in the open.[5]

In 2014, the Government of India launched *Swachh Bharat Abhiyan* (SBA; or *Swachh Bharat Mission*) to achieve universal sanitation coverage and eradicate open defecation by 2019. Although the status of sanitation was different across states, each state was asked to prepare a three-phase implementation framework for the mission, which helped in identifying districts that required urgent action. Raising mass awareness, social mobilisation, financing and toilet construction were the second phase of the implementation framework, followed by hygiene promotion, follow-up, and monitoring and evaluation in the third phase. The SBA focused on constructing individual household-level latrines, community sanitary complex, solid–liquid waste management, and organising information, education and communication and Human Resource Development activities across gram panchayats.[6] The SBA provided a grant of 12 000 rupees for the construction of individual household-level latrines, along with the provision of improving solid–liquid waste management through the 60:40 funding on sharing basis. The mission has also played a significant role in reaching SDG Target 6.2 of ending open defecation in the country by 2030. Around 10.28 crores toilets have been constructed all over the country and more than 30 crores people took part in the behavioural change initiative under the SBA Gramin.[7] According to the Government of India, sanitation coverage reached 100% in rural areas in 2019, progressing sharply from 38.7% in 2014.[8] Close to 6 million villages, 633 districts and 35 states/union territories were verified to be open defecation free in December 2019. The SBA has also resulted in an annual profit of more than 50 000 per household in rural India.[7] However, differences between rural and urban areas persist. Several studies found gaps in terms of availability of latrine facilities and practice of open defecation.[9–13] Previous research has addressed the difference in access to sanitation facilities and linked it to factors such as caste, religion, state, region, gender, wealth and education.[9 13–15] Several Scheduled Caste and Scheduled Tribe communities persisted to have less access to improved sanitation facilities but were involved in the manual scavenging of human waste.[6] A study by Coffey *et al*[16] also mentioned the aspect of untouchability practices in India, especially in rural areas, which prevent many poor from using latrines and forcing them to defecate in the open.[16] In 2014, only 4 among 10 rural households owned a sanitation facility, while it rose to around 95% in 2019 due to the ongoing SBA in the country.[17] Adequate sanitation facilities can also help rural areas to grow and reduce the occurrence of various diseases and early-age mortality. However, the situation became much better during the SBA; as mentioned in the Ministry of Statistics and Programme Implementation (MOSPI) 2018,[18] open defecation has been reduced to 20.2%, with 28.7% and 3.8% in rural and urban areas, respectively.[18] The National Family Health Survey 5 (NFHS-5) data show that sanitation coverage in rural parts of the country has improved, but still needs more attention in order to fill the remarkable gap existing between urban and rural areas in terms of access to sanitation facilities.[19] The SBA played a significant role in reducing water and sanitation-related diseases. A study by Gupta *et al*[20] mentioned that open defecation is still practised even after the establishment of sanitation facilities in the households and that there is a need for a large-scale campaign to change sanitation preferences. Various studies mentioned that the need for basic sanitation services to reduce open defecation and community-level awareness are required to change behavioural preferences.[21–23] Moreover, eradication of open defecation depends on social, cultural and political aspects.[24]

Earlier studies have focused on the perception and practices regarding the SBA in urban and rural areas.[25 26] This study attempts to understand the socioeconomic characteristics of households that received benefits for sanitation facilities from the SBA in the last 3 years preceding the survey. Further, it also explores the linkages between access to adequate improved sanitation facilities and the SBA programme. This study also shows the pattern of sanitation services across India as per the Joint Monitoring Programme (JMP) sanitation ladder of World health Organization and United Nations Children's Fund and further examines the effect of socioeconomic characteristics on the pattern of sanitation services. Therefore, it also gives an idea regarding improved and unimproved sanitation services in the country.

