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# National Economic Impact Evaluation of the Swachh Bharat Mission

ODF Sustainability



Years



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# National Economic Impact Evaluation of the Swachh Bharat Mission

**Final Report**

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United Nations Children's Fund

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# List of acronyms

Abbreviation	Definition
ALRI	Acute Lower Respiratory Infections
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
ASHA	Accredited Social Health Activist
BCC	Behavior Change Communication
BMGF	Bill & Melinda Gates Foundation
BOQ	Bill of Quantities
BPMU	Block Project Management Unit
BSE	Bombay Stock Exchange
CCDU	Communication and Capacity Development Unit
CEO	Chief Executive Officer
CII	Confederation of Indian Industry
CLTS	Community-led Total Sanitation
CPI	Consumer Price Index
CRSP	Central Rural Sanitation Programme
CSC	Community Sanitary Complexes
CSR	Corporate Social Responsibility
DAC	Development Assistance Committee
DALY	Disability-Adjusted Life Years
DFID	Department for International Development
DHS	Demographic and Health Survey
DLAMC	District Level Advisory and Monitoring Committee
DPR	Detailed Project Report
DWSC	District Water and Sanitation Committee
DWSM	District Water and Sanitation Mission
ERG	Expert Reference Group

## Abbreviation      Definition

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ESI	Economics of Sanitation Initiative
FDI	Foreign Direct Investment
FSM	Faecal Sludge Management
FSTP	Faecal Sludge Treatment Plant
FTE	Full-Time Equivalent
GCI	Galvanized Corrugated Sheets
GDP	Gross Domestic Product
GEROS	Global Evaluation Reports Oversight System
GOBAR	Galvanizing Organic Bio-Agro Resources
GVA	Gross Value Added
HPI	House Price Index
HRD	Human Resource Development
ICMR	Indian Council of Medical Research
ICO	Information Commissioner's Office
IEC	Information, Education, and Communication
IGS	Indian Green Service
IHHL	Individual Household Latrines
IHME	Institute for Health Metrics and Evaluation
IJERPH	International Journal of Environmental Research and Public Health
IPC	Interpersonal Communication
IRB	Institutional Review Board
ISI	Indian Standards Institute
IVA	Independent Verification Agency
JMP	Joint Monitoring Programme
KII	Key Informant Interviews
LSBA	Lohiya Swachh Bihar Abhiyaan
MDWS	Ministry of Drinking Water and Sanitation
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme

Abbreviation	Definition
MICS	Multiple Indicator Cluster Surveys
MIS	Management Information System
MNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MOHUA	Ministry of Housing and Urban Affairs
MOSPI	Ministry of Statistics and Programme Implementation
NARC	National Advisory and Review Committee
NARSS	National Annual Rural Sanitation Survey
NBA	Nirmal Bharat Abhiyaan
NER	North-eastern region
NFHS	National Family Health Survey
NGO	Non-governmental organization
NNP	Nir Nirmal Pariyojna
NRC	National Resource Centre
NRDWP	National Rural Drinking Water Programme
NSS	National Sample Survey
NSSO	National Sample Survey Office
ODF	Open Defecation Free
OECD	Organization for Economic Co-Operation and Development
PDF	Portable Document Format
PHFI	Public Health Foundation of India
PIP	Programme Implementation Plan
PMU	Project Management Unit
PSM	Propensity Score Matching
PVC	Poly Vinyl Chloride
PWD	Persons with Disabilities
P&RDD	Panchayats and Rural Development Department
QCI	Quality Council of India
RBI	Reserve Bank of India
RCT	Randomized Control Trial

## Abbreviation      Definition

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RSM	Rural Sanitary Marts
SAP	Sanitation Action Plan
SBM	Swachh Bharat Mission
SDG	Sustainable Development Goals
SHG	Self-Help Group
SHPC	State High Powered Committee
SLSSC	State Level Scheme Sanctioning Committee
SLWM	Solid and Liquid Waste Management
SOR	Schedule of Rates
SPMU	State Project Management Unit
SWM	Solid Waste Management
SWSM	State Water and Sanitation Mission
TOR	Terms of Reference
TSC	Total Sanitation Campaign
UDD	Urban Development Department
ULB	Urban Local Body
UNEG	United Nations Evaluation Group
UNICEF	United Nations Children's Fund
USD	United States Dollar
VOSL	Value of Statistical Life
VSL	Value of Saved Lives
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization
WSSO	Water and Sanitation Support Organization

# Executive summary

On 2 October 2014, the Hon'ble Prime Minister of India, Narendra Modi, launched Swachh Bharat Mission (SBM) to eliminate open defecation by 2 October 2019. When SBM was launched, despite a succession of interventions to improve sanitation landscape (Central Rural Sanitation Programme, Total Sanitation Campaign, and Nirmal Bharat Abhiyaan, to name a few), India faced seemingly insurmountable odds in the form of lack of usage of improved sanitation facilities. According to the UNICEF-WHO Joint Monitoring Programme (JMP) estimates, only 41 per cent of rural households and 67 per cent of urban households used improved sanitation facilities in 2013. Improved sanitation facilities are those designed to hygienically separate excreta from human contact (UNICEF-WHO JMP). In addition, the achievement of SBM targets held strategic significance in terms of meeting global targets of Sustainable Development Goal 6, which aims to ensure universal access to safely managed drinking water and sanitation by 2030.

Open defecation leads to health hazards, safety and dignity issues, particularly for women and children. Various studies have cited several socio-cultural factors, which could have inhibited the mass adoption of toilets for defecation. In rural India, various myths, stigmas, and misconceptions about constructing toilets prevailed. Iyer 2019 reports misconceptions such as (i) construction of toilet within household premises is considered to be impure, (ii) only women need to use toilets while men can defecate in open, (iii) cleaning of a toilet is someone else's job.<sup>1</sup>

In the aforementioned context, Swachh Bharat Mission was launched with a multi-dimensional focus on both demand and supply-side factors. On the demand side, the programme focused on effective Information, Education, Communication (IEC) campaigns to create demand for toilets and to spread the word on the financial incentive of Rs. 12,000 per household for construction of toilet. On the supply side, it focused on building capacity of masons and other stakeholders to ensure that increased demand is met, and stakeholders are trained in delivering the mandate. Further, the programme also sensitized on cheap and safe technology (twin-pit toilet). More than 100 million toilets were constructed within a span of five years. As per the National Annual Rural Sanitation Survey (NARSS) 2018-19, 90 per cent of households are reported to be owning and using toilets.

“  
  
**Within five years, percentage of households using improved sanitation facilities in rural areas improved from 41 per cent in 2013-14 to 90 per cent in 2018-19.**  
”

With such large-scale investment in sanitation under SBM, UNICEF led the implementation of an evaluation of SBM to estimate the national economic impact resulting from a rapid rise in sanitation facilities and usage. UNICEF contracted PricewaterhouseCoopers Pvt. Ltd., India on 24 July 2019 to conduct an evaluation. The evaluation highlights potential gains from investing in improved sanitation and sustaining it. The primary intended

users of the evaluation include officials at the Ministry of Jal Shakti (implementing agency for the rural component), Ministry of Housing and Urban Affairs (implementing agency for the urban component), and the Ministry of Finance, Government of India (GoI). The government of India is now investing in sustainability measures of Open Defecation Free (ODF) and safe faecal sludge management, including the management of both solid and liquid waste. The findings of the evaluation would highlight to what extent it is important to invest in sustainability measures.

The evaluation is conducted within the OECD-DAC framework of effectiveness, efficiency, impact, and sustainability. In terms of impact areas, the evaluation focuses on six categories, namely, (i) health, (ii) time-use, (iii) sanitation input market, (iv) sanitation output market, (v) environment and (vi) social outcomes.

In terms of timeline, the evaluation covered the cumulative impacts of SBM from 2 October 2014 to 31 March 2019. In addition, the evaluation made a prospective assessment of the impacts of SBM for the period of 2019-20 to 2023-24. Further, it assesses the effectiveness, efficiency, and sustainability through secondary information from published sources, wherever available.

Given the short timeframe, the evaluation is based on literature review and in-depth analysis of available data from household surveys of UNICEF (2017) and Management Information System (MIS) of line ministries. Further, UNICEF 2017-18 cost-benefit study (Hutton et al (2018)<sup>2</sup>) methodology has been used as the starting point and has been developed further with appropriate revisions to conduct the analysis. Specifically, economy-wide output and employment impact have been estimated using the 'input-output' methodology. Finally, Key Informant Interviews (KIIs) have been used

for triangulation of data points to estimate economic impact, qualitative impacts of SBM, and insights about effectiveness, efficiency, and sustainability. Some examples of triangulation include verification of the cost of construction of toilets and input-mix. Qualitative impacts included documentation of social outcomes such as improvement in dignity, community cohesion, and security. KIIs were also used to document gaps and challenges and to answer evaluation questions on the efficiency and sustainability of SBM intervention. These KIIs were conducted in Bihar, Jharkhand, and Maharashtra.

Major data sources for the evaluation include National Family Health Survey (NFHS) 2015-16, NSSO 71<sup>st</sup> round and 72<sup>nd</sup> round, and other household surveys like NARSS 2017-18 and 2018-19, ministries' databases, UNICEF-WHO Joint Monitoring Programme statistics on sanitation, and survey data from the UNICEF 2017-18 cost-benefit study. The detailed approach followed is provided in Chapter 2 of this report. Summary of key findings across evaluation questions is provided below:

### *Effectiveness:*

#### **To what extent did the SBM achieve its intended outcomes, including intermediate outcomes such as access and use of toilets, and final outcomes such as reaching open defecation free status?**

In rural areas, according to the SBM dashboard, toilet coverage has increased from nearly 44 per cent in 2014-15 to 100 per cent in 2019-20 with reference to the households identified in the government system.<sup>3</sup> The coverage increased at a higher rate in 2017-18 and 2018-19. The NARSS<sup>i</sup>, conducted by an Independent Verification Agency (IVA) under the technical guidance of World Bank,

<sup>i</sup> Survey for NARSS 2017-18 was conducted between mid-November 2017 and mid-March 2018. While survey for NARSS 2018-19 was conducted between November 2018 to February 2019.

found that in 2017-18, 77 per cent households had access to toilets of which 93.4 per cent regularly used them and in 2018-19, 93.3 per cent households had access to toilets of which 96.5 per cent regularly used them. In the case of urban areas, in 2015-16, none of the cities were declared ODF. As per data with the Ministry of Housing and Urban Affairs (MoHUA), as on 28 August 2019, 4,311 cities of total 4,378 cities (approximately 98 per cent), declared themselves to be ODF. Of the 4,311 self-declared ODF cities, 3,876 cities were certified to be ODF (nearly 89 per cent of the total number of cities).

### What were the major factors influencing the achievement of these outcomes?

Key factors that contributed to the achievement of these outcomes include (i) effective monitoring from Prime Minister Office, (ii) specific focus on behavioral change, (iii) availability of cheap and safe toilet technology, (iv) sufficient workforce to construct toilets, (v) adequate required public funding, (vi) multi-sectoral partnership and participation from multilateral agencies, NGO and CSRs, and (vii) people's participation. As per SBM(G) guidelines, about 8 per cent of the total expenditure is to be allocated towards IEC. As per expenditure estimates from MIS, IEC made up 2 per cent of the total expenditure to generate a wide level impact.

### To what extent did the results of the SBM succeed in addressing the gender and equity gaps in access to clean sanitation?

Entrenched gender and caste-based differences are found to hamper universal access to clean sanitation facilities. However, recent statistics report substantial progress. As per NARSS 2018-19, the percentage of households having access to toilets in non-ODF villages was 86.6 per cent, 91 per cent, 87 per cent and 93.6 per cent for ST, SC, OBC, and general category households respectively.

### Efficiency:

#### What has been the total investment in the SBM, based on implementation costs?

#### To what extent has the SBM made efficient use of the resources that have been invested?

The total investment made under SBM-G was Rs. 821.38 billion and under SBM-U was Rs. 114.50 billion during the period 2014-15 to 2019-20.

SBM-G led to benefits of approximately 3.8 at the national level, where benefits are roughly four times the costs. Benefits include medical expenditure saved, the value of treatment time saved, the monetary value of sanitation access time saved, the value of saved lives and property value appreciation. Costs include toilet construction and its operation and maintenance.



**The evaluation found an estimated Return on Investment of the SBM of 3.8 at the national level.**

Under SBM, Rs. 35 billion-Rs. 40 billion have been spent by the government, private sector, and the development community on IEC activities. This investment has generated per capita exposure of 2,500-3,300 SBM related messages in rural India. As per the report by BMGF<sup>4</sup> (June 2019), to get equivalent exposure, spending of Rs. 220 billion to Rs. 260 billion on IEC activities would be required. This implies a leverage factor of approximately six. Hence, SBM has been effective in mobilizing funds much higher than the actual spending on IEC activities.

Despite the successful mobilization of resources and funds, certain gaps and challenges may be addressed. Field visits and KIIs across Maharashtra, Jharkhand, and Bihar report that (i) cases of capacity gaps

among masons have led to construction of toilets with incorrect designs (ii) lack of water especially during summers constrains use of toilets, (iii) existence of caste-based differences in access to community toilets, (iv) cases of visible excreta in open environment in ODF certified ULBs, (v) floating population (laborers) with limited access to public toilets, and (vi) 'one toilet for one family' found to be inadequate for joint families having more than 7-8 members.

### Impact:

#### What have been the economic and financial impacts of the SBM at the national level in key domains?


Impact of SBM at the national level include (i) economic impact in terms of damage costs saved (ii) financial impact from construction of toilets, solid waste management infrastructure, IEC spending (sanitation input market) and financial value of treated waste for reuse (termed as sanitation output market) and (iii) employment impact because of construction of toilets and SWM (Solid waste management) infrastructure under SBM.

The impacts on health, time-use is estimated in an imputed scenario, while the economy wide impact of sanitation input and sanitation output market are estimated using GVA (Gross Value Added) and employment multipliers. To ensure consistency, impact estimates are expressed as a percentage of GVA instead of GDP (Gross Domestic Product).

It should be noted that the impact of health, time-use, and property value appreciation do not imply one-to-one contribution to GVA. Rather, they represent economic value

generated through a counterfactual logic. On the other hand, the impact due to the sanitation input market (as well as prospective impacts of sanitation output market) can be termed as a more direct contribution to GVA. These two benefits are not additive. Hence, benefits emanating from (i) health, time-use, and property value and (ii) sanitation input/output market are shown separately as a percent of GVA.

Toilet usage increased from 41 per cent in 2013-14 to 44 per cent in 2014-15 in rural areas and from 67 per cent in 2013-14 to 68 per cent in 2014-15 in urban areas. The economic impact is interpreted as a difference between the damage cost<sup>ii</sup> under the improved sanitation usage scenario with SBM relative to damage costs without improved sanitation usage scenario. SBM has led to cumulative economic damage savings of approximately Rs. 25,815 billion (US\$361.85 billion) during the period 2014-15 to 2018-19. Economic damages saved increased from Rs. 1,212 billion (US\$16.99 billion) in 2014-15 to Rs. 10,144 billion (US\$142.19 billion) in 2018-19.

“  
 **SBM led to cumulative savings of approximately Rs. 25,815 billion (US\$361.85 billion) during the period 2014-15 to 2018-19.**  
 ”

If SBM achieves 100 per cent sanitation coverage and usage in 2019-20, economic damages saved would increase to Rs. 13,845 billion (US\$194.07 billion). By 2023-24, if India achieves 100 per cent safe faecal sludge management too, economic damages saved would further go up to approximately Rs. 24,809 billion (US\$347.75 billion<sup>iii</sup>). Economic

<sup>ii</sup> Damage costs refers to the damages incurred by households in terms of higher medical expenditure because of increase in disease prevalence, loss of time in treatment of diseases for both the patient and caretaker and time lost in defecating in open as compared to using a toilet at their premises. Damage costs are computed in an imputed scenario.

<sup>iii</sup> At exchange rate of Rs. 71.3429 per United States Dollar

damages saved would represent approximately 8.55 per cent of GVA and 7.74 per cent of GDP in 2023-24.

“



**By 2023-24, the SBM is projected to result in an annual saving of 7.74 per cent of GDP for the country.**

”

Sanitation input market impact is estimated by combining the impact of the construction of infrastructure for sanitation input and sanitation output market. Both direct and indirect economy-wide impacts have been estimated. The direct impact is the total amount spent in the construction of SBM infrastructure and IEC activities. A range of inputs (such as iron and steel, cement, bricks, and sand) are used in the construction of sanitation infrastructure (Individual Household Latrines (IHHL), etc.). Through various backward channels, the use of these inputs creates economy-wide impacts. The economy-wide impact because of backward linkage is referred to as indirect impact. Direct and indirect economy-wide impacts of the sanitation market are estimated to be Rs. 86.42 billion in 2014-15, which increased to Rs. 518.74 billion in 2017-18. Sanitation output market impact was estimated as the value of reusable and recyclable waste. Owing to the lack of data for rural areas, sanitation output market impact is estimated only for urban areas. Over the period of 2014-15 to 2018-19, the cumulative sanitation output market impact was estimated to be Rs. 514 billion.

By 2023-24, the impact of sanitation input market because of the construction of additional toilets, retrofitting of toilets, expenditure on IEC activities, and development of SWM infrastructure will lead to an economy-wide impact of Rs. 2,035 billion. The influence of the sanitation output

market by 2023-24 would increase to Rs. 1,013 billion assuming 100 per cent treatment of solid waste.

“



**Investments under SBM for construction of toilets, other infrastructure and IEC activities has created employment of 7.55 million FTE workers over 2014-15 to 2018-19 period.**

”

Construction of infrastructure creates employment opportunities for people involved directly in the construction of infrastructure as well as for people involved in the supply chain that provides input and materials for the development of infrastructure. The supply chain consists of the industries that provide inputs like toilet pans, doors, bricks, cement, sand, etc. It is estimated that the development of SBM infrastructure has provided direct cumulative employment of 2.59 million full-time equivalents (FTE)<sup>iv</sup> workers over 2014-15 to 2018-19 period. Through the impact on the supply chain, SBM is estimated to have created indirect employment of 4.95 million FTE workers during the same period. Employment generated year-wise was closely linked to the number of toilets and SWM infrastructure constructed in a given year. Hence, FTE jobs generated on the basis of computation were the highest in 2017-18, when a maximum number of toilets and SWM infrastructure was constructed.

“



**By 2023-24, construction of SBM infrastructure (retrofitting, SWM infrastructure etc.) and IEC activities would create additional employment of 5.63 million FTE workers.**

”

<sup>iv</sup> FTE workers: 1 full-time equivalent employment is 240-person days of work in a year. It does not imply that 2.59 million of workers were provided employment/jobs over the five-year period

Construction of IHHLs and SBM infrastructure and IEC activities would provide additional employment of 5.63 million FTE workers by 2023-24, which is made up of direct employment of 2.28 million FTE workers and indirect employment of 3.35 million FTE workers. Employment generated would be greater in rural areas (2.93 million FTE workers) than urban areas (2.70 million FTE workers).

Inadequate sanitation affects girls and women disproportionately, due to physical and psychological factors. Safe sanitation technologies for women are essential towards achieving gender equality and the realization of their rights. As per the UNICEF 2017-18 cost-benefit study, over 90 per cent of female respondents reported that having a toilet in the household improved their safety. From the equity perspective, with access and use of improved sanitation facilities, it is estimated that the poorest households in 2018-19 saved Rs. 45,910 in rural areas and Rs. 61,777 in urban areas in one year.

“



**With access and use of improved sanitation facilities, poorest households saved**

**Rs. 45,910 in rural and Rs. 61,777 in urban areas in 2018-19.**

”

### *Sustainability:*

#### **Is the current and projected level of investment in WASH sustainable at the national level?**

Costs associated with the construction of additional toilets for new households and retrofitting of single-pit toilets to twin-leach pit toilets are not significant relative to spending on construction of nearly 100

million toilets, IEC, BCC activities and capacity building activities. Assuming the leading determinants to the achievement of outcomes are sustained and gaps outlined in the efficiency section are addressed, the current investments seem to be sustainable. However, a detailed assessment of projected investment is not feasible, as Gol is in the stage of finalizing the investments for ODF-S and ODF+ phases.

#### **In what ways and why might the sustainability of the SBM results be threatened?**

Key factors and reasons as identified through relevant literature and KIIs<sup>v</sup> that might impact SBM results include (i) lack of sustained behavioral change and community engagement, (ii) little development of supporting infrastructure such as availability of water, (iii) improper retrofitting and maintenance of defunct toilets, (iv) lack of independence and rigor during verification of ODF status, and (v) operational challenges that have currently not hampered the achievement of results but may affect if these become widespread. These include specific cases of improper training of masons, lack of capacity building activities, delay in the disbursement of incentives to swachhgrahis (community volunteers) and in data entry for monitoring, inadequate tracking of deployment of trained masons, poor CSR/grants sourcing, long distance between constructed toilet and the nearest water source, limited evidence of involvement of panchayats and beneficiaries in the planning process, and use of improper technologies to construct toilets.

#### **Recommendations**

The Swachh Bharat Mission has created substantial economic impact and influenced

<sup>v</sup> The points enlisted through the KIIs are anecdotal and are not established empirically. Hence, it might not be possible to assess the size of these challenges only based on KIIs.

social outcomes. In the coming years, the focus needs to shift on maintaining the sustainability of the results achieved (ODF-S) so far and on achieving additional benefits through safe FSM, inculcating the importance of handwashing among other things (ODF+ and ODF++ stage). The ODF-S guidelines focus on ensuring access to sanitation for new households and left-over beneficiaries, developing and retrofitting of infrastructure and continuous behavioral change communication. Similarly, the ODF+ and ODF++ guidelines focus on solid waste, plastic waste management, and greywater management. Through the KIIs and literature review, some determinants of impacts are known. Based on the determinants of impact created by SBM, future sanitation programmes should focus on:

#### *Sustaining SBM results (ODF-S stage):*

1. Sustaining behaviour change through an awareness programme and community engagement were key components for SBM as noted in the efficiency section of this evaluation. Continuous efforts should be made to sustain changed behaviours for the sustainability of SBM results in the ODF-S stage.

*Stakeholders targeted: Line ministries (MoJS and MoHUA), Panchayati Raj Institutions, ULBs and Swachhagrahis, and CSO.*

2. As deliberated in the efficiency section of this evaluation, rigorous independent verification to monitor defecation practices need to be in place; innovative methods such as potential withdrawal of government benefits for local monitoring of sanitation and hygiene practices may be explored and could be potentially included in ODF-S guidelines.

*Stakeholders targeted: Line ministries (MoJS and MoHUA), Panchayati Raj Institutions, ULBs, and 3rd party verification agencies.*

3. UNICEF 2017-18 cost-benefit study survey notes that households aspire to build toilets with bath facilities, and superior material which they can use for many years. Promotion of micro-loans for WASH infrastructure to finance the construction of more than basic toilets, which households may aspire and use for many years could be investigated by the ministry and other implementing partners.

*Stakeholders targeted: Line ministries (MoJS and MoHUA) and financial institutions with WaSH portfolio*

4. Poor quality construction was one area of concern flagged in many KIIs. Hence, the focus should be given on strengthening work supervision by GPs/blocks to ensure good quality construction of toilet facilities and SLWM infrastructure in the coming phase. Disease prevalence can be further reduced with sustained usage of good quality toilet facilities and SLWM infrastructure.

*Stakeholders targeted: Ministry of Jal Shakti, masons, and technical supervisors*

5. Promoting and monitoring operation, maintenance, and retrofitting of single-pit toilets to sustain health impact along with the continuation of financial incentives. Further, different toilet designs could be adapted depending on the terrain, for example, flood-resistant toilets and toilets constructed using a ferro-cement technique in flood-prone areas like Assam and dry pit toilets in drought-prone areas.

*Stakeholders targeted: Line ministries (MoJS and MoHUA), Panchayati Raj Institutions, ULBs and masons*

6. Given the role, caste-based discrimination and caste idiosyncrasies have in hampering sustained usage of toilets, ODF-S guidelines, and future policies should be formulated to connect rural sanitation policy to eliminating manual scavenging and caste-based oppression in

cleaning and desludging of toilets.

*Stakeholders targeted: Ministry of Jal Shakti*

*Achieving additional benefits (ODF+ and ODF++ stage):*

7. KILs conducted under this evaluation reveals that access to water is crucial for sustained usage of toilets. Therefore, provision should be made for water supply for sustained usage of household toilets constructed under SBM; priority could be provided to drought-prone areas on the same.

*Stakeholders targeted: Line ministries (MoJS and MoHUA)*

8. As highlighted in the efficiency criteria of this evaluation, training of swachhagrahis (community volunteers), SHG members, members of other village level institutions on ODF plus interventions should form a crucial component of the ODF+ and ODF++ guidelines.

*Stakeholders targeted: Ministry of Jal Shakti, Swachhagrahis*

9. Clarity on expectations from the communities in ODF+ stage should be provided, dissemination of potential gains at the community level from safe faecal management and re-use in terms of fertilizers, electricity from bio-gas, bio-charcoal, treated water at a similar scale and speed should be carried out. This can

potentially include training of women or women-led SHGs to actively engage in safe-faecal management that can serve as a source of livelihood.

*Stakeholders targeted: Ministry of Housing and Urban Affairs, Women SHGs*

10. Development of the market for the re-use of materials through technical training of communities in ensuring the quality of re-useable materials relative to their substitutes in the market and preferential public procurement of re-usable materials that can provide initial support to suppliers in the re-use market should form an important part of the ODF+ and ODF++ guidelines.

*Stakeholders targeted: Ministry of Housing and Urban Affairs, Businesses working in reuse and recycling of material, de-sludgers.*

11. ODF+ and ODF++ guidelines focus on ensuring access to public toilets in market places, transport points, railway stations, religious places, district/sub-district administrative headquarters, district/sub-district hospitals, burning ghats/burial grounds. This would be beneficial in reducing open defecation, particularly among the floating population.

*Stakeholders targeted: Ministry of Housing and Urban Affairs*

# Introduction



## 1. Introduction

On 2 October 2014, the Government of India launched the Swachh Bharat Mission to make India open defecation free (ODF) within five years (i.e. by 2 October 2019). The programme has two components: Swachh Bharat Mission-Gramin (SBM-G) and Swachh Bharat Mission-Urban (SBM-U). SBM-G aims to accelerate sanitation coverage and toilet use, eliminate open defecation, promote overall cleanliness, and develop safe hygiene practices in rural India. SBM-U aims to eliminate open defecation, eradicate manual scavenging, adopt modern and scientific municipal solid waste management, and bring behavioral change in urban India.

UNICEF appointed PricewaterhouseCoopers Pvt. Ltd.<sup>vi</sup>, India on 24 July 2019 to conduct an evaluation for estimating the national economic impact resulting from the drastic increase in sanitation coverage and achievement of ODF status throughout India under UNICEF guidance and technical leadership. The evaluation also intends to provide recommendations for the future implementation of WASH programmes and the efficiency of sanitation and hygiene interventions based on the implementation costs. Appendix A includes terms of reference for the evaluation.

The evaluation covers retrospective analysis, starting from the inception of Swachh Bharat Mission (i.e., 2 October 2014) till 31 March 2019 and a prospective analysis for the period 2019-20 to 2023-24. The details and key caveats for the timeline are provided in Appendix K. The evaluation commenced on 24 July 2019. The evaluation is specific to India with field visits to the following states, i.e., Maharashtra, Bihar, and Jharkhand.

### 1.1. Background and context of the intervention

Globally, a large fraction of the population lacks access to basic sanitation facilities and practices open defecation. As per WHO/UNICEF (2017), 892 million people practiced open defecation worldwide in 2015. About 520 million of them were in India, of which nearly 490 million were in rural areas.