METHODS

The study used cross-sectional data from the 76th round of the National Sample Survey (NSS) conducted between July and December 2018 by the MOSPI, India. The survey collected information on drinking water, sanitation, hygiene and housing conditions in India and its states and union territories. The 76th round of the NSS adopted a two-stage stratified sampling design for data collection. The first-stage units were villages/Urban Frame Survey (UFS) blocks/subunits, and the ultimate-stage units were households in both rural and urban areas. The survey collected information on 466 524 individuals (63 736 in rural areas and 43 101 in urban areas) from 106 837 households. Detailed methodology, sampling design and data collection procedure have been published in the survey report.[18] The data set is freely accessible online and can be downloaded from https://mospi.gov.in/web/mospi/download-tables-data/-/reports/view/templateTwo/16205?q=TBDCAT. The unit of analysis in this study is the household. The study used information on access of a household to a latrine, as well as information on the type of latrine used, along with handwashing practices after defecation and safe disposal of excreta. Further, information related to the benefits received for sanitation

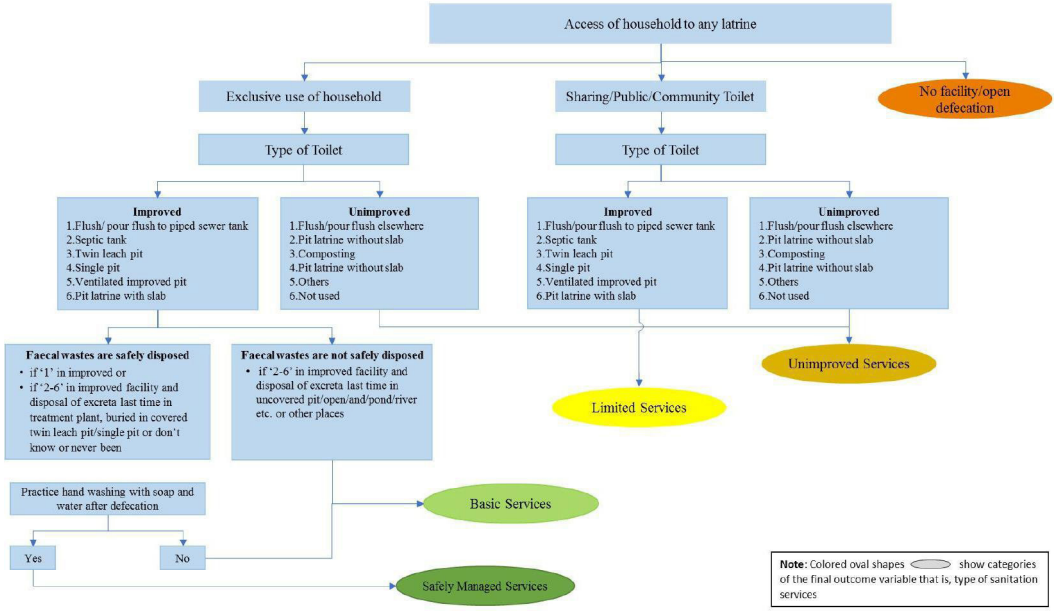

Figure 1 Classification of different types of sanitation services as per the JMP sanitation ladder.

facilities from various schemes in the last 3 years was also included.

Outcome variables

Sanitation services and benefits received from the SBA in the last 3 years preceding the survey were the two outcome variables of this study. Sanitation services were grouped into five categories using the JMP definition of sanitation services: safely managed services, basic services, limited services, unimproved services and no services. Figure 1 depicts the procedure used in the creation of the sanitation services and a detailed definition of these categories.

The study used benefits received from the SBA, coded as 1 'benefit received' and 0 'not received'.

Explanatory variables

The exposure variables used in this study were based on previous literature.[9 11 27] These include age of the household head (below 35 years and 35 years and above), gender of the household head (male and female), education level (no education, primary and below, secondary and graduate and above), place of residence (rural and urban), caste (Scheduled Tribe (ST), Scheduled Caste (SC), Other Backward Class (OBC) and others), religion (Hindu, Muslim and others), monthly per capita consumer expenditure (MPCE) (poor, middle and rich) and region (North: Jammu and Kashmir, Himachal Pradesh, Punjab, Chandigarh, Uttarakhand, Haryana, Delhi, and Uttar Pradesh; East: Bihar, Jharkhand, Orissa, West Bengal, and Andaman and Nicobar Islands; West: Rajasthan, Goa, Gujarat, Daman and Diu, Dadra and Nagar Haveli, and Maharashtra; south: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Pondicherry, Telangana and Lakshadweep; Central: Chhattisgarh and Madhya Pradesh; and Northeast: Assam, Sikkim, Nagaland, Meghalaya, Manipur, Mizoram, Tripura and Arunachal Pradesh). Information on households' usual monthly consumer expenditure (UMCE) was collected through a single question on the survey. To calculate the MPCE, the UMCE has been divided by household size.[18]