Poor sanitation is linked to the prevalence of numerous diseases and conditions like diarrhea,<sup>5</sup> malnutrition, helminths (intestinal worms), and trachoma.<sup>6</sup> Regular bouts of diarrhea at a young age lead to reduced immune status and higher rates and fatalities from other diseases such as pneumonia and measles. Lack of access to proper sanitation facilities leads children to fall frequently ill, missing school, and eventually dropping out. This leads to inferior human capital development and impaired cognitive skills.<sup>7</sup> Shame and risk of harassment are additional burdens that adolescent girls and women face because of a lack of adequate sanitation facilities.

Sanitation broadly includes the management of human excreta, solid waste, and drainage. 'Improved' sanitation facility, according to the WHO/UNICEF Joint Monitoring Programme, is one, which hygienically separates human excreta from human contact. "Unimproved" sanitation facilities include defecation in open, bucket, or hanging latrines and open-pit latrines. Poor sanitation results in contaminated drinking water sources. Exposure to these contaminated

<sup>vi</sup> The evaluation team comprised of Manoranjan Pattanayak, (Team Leader), Anupam Tyagi (Health Expert), Mehul Gupta (Economist), Rahul Mallik (WASH and Environmental Engineer), Sambit Rath (Statistician), Ajaya Kumar Naik (Senior Field Research Manager), Pooja Singh (REM Expert), Technical Analysis Team (Pradyun Rame Mehrotra, Devkanya Chakravarty, Ipsit Rath)

water sources through faecal-oral path leads to diarrhoea and other deadly diseases. WHO (2008) shows that one gram of faeces can contain 10,000,000 viruses, 1,000,000 bacteria, 1,000 parasite cysts, and 100 parasite eggs. In a World Bank paper comparing villages that achieved ODF status with those that had not achieved it, Andres et al. (2011) have shown a reduction of 47 per cent in diarrhoea prevalence from having and using an appropriate sanitation facility. Health impacts also lead to loss of disposable income due to time off and due to increased medical expenditure of income earners. Inadequate sanitation also leads to loss of lives, which means permanent loss of income to family members. The economic loss due to poor health conditions adds to damage-costs at the macro-economy level. The poor population is the most likely not to have improved sanitation and is worst affected by its consequences.

Children under five years of age are also affected by the aforementioned diseases due to poor immunity to fight most of these diseases. As per the UNICEF study 2009, severe diarrhoea is the second biggest killer of children each year. Long-term malnutrition as a result of parasites in the child's body prevents necessary physical and cognitive development and leads to stunted growth. Children falling ill frequently miss school often and end up performing poorly in comparison with their peers. The absence of separate and clean toilet facilities causes discomfort to girl students and discourages them from attending school during menstruation. Fear, shame, and harassment are additional burdens on young girls and women because of poor sanitation. The published literature has shown various disadvantages to women due to the lack of improved sanitation. Some of them include (i) susceptibility to urinary and genital infections because they abstain from drinking water in order to avoid accessing toilets and (ii) security risks due to defecating in secluded locations; improved sanitation can address some of these issues that will have long-term economic impacts.

Lack of sanitation facilities not only adversely affects individuals and households but leads to damages at the national level in terms of higher disease prevalence, loss of work time because of frequently falling ill, among other things.<sup>8</sup> The social and economic developments of a country are often hampered by poor sanitation. Developing countries with a greater proportion of households without access to toilets are the worst affected. Therefore, providing access to sanitation holds immense significance in the policy narrative of several developing countries.

A cleaner environment is associated with higher property prices (*ceteris paribus*). Improved sanitation and villages/cities free from open defecation would mean higher property prices, adding to the wealth of the citizens residing in the locality.

Noting its importance as a basic human right; sustainable Development Goal 6 (SDG-6) aims to ensure availability and sustainable management of water and sanitation for all by 2030. It calls for increased attention to water and sanitation at the global level. Target 6.2 focuses on sanitation and hygiene services and aims to end open defecation globally. However, despite considerable efforts, significant progress needs to be made to achieve this target.

The trajectory of sanitation policy in India has closely followed the international trajectory, albeit slowly. The rural sanitation programme in India was introduced in 1954, as part of the first five-year plan. During the international decade for drinking water and sanitation (1981-90), the Government of India introduced Central Rural Sanitation Programme (CRSP) in 1986, with the primary objective of improving the quality of life of rural people, especially women. CRSP was followed by "demand-driven" initiatives like Total Sanitation Campaign (TSC) in 1999, where the emphasis was paid to IEC activities and capacity development to increase awareness and generate demand for sanitary facilities. Nirmal Bharat Abhiyaan (NBA), the successor of TSC, was

launched in 2012, with an objective to accelerate sanitation coverage in rural areas. Under NBA, incentives for IHHL were increased, along with support from policies like MGNREGS. However, despite the different programmes, achieving safe sanitation for all and eradicating open defecation has been slow. For instance, toilet access increased by only 9 percentage points from 22 per cent in 2001 to 31 per cent in 2011.<sup>9</sup> This called for interventions, through which acceleration in access to toilets could increase. Given this context and background, SBM was launched in 2014. Figure 1 shows the key components and timeline of sanitation programmes in India.

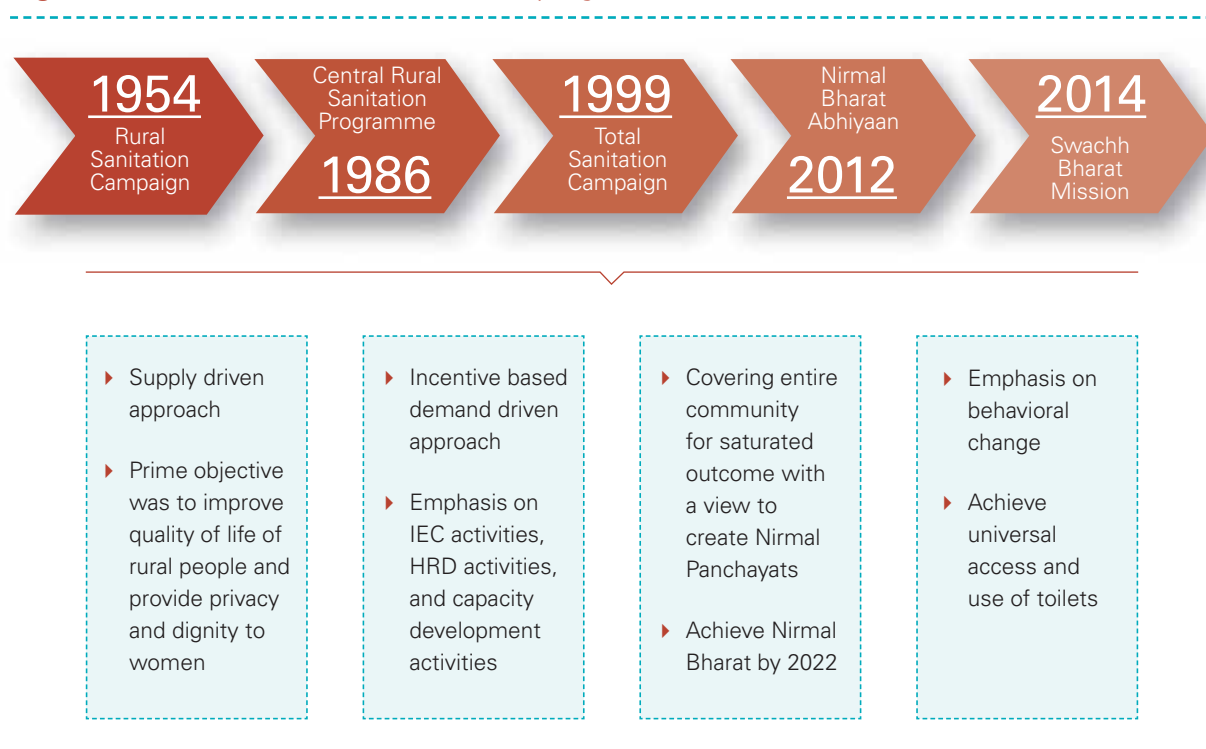
Swachh Bharat Mission is to date the largest sanitation initiative in the world in the modern era in terms of sheer size and spread. Swachh Bharat Mission shifted focus from output-based programme implementation to outcome-based programme implementation. The mission aims to achieve Open Defecation Free status by 2 October 2019 rather than merely aiming for the construction of toilets for all households.

We have listed down the specific objectives of Swachh Bharat Mission-Gramin (SBM-G) and Swachh Bharat Mission-Urban (SBM-U) below.

As per Swachh Bharat Mission-Gramin (SBM-G) guidelines, the objectives of SBM in rural areas are as follows:

1. Bringing about an improvement in the general quality of life in rural areas by promoting cleanliness, hygiene, and eliminating open defecation
2. Accelerating sanitation coverage in rural areas to achieve the vision of Swachh Bharat by 2 October 2019
3. Motivating communities and Panchayati Raj institutions to adopt sustainable sanitation practices and facilities through awareness creation and health education

**Figure 1: Timelines of various sanitation programmes**



4. Encouraging cost-effective and appropriate technologies for ecologically safe and sustainable sanitation
5. Developing, wherever required, community managed sanitation systems focusing on scientific solid and liquid waste management systems for overall cleanliness in rural areas
6. Creating a significant positive impact on gender and promoting social inclusion by improving sanitation, especially in marginalized communities

As per SBM-U guidelines, the objectives of SBM in urban areas are as follows:

1. Elimination of open defecation
2. Eradication of manual scavenging
3. Modern and scientific municipal solid waste management
4. To effect behavioral change regarding healthy sanitation practices
5. To generate awareness about sanitation and its linkage with public health
6. Capacity augmentation of ULBs to create an enabling environment for private sector
7. To support capital expenditure and operation and maintenance expenditure

Encompassing both rural and urban components, it is estimated that 101.11 million<sup>10</sup> rural individual household toilets and about 6.4 million<sup>11</sup> urban individual household toilets have been built since 2 October 2014, when the Mission was launched.

Key components of SBM-U and SBM-G are provided in Appendix K and are summarized below in Table 1. A detailed description of the components and stakeholders involved is presented in Appendix B.

**Table 1: Broad components of SBM-G and SBM-U**

SBM-G	SBM-U
<ul style="list-style-type: none"> <li>▶ Start-up activities including baseline survey</li> <li>▶ Information, education, and communication (IEC) activities</li> <li>▶ Capacity building</li> <li>▶ Construction of Individual Household Latrines (IHHL)</li> <li>▶ Rural Sanitary Marts (RSM) and Production Centers (PC)</li> <li>▶ Community Sanitary Complexes (CSCs)</li> <li>▶ Solid and Liquid Waste Management (SLWM)</li> </ul>	<ul style="list-style-type: none"> <li>▶ Construction of individual household toilets</li> <li>▶ Construction of community toilets</li> <li>▶ Construction of public toilets and urinals</li> <li>▶ Solid waste management</li> <li>▶ IEC &amp; public awareness</li> <li>▶ Capacity building and administrative and office expenses</li> </ul>

In terms of budget allocations, SBM has seen one of the highest allocations among all centrally sponsored schemes in the last 3-4 years.

In Table 2, financial estimates of SBM-G and SBM-U are provided since the commencement of the programme. SBM-G estimates include both the center and the state’s shares. SBM-U covers the only allocation to states. Estimates for 2018-19 and 2019-20 are revised estimates and budget estimates respectively.

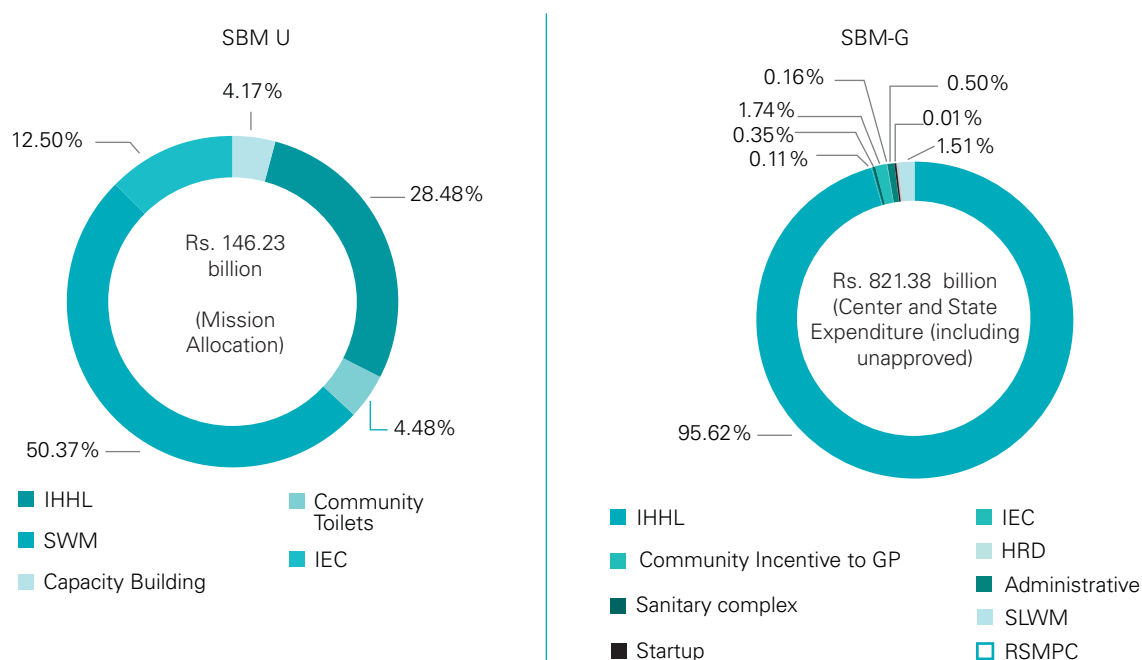
**Table 2:** Financial estimates of SBM-G and SBM-U for the period 2014-15 to 2019-20, Rs. billion (Including unapproved)

Scheme	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
SBM-G Expenditure	38.85	120.76	163.60	203.05	225.66	69.46	821.38
SBM-U (only center)	8.59	7.66	21.35	25.39	25.00 (RE)	26.50 (BE)	114.50

*Source:* Ministry of Jal Shakti (SBM-G) and various budget documents; *Note:* RE: Revised estimates, BE: Budget estimates

Figure 2 shows the bifurcation of allocation/expenditure across the components for SBM-U and SBM-G.

**Figure 2:** Distribution of SBM allocation/expenditure across components



*Source:* Ministry of Jal Shakti and Ministry of Housing and Urban Affairs

Swachh Bharat Mission is expected to impact the strategic sectors such as health, water, education, environment, and various population groups, particularly women, children, and the poor. In the sections that follow, a theory of change is presented, post which results for aspects assessed in this evaluation are discussed.

## 1.2. Theory of change

We hypothesize that the benefits of SBM depend upon the broad pathways of the impact. Swachh Bharat Mission interventions revolved around four aspects:

### *Inputs:*

1. Financial assistance in the construction of toilets (IHHL, public toilets, community sanitary complex, urinals, and PWD toilets).
2. Capacity building (Training of masons, ULBs).
3. Behavioral change (IPC, ambient media, mass-media, digital media, logo)
4. Sanitation output market (Faecal sludge management, solid waste management)

### *Output:*

Financial assistance for construction of IHHLs, community toilets, and public toilets along with a behavioral change to create demand for toilets and capacity building activities of masons and ULBs lead to an increased number of households with access to toilets (output).

On the sanitation output market front, investments have been made in the sanitation output economy in terms of improved collection of both liquid and solid wastes and their safe management.

### *Outcomes:*

Households with access to toilets with active behavioral change interventions lead to households using toilets and less open defecation. This results in the reduction of the number of faeces in the environment, which in turn results in the decrease in faecal contamination of water and in pathogens responsible for faecal-oral disease transmission.

Construction of IHHL and other kinds of toilets also boost the sanitation input market, which can provide more innovative solutions to the upcoming challenges in the sanitation economy.

Safe management of solid and liquid waste followed by treatment of waste for re-use/recycle and safe disposal lead to both reductions in pathogens responsible for faecal-oral disease transmission and financial value of reused products. The recycled and reused waste generates immense value for the economy, as the waste could be converted to energy through different processes like composting, mass-incineration, inter alia.

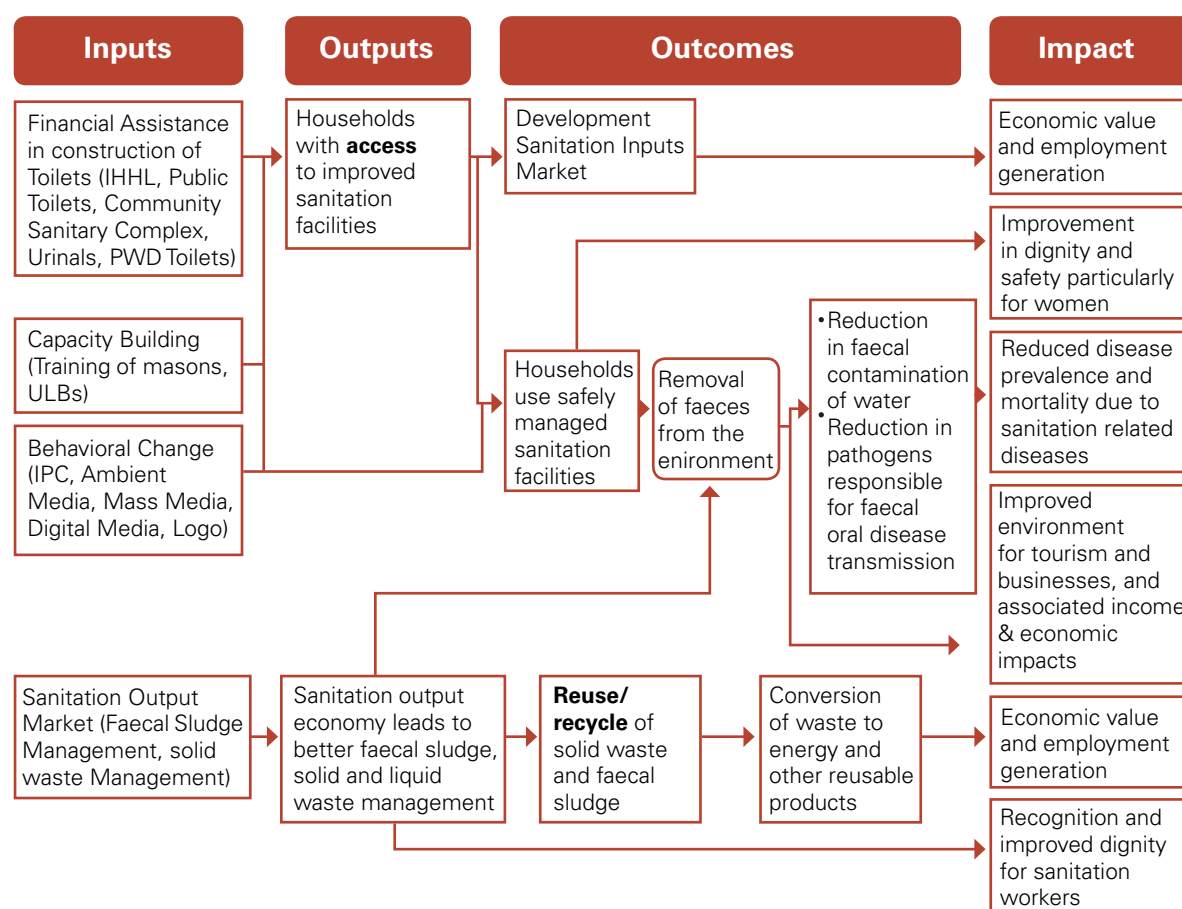
### *Impact:*

The development of the sanitation input market has a positive economic impact through backward linkages across the sectors. The backward linkages lead to higher employment generation, given that more inputs are required for IHHL construction and other activities.

The increased use of IHHL, especially by women leads to improved dignity and safety, as it has been one of the widely cited consequences of inadequate sanitation. Removal of faeces from the environment leads to an improved environment for tourism and businesses, and associated income and economic impacts. Reduction in faecal contamination of water and in pathogens leads to a decrease in the prevalence of diseases and mortality. Reduced morbidity and mortality help households save medical expenditure and get benefits from avoided death cases. Similarly, households also save time they earlier lost to illness. This saved time is in turn used for productive purposes and has indirect consequences on employment.

Proper management, reuse, and recycling of solid and liquid waste result in formal employment outcomes for workers involved in the sanitation economy. This not only improves the dignity of these workers but also results in better livelihood outcomes, in general.

Figure 3: Theory of change



### Assumptions:

1. Implementation modalities are compatible to achieve 100 per cent access and use to improved sanitation facilities
2. IEC activities leads to change in behavior and households use improved sanitation facilities
3. Availability of supporting infrastructure such as water to achieve impacts
4. Absence of natural disasters which impact of prevalence/mortality of sanitation related diseases
5. Operation and maintenance of improved sanitation facilities is ensured

### 1.3. Purpose of the evaluation

India has made significant improvements in providing access to improved sanitation. The percentage of households using improved sanitation facilities increased from 41 per cent in 2013 (UNICEF-WHO JMP) to 90 per cent in February 2019 (NARSS 2018). The GoI has invested significant resources to achieve this milestone.

In table 2, the GoI spent nearly Rs. 821.38 billion in rural areas and allocated nearly Rs. 114.50 billion in urban areas to states over the period 2014-15 to 2019-20.<sup>vii</sup> It was aimed to achieve ODF status by 2 October 2019. As per the UNICEF 2017-18 cost-benefit study, lack of improved sanitation in India implied economic damages of 7.9 per cent of GDP. As Swachh Bharat Mission achieved a crucial milestone on 2 October 2019, it is relevant to retrospectively assess how improved sanitation impacted the overall economic development in India in terms of health, productivity, and sanitation market development and look forward at where efforts should be concentrated in coming times.

<sup>vii</sup> Based on data uploaded as on 01-Nov-2019. Please note that SBM-U mission allocation is Rs. 146.23 billion.

The evaluation aims to highlight the potential gains from investing in improved sanitation and sustaining it. The primary intended users of the evaluation include officials at the Ministry of Jal Shakti (responsible for the rural component), Ministry of Housing and Urban Affairs (responsible for the urban component), the Ministry of Finance, the Government of India, sanitation sector, and other development partners. The Gol is now investing in sustainability measures of ODF and safe faecal management, including the management of both solid and liquid wastes. The findings of the evaluation will recommend to what extent sustainability measures are needed to maintain the socio-economic gains over time and what is still needed to further develop the sanitation value chain and sanitation service to meet the aspirations of communities.

The state governments and district officials would also be interested both as implementation partners of WASH and policymakers, given the fact that sanitation is a state subject. Other intended users include UNICEF and other development partners to ensure that they are investing in the sector to sustain economic benefits from improved sanitation. The findings will also feed into the ongoing sanitation plan for UNICEF India country office 2018-22, shifting the focus to ODF sustainability and aligning deliverables by the state teams. Researchers and field practitioners are other intended users to further research on this evaluation.

At the global level, it is anticipated that this evaluation will have a major impact as well, as other countries stand to learn from the India experience in defining and implementing their own sanitation programmes. India is indeed playing an important role in the global dialogue on WASH and on the SDGs. For example, the Mahatma Gandhi International Sanitation Convention assembled in New Delhi included 55 sanitation ministers and 200 representatives from 70 countries to reflect on sanitation programming. Hence, lessons learnt from the implementation of the SBM have majorly influenced other developing countries. In this context, translating sanitation achievements into financial benefits will contribute to better prioritization of sanitation issues at the global level.

## 1.4. The objective of the evaluation

The objectives of the evaluation are as follows:

### Primary objective

The primary objective is to estimate the likely economic and financial impact linked to the outcomes of SBM at the national level, now and in future.

### Secondary objective

The secondary objectives are as follows:

- 1 Estimate the potential impact of the SBM on public related aspects, notably:
  - ▶ On improving public health considering avoided mortality and morbidity related to faecal transmitted infections and the value in terms of avoided medical costs and value of lives gained
  - ▶ On time saved with a focus on gender equity
    - for having a toilet at home compared to OD/use of community toilet
    - due to morbidity avoided
  - ▶ On improving work productivity and wages linked to the potential decrease of the prevalence of transmitted infection through faeces
- 2 Estimate the full potential provided by the SBM on the sanitation economy considering:
  - ▶ Sanitation and hygiene market value and sanitation circular economy including the value of reuse and recycling;
  - ▶ Impact on employment and livelihoods; and
  - ▶ Increased property value, for households having a new toilet/ sanitation facility.

## 1.5. Scope of the evaluation

The scope of the evaluation includes the following:

1. Assessment against the evaluation criteria effectiveness, efficiency, impact, and sustainability
2. Estimation of the financial and economic impact of SBM under six categories by mapping of the following sub-studies:
  - ▶ Health
  - ▶ Time-use
  - ▶ Sanitation input market
  - ▶ Sanitation output market
  - ▶ Environment (property value)
  - ▶ Social (dignity, security, cohesion, and gender outcomes)

As presented in Figure 3, investing in sanitation leads to a reduction in diseases being transmitted through the faecal-oral pathway. Further, having a toilet at household premises leads to savings in time as against a case, where individuals had to defecate openly. Construction of toilets and SWM infrastructure leads to an economy-wide impact in terms of output and employment. The evaluation maps the financial and economic impact of the above-stated sub-studies.

The health, time, and property price impacts are drawn from the UNICEF 2017-18 cost-benefit study and have been updated to reflect SBM progress since then. Separate additional studies were conducted on the sanitation markets and data on progress and costs from mainly government sources and published literature have been assembled. It is not easy to measure the social impacts like social cohesion, dignity, security, comfort, etc. nor value them in monetary terms. A literature review is, therefore, conducted to assess social outcomes. KIIIs and various stakeholder consultations are used to build the narrative around the key findings from the literature review.

The secondary data analysis and final outcomes of the evaluation are at the national level. The primary data collection was conducted in the following states:

1. Bihar
2. Jharkhand
3. Maharashtra

The evaluation covered the cumulative impacts from 2014-15 to 2018-19. In addition, a prospective assessment of the impacts of SBM by 2024 is conducted. The details of changes made to the terms of reference are provided in Appendix C.

The value generated from the sanitation input market and sanitation output market makes the contribution to GVA. However, benefits generated from the health, time-use, and property value impact are imputed benefits that do not contribute to the GVA, per se. Since these two benefits cannot be added up, cost-benefit estimates of SBM at the national level would be difficult to estimate. Thus, the objective will be to assess economic and financial impact in terms of contribution to GVA or imputed benefits and not conduct a cost-benefit analysis.

# Methodology



## 2. Methodology

### 2.1. Evaluation criteria and questions

The evaluation shall cover the following criteria and questions as per 'OECD-DAC Criteria for Evaluating Development Assistance':

#### *Effectiveness*

1. To what extent did the SBM achieve its intended outcomes, including intermediate outcomes such as access and use of toilets, and final outcomes such as reaching the ODF status?
2. What were the major factors influencing the achievement of these outcomes?
3. To what extent did the results of the SBM succeed in addressing the gender and equity gaps in access to clean sanitation?

#### *Efficiency*

1. What has been the total investment in the SBM, based on implementation costs?
2. To what extent has the SBM made efficient use of the resources that have been invested?

#### *Impact*

1. What has been the economic and financial impact of the SBM at the national level in key domains?
2. What have been the economic and financial impacts of the SBM for specific sub-populations, including children, urban vs rural, different income quintiles?
3. What will the economic impact be of SBM at the national level in five years' time?