Statistical analysis

The analysis for this study was divided into three parts. First, a bivariate analysis of sanitation services and benefits received from the SBA in the last 3 years prior to the survey was done with various background characteristics such as gender of the household head, sector, caste, religion, wealth index and region, respectively. Second, a multinomial logistic regression was applied to estimate the effect of various predictors on sanitation services. To build this model, we merged two categories, namely 'unimproved services' and 'no services', to avoid a small sample in any category. The model considered improved facility as the reference category and the relative risk ratio for each of the basic, limited and unimproved categories was presented. Finally, binary logistic regression was used to examine the factors affecting the outcome variable (benefits received from the SBA). In this analysis, the denominator includes 106 837 households from where information has been collected. All analyses were carried out by applying appropriate sampling weight given in the data.

Patient and public involvement

Patients and/or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

RESULTS

As per the JMP global ladder for sanitation, safely managed services constitute the highest per cent (52%)

Table 1 Distribution of different sanitation services along with their definition

Service level	Total (%)	Definition
Safely managed services	52.0	Private improved facility where faecal wastes are safely disposed on-site or transported and treated off-site, plus a handwashing facility with soap and water.
Basic services	14.8	Private improved facility which separates excreta from human contact.
Limited services	11.4	Improved facility shared with other households.
Unimproved services	1.7	Unimproved facility which does not separate excreta from human contact.
No services	20.2	Open defecation.

in India, followed by no services (20.2%), basic services (14.8%) and limited services (11.4%) (table 1). The union territory Lakshadweep has the highest percentage of safely managed services at 96.8%, followed by Sikkim (89.0%), Himachal Pradesh (81.5%) and Kerala (81.5%). Moreover, utilisation of safely managed services was lowest in Odisha, followed by Tamil Nadu and Andhra Pradesh. On the other hand, Uttar Pradesh reported the highest percentage of no services (37.7%), followed by Jharkhand (33.6%) and Bihar (32.8%). The highest percentage of basic services was reported in Nagaland (47.4%) and was lowest in Chandigarh (2.6%) (figure 2).

The percentage of households with access to sanitation services according to the JMP ladder for sanitation is presented in table 2. The use of safely managed sanitation services was higher in urban areas (64.8%) than in their rural counterparts (45.3%). No services, that is, open defecation, were more prevalent in rural areas (28.7%) than in urban areas (3.8%). Male-headed households had more safely managed services (52.7%) than female-headed households (47.2%). However, female-headed households had more basic services (15.3%) and limited sanitation services (14.5%) than male-headed households. The use of safely managed sanitation services (60.5%) and basic services (16.6%) was higher in the 'other' category of religion, whereas no services were higher in those of Hindu religion (21.9%). The general category has the highest percentage of safely managed services (66%), followed by OBC (51.1%). About one-third of ST and SC households had no services. As expected, wealthy households had the highest percentage of safely managed services, while no services were more common among poor households, followed by middle households. The central region (62%) reported the highest use of safely managed services, followed by the west region (59.8%), while no services were highest in the eastern region (26.8%).

The results of the multinomial logistic regression analysis for sanitation services are presented in table 3. It shows the likelihood of sanitation services varies by various background characteristics. Safely managed services were considered as the reference category of the dependent variable. With reference to male-headed households, households with female heads were 1.28 times more likely to have limited sanitation services, 1.12 times more likely to have unimproved sanitation services and 1.10 times more likely to have basic sanitation services. With reference to rural households, urban households were 1.72 times more likely to have limited sanitation services and 47% and 86% less likely to have basic sanitation services and unimproved sanitation services, respectively.

No significant association was found between religion and basic sanitation services. With reference to the Hindu religion, Muslims were 1.51 times more likely to have limited sanitation services, while others were 1.04 times more likely to have basic sanitation services and 43% less likely to have unimproved sanitation services. However, the likelihood of limited sanitation services and unimproved sanitation services decreased significantly among Muslims to other religions. With reference to the general category, households from the ST caste were 1.92 times more likely to have basic sanitation services and 4.68 times more likely to have unimproved sanitation services. Households from the SC caste were 1.60 times more likely to have limited sanitation services. The middle class were 49% and the wealthy class was 76% less likely to have unimproved sanitation services than poor-class people, while middle-class people were 12% less likely to have basic sanitation services and rich-class people were 80% less likely to have limited sanitation services. The likelihood of limited sanitation services and unimproved services decreased significantly with increase in wealth quintile status. With reference to the north region, the south region was 2.98 times and the northeast region was 2.49 times more likely to have basic sanitation services, while the eastern region was 1.60 times more likely to have limited sanitation services. The northeast region was 78% less likely to have unimproved sanitation services than the north region.

Table 4 shows the percentage of households that have received benefits from the SBA in the last 3 years preceding the survey by various background characteristics. A total of 11.3% of households have received benefits from the SBA (16% for rural and 2.3% for urban). Male-headed families received more benefits from the SBA irrespective of place of residence. As expected, households targeted under the programme received more benefits from the SBA. A higher proportion of households with no education (16.1%; for rural 18.5% and urban 4.9%) or lower education level (13.1%; for rural 16.5% and urban 3.5%) have received benefits from the SBA compared with households with a higher level of education. About 11.9%

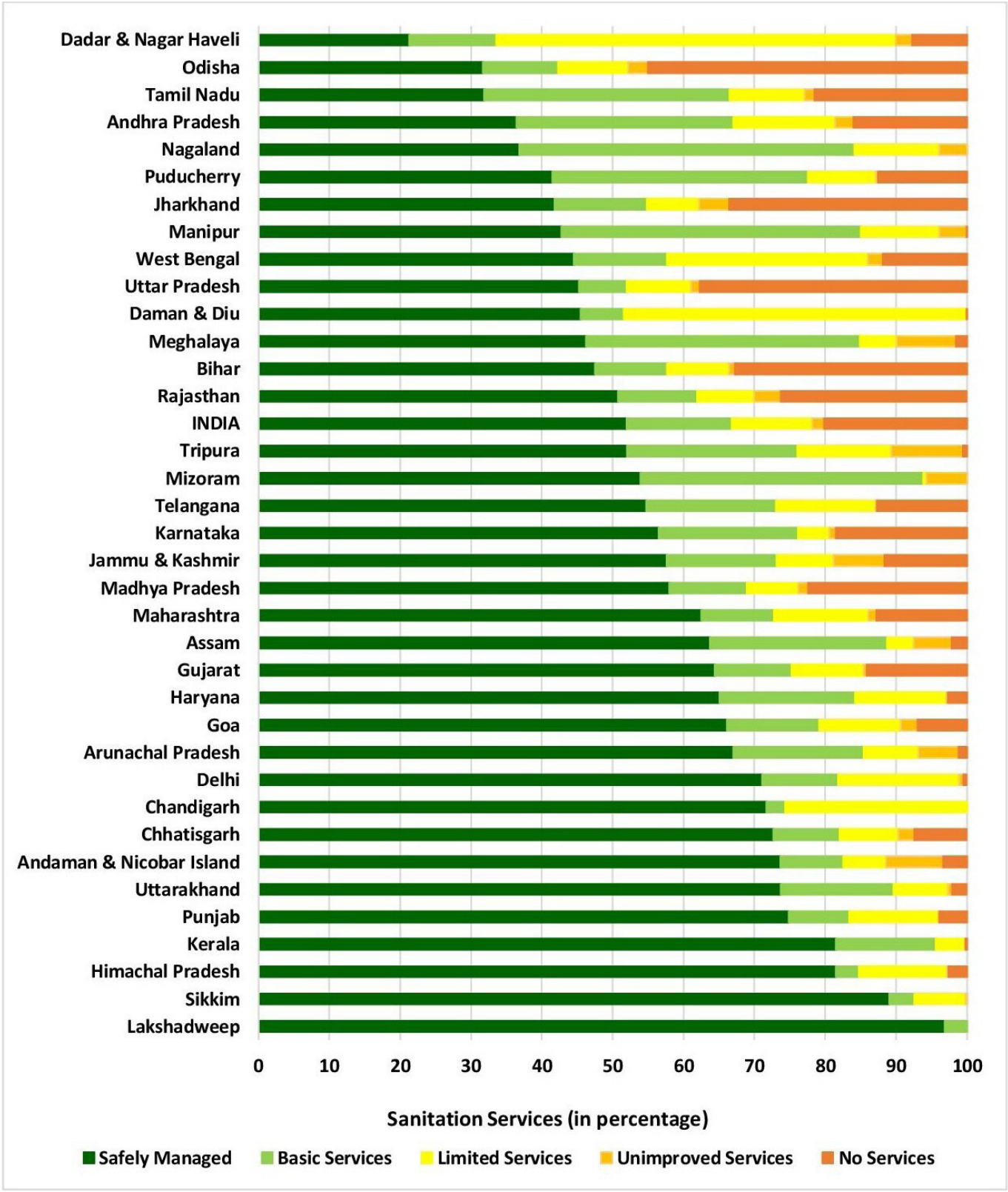

Figure 2 Percentage of households with access to sanitation services as per the JMP sanitation ladder in India and its states.