#### *Sustainability*

1. Is the current and projected level of investment in WASH sustainable at the national level?
2. In what ways and why might the sustainability of the SBM results be threatened?

The methodology used in UNICEF 2017-18 cost-benefit study has been adopted for estimating the impacts of SBM with appropriate adjustments. The evaluation assesses the effectiveness, efficiency, and sustainability through published information, wherever available. However, this should neither be construed nor interpreted as an independent confirmation or endorsement. We have adopted a mixed-methods approach comprising of quantitative as well as qualitative analysis.

### 2.2. Evaluation design

Given the short timeframe of the evaluation, it was not possible to conduct an impact evaluation to understand the impacts of SBM by comparing the benefits of exposure to SBM to that of a counterfactual state of no SBM. Hence, the evaluation is based on a model with impact magnitudes taken from various published literature and analysis of available secondary data sets such as household surveys and MIS of line ministries.

We have used the methodology followed by the UNICEF 2017-18 cost-benefit study as the starting point and developed it further with appropriate revisions to conduct the analysis. Further, we have estimated the economy-wide output and employment impact using the input-output methodology. The input-output methodology represents the structure of the entire economy in

terms of the flow of inputs in the production process across all the sectors. The input-output methodology is used to estimate the multiplier effect of demand in one sector over outputs of all sectors through both backward and forward linkages. Input-output tables for the year 2015-16 have been used to estimate the economy wide impact in terms of output and employment for this evaluation. Finally, KIIs have been used to validate and triangulate secondary data, along with also documenting the qualitative impacts of SBM like social outcomes, which are difficult to capture from existing datasets and indicators.

Major data sources for the evaluation included National Family Health Survey (NFHS) 2015-16; NSSO 71st round and 72nd round and other household surveys like NARSS, ministries databases, the UNICEF-WHO Joint Monitoring Programme statistics on sanitation, and the UNICEF 2017-18 cost-benefit study.

### 2.2.1. Analytical approaches

The DAC (development assistance committee) evaluation criteria cover the effectiveness, efficiency, impact, and sustainability of SBM. The criteria on 'impact' majorly include the analytical approaches undertaken for the evaluation. Criteria on effectiveness, efficiency, and sustainability are answered through literature review and secondary data analysis. We have explained the analytical approach followed for the impact criteria in this section. Approaches undertaken for the retrospective modelling are discussed first, post which approaches for prospective modeling are discussed. The tactic to estimate the impact on sub-population is provided at the end of the section.

The estimates of aggregate economic and financial impacts of SBM at the national level are sub-divided into six different portions. As presented in Figure 3, investing in sanitation leads to a reduction in diseases being transmitted through the faecal-oral pathway. Further, having a toilet at household premises leads to savings in time as against a case, where individuals have to defecate in the open. Construction of toilets and SWM infrastructure results in an economy-wide impact in terms of output and employment. The evaluation maps the financial and economic impacts of six sub-studies, namely: health, time-use, sanitation input market, sanitation output market, environment (property value) and social impact (dignity, security, cohesion, and gender outcomes).

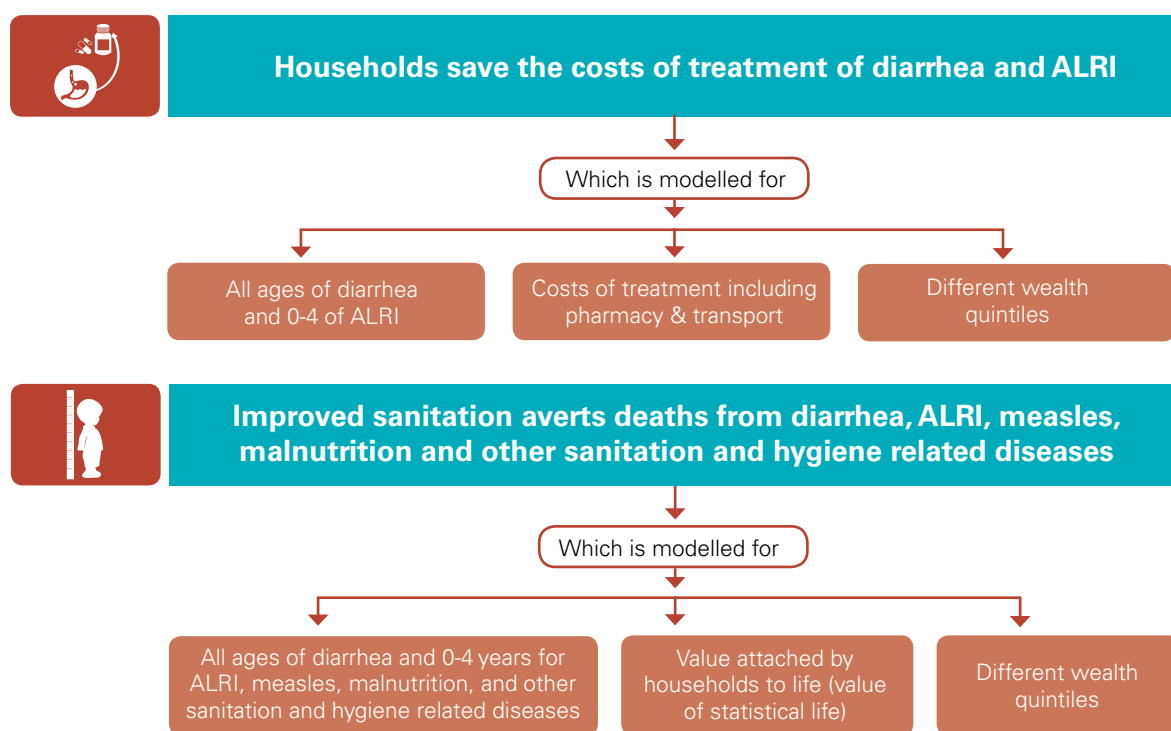
In the case of health, time-use, and property value, the UNICEF methodology adopted in the cost-benefit study 2017 has been applied for comparability. Sub-population analysis for health and time-use benefits is conducted for different age-groups and wealth quintiles at a household level. Different age groups include 0-4 years, 5-14 years and above 15 years. Wealth quintiles based on an asset index have been created using the NFHS 2015-16 data. For the sanitation input market, the economy-wide impact has been estimated using the input-output model. Further, the size of the market is estimated for the same using the data on the output capacity of SWM plants and data available through secondary sources. The impacts of IEC activities have been converted from expenditure estimates as per the BMGF study 'An assessment of the reach and value of IEC activities under Swachh Bharat Mission (Grameen), June 2019' to economy-wide estimates, using the input-output model.

Varied approaches have been followed to estimate different impacts, as these are affected through dissimilar pathways.

#### **Health**

Health-related benefits include medical expenditure saved by households because of reduced diarrheal and ALRI morbidity risks. The impacts of health improvement comprise of the reduced diarrheal and ALRI mortality risks. The two impacts are shown in Figure 4.

Figure 4: Approach for health impact



### ***The analytical approach followed for calculating medical costs averted***

#### ***Retrospective modelling***

The treatment costs for diseases in rural areas from the UNICEF 2017-18 cost-benefit study have been updated for different years, using price level from CPI data. Revisions for treatment costs from rural to urban areas have been made using NSSO 71st round data. The ratio of improved sanitation is sourced from the WHO/UNICEF Joint Monitoring Programme (JMP) and National Annual Rural Sanitation Survey (NARSS) statistics.

The relationship between diarrhea prevalence and the ratio of improved sanitation is estimated as suggested by Andres et al. (2014)<sup>12</sup> (refers to Figure 5). The number of disease cases for each year has been estimated from the prevalence rate graph and the adjustment factor as applied in the UNICEF 2017-18 cost-benefit study.<sup>viii</sup> Fifty-eight percent of the diarrheal diseases are estimated to be due to the faecal-oral pathway, and are hence, related to poor sanitation and hygiene.<sup>13</sup>

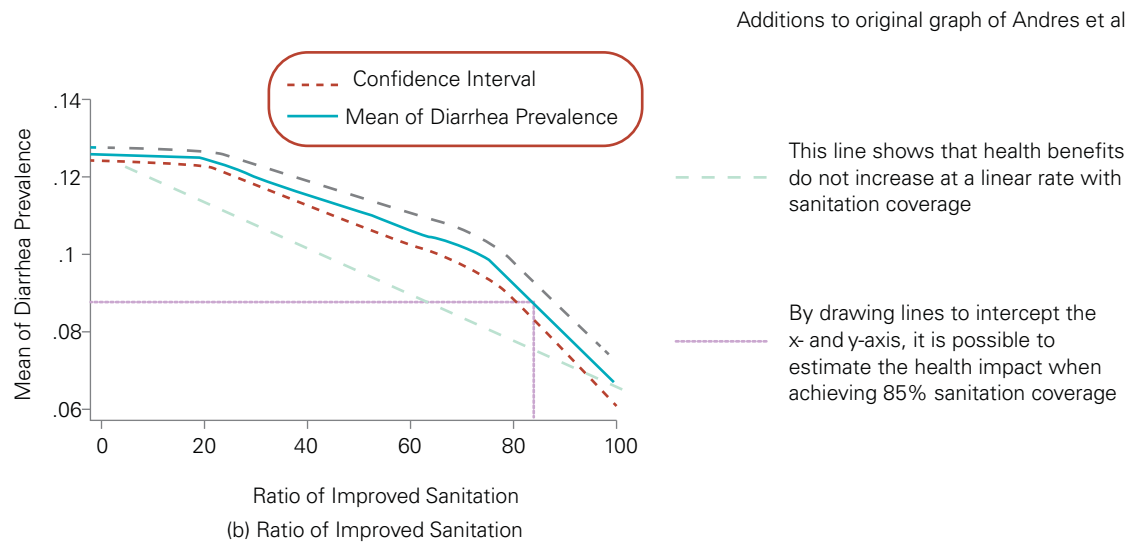
The percentage of cases seeking treatment of diarrhea and ALRI are based on the NFHS 2015-16 data and are estimated to be 65.8 per cent and 70.8 per cent, respectively.

The medical expenditure damages for a household are calculated by using the cost of treatment for a disease case and multiplying it by the number of disease cases per age group, the number of family members per age group, and the treatment-seeking rate.

Forty-seven percent of the damage costs occur because of poor sanitation, which can be averted as households move from unimproved sanitation to improved one.<sup>14</sup> However, 53 per cent of the damage costs are non-avertable and households would keep incurring the damage costs despite using the improved sanitation facilities.

<sup>viii</sup> The same prevalence rate graph has been used to estimate disease cases for urban areas.

Figure 5: Relationship between disease prevalence and ratio of improved sanitation



**Source:** Andres LA, Briceño B, Chase C, Echenique JA (2011). Sanitation and externalities: evidence from early childhood health in rural India. Policy Research Working Paper 6737. The World Bank: Washington DC

### Prospective modelling

The non-avertable damage costs can be further reduced with safe faecal sludge management. In the prospective scenario (2019-20 to 2023-24), for the year 2019-20, it is assumed that toilet usage increases to 100 per cent and no development on safe FSM are undertaken. The impact of 2019-20 is modelled using the same approach as followed in the case of retrospective modelling, as stated in the above section.

Investments will be made in safe FSM from 2020-21 onwards. Given the SBM ODF+ and ODF++ targets, it is estimated that India would achieve 100 per cent FSM by 2023-24. For the time period 2020-21 to 2023-24, the cumulative impact of safe FSM is estimated in the year 2023-24. Treatments costs have been adjusted using inflation data from the IMF. Forty per cent of the non-avertable damage costs are assumed to be reduced with safe FSM.<sup>15</sup>

### **The analytical approach followed for calculating value of lives saved**

#### Retrospective modelling

The value of saved lives is calculated using mortality rates. Using a declining trend of disease-specific death cases as reported by the Institute for Health Metrics and Evaluation (IHME)<sup>16</sup>, mortality rates from the year 2014-15 to 2018-19 are estimated for each age group.

The estimates for the value of statistical life (VOSL) are taken to be Rs. 44.69 million as given in Majumder and Madheswaran (2018)<sup>17</sup>, which refers to the year 2016-17. The same value of life has been assumed for both the rural and urban areas. VOSL has been price-adjusted for years other than 2016-17 considering inflation and per capita economic growth.

Value of lives saved (averted deaths), has been calculated by multiplying disease-specific mortality rate per age group with family members per age group, the value of statistical life, and the proportion of deaths avoided due to sanitation and hygiene-related intervention.

As is the case with medical expenditure, 47 per cent of the damage costs accruing from VOSL can be averted by using improved sanitation facilities. Of the rest 53 per cent non-avertable damage costs, 40 per cent could be reduced with safe faecal sludge management.

## Prospective modelling

Like the case of medical expenditure, in the prospective scenario (2019-20 to 2023-24), the value of saved lives for the year 2019-20 is estimated in the same way as in the retrospective scenario.

Of the 53 per cent non-avertable damages, 40 per cent could be reduced with safe faecal sludge management. For the time period 2020-21 to 2023-24, the cumulative impact for the value of saved lives is estimated. Avertable damages as in the case of medical expenditure saved are adjusted using CPI data from the IMF.

## Time-use

Time-use benefits (value of time savings) are estimated as the value of time saved to access IHHL instead of site of open defecation or community/public toilets, and the value of time saved due to less time sick with sanitation-related diseases. Access time saved refers to the time saved because of having a toilet in the household premises, as against far-away fields. Lower diarrhea and ALRI morbidity risk mean that less time is lost to illness.

The two impact pathways and their estimation are as shown in Figure 6.

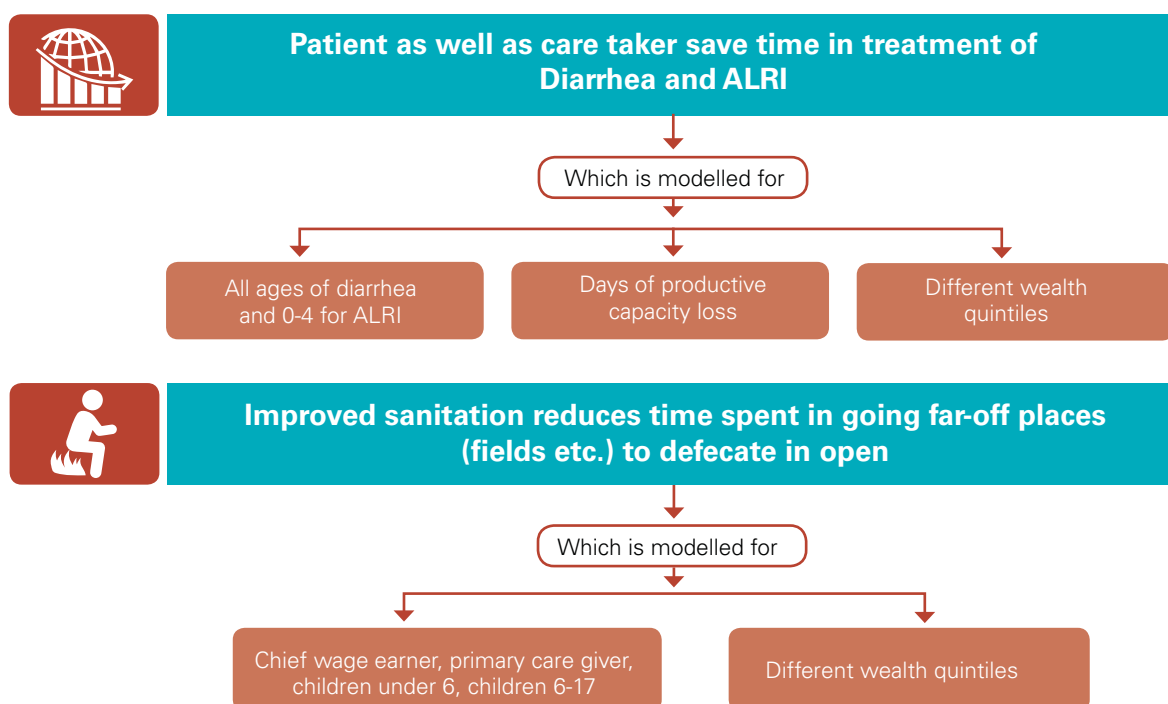
### **An analytical approach for estimating the monetary value of treatment time saved:**

#### Retrospective modelling

The monetary value of treatment time saved was estimated through the primary survey in the UNICEF 2017-18 cost-benefit study. The same has been revised for different years for the difference in price level using CPI data.

For calculation of benefits for urban areas, NSSO 71st round data has been used. Household composition is assumed to be the same as the UNICEF 2017-18 cost-benefit study.

Figure 6: Approach for value of time savings impact



Time savings from a smaller number of disease cases are calculated by multiplying the monetary value of time saved per case with a number of cases per age group and number of household members per age group. 47 per cent of the damage costs are avertable, as households move from unimproved sanitation to improved sanitation facilities.

### Prospective modelling

Non-avertable damage cost for the value of treatment time can be reduced by safe faecal sludge management. Estimates for the prospective model are made using a 40 per cent reduction in non-avertable costs because of safe FSM. Similar to calculations of health benefits, the monetary value of treatment time saved has been adjusted using inflation data from IMF to estimate the cumulative benefit of treatment time saved in 2023-24.

#### ***An analytical approach for estimating the monetary value of access time saved:***

### Retrospective modelling

Like the case of treatment time, the monetary value of sanitation access time was estimated through a primary survey in UNICEF 2017-18 cost-benefit study. The same has been revised for different years for the difference in price level using CPI data. For calculation of benefits for urban areas, NSSO's 71st round data has been used. Household composition is assumed to be the same as the UNICEF 2017-18 cost-benefit study.

The monetary value of access time saved is calculated by multiplying the average value of access time saved per household member (chief wage earner, primary caregiver, etc.) with an average number of household members by each type.

Damage-costs because of time spent in defecating openly can be averted by using improved sanitation facilities. Hence, no non-avertable damage-cost remains in this case.

### Prospective modelling

Given all damage costs incurred are avertable with 100 per cent toilet usage, no benefit accrues with safe FSM vis-à-vis other sub-studies like health and treatment time saved.

### Property value

Property value appreciation due to the construction of IHHL was estimated using a primary survey in the UNICEF 2017-18 cost-benefit study. These estimates are updated across years by using RBI's HPI. Conversion of property value appreciation estimates from rural areas to urban areas is done using the available survey data.<sup>18</sup>

### Sanitation input markets

#### *Retrospective modelling*

The increase in toilet coverage leads to an increase in infrastructural spending for making India ODF. A range of inputs is used in the construction of various infrastructure. Through backward linkages, these inputs create economy-wide impacts in terms of employment and output.

Figure 7 shows different infrastructure, for which economy-wide impact is estimated.

Figure 7: Types of sanitation infrastructure



Through input-output tables for the year 2015-16, the economy-wide impacts are estimated. The economy-wide impact of sanitation infrastructure is estimated by multiplying expenditure on different types of input mix with economy-wide gross value added and employment multipliers to calculate the output and employment impacts, respectively.

The gross value-added multiplier gives the effect of an increase of one-rupee worth of final demand of *j*th sector on outputs across all sectors, which gets converted into one-rupee new value-added.<sup>19</sup>

Similarly, the employment multiplier estimates the direct and indirect employment created in the economy, when the final demand of the *j*th sector increases by one unit.

### Prospective modelling

For the prospective scenario, expenditure estimates are used wherever made available by the ministry. Wherever expenditure estimates were not available, the United Nations' population projections have been applied to estimate the number of sanitation infrastructure needed to meet the SBM outcomes using the per-capita principle.

### Sanitation output markets

#### Retrospective modelling

Reuse and recycling of solid and liquid waste generate value as part of the sanitation circular economy. Different types of waste are recycled as part of the SBM and related programmes like AMRUT. Figure 8 gives an idea of different types of wastes that can potentially be recycled and reused.

The sanitation output economy is estimated using the output capacity of different types of infrastructure. The value of the output capacity is assessed by multiplying the capacity with per unit prices of the recycled waste. The prices are known from available literature and guidelines on the SBM website.

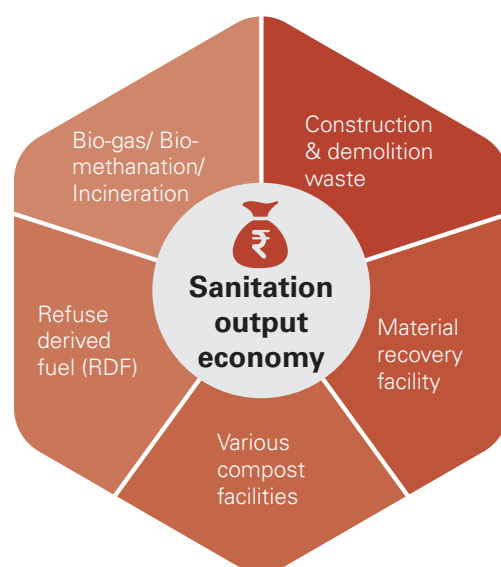
The estimates for the sanitation output economy only include the SWM facilities, as output capacities for FSTPs (faecal sludge treatment plants) and STPs are not available. Similarly, because of the lack of data for rural areas, the estimates for sanitation economy only include urban areas.

#### Prospective modelling

Modelling for the prospective impact in case of sanitation output market is carried out assuming 100 per cent waste is captured and treated. Additional output capacity required is estimated using the United Nations' population estimates and current output capacity available as provided by the Ministry of Housing and Urban Affairs.

In the prospective scenario, it should be noted that while the economy-wide impact of sanitation input market (construction of toilets, etc.) is for the period 2019-20 to 2023-24. The rest of the impact, i.e., economic damages and sanitation output are for 2023-24 only.

Figure 8: Types of sanitation output infrastructure



## Social outcomes

As stated earlier, social impacts such as dignity, security, and comfort are not easily amenable to monetary valuation. Hence, for benefits that cannot be expressed in monetary terms, a literature review and KIIs with state-level programme teams such as SBM-PMU-IEC officer and development partners have been conducted. These benefits can include improved outcomes like privacy for household members, enhanced security due to closer proximity to a sanitation facility, convenience during night and rains, and improved prestige and status for the households. We have documented a few potential social impacts gleaned from the literature survey or pointed out by the key informants.

## Return on Investment

Return on investment is estimated at the national level for SBM-G by using data for costs incurred and benefits accrued across years. ROI could not be estimated for SBM-U due to a lack of data on government expenditure. Return on investments is calculated under different perspectives and scenarios. The approach undertaken for estimation of ROI on different perspectives and scenarios is provided in Table 3. All benefits and costs are aggregated at the national level by multiplying cost and benefits per household to the number of households using toilets.

**Table 3: Return on investment by perspectives**

Perspective	Benefits	Costs
Financial perspective <sup>ix</sup> + time impacts	Medical costs averted + value of time savings + sanitation access time	Financial costs + Non-financial costs (Includes monetary value of time spent in construction and maintenance of toilets)
Financial perspective + time impacts + lives saved	Medical costs averted + value of time savings + sanitation access time + value of saved lives + increase in property value	Financial costs + Non-financial costs (Includes monetary value of time spent in construction and maintenance of toilets)
Societal perspective (includes government incentive)	Medical costs averted + value of time savings + sanitation access time + value of saved lives + increase in property value	Financial costs + Non-financial costs + government subsidy (Includes monetary value of time spent in construction and maintenance of toilets)

<sup>ix</sup> Financial perspective includes medical costs averted as benefits and O&M costs and additional expenditure on toilet construction as costs.



In conclusion for estimation of the economic impact of SBM, it should be noted that the impacts of health, time-use, and property values do not imply one-to-one contributions to GVA. Rather, they represent economic value generated through a counterfactual logic. On the other hand, the impacts due to the sanitation input market (as well as prospective impacts of sanitation output market) can be termed as a more direct contribution to GVA. These two benefits are not additive. Hence, benefits emanating from (i) health, time-use, and property value and (ii) sanitation input/output market are shown separately as a percentage of GVA. A similar approach is adopted for the employment impacts as well.

Benefits by sub-population were estimated per household for both rural and urban areas. Sub-population analysis was conducted across wealth quintiles and age group. Estimation of benefits across wealth quintiles was done for the period 2014-15 to 2018-19, benefits were estimated per household by adding medical expenditure saved, the value of lives saved, the monetary value of access time saved and monetary value of treatment time saved. Benefits for different age groups were estimated using medical expenditure saved and the value of lives saved. Disaggregation for the monetary value of access time saved and treatment time saved did not exist across age groups. Therefore, sub-population analysis by age group was conducted only for medical expenditure saved and the value of lives saved.

## 2.2.2. Data collection methods

### *Quantitative data collection*

Literature review and desk research have been utilized to answer the questions under the criteria of 'Effectiveness', 'Efficiency', 'Impact' and 'Sustainability'.

The following data was collected through secondary sources for the impact model. It may be noted that data sources as referred are from government publication or published in reputed journals to ensure that data sourced is widely used/accepted and/or judged of high quality.

**Table 4: Data collection methods**

Sub-study	Data requirement	Data sources
Health	Adjustments for medical treatment costs: SBM-G	CPI-Healthcare (Rural)
	Adjustments for treatment costs rural areas vis-à-vis urban areas	NSSO 71st round
	Coverage of improved sanitation	NARSS for rural and JMP for urban
	Reduction in diarrhea prevalence rate when using improved sanitation	Andres et al (2011)
	Diarrhea prevalence rate (U5 children)	NFHS 2015-16
	Percentage of cases seeking treatment (U5 children)	NFHS 2015-16
	Value of Statistical Life (VoSL)	Majumder & Madheswaran, 2018; Value of statistical life in India: A Hedonic Wage Approach; The Institute for Social and Economic Change, Bangalore
	Household composition	NSSO 71st round, NFHS 2015-16
Time use	Adjustments to the value of healthcare-seeking time saved: SBM-G	CPI-Healthcare (Rural)
	Adjustment to the value of sanitation access time saved	CPI-General Inflation
	Value of healthcare-seeking time saved rural vis-à-vis urban	NSSO 71st round
	Number of household members (chief wage earners, primary care, givers, etc.)	NFHS 2015-16
Property value	Property value: Rural vis-à-vis urban	Published survey data
	Adjustments to property value: SBM-U	House Price Index (RBI)

contd...

contd...

Sub-study	Data requirement	Data sources
Sanitation input market	Toilet construction by type	<ul style="list-style-type: none"> <li>▶ NARSS</li> <li>▶ Ministry of Drinking Water and Sanitation</li> <li>▶ Ministry of Housing and Urban Affairs</li> </ul>
	Toilets constructed in schools	Ministry of Human Resource Development
	Input mix and prices	Technical specifications report by UNICEF and ministry
	Infrastructure in terms of SLWM, FSTPs, GOBAR-DHAN projects, compost pits, FSM	Cost of infrastructure developed from the Ministry of Housing and Urban Affairs and Ministry of Jal Shakti
Sanitation output market	Output capacity	<ul style="list-style-type: none"> <li>▶ Output capacity from the Ministry of Housing and Urban Affairs in case of urban areas</li> </ul>
	Price of various outputs of SLWM	<ul style="list-style-type: none"> <li>▶ Prices for the various products are sourced from the available literature that includes SBM Guidelines</li> </ul>
Social outcomes		<ul style="list-style-type: none"> <li>▶ Available literature and KIIs on social benefits with access to IHHL</li> </ul>

### Qualitative data collection

The key informant interviews were used for triangulation of the key outputs for the health, time-use, and sanitation market sub-studies. Given the limited timeframe to collect information, the snowballing approach was followed to seeking information on specific questions. The primary data was collected over two months, September 2019 to October 2019. As the impacts of social outcomes are difficult to quantify in monetary terms, questions on specific social impact outcomes of SBM like social status, prestige, community cohesion, and privacy were some of the important features of the key informant interviews. Questions were also meant to validate and triangulate secondary data as well as seek more detailed information, where it was missing.

The KIIs were conducted in the following states:

1. Bihar
2. Jharkhand
3. Maharashtra

The states were selected to ensure reasonable diversity in terms of geography, a number of people benefited from SBM in consultation with UNICEF.



The following information was sought from the interviews:

1. The regional variation in the bill of quantity (BOQ) of different types of toilets constructed under the SBM.
2. Input mix of SLWM infrastructure such as:
  - compost pit
  - GOBAR-DHAN
  - Faecal-Sludge Management (FSM) infrastructure
  - Plastic unit
  - Waste stabilization ponds
  - Information on the social outcomes of the SBM programme vis-à-vis dignity, community cohesion, prestige, and social status.
  - The key informant interviews also sought information on the amount for the household's own investment in the construction of the toilet in addition to the financial incentive received under SBM.
  - Fill the gaps in secondary data analysis
  - Collect information on the good practices of SLWM for the case studies
3. Social outcomes like social status, prestige, community cohesion, and privacy

The key informants selected for the evaluation comprise of SBM Officials and PMU consultants. The list of key informants has been provided in Table 5. In total 22 interviews were conducted, of which 11 were conducted in Bihar, seven were conducted in Jharkhand and four were conducted in Maharashtra. A detailed list of the interviews conducted state-wise is provided in Appendix G.

**Table 5: List of key informants**

S.N.	Key informants	Information
1	Mission directors	The overall perspective of SBM implementation in the State, including social impact, good practices in SLWM, implementation challenges, and recommendations for the sustainability of ODF++
2	State PMU-Engineers	Engineer to provide technical specifications of toilets constructed
3	State PMU-SLWM officer	SLWM officer to provide technical specifications of SLWM constructed
4	State PMU-IEC officer	IEC officer to provide impacts in terms of privacy, comfort, and safety for women and children
5	Development partner	Social outcomes of SBM and recommendations for the sustainability of ODF++

## 2.3. Risks and potential limitations

Risks and limitations for the evaluation as well as the mitigation measures are listed as follows:

1. Given that the determination of causality will be based on non-experimental evidence or methods, true attribution will not be possible for all impacts. To reduce the threat of attribution, we have referred to our estimates as contribution impacts only. However, it is still not possible to rule out threats to attribution completely.
2. Despite the IO framework being widely used to estimate the economy-wide impact in terms of output and employment, some limitations include data availability, exact classification of activities and sectors. Some approximations are hence unavoidable in case of lack of data availability. Further, some assumptions of the IO model include: (i) Fixed price supply chain such that there is no price adjustment for supply constraint (ii) No inter-regional feedback effect such that no change is made to the production in the economy, as a result of alterations in demand outside the economy (iii) It should be noted that IO tables are static in nature. We have applied 2015-16 IO tables, the latest available at the time of writing the report. Secondly, input-output tables do not capture price or income effect, both from demand and supply-sides. An increase in the demand for goods is assumed to lead to increased production.

We acknowledge that all the threats to the internal/external validity of this impact evaluation exercise cannot be eliminated. Therefore, we set down a few caveats:

- ▶ The estimates are susceptible to changes in assumptions: Our estimates are bounded by the assumptions and limitations inherent in our base methodology, i.e., the UNICEF cost-benefit analysis of 2017-18. For example, if alternative assumptions regarding the value of statistical life, cost of time saved due to the treatment of diseases, etc. are used, one may get different estimates. We have updated the numbers used in the base model of the UNICEF 2017-18 cost-benefit study.
- ▶ It should be noted that economic damages of inadequate sanitation in terms of increased medical expenditure, lives lost, time spent in treatment, time spent in accessing places for open defecation, and property value appreciation are estimated in an imputed sense. On

the other hand, the economy-wide impact of sanitation infrastructure developed or to be developed under SBM as well as sanitation output market is not calculated in an imputed sense. Therefore, these two estimates (economic damages and impact of sanitation infrastructure) are not additive in nature.

- ▶ Additional limitations are provided in Appendix K.

## 2.4. Evaluation management

### ***Evaluation design formulation***

Evaluation design was finalized through the consultative process, a series of reviews, and validation. These include the broadly following steps:

1. Development of hypotheses and impact indicators against the sub-studies
2. Initial desk review based on the hypotheses developed and relevant impact indicators
3. Preliminary Key Informant Interviews (KIIs) with the stakeholders to finalize testable hypothesis, validate relevance and importance of sub-studies, data availability and data quality to assess various impact indicators. The stakeholders consulted included the Ministry of Jal Shakti, Ministry of Housing and Urban Affairs, Toilet Coalition Board, WaterAid, Dalberg.
4. Mapping of potential data sources for the evaluation against the impact indicators including observations on data quality
5. Finalization of sub-studies keeping in mind relevance, importance, data availability, and data quality
6. The detailed design of sub-studies such as data collection tools for field studies and implementation plan

Once the evaluation design was formulated based on data availability and data quality, the design was presented to the Expert Reference Group (ERG) headed by the Ministry of Jal Shakti, comprising of WaterAid, UNICEF as well. The design was finalized post the approval of the Expert Reference Group.

### ***Evaluation design implementation***

During the implementation of evaluation design as agreed, the consultant conducted bi-weekly review meetings with the UNICEF on the parameters and assumptions applied, data sources relied upon, field visit plan comprising of the discussion guide, key expectations from field interactions, list of respondents, and synthesizing strategy.

Apart from the bi-weekly meetings with UNICEF, regular updates on the progress of evaluation were provided to the ERG. The ERG members also provided comments on draft estimates on a standalone basis, which were incorporated into the draft report. ERG provided comments on the Draft Report too which have been incorporated in this Final Report.

Stakeholders such as the Ministry of Jal Shakti, Ministry of Housing and Urban Affairs, state teams implementing SBM-G and SBM-U were consulted to collect the relevant data points to answer evaluation questions. These formed inputs in framing recommendations for this evaluation. There was no household-level interaction in this regard.

### ***Quality Assurance processes***

The evaluation comprised quality assurance at two levels, i.e., (i) consultant level (ii) ERG level. At the consultant level, a comprehensive internal review process of deliverables is conducted

before the submission to the client. We follow a three-step quality review process, i.e., (i) team leader /PwC senior member initial review on content, relevance (ii) review against agreed quality standards by the engagement leader (iii) partner review of the quality. At the ERG level, inception report, draft estimates, draft report, and the model are reviewed and comments are incorporated. In addition, UNICEF as per the policy has conducted an external review of the inception report, draft report, final report, and the models deployed. The consultant incorporated the comments of an external reviewer on all the deliverables.

## 2.5. Ethics and UNEG standards

This evaluation follows the UNEG Norms and Standards as well as the UNEG Ethical Guidelines for Evaluation<sup>20</sup> and the UNICEF Procedure for Ethical Standards in Research, Evaluation and Data Collection and Analysis.<sup>21</sup> In line with these guidelines, no IRB approval is sought for this evaluation, given there are very limited ethical implications of the evaluation. Specifically, the evaluation does not collect any data from children or other vulnerable sections of the population. The only primary data that is collected is from the stakeholders involved in the SBM. The usual ethical procedures employed in this case include basic ethics training for interviewers, informed consent from interviewees, and secure transportation and storage of any data recorded from the interviews. Data is anonymized, and the names of the interviewees are not shared or made public unless requested by the interviewee. In the discussion guide is given in Appendix J., the confidentiality of the response was articulated to the interviewee.

The secondary data used for most of the methodology exists at the aggregated level, not at an individual non-anonymized level and is publicly available. Some aggregated datasets might not be publicly accessible, and in this case, the research team ensures that datasets are transferred and stored securely, and not shared with anyone outside the research team and UNICEF.

Attention was paid to ensure that there was no conflict of interest in carrying out the evaluation, including through sub-contracted entities or consultants. The evaluation is credible and based on reliable data and observations. The evaluation report shows evidence of consistency and dependability in data, findings, and judgment. The full set of evaluation findings along with pertinent limitations would be made publicly accessible as per UNICEF's Evaluation Policy. Additionally, all the PwC team members adhere to the PwC Global Code of Conduct.<sup>22</sup>

Regular review with UNICEF is conducted to adhere to UNEG Norms and Standards. Review of the methodology, discussion guide to be used for KIIs, and model to estimate economic impact are conducted either through face to face meetings or online. These steps ensure that the evaluation complies with the ethics and quality assurance standards of UNICEF.

An ERG was convened by UNICEF India to provide an overall technical oversight for this evaluation. The ERG comprises of experts in the WASH sector from UNICEF, government officials leading the implementation of Swachh Bharat Mission at the national level, and few external stakeholders with deep expertise in WASH. Roles and responsibilities of ERG are provided below:

1. Approval of the finalized list of sub-studies
2. Review and approval of proposed methodology to respond to evaluation questions
3. Approval of estimates based on the proposed methodology
4. Review and approval of the inception report, draft report, and final report

While UNICEF was closely involved during the entire evaluation, the existence of the ERG and review by external agency ensured that independent perspective was sought and incorporated.

# Findings



## 3. Findings

### 3.1. Findings by criteria

This chapter briefly reports the results and findings by different criteria including effectiveness, efficiency, impact, and sustainability. Findings for effectiveness, efficiency, and sustainability are presented using secondary data analysis and literature review. For the impact criterion, results are presented on the following sub-studies: health benefit, time-use benefit, property value, sanitation input market, and sanitation output market.

#### 3.1.1. Effectiveness

**To what extent did the SBM achieve its intended outcomes, including intermediate outcomes such as access and use of toilets, and final outcomes such as reaching open defecation free status?**

The intended outcome of SBM was achieving the ODF status by 2 October 2019 by providing universal access and the use of improved sanitation facilities. In this section, we have assessed the effectiveness of the intended outcomes by reporting on intermediate outcomes such as toilet coverage and use, and final outcomes such as reaching open defecation free status. The ODF status is defined in Table 6.

**Table 6:** Definition of ODF

Rural	Urban
ODF would mean the termination of faecal-oral transmission, defined by a) no visible faeces found in the environment/village and, b) every household as well as public/community institution(s) using safe technology option for disposal of faeces.	A city/ward can be notified/ declared as ODF city/ODF ward, if, at any point of the day, not a single person is found defecating in the open.

*Source: SBM (G) Guidelines and SBM (U) Guidelines, Ministry of Jal Shakti and Ministry of Housing and Urban Affairs, the Government of India (Safe technology option means no contamination of surface soil, groundwater or surface water, excreta inaccessible to flies or animals; no handling of fresh excreta; and freedom from odor and unsightly condition.)*



In the case of the rural areas, the ODF verification process starts with a Gram Sabha or village resolution of self-declaration of achievement of the ODF status. The unit of verification may be a village. At least two verifications are to be carried out. The first verification must be carried out within three months of the declaration to verify the ODF status. In order to ensure the sustainability of ODF status, a second verification may be carried out around six months after the first verification. The state ensures at least one level of verification of all the households in every village that declares itself as ODF.

In the case of urban areas, the following are the necessary infrastructure and regulatory conditions to be achieved before declaring a city/ward as ODF:

1. All the households that have a space to construct toilet have constructed one
2. All the occupants of those households that do not have space to construct a toilet have access to a functional community toilet within a distance of 500 meters
3. All the commercial areas have functional public toilets within a distance of 1 kilometer.
4. The details of all IHHL constructed from 2011 onwards will have to mandatorily be uploaded on the SBM-Urban portal
5. Pictures of all functional community and public toilets in the city, irrespective of the date of construction, will have to mandatorily be uploaded on the SBM-Urban portal

Once all the necessary conditions have been fulfilled, wards declare themselves to be ODF. ULB passes preliminary resolution based on the declaration from all wards. A suitable public announcement is made. Public feedbacks are obtained for 15 days on the announcement. If no substantial objection is received, a final resolution is adopted by the ULB. The State may verify the claim of ULB through a third-party agency. MOHUA appoints a third-party verification agency to check the ODF declaration within 30 days. MOHUA issues a Swachh Certificate to ULBs, which is to be recertified every six months.

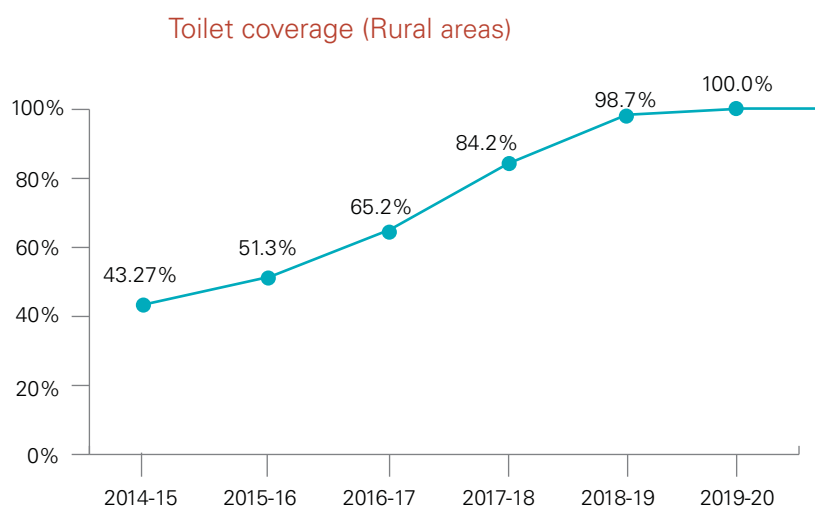
### SBM-G

Toilet coverage, which has increased from 43.27 per cent in 2014-15 to 100 per cent in 2019-20<sup>23</sup>, is defined as the number of households with access to IHHL, community, and other toilets as the percentage of a total number of households covered in the baseline survey in 2012-13 and left-over beneficiaries (LOB). It does not include new households after LOB exercise.

As per the NARSS 2018-19 data, approximately 98.6 per cent of households have functional toilets. The coverage increased at a higher rate in the years 2017-18 and 2018-19 (Figure 9). The following types of toilets are constructed:

1. Twin-pit toilet
2. Single-pit toilet
3. Septic tank toilet
4. Bio-gas toilet
5. Bio-toilet
6. Ecological sanitation toilet
7. Divyang friendly toilet

As per the Ministry of Jal Shakti, the emphasis was given on the construction of the twin pit toilets due to its overall benefits. Table 7 shows the percentage of households with various safe disposal practices as reported in the NARSS 2018.

**Figure 9: Toilet coverage in rural areas**

*Source: Ministry of Jal Shakti, Government of India*

**Table 7: Percentage of households by safe disposal practices**

Type of toilet	Broad category	Percentage
Closed pit	Single pit	13.0%
Single leach pit toilet	Single pit	19.6%
A closed drain with the sewer system	Single pit	0.5%
Double leach pit toilet	Twin pit	29.1%
Septic tank with a soak pit	Septic tank	34.0%
Septic tank without soak pit	Septic tank	3.3%

*Source: NARSS, 2018*

National Annual Rural Sanitation Survey (NARSS), conducted by an Independent Verification Agency (IVA) under the technical guidance of the World Bank, found that 93.6 per cent of households in 2017-18<sup>24</sup> and 96.5 per cent households in 2018-19<sup>25</sup>, which have access to toilets, regularly use them. This implies that approximately 72 per cent of households in 2017-18 and 90 per cent of households in 2018-19 used toilets regularly.<sup>x</sup> As per the UNICEF-WHO JMP, nearly 41 per cent of households in rural areas and 67 per cent of households in urban areas used improved sanitation facilities.

<sup>x</sup> Toilet usage data has been taken from NARSS 2017-18 and 2018-19 rounds, an independent verification study under the guidance of World Bank. It is to be noted that data on usage of toilets can be sourced from several other surveys including recently released NSSO 76th round, which reports relatively lower usage. However, since preliminary findings were released on 2 October 2019 data updated post that has not been included in this evaluation. Further evaluations can build upon findings from alternate data sources and surveys.

In total, as of 26 September 2019, 599,963 villages have been self-declared ODF. Approximately 91 per cent (544,411) of the self-declared villages have been verified ODF after the first level of verification. Only 147,864 (approximately 27 per cent) of the declared ODF villages after the first round of verification have been verified to be ODF at the second level.<sup>26</sup>

## SBM-U

**Table 8** shows the number of IHHL and community and public toilets that have been constructed or are under construction in SBM-U.<sup>xi</sup>

**Table 8: Progress on IHHL and community and public toilets (cumulative), in number of seats**

Year	IHHL	Community toilets/Public toilets (number of seats)
2015-2016	3,532,743	187,367
2016-2017	5,050,510	240,822
2017-2018	5,540,886	355,961
2018-2019	6,343,643	521,116
As on 31st July, 2019	6,457,602	547,912

*Source: Ministry of Housing and Urban Affairs, Government of India*

As of 31 July 2019, SBM-U achieved 97.22 per cent of its target of construction of IHHL. Community and public toilets have achieved more than their intended target. As of 31 July 2019, 107.94 per cent of the target set for public and community toilets has been achieved.<sup>27</sup>

In 2015-16, none of the cities were declared ODF. As of 28 August 2019, 4,311 of total of 4,378 cities (approximately 98 per cent) declared themselves to be ODF. Of the 4,311 self-declared ODF cities, 3,876 were certified to be ODF (nearly 89 per cent of the total number of cities<sup>28</sup>).

## What were the major factors influencing the achievement of these outcomes?

Key factors influencing the achievement of SBM outcomes are as follows:

1. **Specific focus on behavioral change:** In rural India, various myths, stigma, and misconceptions prevailed regarding toilets. Some of them include:
  - having a toilet within household premises is impure; only women need to use toilets and men can defecate in open and cleaning of a toilet is someone else's job (Iyer 2019<sup>29</sup>)
  - the construction of toilet is a costly proposition<sup>30</sup> (Coffey et al 2014)
  - open defecation does not lead to any health impact (KII, Jharkhand)
  - middle-aged men, who typically make financial decisions in rural Jharkhand, are the least possible to use the toilet (KII, Jharkhand)

This implied that there was a low demand for toilets. Under SBM, the extensive focus was made on behavioral change. As per SBM(G) guidelines, about 8 per cent of the total expenditure is to be allocated towards IEC. As per the BMGF Report (June 2019), Rs. 35-Rs. 40 billion was spent on SBM-IEC activities. Various kinds of behavioral change activities under SBM are shown in Figure 10.

<sup>xi</sup> Progress is reported as absolute number of toilets constructed or under construction as progress on percentage of households having toilets in urban areas year-wise is not known

Figure 10: Information, education and communication interventions under SBM



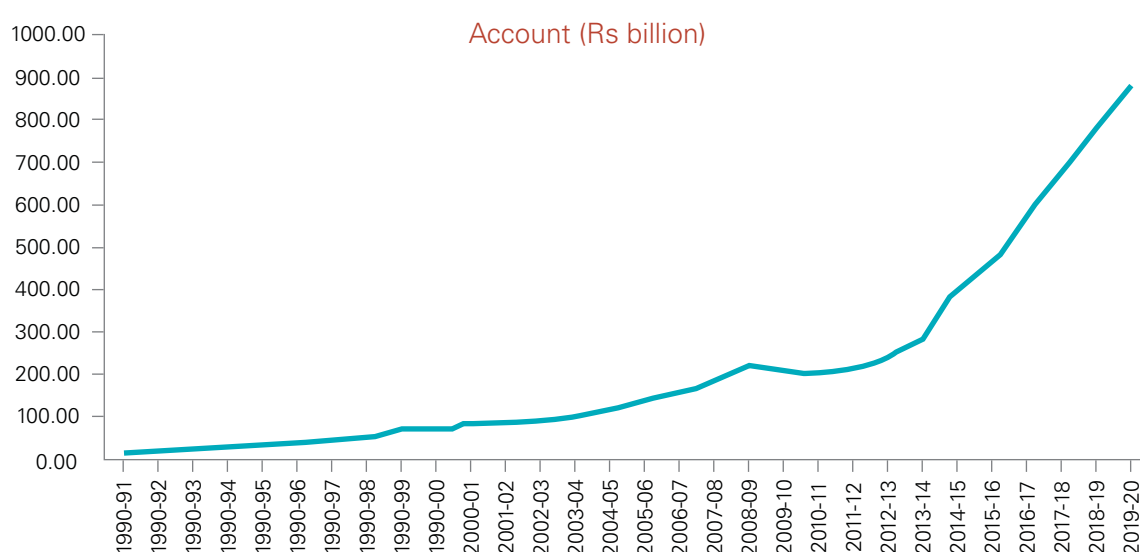
### “ One respondent from Jharkhand stated:

Social and behaviour change communication is a vital component of the SBM-G campaign. Jharkhand has designed many campaigns at the state and district levels to bring behaviour change and promote the usage of toilets. Campaigns like Selfie with toilet, Swachh Sunder Shauchalay, Bhai No-One, Colour-coded sticker, Swachhata Sahyog Abhiyan helped in mobilizing a massive number of rural communities. Specific day campaign, like Swachhata Sabha in the village on the 2nd of every month, Swachhata Diwas on the 19th of every month in Institutions and MHM day on 28th of every month in Institutions contributed in achieving ODF and also maintaining the ODF status. Overall, the social and behaviour change communication approach was the main driving force to large scale adoption of the toilet in the State.

Government official & functionaries and grass-roots workers under the leadership of Deputy Commissioner worked tirelessly for sanitation promotion. The role of other Departments in software activities is praiseworthy. The convergence approach and engagement of officials & functionaries made the SBM-G campaign a real movement for making the villages ODF. The above strategies and methods make SBM-G different from earlier sanitation programmes.

2. **Cheap and safe technology:** Coffey et al (2014) have shown that people in rural India have a minimum requirement of what constitutes an 'acceptable' toilet design, costing around Rs. 21,000. The programme trained masons in the construction of twin-leach pit toilets, which is safe and made up of cheap technology, costing around Rs. 12,000, and this technology is widely promoted.<sup>31</sup>
3. **Availability of adequate workforce:** Construction of nearly 100 million toilets within five years required a significant number of trained masons across states. A large number of women were trained under SBM as masons, who could self-construct toilets.
4. **Adequate Financing:** The central and state governments together pledged to contribute nearly USD 20 billion to achieve the ODF status by 2 October 2019. Given the range of negative impacts associated with open defecation and a series of studies quantifying the impact, government spending has grown substantially over the years. Each line-ministry at the Central Government level was asked to prepare Swachhta Action Plan (SAP) and mainstream sanitation in the respective sector. Total funds committed to SAP during 2017-18 and 2018-19 were over Rs. 350 billion (Iyer, 2019). Figure 11 shows that state-level spending increased from Rs. 282.36 billion in 2013-14 to Rs. 393.16 billion in 2014-15 and Rs. 797.41 billion in 2017-18 (RE). This includes both water and sanitation spending. However, the substantial increase observed after 2014-15 could be attributed to the Swachh Bharat Mission. Additional sources came from corporate spending on WASH. As per FICCI study on 33 companies, which publish data on CSR spending, the median CSR budget was Rs. 46.50 million. Out of the 100 companies in BSE 500 with the largest CSR budgets, more than 90 companies had organized WASH programmes.<sup>32</sup>
5. **Effective monitoring:** The programme included an effective monitoring mechanism starting from the Prime Minister's office. Sanitation, being the state subject, required cooperation at the state level. Regular engagement with Chief Ministers (Iyer, 2019) to keep sanitation among the top priorities along with putting review mechanisms in place (state-level

**Figure 11: State-level spending on water and sanitation, in Rs. billion areas**



**Source:** RBI Study of State Budgets, various years (Note: 2018-19 and 2019-20 are revised estimates and budget estimates respectively)

verification of ODF, third-party verification), both at the state and central levels (NARSS) plays an important role in achieving the outcomes. Communities were heavily leveraged in promoting the construction of toilets and bringing in behavioral changes. For example, Local Nigrani Samities in Jharkhand wake up early in the morning and go to the erstwhile popular open defecation sites to ensure that there is no slippage into old habits (Iyer, 2019).

### To what extent did the results of the SBM succeed in addressing the gender and equity gaps in access to clean sanitation?

Entrenched gender and caste-based differences have continued to hamper universal access to clean sanitation facilities. NARSS 2017-18 and 2018-19 rounds report data on access to sanitation with respect to social groups and socio-economic categories.

Table 9 provides access to household toilets by caste in non-ODF villages. A significant gap existed among households belonging to the general category and those belonging to SC, ST, and OBC categories in 2017-18. The gap, however, reduced from 2017-18 to 2018-19.

**Table 9: Access to household toilets by caste in non-ODF villages**

Social Category	NARSS 2017-18 Survey	NARSS 2018-19 Survey
Scheduled Tribe	71.40%	86.60%
Scheduled Caste	63.00%	91.00%
Other Backward Classes	65.50%	87.00%
General	80.70%	93.60%

*Source: NARSS 2017-18 (Total HH: 69735) and NARSS 2018-19 (Total HH: 86199)*

Table 10 articulates for differences across the economic category for non-ODF villages. The gap between APL and BPL households reduced from 2017-18 to 2018-19.

**Table 10: Access to household toilets by economic category in non-ODF villages**

Socio-economic category	NARSS 2017-18 Survey	NARSS 2018-19 Survey
APL	75.10%	91.00%
BPL	67.90%	87.50%

*Source: NARSS 2017-18 (Total HH: 69735) and NARSS 2018-19 (Total HH: 86199)*

As per NARSS 2018-19, 96.6 per cent of females always used toilets which is slightly higher than males (96.4 per cent). Of the total surveyed public toilets in NARSS 2018-19, 59.1 per cent of public toilets had separate sections for females.

### 3.1.2. Efficiency

#### What has been the total investment in the SBM, based on implementation costs?

Table 11 provides the expenditure under SBM-G and allocation to states under SBM-U. The total investment made to SBM-G was Rs. 821.38 billion and SBM-U was Rs. 114.50 billion during the period 2014-15 to 2019-20.

**Table 11:** Financial estimates of SBM-G for the period 2014-15 to 2019-20, Rs. billion (including unapproved)

Scheme	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	Total
SBM-G Expenditure	38.85	120.76	163.60	203.05	225.66	69.46	821.38
SBM-U (only center)	8.59	7.66	21.35	25.39	25.00 (RE)	26.50 (BE)	114.50

*Source:* The Ministry of Jal Shakti (SBM-G) and various budget documents; *Note:* RE: Revised estimates, BE: Budget estimates

### To what extent has the SBM made efficient use of the resources that have been invested?

SBM funds have been used in the construction of IHHL, community, and public toilets, IEC activities and capacity building activities. Construction of IHHL and community and public toilets form a major chunk of the SBM expenditure. IEC and BCC activities are required for sustained usage of the toilets and guiding behavioral change. Capacity-building activities include training of masons and other key stakeholders responsible for carrying out sustained usage of toilets and the implementation of SBM objectives.

While expenditure on IHHL and community and public toilets has limited evidence on leveraging funds much more than spent by the government and households themselves, the same is not true for IEC activities. Different types of IEC investment can typically mobilize equivalent investments worth much more. Under the SBM, Rs. 35-40 billion cash expenditure has been undertaken by the government, private sectors and development community activities. IEC interventions in SBM have generated an exposure of 2,500-3,300 SBM related messages on a per-capita basis in rural India (Table 12).