of Hindus and 9% of Muslims have received benefits from the SBA. There was a negative association between MPCE and the benefits received from the scheme. Poor households (13%; for rural 17.5% and for urban 3.1%) received the maximum benefit, while a low percentage of rich households received benefits from the SBA irrespective of their place of residence. Around 22% and 13.4% of households from the ST and SC populations have received benefits from the SBA scheme. The central region had the highest (29.7%) while the southern

Table 2 Percentage of households with access to sanitation services as per the JMP ladder by background characteristics, India, 2018

Background characteristics	Safely managed services	Basic services	Limited services	Unimproved services	No services	n
Gender of household head*						
Male	52.7	14.8	10.9	1.7	20.0	92798
Female	47.2	15.3	14.5	1.5	21.6	14018
Sector						
Rural	45.3	16.2	7.7	2.1	28.7	63736
Urban	64.8	12.2	18.4	0.9	3.8	43101
Religion						
Hindu	51.0	15.0	10.6	1.5	21.9	81825
Muslim	54.2	13.0	17.5	2.2	13.1	13789
Other	60.5	16.6	8.9	2.4	11.6	11223
Caste						
ST	37.1	17.1	9.2	3.8	32.8	14767
SC	41.0	14.9	12	1.8	30.3	18157
OBC	51.1	16.1	10.4	1.3	21.0	43640
General	66.0	12.0	13.2	1.3	7.5	30273
MPCE						
Poor	37.4	13.1	18.3	2.0	29.2	47323
Middle	52.8	15.7	9.9	1.7	19.9	32807
Rich	67.6	15.8	5.2	1.2	10.3	26707
Region						
North	54.4	8.8	10.4	1.2	25.3	22382
East	43.0	11.7	16.5	2.0	26.8	21018
West	59.8	10.7	11.3	1.7	16.6	20001
South	47.8	25.6	9.7	1.2	15.7	21942
Central	62.0	10.5	7.6	1.6	18.4	8033
Northeast	59.6	27.4	5.6	5.7	1.7	13461
Total	52.0	14.8	11.4	1.7	20.2	106837

*Sample was limited to 106816.
MPCE, monthly per capita consumer expenditure; OBC, Other Backward Class; SC, Scheduled Caste; ST, Scheduled Tribe.

region the lowest (6.1%) percentage of households that have received benefits from the SBA in the last 3 years preceding the survey.

The results from the logistic regression analysis for the benefits received from the SBA are presented in table 5. Households aged 35 years and above (OR, 1.33; CI 1.25 to 1.41) were more likely to receive benefits from the SBA compared with households aged below 35 years. The likelihood of receiving benefits from the SBA was significantly lower (OR, 0.74; CI 0.70 to 0.79) among female-headed households than among male-headed counterparts. Households with graduates and above education levels were 79% less likely to receive benefits with reference to households with no education. The odds of receiving benefits from the SBA were lower among Muslims (OR, 0.88; CI 0.82 to 0.94) and other religions (OR, 0.67; CI 0.62 to 0.73) compared with Hindus. With reference to the poor, the rich class were 24% less likely to receive benefits from the scheme. The likelihood of receiving benefits from the SBA was higher among ST (OR, 2.71; CI 2.52 to 2.91), SC (OR, 1.82; CI 1.70 to 1.95) and OBC (OR, 1.62; CI 1.53 to 1.72) compared with others. With reference to the north, households in the central region (OR, 2.71; CI 2.53 to 2.91) were 2.71 times more likely to receive benefits while households in the south region (OR, 0.53; CI 0.50 to 0.57) were 0.53 times less likely to derive benefits from the SBA.

Table 6 presents the percentage of households with access to sanitation services among those that received benefits from the SBA in the last 3 years preceding July 2018. About 66% of the households have safely managed services (rural 65.3% and urban 75.2%), while 24.3% of the households have access to basic sanitation services (rural 25.2% and urban 13.2%), 5.4% of the households have limited sanitation services and 4.3% of the households have unimproved sanitation services, among those that received benefits from the SBA in the last 3 years before July 2018.

Table 3 Results of multinomial logistic regression for sanitation services by background characteristics, India, 2018

Safely managed services	Basic services	Limited services	Unimproved services
Background characteristics	**RRR (95% CI)**	**RRR (95% CI)**	**RRR (95% CI)**
Gender of household head†			
Male‡			
Female	1.10*** (1.04 to 1.15)	1.28*** (1.21 to 1.35)	1.12*** (1.07 to 1.18)
Sector			
Rural‡			
Urban	0.53*** (0.51 to 0.55)	1.72*** (1.65 to 1.79)	0.14*** (0.14 to 0.15)
Religion			
Hindu‡			
Muslim	1.03 (0.98 to 1.04)	1.51*** (1.42 to 1.60)	0.94** (0.88 to 0.99)
Others	1.04 (0.98 to 1.11)	0.81*** (0.74 to 0.89)	0.57*** (0.52 to 0.61)
Caste			
General‡			
ST	1.92*** (1.80 to 2.05)	1.09** (1.01 to 1.19)	4.68*** (4.38 to 5.01)
SC	1.64*** (1.54 to 1.64)	1.60*** (1.50 to 1.70)	3.75*** (3.53 to 3.98)
OBC	1.34*** (1.28 to 1.41)	1.06** (1.01 to 1.11)	2.39*** (2.27 to 2.52)
MPCE			
Poor‡			
Middle	0.88*** (0.84 to 0.92)	0.43*** (0.41 to 0.45)	0.51*** (0.49 to 0.54)
Rich	0.79*** (0.75 to 0.82)	0.20*** (0.19 to 0.21)	0.24*** (0.23 to 0.25)
Region			
North‡			
East	1.36*** (1.28 to 1.45)	1.60*** (1.50 to 1.70)	0.96 (0.91 to 1.01)
West	1.07* (1 to 1.14)	1.12*** (1.04 to 1.19)	0.75*** (0.71 to 0.79)
South	2.98*** (2.81 to 3.15)	0.81*** (0.75 to 0.86)	0.84*** (0.79 to 0.88)
Central	0.76*** (0.70 to 0.84)	0.46*** (0.42 to 0.51)	0.35*** (0.32 to 0.38)
Northeast	2.49*** (2.33 to 2.66)	0.92** (0.84 to 1.00)	0.22*** (0.20 to 0.24)

No services category was merged with unimproved services category due to the small sample in the unimproved services category.
***P<0.001, **P<0.05, *P<0.10.
†Sample was limited to 106 816.
‡Reference category.
CI, Confidence Interval; MPCE, monthly per capita consumer expenditure; OBC, Other Backward Class; RRR, relative risk ratio; SC, Scheduled Caste; ST, Scheduled Tribe.

DISCUSSION

The current study shows the level of sanitation services by household characteristics and attempts to link the socio-economic aspect of households that received benefits for sanitation facilities from the SBA in the last 3 years. Overall, around half of the surveyed households used safely managed services, followed by no services, that is, open defecation. Moreover, the use of safely managed services was highest in Sikkim, Himachal Pradesh and Kerala. On the other hand, the study reveals that open defecation remains a major problem in rural areas, especially in Uttar Pradesh, Jharkhand and Bihar, which is in contrast to the declaration that these areas were open defecation free in 2019. This may be due to several reasons. The 76th round of the NSS survey took place between July 2018 and December 2018 and the government declared Open Defecation Free (ODF) in December 2019. This may also be because eradication of the open defecation claim was made on the basis of access to individual household latrines not on the basis of adoption of toilets.[28] Furthermore, ODF reporting is from the provider's side; however, estimates from individual survey data suggest there remain a significant proportion of households that are not using any sanitation facility. Despite an active SBA programme, unimproved services still exist in the rural areas of the northern states.[29] The latest report by NFHS-5 conducted in 2019–2021 also reported that 39% of households in the poor-performing state of Bihar were not using any sanitation facility.[30] Another study, by Spears *et al*,[19] states that, in congruence with NFHS-5, states such as Bihar which had worse sanitation before the SBA still have it on average.[19] The findings of this study show that economically developed states such as Sikkim, Himachal Pradesh, Kerala and Punjab