**Table 12:** Per-capita rural exposure over four years of SBM

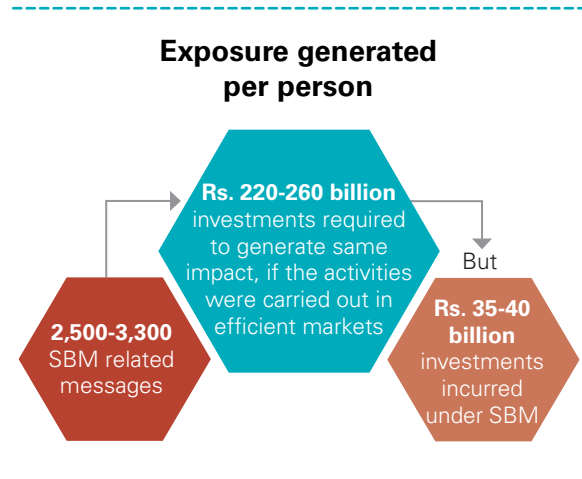
	Ambient Media	Mass Media	Inter-personal Communication	Cinema	Digital media	Hard Assets	Soft Assets
Per-capita rural exposure	280-380	430-520	4	~1	6	1,470-1,970	300-420

*Source:* BMGF (June 2019), Assessment of the reach and value of IEC activities under Swachh Bharat Mission (Grameen)

As per the latest report by BMGF<sup>33</sup>, to get equivalent per capita exposure of 2,500-3,300 over four years, cost/investments worth Rs. 220 to 260 billion would be required if they were carried out in an efficient market.<sup>xii</sup>

A summary of the key efficiency impact of IEC is provided in Figure 12.

**Figure 12: Key result for efficiency of IEC investments**



Capacity-building activities in terms of training of masons and through e-learning portals are also key components of SBM. So far, more than 10 lakh people have registered for trainings at SBM e-learning portals. About 8.66 lakh of them have successfully completed the certification.<sup>34</sup> The e-learning portals are potentially more efficient than in-person training in terms of low cost and higher reach.

SBM promoting construction of twin pit technology, which is both cheap and safe, as compared to designs like a septic tank and single-pit technologies, is crucial to bring in a reduction in disease prevalence. The

twin pit technology is scalable, implementable and cost-effective and is hence more efficient as compared to other designs like a septic tank and single pit latrines. Similarly, provisioning of community toilets within 500 meters for the households, where there is limited space for the construction of toilets, as per ODF+ and ODF++ guidelines, is an important element in reducing open defecation.

Despite the successful mobilization of resources and funds, there are certain gaps and challenges that hamper the outcomes of SBM. The gaps and challenges also cast doubts on the efficient use of resources to achieve the desired outcomes. Field visits and KIIs have been conducted across Jharkhand, Bihar, and Maharashtra to understand the same.

Table 13 summarizes these gaps and challenges across four dimensions, namely, capacity building and IEC, retrofitting of dysfunctional toilets, convergence and inclusiveness, and ODF declaration and verification.

<sup>xii</sup> The whitepaper by BMGF estimates funds mobilised using a two pronged approach (i) First, activities that can directly be bought in markets through channels such as TV, radio etc. Here, equivalent investment was assumed to be equal to media purchase costs, (ii) Second, activities like wall paintings, mention of SBM by PM can't be valued as no market exist for them. Hence, these are valued as if they were operating in 'efficient markets'

**Table 13: Gaps and challenges in the implementation of SBM**

Gaps and challenges	Description
Capacity building and IEC	<ul style="list-style-type: none"> <li>▶ In some cases, the masons and SHGs are improperly trained and lack capacity. In the case of Maharashtra, toilets with septic tanks are being constructed with improper designs. This could be also be related to the cost of toilets. Further, there is a lack of enforcement from the administration and technical knowledge dissemination regarding the construction of twin pit technologies to the local masons.</li> </ul>
Retrofitting of dysfunctional toilets and supporting infrastructure	<ul style="list-style-type: none"> <li>▶ Need for improvement in providing water connections; as an example, availability of water is a challenge in many parts of the state of Jharkhand, especially during summers</li> </ul>
Convergence and inclusiveness	<ul style="list-style-type: none"> <li>▶ Marginalized sections and caste-based differences exist in certain villages across states (cases across Bihar exist where caste-based differences act as barriers to community toilet usage)</li> </ul>
ODF declaration vs verification	<ul style="list-style-type: none"> <li>▶ Visible excreta in an open environment bring the ODF certified status into doubt. Three ULBs out of the 42 self-declared ODF ULBs in Jharkhand fell back from their ODF status during the second verification round.</li> <li>▶ Despite the higher usage of toilets among households, “one toilet for one family” is not adequate for joint families having more than 7/8 members (Jharkhand).</li> <li>▶ In the case of urban areas, the floating population (laborers) have limited access to public toilets. (Bihar)</li> </ul>

*Source: Field reports from Jharkhand, Bihar, Maharashtra*

The efficiency of SBM can further be estimated in terms of return on investment. Return on investment refers to the estimated ratio of benefits from the use of improved sanitation facilities and the costs of using improved sanitation facilities (i.e. costs of construction of toilets, costs of operation and maintenance of toilets, IEC expenditure, etc.). ROI under different perspectives for SBM-G is given below:

Financial perspective + time impact	Household economic perspective (Above two + lives saved impact)	Societal perspective (includes govt. subsidy)
2.06	3.78	3.08

SBM-G led to benefits of approximately 2:1 at the national level. Benefits are roughly two times the costs. Benefits include medical expenditure saved, the value of treatment time saved, and

the monetary value of sanitation access time saved. Costs include toilet construction and its operation and maintenance.

The returns go up to 3.78 times the costs when the value of saved lives and property value appreciation is considered. If government subsidy on toilet construction and IEC is considered the returns come down marginally to 3.08.

### 3.1.3. Impact

#### What have been the economic and financial impacts of the SBM at the national level in key domains?

Impact of SBM at the national level include (i) Economic impact in terms of damage costs saved (ii) Financial impact from construction of toilets, solid waste management infrastructure, IEC spending (sanitation input market) and financial value of treated waste for reuse (termed as sanitation output market) and (iii) employment impact because of construction of toilets, SWM infrastructure and IEC spending under SBM.

GVA multipliers have been used to estimate the economy wide impact of sanitation input and sanitation output market. For consistency, health and time use benefits, the impact of sanitation input and sanitation output market and appreciation in property prices have been expressed as a percentage of GVA equivalent rather than GDP equivalent.

#### Economic damages saved

Inadequate sanitation impacts households with the increased prevalence of diseases and loss of time in the treatment of diseases for both the patient and the caretaker. The households also lose time in defecating in open as compared to using a toilet at their premises. These impacts are aggregated into damage costs for households. Figure 13 shows economic damage costs as a percentage of GVA equivalent.<sup>xiii</sup> With the launch of SBM, toilet usage within one year increased from 41 per cent in 2013-14 to 44 per cent in 2014-15 in rural areas<sup>35</sup> and from 67 per cent in 2013-14 to 68 per cent in 2014-15 in urban areas.<sup>36</sup> Therefore, in 2014-15, with increased sanitation usage, the damage cost was 9.52 per cent, i.e., more than 1 per cent points lower than the damage-cost of 10.58 per cent under a business-as-usual scenario.<sup>xiv</sup> It can also be seen that damage cost as a percentage of GVA equivalent declined with increased toilet usage. By 2018-19, toilet usage in rural areas increased to 90 per cent and in urban areas to 81 per cent<sup>xv</sup>, which led to a decline in overall damage cost to 3.87 per cent as against 9.77 per cent in the business-as-usual scenario (had there been no improvement in sanitation).

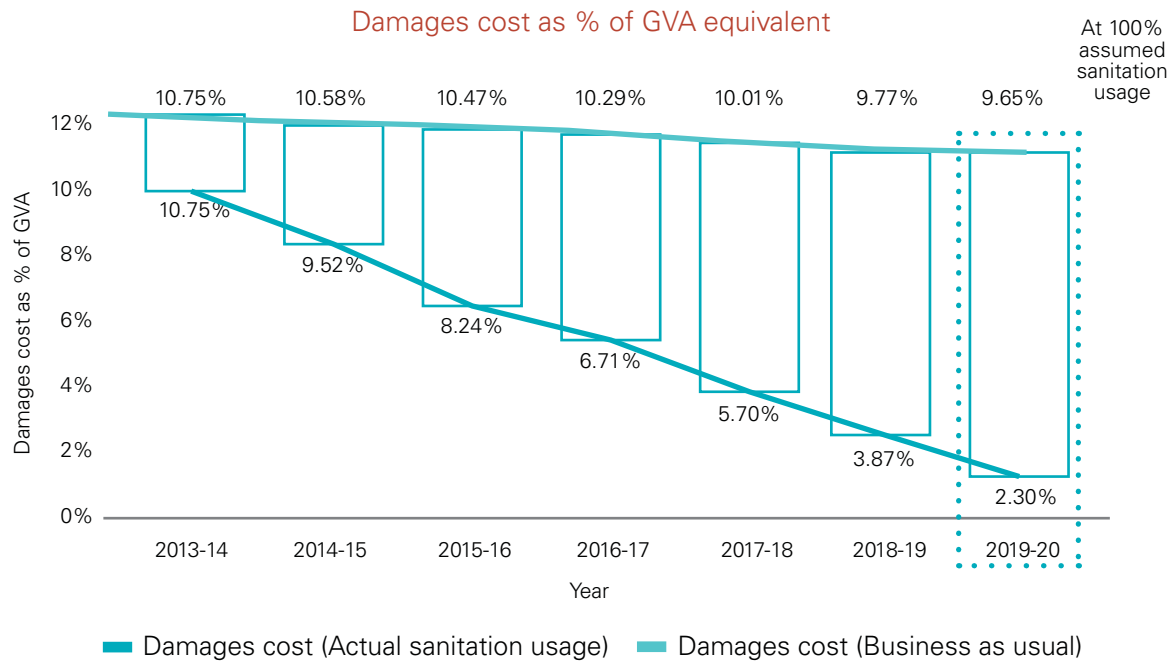
Declining damage cost in the business-as-usual scenario is due to higher growth in GVA than in damage cost. If SBM achieves 100 per cent sanitation usage by 2019-20, damage cost would have been reduced to 2.30 per cent. The damage cost does not fall to zero, because some damage costs cannot be averted with the use of improved sanitation facilities but depend on various factors including faecal sludge management, treatment, and safe disposal.

<sup>xiii</sup> GVA at current prices, 2011-12 series; GVA shows the production contribution of a particular sector. It is defined as the value of the output less the value of intermediate consumption. GDP is defined as sum of GVA at basic prices and product taxes less product subsidies. While GDP is calculated from demand side, GVA is estimated from the supply side.

<sup>xiv</sup> The business-as-usual scenario is constructed taking the percentage households with improved sanitation to be the same as pre-SBM level, i.e. 41 per cent in rural areas and 67 per cent in urban areas.

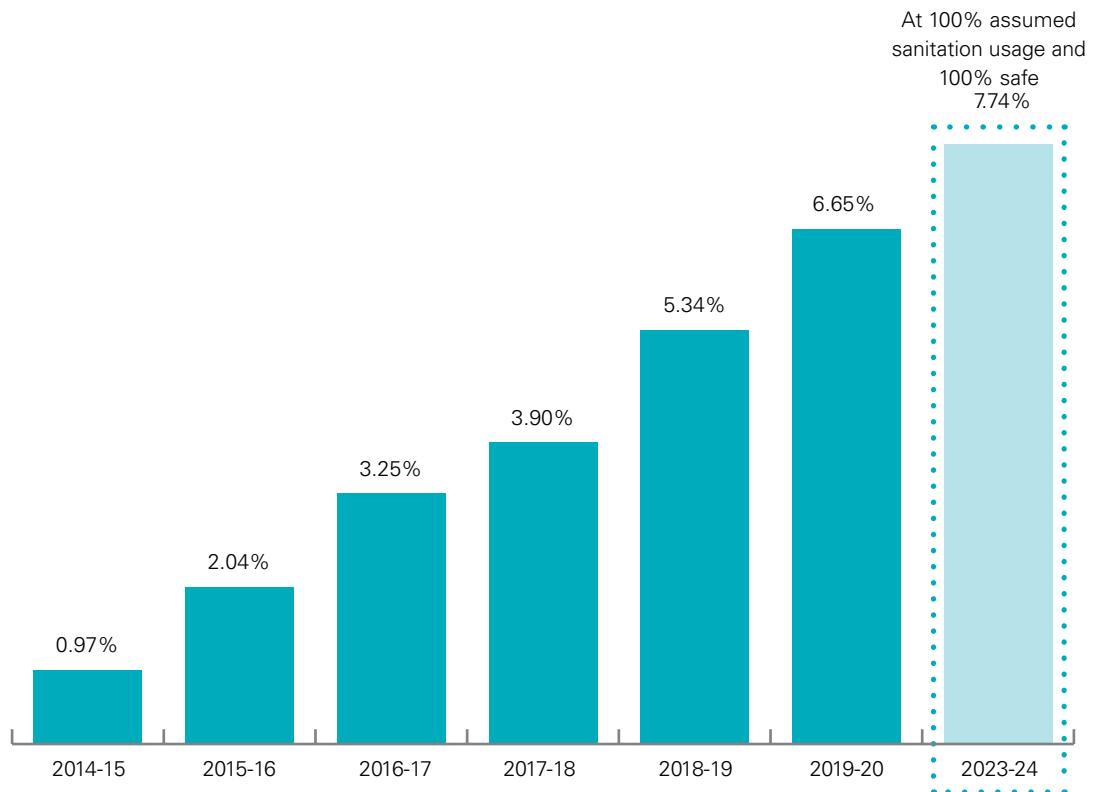
<sup>xv</sup> Percentage of households using improved sanitation in 2018-19 is not available from UNICEF-WHO JMP estimates. We have used percentage of ULBs certified to be ODF as approximates.

Figure 13: Damage as % of GVA equivalent by the year



Damage costs saved as % of GDP equivalent are shown in Figure 14.

Figure 14: Damage costs saved as % of GDP equivalent by year

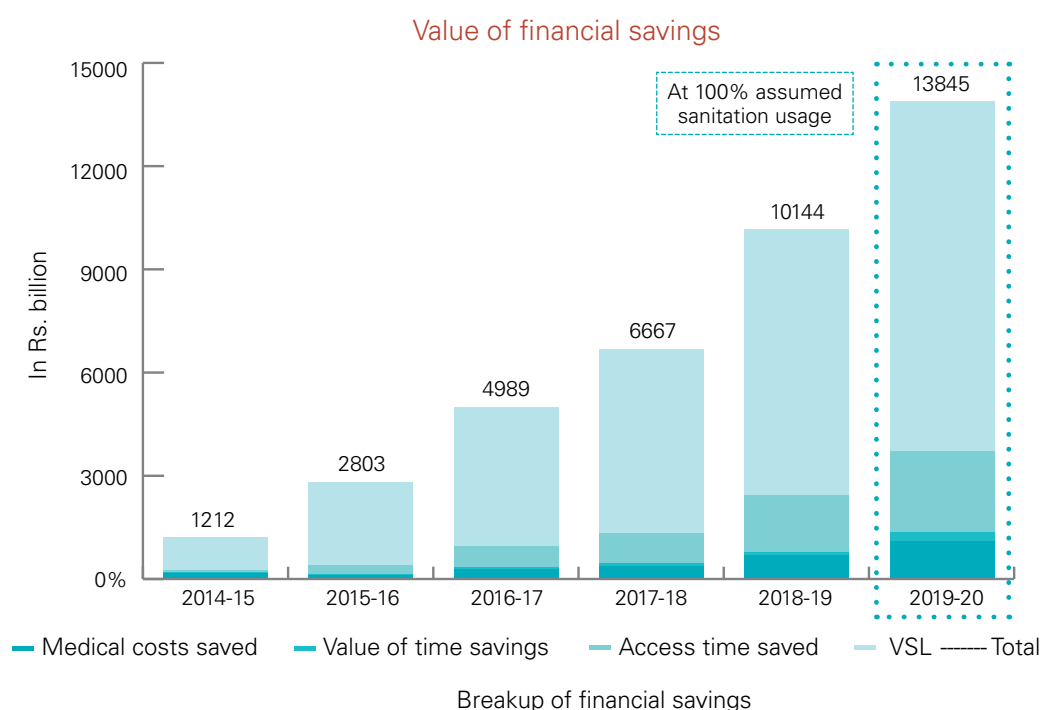


By 2023-24, if India achieves 100 per cent safe faecal sludge management, damage cost would be further reduced to 1.24 per cent relative to the business-as-usual scenario of 9.80 per cent of GVA in 2023-24. Thus, representing an annual saving of 8.55 per cent of GVA.

Annual savings as a percentage of GDP would increase from 6.65 per cent in 2019-20 to 7.74 per cent by 2023-24 if 100 per cent safe FSM is achieved.

Figure 15 shows the different types of damage costs saved. The damage costs saved increase, as more households use improved sanitation facilities. The annual damage costs saved increased from Rs. 1,212 billion (US\$16.99 billion) in 2014-15 to Rs. 10,144 billion (US\$142.18 billion) in 2018-19 and are estimated to increase to Rs. 13,845 billion (US\$194.07 billion) in 2019-20, once 100 per cent usage of sanitation facilities is achieved. Table 14 shows economic damages saved as a percentage of GVA.

**Figure 15: Breakup of financial savings (In Rs. billion)**



**Table 14: Value of economic savings (as % of GVA)**

Year	Medical costs saved	Value of time savings	Access time saved	VSL	Total
2014-15	0.07%	0.01%	0.11%	0.86%	1.05%
2015-16	0.15%	0.03%	0.34%	1.71%	2.23%
2016-17	0.31%	0.06%	0.72%	2.50%	3.58%
2017-18	0.42%	0.08%	0.95%	2.86%	4.31%
2018-19	0.66%	0.12%	1.55%	3.58%	5.90%
2019-20	0.99%	0.17%	2.06%	4.14%	7.35%

## Sanitation input market

Sanitation input market impact is estimated by combining the impact of the construction of infrastructure for sanitation input and sanitation output market along with spending on IEC activities. Both direct and indirect economy-wide impacts have been estimated. Sanitation input market is estimated using data on expenditure on sanitation infrastructure. Sanitation infrastructure includes IHHL, community and public toilets (Sanitary complexes), IEC activities, and SWM infrastructure.

Figure 16 shows the sanitation market impact in absolute terms. Direct and indirect economy-wide impacts of the sanitation market were Rs. 86.42 billion in 2014-15, which increased to Rs. 518.74 billion in 2017-18.

Table 15 shows the sanitation market impact as a percentage of GVA. Expenditure on IHHLs formed a major part of the sanitation input market and was equivalent to 0.070 per cent GVA in 2014-15 and increased to 0.313 per cent of GVA in 2017-18, the year, in which a maximum number of toilets was constructed.

Figure 16: National sanitation input market impact (in Rs. billion)<sup>xvi</sup>

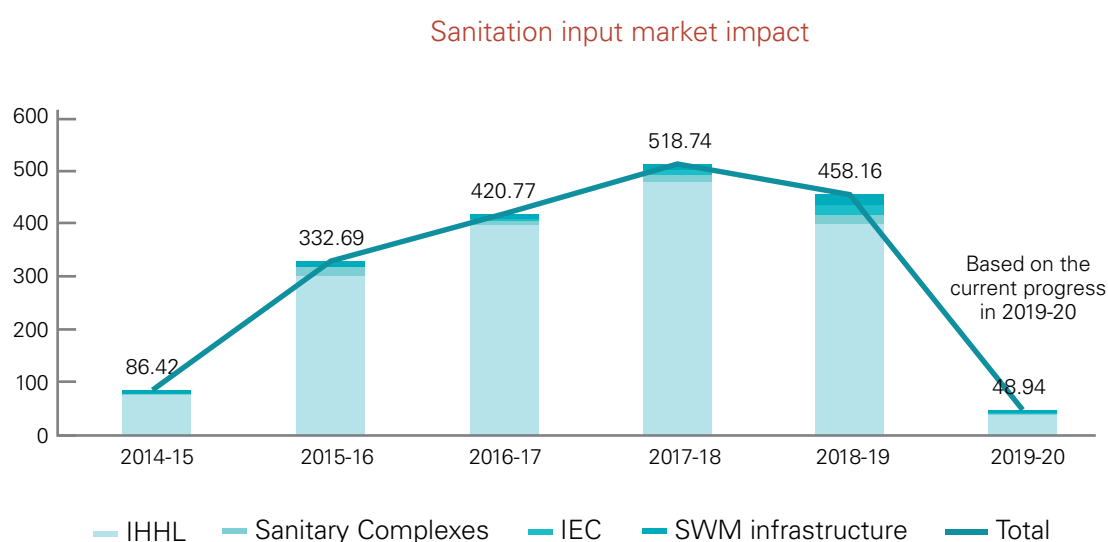


Table 15: National sanitation input market impact (as % of GVA)

Year	IHHL	Sanitary complexes	IEC	SWM infrastructure	Total
2014-15	0.070%	0.000%	0.000%	0.005%	0.075%
2015-16	0.241%	0.014%	0.000%	0.009%	0.265%
2016-17	0.287%	0.004%	0.002%	0.009%	0.302%
2017-18	0.313%	0.007%	0.007%	0.008%	0.335%
2018-19	0.235%	0.009%	0.011%	0.011%	0.266%
2019-20	0.020%	0.002%	0.001%	0.003%	0.026%

<sup>xvi</sup> 2019-20 estimates are as on 2nd October 2019 in rural areas and 31 July 2019 in urban areas.

In the prospective scenario (2019-20 to 2023-24), the sanitation input market because of the construction of additional toilets, retrofitting of toilets, expenditure on IEC activities, and development of SWM infrastructure will lead to an economy-wide impact of Rs. 2,035 billion. The impact is higher in the case of urban areas (Rs. 1,131 billion) than rural areas (Rs. 904 billion).

### Sanitation output market

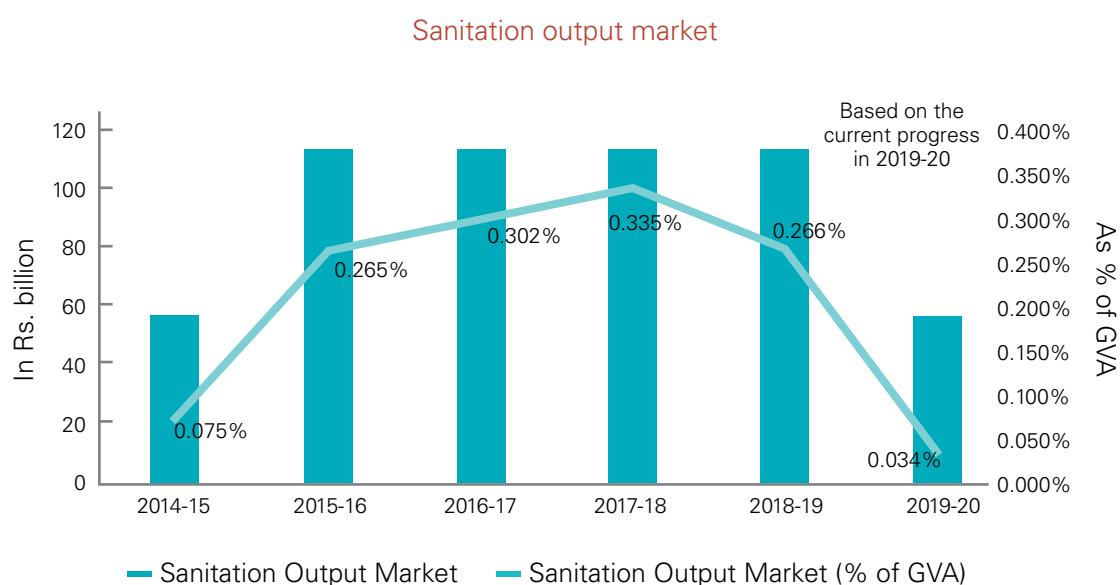
Sanitation output market impact was estimated as the value of reusable and recyclable waste. Owing to the lack of data for rural areas, the sanitation output market impact is estimated only for urban areas. Over the period 2014-15 to 2018-19, the cumulative sanitation output market impact was estimated to be Rs. 514 billion.

The impact would be higher if we include FSTPs and STPs for the estimation. However, because of the lack of data on output capacities, estimates for FSTPs and STPs have been excluded.

Figure 17 shows the year-on-year impact of the sanitation output market as a percentage of GVA.

The impact of the sanitation output market from 2019-20 to 2023-24 would increase to Rs. 1,013 billion. The impact has been estimated assuming 100 per cent treatment of solid waste.<sup>xvii</sup>

**Figure 17: National sanitation output market impact, Rs. billion**



### Property value

Construction and use of toilets make the environment cleaner, which has a positive impact on the property value. Under the UNICEF 2017-18 cost-benefit study survey, a change in the market value of the house after having toilets within premises has been captured. Under this evaluation, with the application of appropriate price adjustments, the impact on property prices has been estimated. It is estimated that the construction of toilets has led to an increase in property value for households each year. In 2014-15, an aggregated increase in property value was estimated to be Rs. 72 billion, which is estimated to have gone up to Rs. 567 billion in 2017-18.

<sup>xvii</sup> Impact of FSTPs and STPs, and SWM in rural areas have not been estimated for sanitation output economy because of lack of reliable data.

**Table 16: Impact on property value (in Rs. billion)**

Year	Property market value increase	As % of GVA
2014-15	72	0.063%
2015-16	367	0.292%
2016-17	459	0.329%
2017-18	567	0.366%
2018-19	507	0.295%
2019-20 (Based on current progress)	55	0.029%

It is important to note that property value impact is a one-time impact, which is dependent on a number of new households that have access to toilet coverage. In 2017-18, a number of new households getting IHHL is the highest across all years. This implies that in 2017-18, the significant construction of IHHL led to a higher appreciation in property value at the national level. The appreciation in property value follows a similar trajectory to that of the sanitation input market.

### Employment impact

Construction of infrastructure creates employment opportunities for people involved directly in the construction of the infrastructure and as well as for people involved in the supply chain, which provides input and materials for the development of infrastructure. The supply chain involves industries that provide inputs like toilet pans, doors, bricks, cement, sand, etc.

It is estimated that the development of SBM infrastructure has provided direct cumulative employment of 2.59 million FTE workers<sup>xviii</sup> during the 2014-15 to 2018-19 period. Through the impact on the supply chain, SBM is estimated to have created indirect employment of 4.95 million FTE workers during the 2014-15 to 2018-19 period.

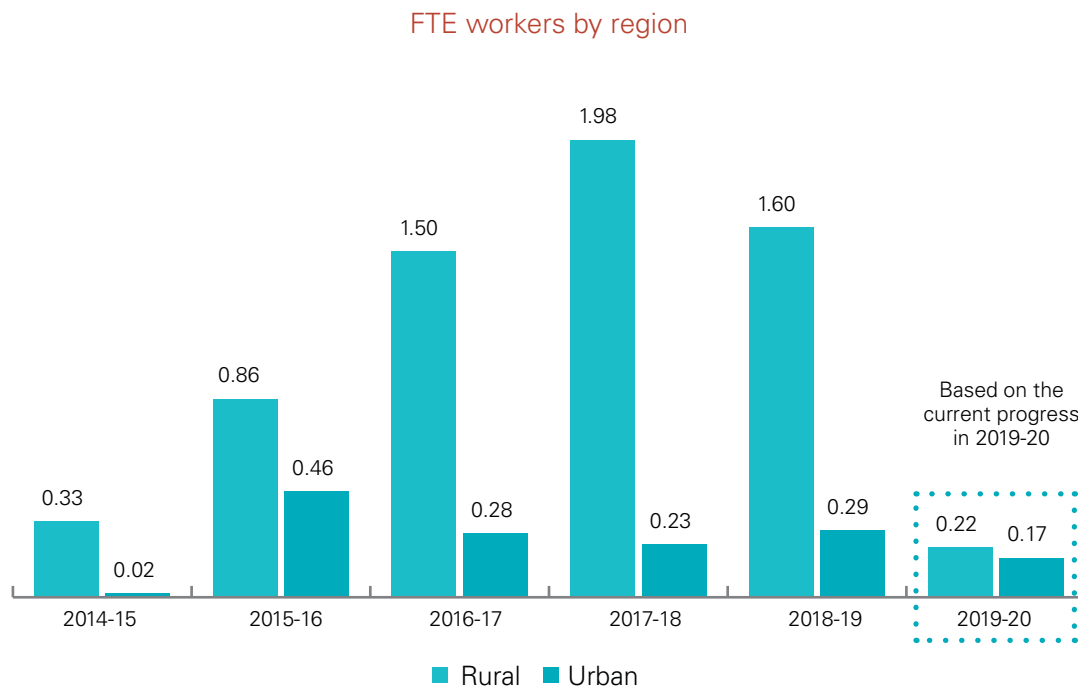
The year-wise breakup of rural and urban employment is provided in Figure 18. The total impact of the SBM was 7.55 million FTE workers through direct and indirect employment effects. It should be noted that the employment impact is not the total count of jobs created by SBM. It is an analytical exercise, through which we have calculated the amount of working time that would have been generated in the economy. There are two main types of employment impact (i) Employment for workers who were not previously employed in related industries and (ii) additional work time for workers already employed in related industries. New employment for workers is a greater impact as compared to additional work time for workers already employed in related industries. However, these numbers may vary with changing methodology and assumptions.

Employment impact is measured through an accounting procedure, as follows:

1. If one single toilet requires 4.9 person-days of masonry work and 0.17 of a supervisor, the number of person-days of total employment would have been created for the increase in IHHLs (this includes self-labor when households construct toilets on their own). Therefore, if the number of person-days for masonry work and supervisor work is different, it would lead to a different number of FTE jobs.
2. With the increase in toilet construction, demand for inputs increases. This creates employment effects in sectors supplying inputs to the sanitation sector. We have captured this through an input-output framework.

<sup>xviii</sup> FTE workers: 1 full-time equivalent employment is 240-person days of work in a year. It does not imply that 7.55 million of workers were provided employment/jobs over the five-year period

Figure 18: FTE workers by region (In Million)

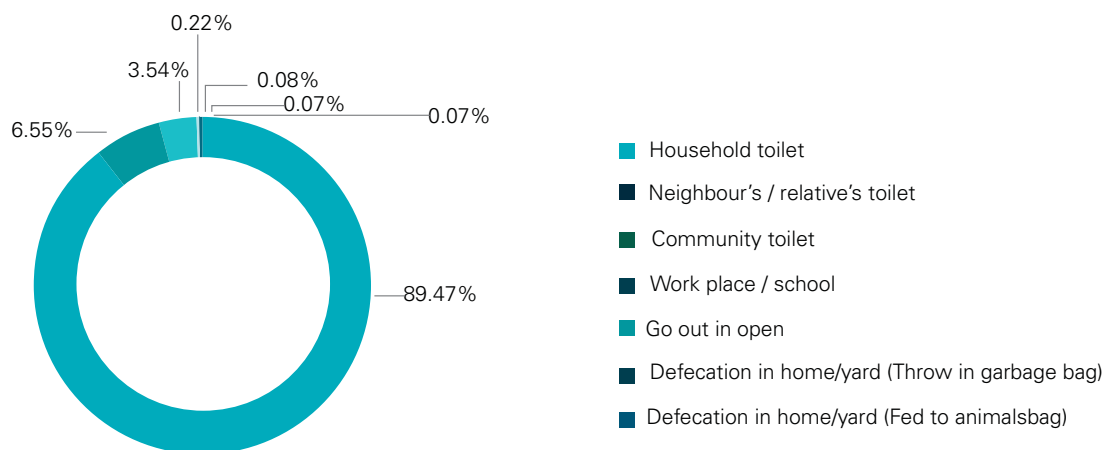


In the prospective scenario, during 2019-20 to 2023-24, the construction of IHHLs and SBM infrastructure would provide direct employment of 2.28 million and indirect employment of 3.35 million. This would lead to the employment effect of 5.63 million FTE workers in total. Employment generated would be greater in rural areas (2.93 million) than urban areas (2.70 million).

### Social Impact

Inadequate sanitation affects girls and women disproportionately, due to physical and psychological factors. Women and girls are subject to harassment during open defecation and trauma thereafter. Safe sanitation technologies for women are essential in achieving gender

Figure 19: Main Sanitation option for females when at home



Source: The UNICEF 2017-18 cost-benefit study

equality and the realization of their rights. Figure 19 shows the main sanitation option for females when they are at home. As can be seen, approximately 89.47 per cent of females use a household toilet as their main sanitation option.

Figure 20 depicts the female respondents' response to the social benefits of having a household toilet as given in the UNICEF 2017-18 cost-benefit study. The respondents strongly agreed (over 90 per cent positive response) that having a toilet in the household improved the safety of women and girls. Over 85 per cent of the respondents strongly agreed that IHHL improved their social status. Inadequate sanitation seems to have the greatest influence on safety and privacy. Majority of the women respondents associated improved sanitation with better safety, social status, and convenience.

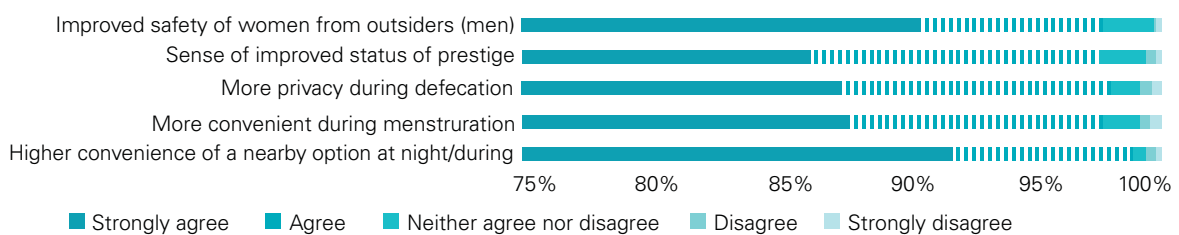
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### One respondent from Jharkhand stated:

The SBM-G campaign was centered on dignity, security, and comfort of all, especially for women, old-age population and children. In the State, numerous cases are found of the proud owner of a good quality toilet. The vital driving force behind high usage patterns in the State is because women felt the need for toilets for them and their families. In Hazaribag and Koderma Districts, many girls forced their parents to construct a toilet at home, as they felt insecure while going out for defecation. Similarly, women stopped cooking at home until their spouse built a toilet for them.

”

**Figure 20:** Percentage of Household respondents who agree or disagree with the social benefits of IHHL



*Source:* UNICEF 2017-18 cost-benefit study

Table 17 further shares some of the responses received on social impacts under SBM based on field interactions in states.

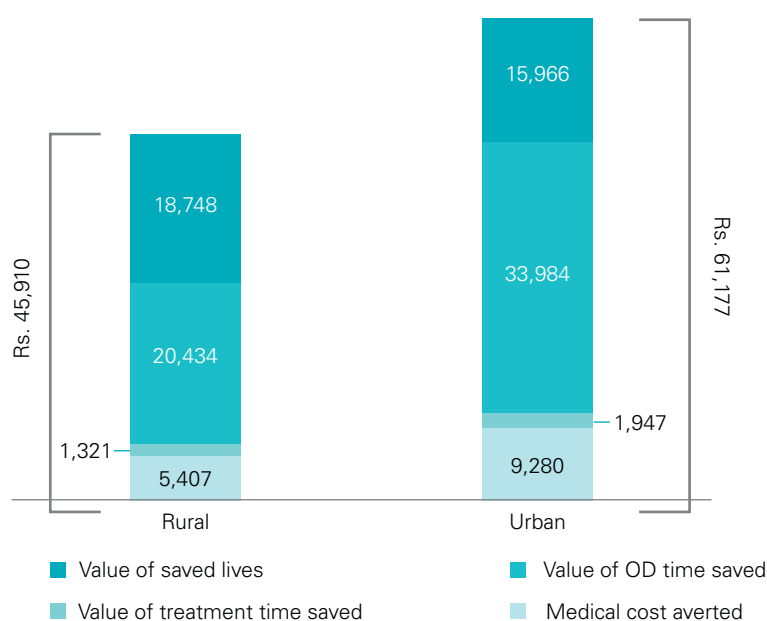
**Table 17: Social Impact of SBM**

Category	Description
Privacy	The idea of privacy has evolved. Earlier in the absence of a toilet, the options were to defecate in the open or not defecate at all. Now, there is an option to defecate privately, which many households are opting for (Maharashtra).
Inclusiveness (dignity, women empowerment, PWD)	The SBM-G campaign of Jharkhand has involved women groups for mobilizing communities and trained women masons for supporting in toilet construction. The engagement of women has empowered women socially and economically. The state also engaged women's motivators to deal with the issues that most affected themselves and their children (Jharkhand).
	The impact of SBM-G is visible in the improved attendance of girl children in the Schools. Jharkhand is maintaining a national average in most of the health indicators. SBM-G also promotes hygiene practices like hand washing and menstrual hygiene management, beyond toilet usages. The programme also contributed to the livelihoods of many families, directly or indirectly (Jharkhand).
	The SBM-G campaign was centered on dignity, security, and comfort of all, especially for the women, aged and children. The vital driving force behind high usage patterns in the state is because women felt the need for toilets for them and their families (Jharkhand).
	In Hazaribag and Koderma Districts, many girls forced their parents to construct a toilet at home, as they felt insecure while going out for defecation. Similarly, women stopped cooking at home until their spouse built a toilet for them (Jharkhand).
	People with disability (PWD) are an issue in the State, as 2 to 5 per cent of households have any one member falling under this category. The state identified those households and motivated the family head, on the need of toilet for PWD. The SBM-G campaign also provided technical support for the construction of toilets for PWD, old age and people with other challenges (Jharkhand).
	Ease of access to toilets leads to greater comfort and dignity, especially for women. SBM has led to improved community cohesion towards community motivation, triggering behavior change and demand generation. Ease and flexible timing to access toilets is an important social outcome, especially for women and children (Bihar).

Category	Description
	Associated with the idea of privacy, dignity has increased over time in a similar manner. There was no dignity, or lack of dignity thereof, associated with defecating in the open due to the absence of any choice. Since this choice is available now, the role of dignity and privacy is enhancing (Maharashtra).
	Safety has increased for key groups (women and children), as they can defecate in a closed space. Women were vulnerable to rape/ violence by men in the situation previously. The general presence of toilets has reduced the instances, where women were susceptible to such violence. Safety for all groups has increased in general as well. Cases, where people were attacked by animals, bitten by insects, have naturally lessened. Providing people with the choice for increased safety, privacy and dignity has been the driving force in people opting for toilets (– this could be viewed as a virtuous cycle) (Maharashtra).
Community Cohesion	SBM-G is the only flagship programme that focused on demand-driven and behavior change through intensive communication activities. Community meetings, especially, evening meetings (Sandhya Choupal), had the most noticeable impacts on communities and also brought community cohesion (Jharkhand).
	The result of community cohesion is observed even after achieving ODF in the form of demand for ODF Sustainability and implementation of SLWM, MHM and water supply intervention. Mukhiya (Village Head) has always been in the center to bring collective community action for better living (Jharkhand).
	People are involved, rather immersed in the idea of 'cleanliness'. The concept of sanitation has been popularized to a point, where households are spending individually to seek such remedies (Maharashtra).

From the equity perspective, with access and use of improved sanitation facilities, it is estimated that the poorest households in 2018-19 saved Rs. 45,910 in rural areas and Rs. 61,777 in urban areas (Figure 21). The richest household, in comparison, saved Rs. 46,654 in rural areas and Rs. 70,079 in urban areas. The savings were higher for the richest households because of higher medical expenditure incurred by the richest households, as compared to the poorest ones. This is composed of four kinds of economic damage-costs averted, as described in the methodology section.

**Figure 21: Economic benefits to the poorest from improved sanitation, 2018-19 (in Rs. per household per year)**



### What have been the economic and financial impacts of the SBM for specific sub-populations, including children, urban vs rural, different income quintiles?

This section presents findings on the economic and financial impacts of SBM on specific sub-population, including children, urban areas vs. rural areas, and on different income quintiles. The benefits of year-on-year per household are estimated using a modelling approach. We start by discussing the benefits for households in rural areas, post which we discuss benefits for households in urban areas.

#### SBM-G

Economic benefits, as shown in Table 18, are estimated using medical cost averted, value of saved lives, sanitation access time saved, and treatment time saved. For the year 2014-15, the benefit for households in the poorest quintile had been equivalent to Rs. 8,150, which increased to Rs. 33,736 in 2018-19. Estimates from the UNICEF 2017-18 cost-benefit study were based on fieldwork, through which medical expenditure of households, the monetary value of treatment time and access time saved for the year 2017-18 were known. Households had similar profiles in terms of medical expenditure, treatment time saved, and access time saved, with richer households spending higher than the poorest households. Since the above-known estimates are updated for price level across years, profile within a wealth quintile remains similar from 2014-15 to 2018-19.

Table 19 shows health damages saved by age group. The health damages saved are estimated using medical expenditure saved and the value of lives saved. Benefits are the highest for children below five years of age, given they are susceptible to more disease cases.

**Table 18: Economic benefits (rural) by wealth quintiles at actual usage (in Rs. per household)**

Year	All	Poorest	Q2	Q3	Q4	Richest
2014-15	8,592	8,150	8,847	8,507	8,833	8,403
2015-16	11,461	10,946	11,741	11,320	11,680	11,249
2016-17	16,568	15,916	16,884	16,328	16,754	16,342
2017-18	20,895	20,161	21,243	20,564	21,016	21,238
2018-19	34,572	33,736	34,804	33,889	34,247	34,407

**Table 19: Health damages saved per household (Rural) by age group (in Rs.)**

Health damages saved	0- 4 years	5- 14 years	15+ years
2014-15	274	88	129
2015-16	866	273	455
2016-17	1,846	645	1,082
2017-18	2,790	1,039	1,675
2018-19	7,013	2,734	4,536

### SBM-U

Economic benefits for urban areas are estimated analogs to rural areas (shown in Table 20). For the year 2014-15, a benefit for households in the poorest quintile had been equivalent to Rs. 19,818, which increased to Rs. 31,898 in 2018-19.

Benefits per household in urban areas are higher than for households in rural areas, largely because of the higher price level in urban areas. Further, the economic benefits were higher for the richest population group than the poorest one, as they spent higher on the treatment of diseases, compared to the households in the poorest wealth quintile.

Health damages saved by different age groups are higher for the rural areas compared to the urban areas (as can be seen from Table 19 and Table 21) because of low disease prevalence in the latter, which in turn is due to higher toilet usage in urban areas as compared to the rural areas. Health damages saved for children below five years of age in 2014-15 totaled Rs. 90, which would increase to Rs. 1,476 by 2018-19.

**Table 20: Economic benefits (Urban) by wealth quintiles at actual usage (in Rs. per household)**

Year	All	Poorest	Q2	Q3	Q4	Richest
2014-15	20,981	19,818	21,671	20,835	21,730	20,578
2015-16	22,453	21,191	23,150	22,279	23,234	22,052
2016-17	24,877	23,485	25,611	24,691	25,739	24,538
2017-18	26,271	24,805	27,027	26,077	27,178	25,966
2018-19	33,747	31,898	34,429	33,537	34,882	34,136

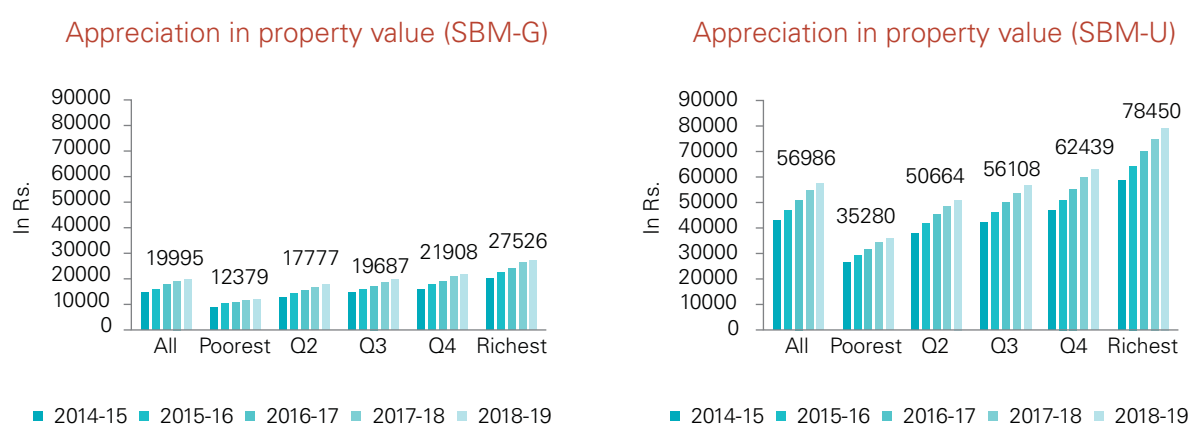
**Table 21: Health damages saved per household (Urban) by age group (in Rs.)**

Medical Cost	0- 4 years	5- 14 years	15+ years
2014-15	90	32	89
2015-16	170	60	189
2016-17	319	126	399
2017-18	403	170	525
2018-19	1,476	658	2,105

### Property value:

Construction of the toilet is associated with appreciation in property prices. The UNICEF 2017-18 cost-benefit study estimates the increase in property prices for rural areas. Estimation for urban areas is done using the available data for the difference between rural and urban property prices.<sup>37</sup> Revisions for each year are based on RBI's house price index.

Appreciation in property prices shows an increase from 2014-15 to 2018-19, as shown in Figure 22. The benefits are higher for households in the richest wealth quintile, because the richest households invest a higher amount, leading to the construction of better toilets over and above the subsidies received from the government to construct a toilet.

**Figure 22: Appreciation in property prices by income quintiles**

### 3.1.4. Sustainability

#### Is the current and projected level of investment in WASH sustainable at the national level?

At the start of the programme, the central and state governments committed USD 20 billion towards achieving the ODF status. Toilet coverage has improved significantly over the years. There is also a noticeable improvement in the use of toilets. Costs associated with the construction of additional toilets for new households and retrofitting of single-pit toilets to twin-leach pit toilets are not significant relative to spending on construction of nearly 100 million toilets, IEC and BCC activities and capacity building activities. Assuming the leading determinants to the achievement of outcomes are sustained and gaps outlined in the previous section are addressed, current investments seem to be sustainable.

The GoI is now moving towards the next stage of reforms, i.e., safe and sustainable faecal sludge management, thus sustaining the use of improved sanitation facilities. The GoI is in the process of finalizing investment requirements to achieve ODF+ and ODF++ status. Therefore, the detailed assessment of the projected investment is not feasible.

#### In what ways and why might the sustainability of the SBM results be threatened?

Since the commencement of SBM, 100 per cent of villages have self-declared themselves to be the ODF and many have been verified at the first and second levels. As per NARSS, 96.5 per cent



of households use toilets. In urban areas, 81 per cent of ULBs have been certified to be ODF (March 2019). However, several factors may impede the progress achieved so far.

Key factors and reasons that might threaten the sustainability of SBM results are enlisted below<sup>xix</sup>:

1. Lack of sustained behavioral change and community engagement can lead to villages and districts falling back from the ODF status. This may lead to low usage of toilets among the households, despite 100 per cent coverage. As a case-in-point from KIIs, 42 ULBs in Jharkhand maintained their ODF status for two consecutive years. However, in the latest verification report, three ULBs slipped back from being ODF. Hence, a continuous thrust would be required through IEC activities to ensure the regular use of toilets. Table 7, nearly 29.1 per cent are reported to be twin-leach pit toilets and 33.1 per cent of toilets as of February 2019 is still single pit. Emptying single-pit toilets is less safe, given that the waste does not get decomposed and needs to be emptied frequently. As per the study conducted by the International Initiative for Impact Evaluation (3ie), a significant portion of households considered emptying the pit to be inconvenient. Additionally, the study reports cases of de-sludgers merely transporting non-decomposed faeces from one location to others and dumping it without safe treatment, which threatens the expected health benefits. The study also reports cases of emptying of latrines attached to specific population groups perpetuating historical biases towards specific castes and socio-economic status. This may threaten equity impacts.
2. As per NARSS 2018, 23.8 per cent of respondents reported that child faeces are either thrown in open areas or into the garbage. As per the study conducted by 3ie, there are beliefs that child faeces are not harmful. Further curtailment of unsafe disposal of child faeces would be required to achieve maximum health outcomes.
3. Little development of supporting infrastructure such as availability of water may hamper sustained usage of toilets. As per NARSS 2018, 30.6 per cent of households reported having a water facility outside the premises. Long-distance between water sources and toilets would deter households to use toilets regularly.
4. Improper retrofitting and maintenance of defunct toilets might cast doubts on sustained usage of toilets by households. Further, lack of a demand-driven approach for use of toilets by new households would again be a threat to the sustainability of the SBM results. Based on the interactions in Maharashtra, it is noted that single pits are still very common. Retrofitting has been taken up, but space within the household is a major concern impeding the progress of this activity.
5. Lack of independence and rigor during verification of ODF status can lead to questions being raised over the ODF status of the villages and districts. Hence, it is imperative that proper procedures as listed down by the ministry are followed while verifying a village or district to be ODF.
6. Some additional factors emerging from KIIs that might threaten the SBM results include
  - Improper training of masons and construction of toilets;
  - Lack of capacity building activities;
  - Delay in disbursement of incentives to swachhgrahis (community volunteers) and delay in data entry for monitoring purpose;

<sup>xix</sup> The points enlisted through the KIIs are anecdotal and have not been very well established empirically. Hence, it might not be possible to assess the size of these challenges through the information from KIIs.

- Inadequate tracking of deployment of trained masons, poor CSR/grants sourcing, danger to drinking water sources due to the insufficient distance between a constructed toilet and leach pit, limited evidence of involvement of panchayats and beneficiaries in the planning process, use of improper technologies to construct toilets, among other things.

Although these factors have not had a major effect on the SBM results as of now, if these challenges become widespread, they might collectively threaten SBM results in the future.

7. Septic tanks are constructed with improper designs – not accounting for necessary anaerobic conditions or outlets. Lack of skill at the GP-level is a general concern, which must be addressed through training/ capacity-building programmes.
8. Based on KII in Maharashtra, it is observed that the entire value chain is yet to be addressed. There are not enough personnel undertaking desludging, STPs, or safe spaces for disposal have not been well thought out. There is an absence of standardized procedures and protocols in the field of desludging, treatment, and disposal.

“

### One respondent from Jharkhand stated:

The SBM-G campaign was centered The momentum built during the SBM-G campaign should be continued during the ODF Sustainability phase. Nigrani Samiti (Vigilance Committee) formed under the campaign played a pro-active role in making their villages ODF. They must be motivated and engaged in the post ODF campaign for sustainability.

The availability of water is a big challenge in many parts of the State, especially during the summer. The government of Jharkhand is working on ensuring a 24x7 water supply. The success will help the communities to have adequate water for their needs.

Retro-fitting and operation & maintenance of the toilet should also be added for the ODF Sustainability campaign. Large scale community mobilization interventions would also be required for sustaining the ODF.

”

### Solid Waste Management: Bhui (SBM-G) (Case Study)

Bhui is the first zero waste panchayat in Bihar. The district administration jointly with the Bhui Gram Panchayat (GP) organized an Aam Sabha in mid of 2016, where the idea of developing the first zero waste panchayat in Bihar was agreed and approved. The places for Solid Liquid Resource Management (SLRM) activities was also suggested in the meeting.

Bhui Swachhta Samiti was formed and received funding for SLRM pilot. The user fee was kept as Re 1/ day per house and Rs 3 for per shop/ day.

The first phase of the project work commenced with 455 households and 120 commercial shops across three wards. The project involved a team of 12 members including the

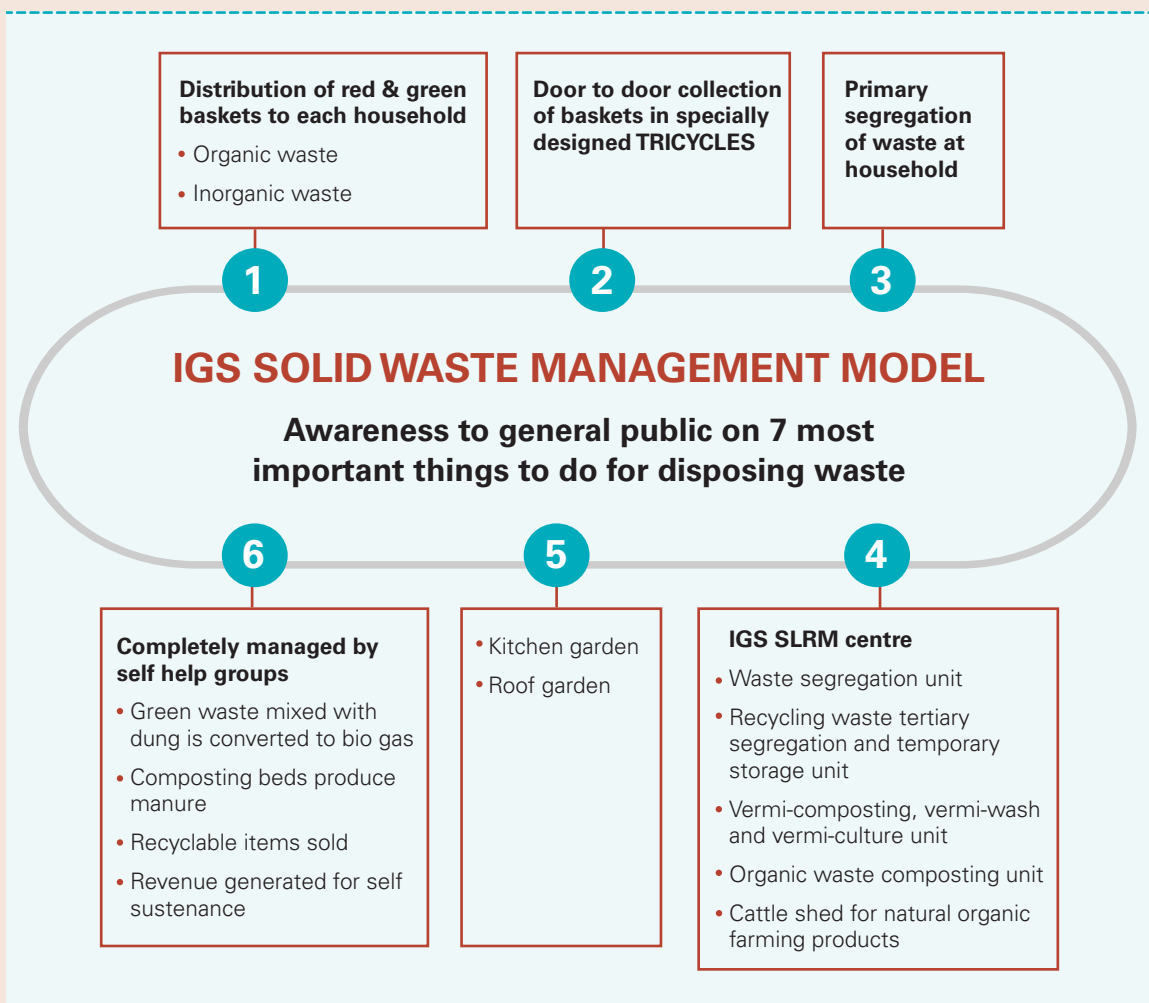
project in charge and project head. Waste was collected using two tricycles with boxes to collect waste from households. Further, green and red dustbin were distributed for better segregation of waste. Secondary segregation, composting and store and sale of recyclable materials were other crucial components of the model.