Table 4 Per cent benefits received by households from the SBA in the last 3 years by background characteristics, India, 2018

Background characteristics	Benefits received from the SBA in the last 3 years			
	Total	Rural	Urban	n
Age of household head (in years)	***	***	***	
Below 35	8.7	13.9	1.7	18947
≥35	11.9	16.4	2.5	87890
Gender of household head†	***	***		
Male	11.5	16.2	2.3	92798
Female	10.2	14.8	2.2	14018
Education level	***	***	***	
No education	16.1	18.5	4.9	26512
Primary and below	13.1	16.5	3.5	23767
Secondary	9.4	14.3	1.9	43787
Graduate and above	2.8	7.8	0.8	12771
Religion	***	***		
Hindu	11.9	16.7	2.3	81825
Muslim	9.0	13.1	2.6	13789
Others	8.3	12.1	1.9	11223
MPCE	***	***	***	
Poor	13.0	17.5	3.1	47323
Middle	11.7	16.6	2.1	32807
Rich	7.5	11.7	1.2	26707
Caste	***	***	***	
Scheduled Tribe	21.9	25.1	4.2	14767
Scheduled Caste	13.4	16.5	3.7	18157
Other Backward Caste	11.4	15.8	2.7	43640
Others	6.0	10.6	1.2	30273
Region	***	***	***	
North	10.8	15.4	1.3	22382
East	11.4	14.0	2.8	21018
West	10.7	16.2	2.9	20001
South	6.1	10.2	1.2	21942
Central	29.7	37.1	8.7	8033
Northeast	13.6	16.1	2.7	13461
Total	11.30	15.97	2.30	106837

***P<0.001.
†Sample was limited to 106816.
MPCE, monthly per capita consumer expenditure; SBA, *Swachh Bharat Abhiyan*.

Table 5 Results from binary logistic regression of benefits received (1/0) by households from the SBA in the last 3 years by background characteristics, India, 2018

Background characteristics	OR	95% CI
Age group of household head (in years)		
Below 35‡		
≥35	1.33***	1.25 to 1.41
Gender of household head†		
Male‡		
Female	0.74***	0.70 to 0.79
Education		
No education‡		
Primary and below	0.81***	0.77 to 0.86
Secondary	0.60***	0.57 to 0.63
Graduate and above	0.21***	0.19 to 0.24
Religion		
Hindu‡		
Muslim	0.88***	0.82 to 0.94
Others	0.67***	0.62 to 0.73
MPCE		
Poor‡		
Middle	1.00***	0.95 to 1.05
Rich	0.76***	0.72 to 0.80
Caste		
Others‡		
Scheduled Tribe	2.71***	2.52 to 2.91
Scheduled Caste	1.82***	1.70 to 1.95
Other Backward Caste	1.62***	1.53 to 1.72
Region		
North‡		
East	0.98***	0.92 to 1.04
West	1.03***	0.96 to 1.10
South	0.53***	0.50 to 0.57
Central	2.71***	2.53 to 2.91
Northeast	1.00***	0.92 to 1.09

***P<0.001.
†Sample was limited to 106816.
‡Reference.
CI, Confidence Interval; MPCE, monthly per capita consumer expenditure; OR, Odds Ratio; SBA, *Swachh Bharat Abhiyan*.

used more safely managed services, while unimproved services were more prevalent among underdeveloped states such as Odisha, Uttar Pradesh, Bihar and Madhya Pradesh.[31] State-level and regional disparities exist, along with rural–urban differential, in terms of access to and usage of sanitation facilities. These findings are in line with other work.[13 32] The NFHS-5 factsheet also reveals major states such as Bihar, Assam, Manipur, West Bengal and Maharashtra still have many households that do not have access to an improved sanitation facility.[30] Another important finding of this study is that urban households have more safely managed sanitation services than their rural counterparts, which means that there is a need to create more awareness at the village level on the health

Table 6 Percentage of households with sanitation services according to the JMP sanitation service ladder among households that received benefits from the SBA in the 3 years preceding July 2018

Service level	Benefits received from the SBA		
	Total	Rural	Urban
Safely managed services	66	65.3	75.2
Basic services	24.3	25.2	13.2
Limited services	5.4	5	9.9
Unimproved services	4.3	4.5	1.7

SBA, *Swachh Bharat Abhiyan*.

benefits of using improved sanitation facilities, along with providing them sanitation facilities.[9]

The present paper further brings out the fact that the socioeconomic characteristics of the households, such as religion, caste, wealth status and education, significantly influence access and usage of sanitation services in India. For instance, the general caste group and rich households have better accessibility to sanitation facilities.[14] The plausible reason is that the general caste group and wealthy households have good knowledge of sanitation services and how they affect the health of the people. Unimproved services are highest among those of Hindu religion and this finding is supported by earlier studies.[16 33 34] A study mentioned certain religious aspects that are related to using toilet facilities inside the house, which might be one reason for the unimproved services among Hindus.[35] Another study conducted in neighbouring country Nepal also mentioned religious beliefs affecting the practice of open defecation.[36] This study identifies the presence of a huge gap in the availability of safely managed services, basic services and limited services, which is in the line with the report 'Progress on Drinking Water, Sanitation and Hygiene: 2017 Update and SDG Baselines' by the WHO and UNICEF.[2]

The study also found that among households that received benefits from the SBA, every household does not have access to an improved sanitation facility. The same is addressed by a previous research[37] showing that building toilets only is not sufficient, but that their usage is also a main matter of concern. By providing subsidies, the SBA was able to solve the financial constraints associated with building toilets in Indian households. However, the success of the SBA does not solely depend on access to toilets but on the adoption of toilets and using them on a sustained basis.[28] Ideally, every household receiving benefits from the SBA must be using an improved sanitation facility. It might be due to personal preference, behavioural factors or lack of awareness among people regarding the adverse impact on health of using unimproved sanitation facilities. A study on rural Tamil Nadu also discussed that the lack of utilisation of sanitation services could be improved by creating awareness through organising an information, education and communication campaign and motivating people to use toilets.[38] Another important finding is that poor people and those with no education have received more benefits from the SBA and significantly poor people benefited the most from the scheme.[39] This may be because the government focused more on these groups of society when providing sanitation facilities. These groups are mainly affected and are more prone to diseases caused by inadequate sanitation. Our study reveals that the central region has received the maximum benefit from the SBA. One reason for this might be that states in the central region (Chhattisgarh and Madhya Pradesh) have a lower percentage of access to sanitation facilities[12] and the government must have focused on these states when providing benefits from the SBA. The main contribution of the study is providing estimates of accessibility of the different types of sanitation services in India and its states using an exhaustive information collected from a household survey and by adopting the JMP ladder. However, some information such as washing hands with soap and water after defecation and receiving benefits from the SBA may be affected by reporting bias. The survey also acknowledged respondent bias, that is, individual households not admitting that they have toilets or liquified petroleum gas (LPG) cylinders when asked a leading question on whether they have ever received benefits from the government, in the hope of receiving additional benefits from the government.[40] This bias may have led to under-reporting of sanitation coverage. Such biases are often observed in households when canvassing information on items and issues where government-funded beneficiary schemes are under implementation.[40]

Acknowledging this limitation in the leading question, the survey report itself has issued a disclaimer as follows: 'In NSS 76th round, information on 'benefits received by the household from the government schemes for drinking water, sanitation, housing, electrification and LPG connection facilities' was collected for the first time, before asking them about having access to these facilities'.[40] There may be an inherent tendency for the respondents to give a negative reply on the presumption or expectation that a negative reply on the benefits received and access to facilities may help them get additional benefits from government schemes.[40] We have kept these points in mind while interpreting the results on the benefits received from different government schemes and access to the said facilities. Further, the present study is quantitative and did not explore the reasons for not using safely managed sanitation services by individuals after receiving benefits from the SBA.

CONCLUSION

This study clearly reveals that even after the completion of SBA in the country, only half of the population had access to safely managed sanitation services and about 21% of the population are still using unimproved services, which also includes the population with no services. State-level deferential depicts that the government must now come up with state-oriented schemes to improve the sanitation services in particular states. The rural–urban gap prevailing in terms of access and usage of sanitation facilities must also be reduced to a certain extent. Indeed, the mission has been successful

in increasing access; however, there remains a need to follow up households from the poor strata of the society to determine their usage and the current state of their sanitation facilities.

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