The implementation modalities of the Bhui waste management model include the following:

- ▶ Awareness to public on important things to do for disposing and primary segregation of waste at the household level
- ▶ Door to door collection of waste from households and shops in the Gram Panchayat
- ▶ Segregation and recycling at the SLRM centre. This includes recycling waste through different methods like vermi composting, organic caste composting etc.
- ▶ Market development for the products developed from the compost and recycling of solid and liquid waste.

Bhui gram panchayat follows the IGS solid waste management model:

Figure 23: IGS Solid Waste Management Model

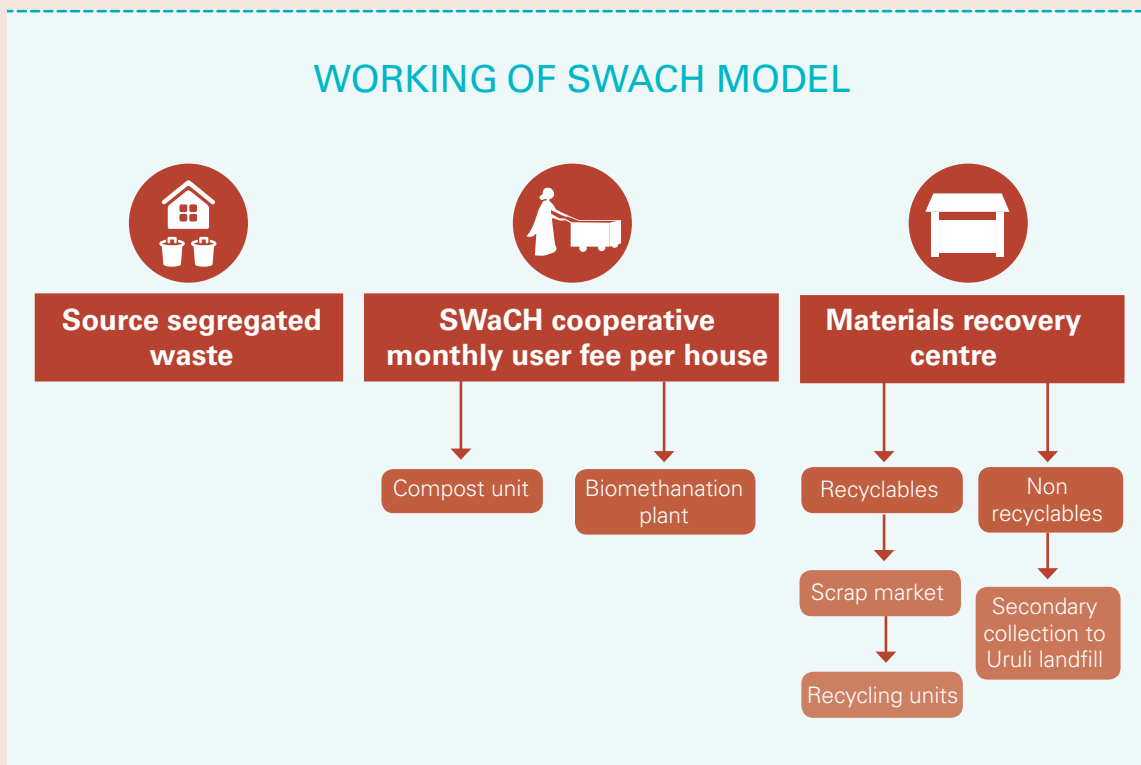


### Solid Waste Management: Pune (SBM-U) (Case Study)

Pune is the second largest city in Maharashtra. Pune Municipal Corporation has signed a contract with SWaCH, a cooperative society for door-to-door collection and waste segregation. Nearly 60 per cent of the households are covered by members of SWaCH. Following are the key implementation modalities, of the model:

- ▶ **Public Participation:** Under this initiative there is direct participation of SWaCH members and public in waste management. This enables participation and empowerment of weaker sections of the society.
- ▶ **Incentivization of stakeholders:** The participants in the collection and segregation of waste are incentivized for efficient implementation of the system.
- ▶ **Recycling:** The segregated waste is delivered to a feeder point and the recyclable waste are sold to scrap dealers. The wet waste is used for composting purpose.
- ▶ **Sustainability:** All the identifiable gaps have been corrected to ensure the sustainability of the mechanism in the long run.

Working of the SWaCH model is shown in figure below.



Key outcomes of the model are:

- ▶ The rag pickers are included in formal employment stream. On an average, the rag pickers can earn Rs. 12,000-15,000 per month.
- ▶ SWaCH integrated 40 per cent of the rag pickers into formal employment stream in 2016.

- ▶ SWaCH has set up a strong mechanism for grievance redressal with PMC. The field coordinators of SWaCH (SWaCH Mitra) and PMC staffs help in addressing the grievance of SWaCH members and households.
- ▶ Through this initiative, the PMC has managed to save more than Rs. 60 crores in collection and transportation of waste.
- ▶ PMC has subsidized the collection fees of waste in the notified slums. The households are paid Rs. 10 each for door-to-door collection of waste.

*Source: SBM Coffee Table Book Final. Transforming urban landscapes of India: Success Stories in Solid Waste Management [Swachh Bharat Mission (Urban)]*

## 3.2. Lessons Learnt

The rapid increase in toilet coverage and usage is expected to lead to savings of economic damages (health and time-use) of up to 6.65 per cent of GDP by 2019-20. Further, the construction of toilets and SWM infrastructure, has resulted in economy-wide impacts in terms of output and employment. Progress has also been made on the sanitation output market, which has promoted systematic waste management practices as well as the unbundled economic potential for reuse and recycles of the waste generated.

The evaluation ascertains the findings of previous studies on the benefits of investing in WASH. While this evaluation has analyzed several benefits of improved sanitation, due to data unavailability, benefits on tourism, financial institutions, and businesses are not quantified. Hence, the impact of investing in improved sanitation is likely to be greater than estimated in the present evaluation.

The input-output methodology would be better suited to estimate the economy wide impact of the sanitation input market in comparison to surveys. Surveys may be more time-consuming, costly and non-representative of the entire sanitation input market.

Upcoming research can build on this evaluation and estimate additional benefits of improved sanitation. These can include benefits like tourism, impact on education, financial institutions, environment, and businesses. Assessment of impact achieved under ODF-S and ODF+ stage after completion would be important to analyze. Attention should be given to capturing accurate and reliable data regularly. This would enable enhanced decision making among various stakeholders and would lead to better outcomes.

### *Unintended consequences*

#### **Positive consequences**

Behavioral change was a crucial element in SBM achieving its outcomes. Upcoming policies could unintentionally draw cues from behavioral change focus in SBM and could lead to better implementation. These include interventions that require behavioural change to achieve intended outcomes such as tax compliance, saving for old age, etc. SBM could attract private sector funding and support in creating awareness about safe sanitation practices. Other programmes may adopt learnings from SBM to better engage with the private sector.

### Negative consequences

The evaluation findings report substantial economic and financial impact of improved sanitation with the intention of further investment in the sector in terms of faecal sludge management. This would maximize the health benefits from improved sanitation. However, it does not imply diverting resources from the existing schemes targeted towards the improvement of health outcomes. Sanitation is not the only factor determining health status. Improved sanitation may reduce the burden of diseases such as diarrhea, ALRI but the population may still be subject to other diseases unrelated to sanitation.

The evaluation findings are based on results achieved under the sanitation programme in India. Different sanitation programmes might have a varying impact depending upon their implementation and local context. Hence, caution should be taken before generalizing the impact estimates of the current evaluation.





# 4. Recommendations



## 4. Recommendations

### 4.1. Recommendations

The evaluation shows that Swachh Bharat Mission has created substantial economic impact and has influenced social outcomes. Many villages and ULBs have self-declared themselves to be ODF since the commencement of SBM. However, it is important to continue to focus on the sustainability of the results achieved under SBM. Achieving ODF+ status, which entails safe FSM, SLWM would be a key result area in the coming years. In lieu of the above, the Ministry of Jal Shakti and Ministry of Housing and Urban Affairs have framed a ten-year strategy document (for rural areas)<sup>38</sup> and document on declaring a city ODF+ and ODF++<sup>39</sup> for urban areas, respectively.

Key goals of the ten-year sanitation strategy in rural areas include (i) ODF sustainability and (ii) Solid and Liquid Waste management in rural areas. Key focus areas of ODF sustainability and Solid and Liquid Waste management in rural areas are provided in Table 22.

**Table 22: Focus areas of rural sanitation strategy 2019-2029**

ODF Sustainability	
S. No.	Focus Area
1	Ensuring access to sanitation for new households and anyone left behind
2	Developing and retrofitting needed infrastructure
3	Continuous behavior change communication

Solid Liquid Waste Management in Rural Areas	
S. No.	Focus Area
1	Solid waste management
2	Bio-degradable waste management
3	Plastic waste management
4	Greywater management

*Source: 'From ODF to ODF+ Rural Sanitation Strategy, 2019-2029', Ministry of Jal Shakti*

Similarly, in the case of urban areas, achieving ODF+ and ODF++ status refers to:

**Table 23: Key areas of ODF+ and ODF++ toolkit for ULBs**

Term	Definition
ODF+	SBM ODF+ work circle is one where not a single person, at any point in the day, is found defecating or urinating in the open and all community and public toilets are well-maintained and functioning
ODF++	SBM ODF++ work circle is one where not a single person, at any point in the day, is found defecating or urinating in the open, all community and public toilets are well-maintained and functioning and faecal sludge/ septage and sewage are safely managed and treated with no discharging or dumping of untreated faecal sludge/ septage and sewage in drains, water bodies or open areas

*Source: Declaring your city/town SBM ODF+ and SBM ODF++*

Based on the review of the determinants of impact and key objectives and targets stated in the strategy documents, future WASH programmes should focus on the following:

### *Sustaining SBM results*

1. **Sustaining behavior change:** As assessed under the efficiency section of the evaluation, behavioral change through community engagement and IEC activities was a critical determinant of transforming toilet usage within five years. It is imperative that awareness programme and community engagement continue to maintain developed behaviors. Targeted IEC/BCC intervention is crucial in customizing messaging and media mix for specific groups spread across various geographies, urban and rural and counter conflicting religious beliefs and mass sentiment.

*Stakeholders targeted: Line ministries (MoJS and MoHUA), Panchayati Raj Institutions, ULBs and Swachhagrahis, and CSO.*

2. **Sustenance behavior change requires an understanding of ground realities:** As noted on the efficiency parameter of SBM, rigorous independent verification is critical to monitor defecation practices. The ODF sustainability guidelines state that gram panchayats can pass resolutions with the potential dos and don'ts for ODF sustainability. Steps like local monitoring and reinforcement of improved sanitation behaviors through the potential withdrawal of government benefits in case of non-compliance may be encouraged as part of the guidelines. GPs and ULBs are also empowered to apply measures such as spot fines etc. While coercive measures like spot fines might work in a few cases, some measures such as humiliation in any form should not be actively encouraged. Rigorous verification would mean that chances of villages and ULBs falling back from the ODF status would reduce considerably. Further, reinforcements, both positive and negative would deter people from practicing open defecation and would eventually lead to enhanced sustainability.

*Stakeholders targeted: Line ministries (MoJS and MoHUA), Panchayati Raj Institutions, ULBs, and 3rd party verification agencies.*

3. **Market solutions to financing construction of toilets:** The UNICEF 2017-18 cost-benefit study survey found that in addition to the subsidy, toilet construction also needs private out-of-pocket expenditure. On an average, Rs. 24,825 is spent in rural areas on the construction of household toilets which includes government subsidy of Rs. 12,000. This may be because households aspire to have toilets with bath facilities are made of superior material and that the family can use it for many years. There is no standard approach followed with regard to the availability of funds upfront to construct toilets. The upfront expenditure may be out of reach to many households. In such cases, financial products focused on WASH infrastructure may be further promoted. The ODF-S guidelines deliberate on the financing of ODF sustainability related to the allocation of SBM (G) funds to states. The guidelines could be further augmented with market solutions to finance the construction of toilets.

*Stakeholders targeted: Line ministries (MoJS and MoHUA) and financial institutions with WaSH portfolio*

4. **Construction quality** is an area of concern flagged by many key informants under this evaluation, especially in the case of SBM(G). Inadequate technical supervision, due to lack of technical staff at GP/Block levels, during the construction of toilets and SLWM facilities could potentially lead to a greater public health hazard. Hence, measures should be taken to ensure that adequate technical supervision is in place to improve construction quality in the coming phase of SBM.

*Stakeholders targeted: Ministry of Jal Shakti, masons, and technical supervisors*

- 5. Operation and maintenance and retro-fitting of single-pit toilets:** Although twin-pit leach toilets were encouraged under SBM, there are various instances of single-pit toilets as highlighted in the effectiveness section. In order to sustain health impact, existing single-pit toilets may be converted to twin-pit toilets. Further, in order to maintain health impact and to meet the 'safely-managed' criteria as per SDG standards, different toilet designs could be adapted in different terrains. This could include flood-resistant toilets and toilets constructed using a ferro-cement technique in flood-prone areas like Assam and dry pit toilets in drought-prone areas. Secondly, financial incentives played an important role in promoting the construction of toilets. Financial incentives may be continued to new households given the negative externalities to entire communities.

*Stakeholders targeted: Line ministries (MoJS and MoHUA), Panchayati Raj Institutions, ULBs and masons*

- 6. ODF-S guidelines should address untouchability and caste-based differences:** While significant progress has been made to increase toilet coverage, untouchability and caste-based differences continue to hamper the sustainability of SBM results. Construction of twin pit latrines as against single pit latrines provide a cheap and safe alternative. However, cleaning and maintenance of toilets are concentrated to specific castes. Hence, the government must make substantial efforts to connect rural sanitation policy by eliminating manual scavenging and caste-based oppression in the cleaning and maintenance of toilets to achieve sustained results.

*Stakeholders targeted: Ministry of Jal Shakti*

### ***Achieving additional benefits through ODF+ and ODF++ activities***

- 7. Provision of water supply:** KIs under this evaluation reveals that access to water is an important input in sustaining the use of toilets. It is reported that households are unable to use toilets due to lack of water connections. Future WASH programmes should focus on providing access to water to all to sustain the usage of household toilets constructed under SBM.

*Stakeholders targeted: Line ministries (MoJS and MoHUA)*

- 8. As highlighted in the efficiency parameter of SBM, effective training of swachhagrahis (community volunteers) led to substantial progress in construction as well as the adoption of toilets. In the subsequent phase of SBM, which includes 100 per cent FSM, the quality of training for outreach motivators should be improved** so that they could carry out triggering activities effectively. Training of Swachhagrahis, SHG members, members of other village level institutions should be designed more effectively so that going forward, they could contribute during ODF plus interventions.

*Stakeholders targeted: Ministry of Jal Shakti, Swachhagrahis*

- 9. Clarity on expectations from the communities in ODF+:** Role of communities was clearly defined under SBM. Generating awareness on health impacts of open defecation, creation of a need for toilets and usage were some of the clear mandates. In the ODF+ phase, potential gains at the community level from safe faecal management and re-use in terms of fertilizers, electricity from bio-gas, bio-charcoal, treated water needs to be shared and disseminated at a similar scale and speed. It may be useful to set up demonstration units to trigger interest and demand. Similar to the case of SBM, women or women-led SHGs/federations can be trained to actively engage in safe-faecal management, which can serve as a source

livelihood. The business cases for treatment, reuse, and recycling of faecal matter need to be established to increase private investments in safe solid and liquid waste management.

*Stakeholders targeted: Ministry of Housing and Urban Affairs, Women SHGs*

10. **Development of the market for re-use material:** SBM focused both on demand-side (household level) and supply-side (availability of trained masons and toilet technology), which led to the quick adoption of toilets. Similarly, in the case of ODF+, the intervention should also focus both on-demand and supply side. Supply-side interventions may include technical training of communities in ensuring the quality of re-use material relative to its substitutes in the market. Demand-side intervention (i.e., buyers of reused material) may include preferential public procurement of re-use material, which can provide initial support to suppliers in the market. Rural sanitary marts would also form an important part to bridge the supply-demand gap for raw materials and the sale of re-use material. The ODF+ and ODF++ guidelines could be augmented to include provisions for the development of the market for re-use material. This could include the government subsidizing the prices of reused materials for an initial period.

*Stakeholders targeted: Ministry of Housing and Urban Affairs, Businesses working in reuse and recycling of material, de-sludgers.*

11. **Access to public toilets** should be ensured in market places, transport points, railway stations, religious places, district/sub-district administrative headquarters, district/sub-district hospitals, burning ghats/burial grounds should be ensured. Suitable models of private sector involvement may be explored based on on-demand assessment. The joint plan of action with clear responsibility-sharing between the stakeholders would be an important aspect of this.

*Stakeholder identified: Ministry of Housing and Urban Affairs*





# Appendices



# Appendix A. Key components and stakeholders under SBM-G and SBM-U

Swachh Bharat Mission has two parts: SBM-G and SBM-U. Table 24 and Table 25 provide key components of SBM-U and SBM-G respectively.

**Table 24: Key components of SBM-U**

Component Name	Description
Household Toilets	<b>Coverage</b>
	The target group for the construction of household units of toilets is <ul style="list-style-type: none"> <li>▶ 80% of the urban households engaging in open defecation</li> <li>▶ All households with unsanitary latrines</li> <li>▶ All households with single-pit latrines</li> </ul>
	The selection of beneficiaries shall be as per the strategy of Urban Local Bodies and State-specific guidelines need to be followed for the same. Final Target households are decided at the ULB and the State level
	<b>Financial Assistance</b>
	States- Unit cost is Rs. 16,000/- to Rs. 20,000/- States to contribute a minimum of 25% funds (Rs 1,333/- per IHHL) towards individual toilets to match 75% Central Share (Rs. 4,000/- per IHHL) UTs – Unit cost is Rs. 5,333/- For UTs without a legislature, Central share will be 100% (Rs 5,333/- per IHHL) and UT share will be nil. For UTs with the legislature, the Central share will be 80% (Rs 4,000/- per IHHL) and UT share will be 20% (Rs 1,333/- per IHHL).
	North East and the Himalayan States For North Eastern and the Himalayan States, the Central share will be Rs 10,800/- per IHHL (90% of Rs 12,000/-), and state share will be Rs 1,200/- per IHHL.

Component Name	Description
Community Toilets	<p><b>Coverage</b></p>
	<ul style="list-style-type: none"> <li>▶ The number of CTs is decided by ULBs and States.</li> <li>▶ Beneficiaries shall be defined as groups of households (“beneficiary household group”) in urban areas whose members practice open defecation and who do not have access to a household toilet, and for whom the construction of individual household toilets is not feasible.</li> <li>▶ Beneficiary household groups will be targeted under this scheme irrespective of whether they live in authorized/unauthorized colonies or notified / non-notified slums.</li> <li>▶ Beneficiaries to be identified as per the procedure designed by the ULBs.</li> </ul>
	<p><b>Financial Assistance</b></p>
	<p>States- Unit cost is Rs. 98,000 per seat</p> <p>States will contribute a minimum of 25% share towards community toilet projects to match 75% of Central Share (Rs 39,200/- per seat) including the North East States and the Special Category States</p> <p>UTs – Unit cost is Rs. 52,267 per seat</p> <p>For UTs without a legislature, Central share will be 100% (Rs 52,267/- per seat) For UTs with the legislature, Central share will be Rs.39,200/- (80%) per seat while UT share will be Rs 13,067/- (20%) per seat.</p>
Public Toilets and Urinals	<p><b>Coverage</b></p>
	<p>All places within the city attracting floating population need to be covered.</p> <p>Financial Assistance-Public Toilets</p> <p>States- Unit cost is Rs. 98,000/-per seat</p> <p>States will contribute a minimum of 25% funds of Central Share towards public toilets projects to match 75% of central share (Rs. 39,200 per seat) including the North East States and the Special Category States.</p> <p>UTs – Unit cost is Rs. 52,267/- per seat</p> <p>For UTs without a legislature, the Central share will be 100% (Rs. 52,267 per seat). For UTs with the legislature, Central share will be Rs 39,200/- (80%) per seat while UT share will be Rs 13,067- (20%) per seat.</p>

Component Name	Description
	<p><b>Financial Assistance -Urinals</b></p> <p>States – Unit Cost is Rs. 32,000/- per seat</p> <p>States will contribute a minimum of 25% funds of central share towards urinal seat projects to match 75% of Central Share (Rs.12,800/- per seat) including the North Eastern States and the Special Category States.</p> <p>For UTs without a legislature, the central share will be 100% (Rs 17,067 ).</p> <p>For UTs with the legislature, Central share for urinals will be Rs 12,800/- (80%) per seat while UT share will be Rs 4,267/- (20%) per seat.</p>
Solid Waste Management (SWM)	<p><b>Coverage</b></p> <p>All statutory ULBs need to be covered.</p>
	<p><b>Financial Assistance</b></p> <p>Central assistance is up to 35% of the project cost for all States/ UTs including North Eastern and the Special Category States.</p>
IEC and public awareness	<p><b>Coverage</b></p> <p>Target is the general public at large covering issues such as open defecation,</p> <p>prevention of manual scavenging, hygiene practices, proper use and maintenance of toilet facilities and its related health and environmental consequences.</p>
	<p><b>Financial Assistance</b></p> <p>A total of 15% of the total central allocation will be earmarked for this component. Of this, 12% will be earmarked for States to undertake massive public awareness campaigns on sanitation and establishing its link to public health, hygiene, and the environment through various means including- radio, social media, documentaries, plays, workshops, etc. The remaining 3% will be earmarked for the MoHUA to draw a national media campaign and developing standard campaign tools for effective awareness and communication on sanitation.</p>

Component Name	Description
Capacity Building	<b>Coverage</b>
	All ULB staff will be required to mandatorily register for and complete with certification the e-learning training modules that have been compiled on the e-courses portal.
	<b>Financial Assistance</b>
	3% of the total Central Government allocation under the mission will be earmarked for capacity building, administrative and office expenses of States and ULBs.

Source: SBM-U Guidelines

Table 25: Key components of SBM-G

Component Name	Description
Start-up activities	<ul style="list-style-type: none"> <li>▶ Baseline survey to assess the sanitation coverage and hygiene practices</li> <li>▶ Baseline survey data is to be updated in April of every year. This does not envisage re-survey of GPs, but the only entry of incremental changes that may have happened in the GP in the preceding year.</li> <li>▶ The orientation of key personnel at the district/GP level and preparation of District Plans</li> <li>▶ Preparation of State Plan (Programme Implementation Plan – PIP)</li> </ul>
Information, education, and communication (IEC)	<b>Coverage</b>
	<p>The state-level IEC activities include:</p> <ul style="list-style-type: none"> <li>▶ Mass Media: Amplification of National IEC advertisements on TV/Radio/Community Radio, and/or creative design of State-specific creative material for mass media dissemination</li> <li>▶ Use of social media: Maintaining active Facebook and Twitter pages around Swachh Bharat Mission</li> <li>▶ Regular felicitation of local champions at the State level</li> <li>▶ Using local celebrities to spread the message of SBM</li> <li>▶ Explore further use of innovative tools like Community Radio for connecting directly with local communities</li> </ul>

Component Name	Description
	<p><b>Financial Assistance</b></p> <p>Provision for IEC to be limited to 8% of total project expenditure with up to 3% to be utilized at the central level and up to 5% at the state level.</p> <p>The 5% at state level shall be used on IEC/BCC/IPC and all related communication activities, and on capacity building. The State must put in its share of funds for IEC in the Centre to State ratio of 60:40 all states except for NER/special category States where the ratio of sharing is 90:10. States should spend at least 60% of the overall IEC allocation (Central and State share) on Inter-Personal Communication.</p>
Capacity Building	<p><b>Coverage</b></p> <p>Capacity building workshops are to be convened under SBM-G on masonry work, plumbing, construction and maintenance of toilets, and for Solid and Liquid Waste Management works and IEC strategies.</p> <p>The beneficiaries include:</p> <ul style="list-style-type: none"> <li>▶ Sanitation workers</li> <li>▶ The Swachhagrahis/Sena</li> <li>▶ Members of PRIs</li> <li>▶ VWSCs</li> <li>▶ Functionaries of BPMU</li> <li>▶ DWSM, ASHA, Anganwadi workers</li> <li>▶ SHG members</li> <li>▶ Masons</li> <li>▶ CSOs/NGOs</li> </ul> <p><b>Financial Assistance</b></p> <p>Funding for the Capacity Building Action plan will be from the IEC budget, with a sharing pattern of expenditure between GoI and State in the ratio of 60:40.</p>

Component Name	Description
Construction of Individual Household Toilets (IHHL)	<p><b>Coverage</b></p>
	<ul style="list-style-type: none"> <li>▶ All States are to ensure data entry of all households' on the MIS. Any household not entered by the States on the MIS will not be entitled to funds under SBM (G).</li> <li>▶ Safe sanitation technologies include twin Pit, a septic tank with soak pit, eco-san, bio-toilets are recommended under SBM-G.</li> <li>▶ Ministry encourages using twin-pit technology wherever suitable, however, States may choose other safe technologies as well.</li> <li>▶ States shall have the flexibility to decide on the implementation mechanism to be followed.</li> <li>▶ States should also ensure that the quality of the toilet is maintained through sample physical verification through its teams.</li> <li>▶ Payment of incentives may also be in cash or in the form of construction materials or credit vouchers for such materials.</li> <li>▶ Gram Panchayats must ensure the availability of a pool of trained masons whose services can be utilized for the construction of toilets.</li> </ul>
	<p><b>Financial Assistance</b></p>
Rural Sanitary Marts (RSM) and Production Centers (PC)	<ul style="list-style-type: none"> <li>▶ Eligible households are to be provided with Rs. 12,000 financial incentives for IHHL construction and to provide for water availability and may also include storage for hand-washing and cleaning of the toilet. Central Share of this incentive for IHHLs from Swachh Bharat Mission (Gramin) shall be Rs.7,200 (60%) and the State share will be Rs.4,800 (40%). For special category states, the share shall be the centre (90%) and state (10%).</li> <li>▶ State Governments also have the flexibility to provide a higher incentive for a household toilet, for higher unit costs from sources other than SBM(G).</li> </ul>
	<p><b>Coverage</b></p> <p>In a few States, the penetration of sanitary materials in the market is still inadequate. In such cases, States can decide to utilize the provision of the Rural Sanitary Marts (RSM) and Production Centers (PC).</p> <p>DWSM/DWSC/GPs should have a Memorandum of Understanding (MoU) with the RSMs/PCs along with a system of joint monitoring evolved to ensure that the RSMs &amp; PCs are on track with production plans as per requirement.</p> <p>States may decide on the number of RSM/PCs to be set up as per requirement, ideally with one such unit per block. However large blocks having more than 10,000 population may have multiple RSM/PCs.</p>

Component Name	Description
	<p><b>Financial Assistance</b></p> <p>An interest-free loan up to Rs.5 lakh can be given out of the Revolving Fund available with the district in each case for establishing an RSM/PC.</p>
Community Sanitary Complexes (CSCs)	<p><b>Coverage</b></p> <p>Community sanitary complexes are to be constructed in public places where it is accessible and where there is a lack of land for the construction of IHHL.</p> <p>The State level Scheme Sanctioning Committee (SLSSC) approves the proposal to set up a CSC.</p> <p>Gram Panchayats to be responsible for O&amp;M.</p> <p>User families, in case of complexes specifically meant for households, may be asked to contribute a reasonable monthly user charge for cleaning &amp; maintenance.</p>
	<p><b>Financial Assistance</b></p> <p>The maximum support per unit prescribed for a Community Sanitary Complex is Rs.2 lakh. Sharing pattern among Central Government, State Government, and the Community shall be in the ratio of 60:30:10.</p>
	<p><b>Coverage</b></p> <p>SLWM includes systems for scientific disposal of waste so that the general quality of life in rural areas can be improved.</p>
	<p><b>Under SBM-G, Ministry targets to achieve:</b></p> <ul style="list-style-type: none"> <li>▶ Plastic unit per block (7000 total)</li> <li>▶ 1 FSM in each district</li> <li>▶ 750 Gobardhan projects</li> <li>▶ Compost pits and Soak pits in all villages</li> <li>▶ Waste settlement ponds</li> </ul>
Solid and Liquid Waste Management (SLWM)	

Source: SBM-G Guidelines and Ministry of Jal Shakti

Key stakeholders involved in implementing SBM are provided in Table 26.

**Table 26: Key stakeholders**

	SBM-G	SBM-U
<b>Policymaking</b>	<ul style="list-style-type: none"> <li>▶ Ministry of Jal Shakti</li> </ul>	<ul style="list-style-type: none"> <li>▶ Ministry of Housing and Urban Affairs (MoHUA)</li> <li>▶ National Advisory and Review Committee (NARC)</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>▶ National Mission Director and State Mission Directorate</li> <li>▶ State Water and Sanitation Mission (SWSM)</li> <li>▶ District Water and Sanitation Mission (DWSM)</li> <li>▶ Block Project Management Unit (BPMU)</li> <li>▶ Panchayati Raj institutions</li> <li>▶ CSOs, SHGs, and Volunteers (Swachhagrahis)</li> <li>▶ Sanitation Market players</li> <li>▶ Private sector CSR operations</li> <li>▶ Media agencies</li> <li>▶ Rural Sanitation Marts</li> </ul>	<ul style="list-style-type: none"> <li>▶ National Mission Director and State Mission Directorate</li> <li>▶ State High Powered Committee (SHPC)</li> <li>▶ Project Management Unit at the State Level</li> <li>▶ District Level Advisory and Monitoring Committee (DLAMC)</li> <li>▶ Urban Local Bodies (ULBs)</li> <li>▶ Ward Committees, Area Sabhas, Resident Welfare Associations, NGOs and Civil Society Groups</li> <li>▶ Sanitation Market players</li> <li>▶ Private sector CSR operations</li> <li>▶ Media agencies</li> </ul>
<b>Beneficiaries</b>	<ul style="list-style-type: none"> <li>▶ Households without toilets</li> <li>▶ Women</li> <li>▶ Person with Disabilities</li> <li>▶ Children</li> <li>▶ Masons</li> </ul>	<ul style="list-style-type: none"> <li>▶ Rag-pickers</li> <li>▶ Households without toilets</li> <li>▶ Person with Disabilities</li> <li>▶ Women</li> <li>▶ Children</li> <li>▶ Masons</li> </ul>
<b>Training and capacity building</b>	<ul style="list-style-type: none"> <li>▶ Key resource centers</li> </ul>	<ul style="list-style-type: none"> <li>▶ National Resource Centre (NRC)</li> <li>▶ Water and Sanitation Support Organization (WSSO)/ Communication and Capacity Development Unit (CCDU)</li> </ul>

	SBM-G	SBM-U
Review	<ul style="list-style-type: none"><li>▶ National Advisory and Review Committee (NARC)</li><li>▶ Resident Welfare Associations, NGOs and Civil Society Groups</li><li>▶ Development Partners</li><li>▶ Niti Aayog</li></ul>	<ul style="list-style-type: none"><li>▶ CSOs, SHGs, and Volunteers (Swachhagrahis)</li><li>▶ Development Partners</li><li>▶ Niti Aayog</li></ul>



# Appendix B. Evaluation matrix

**Table 27:** Evaluation matrix

S/N.	Evaluation Criteria	Key Indicators	Methodology	Data Sources
1.	<p>Effectiveness:</p> <p>To what extent did the SBM achieve its intended outcomes, including intermediate outcomes such as access and use of toilets, and final outcomes such as reaching open defecation free status?</p>	<ul style="list-style-type: none"> <li>▶ A number of households having access to toilets and using them.</li> <li>▶ Number of villages and ULBs self-declared and verified to be ODF, as per the SBM guidelines</li> </ul>	<ul style="list-style-type: none"> <li>▶ We collected data on access and use of toilets, a number of villages declared/verified (1st and 2nd) ODF from the MIS of Ministry of Jal Shakti and Ministry of Housing and Urban Affairs. Using the published data from govt. sources, we answer the effectiveness.</li> </ul>	<ul style="list-style-type: none"> <li>▶ MIS data from the Ministry of Jal Shakti and Ministry of Housing and Urban Affairs.</li> <li>▶ Data from surveys such as NARSS.</li> </ul>
2.	<p>Effectiveness:</p> <p>What were the major factors influencing the achievement of these outcomes?</p>	<p>Factors influencing the outcomes of SBM include:</p> <ul style="list-style-type: none"> <li>▶ Community participation</li> <li>▶ Capacity building</li> <li>▶ Behavioural change</li> <li>▶ Broad-based stakeholder engagement</li> </ul>	<ul style="list-style-type: none"> <li>▶ Economic Survey has captured certain success criteria. Also, we have done a literature review to find out what are the factors driving it.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Literature review</li> </ul>

S/N.	Evaluation Criteria	Key Indicators	Methodology	Data Sources
3.	<p>Effectiveness:</p> <p>To what extent did the results of the SBM succeed in addressing the gender and equity gaps in access to clean sanitation?</p>	<ul style="list-style-type: none"> <li>▶ The dignity of women and marginal groups</li> <li>▶ Improved safety for girls and women</li> </ul>	<ul style="list-style-type: none"> <li>▶ Under UNICEF 2017-18 Cost-Benefit study, as part of the household survey, the impact of access to household latrine on status and prestige of women among friends, guests, and visitors was assessed. Additionally, the survey also assessed the safety of household girls and women against voyeurism and harassment by males. We have leveraged the findings of this household survey. This is supplemented with the literature review.</li> </ul>	<ul style="list-style-type: none"> <li>▶ SBM-G Economics and Financial Benefits Assessment survey (2017-18)</li> <li>▶ Literature review</li> </ul>
4.	<p>Efficiency:</p> <p>What has been the total investment in the SBM, based on implementation costs?</p>	<ul style="list-style-type: none"> <li>▶ Budgeted expenditure vs actual spending</li> </ul>	<ul style="list-style-type: none"> <li>▶ This is based on total investments made under SBM and analysis on budget v/s actual spending.</li> </ul>	<ul style="list-style-type: none"> <li>▶ MIS data from the Ministry of Jal Shakti and Ministry of Housing and Urban Affairs.</li> <li>▶ Literature review</li> </ul>
5.	<p>Efficiency:</p> <p>To what extent has the SBM made efficient use of resources that have been invested?</p>	<ul style="list-style-type: none"> <li>▶ Budgeted expenditure vs actual spending</li> </ul>	<ul style="list-style-type: none"> <li>▶ This is based on total investments made under SBM and analysis on budget v/s actual spending.</li> </ul>	<ul style="list-style-type: none"> <li>▶ MIS data from the Ministry of Jal Shakti and Ministry of Housing and Urban Affairs.</li> <li>▶ Literature review</li> </ul>

S/N.	Evaluation Criteria	Key Indicators	Methodology	Data Sources
6.	Impact: What has been the economic and financial impact of the SBM at the national level, in terms of cost-benefit, in key domains?	<ul style="list-style-type: none"> <li>▶ Health benefit: Saved expenditure because of lowered disease prevalence (By wealth quintiles)</li> <li>▶ Health benefit: Value of saved lives due to lower mortality risk, with improved sanitation facilities (By wealth quintiles)</li> <li>▶ Value of time saved: Less time is lost to illness as the prevalence of sanitation-related diseases decreases. This saved time could be used for productive purposes (By wealth quintiles)</li> <li>▶ Value of access time saved: Having a toilet at home means that households save time traveling to a place for open defecation (By wealth quintiles)</li> <li>▶ Value generated through sanitation input and sanitation output market</li> </ul>	<ul style="list-style-type: none"> <li>▶ Health and time use benefits are estimated using the UNICEF, 2017 study. Revisions made to adjust for the period 2014-15 to 2018-19 have been described earlier in detail.</li> <li>▶ Sanitation input market impact is estimated using Input-Output Multipliers for year 2015-16.</li> <li>▶ Sanitation output market impact is estimated using output capacity of SWM infrastructure, as provided by the ministry.</li> </ul>	<ul style="list-style-type: none"> <li>▶ NARSS 2017-18 and 2018-19 survey</li> <li>▶ CPI, MOSPI</li> <li>▶ NFHS 2015-16</li> <li>▶ NSSO 71st Round</li> <li>▶ MIS data from Ministry of Jal Shakti and Ministry of Housing and Urban Affairs</li> </ul>

S/N.	Evaluation Criteria	Key Indicators	Methodology	Data Sources
7.	Impact: What has been the economic and financial impact of the SBM for specific sub-populations, including children, urban vs rural, different income quintiles?	<ul style="list-style-type: none"> <li>▶ Health benefit: Saved expenditure because of lowered disease prevalence (By wealth quintiles)</li> <li>▶ Health benefit: Value of saved lives due to lower mortality risk, with improved sanitation facilities (By wealth quintiles)</li> <li>▶ Value of time saved: Less time is lost to illness as prevalence of sanitation-related diseases decrease. This saved time could be used for productive purposes (By wealth quintiles)</li> <li>▶ Value of access time saved: Having a toilet at home means that households save time travelling to a place for open defecation (By wealth quintiles)</li> </ul>	<ul style="list-style-type: none"> <li>▶ Health and time use benefits are estimated using the UNICEF, 2017 study. Revisions made to adjust for the period 2014-15 to 2018-19 have been described earlier in detail.</li> </ul>	<ul style="list-style-type: none"> <li>▶ NARSS 2017-18 and 2018-19 survey</li> <li>▶ CPI, MOSPI</li> <li>▶ NFHS 2015-16</li> <li>▶ NSSO 71st Round</li> <li>▶ MIS data from Ministry of Jal Shakti and Ministry of Housing and Urban Affairs</li> </ul>
8.	Sustainability: Is the current and projected level of investment in WASH sustainable at the national level?		<ul style="list-style-type: none"> <li>▶ Based on discussions with Ministry of Jal Shakti and Ministry of Housing and Urban Affairs to understand projected level of investments and its financing.</li> </ul>	<ul style="list-style-type: none"> <li>▶ KIIs</li> </ul>
9.	Sustainability: In what ways and why might the sustainability of SBM results be threatened?		<ul style="list-style-type: none"> <li>▶ Assessment of assumptions stated in theory of change which may impact sustainability of results</li> </ul>	<ul style="list-style-type: none"> <li>▶ KIIs with state teams and literature review</li> </ul>

# Appendix C. List of meetings conducted

## Meetings with UNICEF and ERG

Agenda	Key Stakeholder	Date
Kick-off meeting	UNICEF	18 <sup>th</sup> July 2019
Project scoping, methodology, field visits	UNICEF	29 <sup>th</sup> July 2019
Evaluation objectives and expected outcomes	ERG	5 <sup>th</sup> August 2019
Evaluation objectives and expected outcomes following discussion with ERG	UNICEF	12 <sup>th</sup> August 2019
Availability of data for the evaluation	Ministry of Jal Shakti	16 <sup>th</sup> August 2019
Finalization of conceptual issues and methodological issues	UNICEF	20 <sup>th</sup> August 2019
Availability of data for the evaluation	Additional Mission Director, Ministry of Housing and Urban Affairs	27 <sup>th</sup> August 2019
Progress update meeting	UNICEF	2 <sup>nd</sup> September 2019
Scope and understanding of SBM Urban	Joint Secretary, SBM Urban; PMU, SBM Urban	3 <sup>rd</sup> September 2019
Progress update meeting	ERG	5 <sup>th</sup> September 2019

## Meetings for KIIs

State	Key stakeholder
Bihar	Mission director, SBM-G; State coordinator, SBM-G; IEC and State consultant, SBM-G
Bihar	Mission director, SBM-U; Team leader, SBM-U; SWM Expert and IEC Expert, SBM-U
Jharkhand	State coordinator and consultant, SBM-G;
Jharkhand	Consultant and Director, SBM-U
Maharashtra	Wash specialist, UNICEF; MD-SBM-G
Maharashtra	Principal secretary, SBM-U



# Appendix D. Literature review

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
1.	Health	Improved sanitation leads to reduction in diarrheal cases. Use of water filters and provision of high-quality piped water and sewer connections has greater impact in reduction of diarrhea	The study concludes that improvements in drinking water and sanitation were associated with decreased risks of diarrhea. Specific improvements, such as the use of water filters, provision of high-quality piped water and sewer connections, were associated with greater reductions in diarrhea (28 percent) compared to other interventions.	Systematic Review and meta-regression	2014	Global	Wolf et al. (2014)	Assessing the impact of drinking water and sanitation on diarrheal disease in low- and middle-income settings: systematic review and meta-regression
2.	Health	Improved sanitation reduces prevalence of childhood (0-5 years) mortality due to diarrhea	In 2016, nearly 5.3 percent death of children under 5 years could have been prevented, which was due to diarrhea attributable to lack of sanitation facilities.	Estimation of burden of disease attributable to inadequate WASH in low and medium-income countries using a theoretical counterfactual	2019	Global	Prüss-Üstun et al (2019)	Burden of disease from inadequate water, sanitation, and hygiene for selected adverse health outcomes: An updated analysis with a focus on low and middle-income countries

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
3.	Environment	Investment by government and households have led to an increase in toilet coverage	Nearly 71 percent of the household surveyed owns land and the increase in coverage is resulting from the introduction of Swachh Bharat Mission (SBM).	Explorative data analysis	2019	Bihar, Madhya Pradesh, Rajasthan, and Uttar Pradesh (India)	Gupta et. al. 2019	Changes in Open Defecation in Rural North India: 2014-2018
4.	Health	Estimates for infectious disease mortality in Indian children aged 5 to 14 years.	Approximately 60% of all deaths in the 5-14 age group are due to infectious diseases mostly from diarrhea and pneumonia.	Verbal autopsy based assessment of 3855 deaths of children, aged 5 to 14 years from a nationally representative survey of deaths occurring in 2001-03	2011	India	Morris et (2011)	Diarrhea, pneumonia, and infectious disease mortality in children aged 5 to 14 years in India.
5.	Health	The study examines major health, water, environmental, tourism and other welfare impacts associated with poor sanitation in Cambodia, Indonesia, the Philippines, and Vietnam.	Poor sanitation led to a loss of US \$9 billion per year (based on 2005 prices) in Cambodia, Indonesia, Philippines, and Vietnam. This was approximately 2% of their combined GDP.	Attributable fractions (AF) of mortality and morbidity	2008	Cambodia, Indonesia, Philippines, and Vietnam	World Bank (2008)	Economic Impacts of Sanitation in Southeast Asia: A four-country study conducted in Cambodia, Indonesia, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI)

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
6.	Health	Impact of open defecation elimination programme on diarrhoea prevalence among children in Kenya	Using Mann-Whitney U Test, the author finds statistically significant differences in prevalence of diarrhoea in ODF sub-counties relative to other sub-counties. The two sub-counties declared to be ODF experienced 20% and 40% decline in prevalence of diarrhoea.	Mann-Whitney U Test	2016	Kenya	Njuguna, J. (2016). BMC public health, 16(1), 712	Effect of eliminating open defecation on diarrhoeal morbidity: an ecological study of Nando and Nambale sub-counties, Kenya
7.	Health	Whether increased toilet coverage leads to reduction in diarrhoea prevalence among children	Increased toilet coverage is generally believed to be effective in reducing exposure to faecal-oral pathogens and preventing diseases. However, the study fails to establish this association. Therefore, sanitation improvement programmes should not target coverage, rather should target reducing exposure and help in gaining health outcomes.	RCT	2016	Odisha (India)	Clasen et. al (2016)	Effectiveness of a rural sanitation programme on diarrhoea, soil-transmitted helminth infection, and malnutrition in India

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
8.	Environment	Poorly managed sanitation affect the welfare of the households as well as the neighborhood	Household sanitation provision along with neighborhood sanitation through public sanitation infrastructure and community-wide sanitation adoption is advisable for effective reduction of diarrheal disease burden.	Systematic Review	2017	Global	Jung et al (2017)	Effects of neighborhood and household sanitation conditions on diarrhea morbidity: Systematic review and meta-analysis
9.	Health	The study focuses on estimation of disease burden from water, sanitation, and hygiene at the global level taking into account various disease outcomes, principally diarrheal diseases.	The study estimated that the disease burden from water, sanitation, and hygiene is 4.0% of all deaths and 5.7% of the total disease burden (in DALYs) occurring worldwide, taking into account diarrheal diseases, schistosomiasis, trachoma, ascariasis, trichiasis, and hookworm disease.	The study estimation is based on the Global Water Supply and Sanitation Assessment 2000 report, Global Health Statistics, and WHO 2000 report	2002	Global	Prüss et. al (2002)	Estimating the burden of disease from water, sanitation, and hygiene at a global level

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
10.	Economic Impact	The aim of the study was to estimate the economic costs and benefits of a range of selected interventions to improve water and sanitation services	A US\$1 investment on sanitation will yield a return of US\$5- US\$28. The main contributor of benefit is the gain in productive time due to less treatment of diarrheal diseases.	Cost-benefit analysis	2004	Global	Hutton and Haller (2004)	Evaluation of the Costs and Benefits of Water and Sanitation Improvements at the Global Level
11.	Health	Assess the association of neighbourhood sanitation coverage on diarrheal morbidity of children under five years of age	A significant association between neighborhood-level coverage of improved household sanitation and diarrheal morbidity	logistic regression analysis	2017	Sub-Saharan Africa and South Asia	Jung, Lou, Cheng (2017)	Exposure-response relationship of neighborhood sanitation and children's diarrhea
12.	Sanitation Input Market	Increase investment in Sanitation has resulted in GDP growth	When 100 percent of households in a community use a toilet the benefits (financial savings, time saved, health) exceed costs (financial cost, time use for cleaning) by 4.3 times	Cost-benefit analysis	2017	India	UNICEF (2017)	Financial and Economic Impacts of the Swachh Bharat Mission

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
13.	Sanitation Input Market	Whether sanitation financing leads to significant social and economic benefits for financial institutions, helps government leverage private sector funds and eventually allows households to easily access sanitation facilities	Sanitation financing breaks down barriers and allows poor households get access to improved sanitation facilities. The Water Credit portfolio analysis shows that around 15% of loans from WWater.org's financial institution partners go to the very poor borrowers. Approximately 80% of clients are living in household earning less than US\$2 per day. The borrowers also demonstrated the ability to repay.	Using Market Estimates	2015	India	World Bank (2015)	Financing Sanitation for the Poor: Household-level financing to address the sanitary gap in India
14.	Economic Impact	Study aims to estimate the economic benefits and costs of interventions to improve access to water supply and sanitation facilities	An investments of US\$1 spent on water supply and sanitation services could lead to an economic return of between US\$5 and US\$46, with the highest returns in the least-developed areas	Cost-benefit analysis	2007	Global	Hutton, Haller, and Bartram (2007)	Global cost-benefit analysis of water supply and sanitation interventions

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
15.	Economic Impact	The study aim is to estimate global and regional costs and benefits of sanitation and drinking-water supply intervention	The benefit-cost ratio were 5.5 for sanitation, 2.0 for water supply and 4.3 for combined sanitation and water supply. Globally, the costs of universal access amount were US\$35 billion per year for sanitation and US\$17.5 billion for drinking-water, over the 5-year period 2010-2015 (billion defined as 10(9) here and throughout).	Cost-benefit analysis	2013	Global	Hutton 2013	Global costs and benefits of reaching universal coverage of sanitation and drinking-water supply
16.	Economic Impact	To estimate the health costs and benefits of National Rural Drinking Water Security Pilot Project in India between 2012 and 2015	The study shows reduction in cases of diarrhoea, malnutrition, malaria, and dengue in intervention villages overtime while deterioration in cases of helminths, ALRI, scabies in the age group of 0-5 years.	The programme targeted around 2.23 million people located in 15 blocks covering ten states of India. The study covered six villages each in Karnataka and Uttar Pradesh. These six villages were separated into two groups (intervention and control) of three villages each. The control group received limited intervention. The intervention included community-led total sanitation including financial assistance.			Weis, D., Hutton, G., & Kumar, M. (2018). Journal of Water, Sanitation and Hygiene for Development, 9(1), 129-138.	Health costs and benefits from a pilot rural sanitation intervention in India.

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
17.	Health	Improved sanitation reduces prevalence of childhood (0-5 years) morbidity due to diarrhea	Sanitation interventions reduced diarrheal morbidity by 25 percent with evidence for greater reductions when high sanitation coverage is reached.	Systematic Review	2018	Global	Wolf et al (2018)	Impact of drinking water, sanitation and handwashing with soap on childhood diarrheal disease: updated meta-analysis and meta-regression
18.	Health	Improved sanitation reduces prevalence of diarrheal mortality among adults	Unsafe water and sanitation contributes 5% of the total disease burden, mainly through diarrheal diseases and other infections in 2016.	Explorative data analysis	2017	India	ICMR, PHFI, and IHME (2017)	India: Health of the Nation's States-The India State-Level Disease Burden Initiative
19.	Health	The study aims to estimate the association between the prevalence of open defecation and stunting after adjustment for potential confounding factors	A 10 percent increase in open defecation was associated with a 0.7 percentage point increase in both stunting and severe child stunting.	Ecological regression analysis and Monte Carlo simulation	2013	India	Spears, Ghosh, and Cumming (2013)	Open Defecation and Childhood Stunting in India: An Ecological Analysis of New Data from 112 Districts

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
20.	Health	The study aims to estimate the benefits of access to sanitation infrastructure on early childhood health	There is a 47 percent reduction in the cases of diarrhea among children living in a village with complete sanitation coverage.	PSM using cross-sectional data	2011	India	Andres et al (2011)	Sanitation and Externalities: Evidence from Early Childhood Health in Rural India
21.	Economic Impact	The study aims to estimate the economic impact from improvement in sanitation facilities	One dollar spent on sanitation could generate about ten dollars' worth of economic benefit, mainly by productive work time gained from not being unwell.	Cost-benefit analysis	2010	Global	Mara et al (2010)	Sanitation and Health
22.	Economic Impact	The study aims to estimate the economic impact of poor sanitation and the costs and benefits of improved sanitation facilities	This study estimates that the total annual economic impact of inadequate sanitation in India amounted to a loss of INR 2.4 trillion (US\$53.8 billion ) in 2006. The above impact was equivalent to 6.4 percent of India's GDP in 2006	Explorative Data Analysis	2011	India	World Bank (2011)	The Economic impacts of Inadequate Sanitation in India

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
23.	Economic Impact	Using Shared toilets or open defecation are time-consuming (waiting and travel time)	The study estimated that 78.6 billion hours were spent accessing open-defecation sites and shared toilets in 2006 in India. The economic cost of this lost access time is estimated at rupees 477.5 billion (\$10.5 billion).	Assumption based impact calculation	2011	India	World Bank (2011)	The Economic impacts of Inadequate Sanitation in India
24.	Sanitation market	The study examines major health, water, environmental, tourism and other welfare impacts associated with poor sanitation in Cambodia, Indonesia, the Philippines, and Vietnam.	The reuse of human excreta would lead to an estimated US\$271 million economic gain. This estimate is based on relatively conservative assumptions about the numbers of households adopting 'ecological sanitation' (Ecosan) solutions.	Using Market Estimates	2008	Cambodia, Indonesia, the Philippines, and Vietnam	World Bank (2008)	The economic impacts of sanitation in Southeast Asia: A four-country study conducted in Cambodia, Indonesia, the Philippines and Vietnam under the Economics of Sanitation Initiative (ESI)
25.	Health	The study aims to assertion impact of sanitation on diarrhea, soil-transmitted helminth (STH) infections, trachoma, and schistosomiasis.	There is a positive impact of sanitation on health outcomes.	Systematic Review and meta-analysis	2017	Global	Freeman et al (2017)	The impact of sanitation on infectious disease and nutritional status: A systematic review and meta-analysis

S. No.	Impact Area	Hypotheses	Evidence	Methodology	Year	Study Area	Reference	Title
26.	Sanitation Output Market	Improved sanitation will help in better business opportunity/ opening up of new markets	The study estimates that the business opportunity for sanitation economy in India is worth US\$32 billion in 2017 and could double to US\$62 billion by 2021	Using Market Estimates	2017	India	The toilet board coalition (2017)	The Sanitation Economy in India
	Social	Lack of sanitation causes negative effect on dignity and security of women	The study points out that lack of privacy or resources for menstruation and urination activities are the main concerns of women, particularly for unmarried and recently married women. These experiences cause stress and assaults to dignity and status due to public exposure.	Questionnaire-based observational study	2017	Odisha (India)	Caruso et al. 2017	Understanding and defining sanitation insecurity: women's gendered experiences of urination, defecation and menstruation in rural Odisha, India
	Health and Time use	Access to proper sanitation leads to more productive activities and better wage	A 10 percentage point decrease in open defecation translates into an approximately 2–3 percent increase in wages.	Explorative data analysis	2016	India	Lawson and Spears (2016)	What doesn't kill you makes you poorer: Adult wages and early-life mortality in India

## Appendix E. List of persons interviewed

SN	State	Designation/Organization	Interview Status
1	Bihar	UD&HD, GoB cum Mission Director, SBM-U	Completed
2	Bihar	UD&HD, GoB (SBM-U)	Completed
3	Bihar	Team Leader, SPMU (SBM-U)	Completed
4	Bihar	SWM Expert, SPMU (SBM-U)	Completed
5	Bihar	IEC Expert, SPMU (SBM-U)	Completed
6	Bihar	Mission Director, LSBA (SBM-G)	Completed
7	Bihar	State Coordinator (SBM-G)	Completed
8	Bihar	State Consultant, SWM (SBM-G)	Completed
9	Bihar	State Consultant, IEC (SBM-G)	Completed
10	Bihar	State Consultant, IEC (SBM-G)	Completed
11	Bihar	State WASH Officer, UNICEF	Completed
12	Jharkhand	Consultant, SBM-U	Completed
13	Jharkhand	Director, SBM-U	Completed
14	Jharkhand	HRD Consultant, SBM-G	Completed
15	Jharkhand	IEC Consultant, SBM-G	Completed
16	Jharkhand	Director, SBM-G	Completed
17	Jharkhand	Deputy Director, SBM-G	Completed
18	Jharkhand	Wash Specialist, UNICEF	Completed
19	Maharashtra	MD – SBM-G	Completed
20	Maharashtra	SBM-G IEC Team (Deputy CEO, Nagpur)	Completed
21	Maharashtra	SBM-G DC, Nagpur	Completed
22	Maharashtra	Principal Secretary – UDD Maharashtra – (as well as her technical team)	Completed

# Appendix F. List of documents referred

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# Appendix G. Interview checklists

The following procedures and steps were taken before commencing any KII:

- ▶ Ethical procedures were employed, including ensuring that the interviewers have basic ethics training.
- ▶ Purpose of the interview was explained to the interviewee before commencement
- ▶ Consent was obtained from the interviewees beforehand. Participant participation was kept purely voluntary
- ▶ The interviewee could withdraw in between the interview or need not answer all questions
- ▶ Interviewee name is kept completely confidential and transcript does not contain any information that would personally identify the interviewee
- ▶ Different stakeholders have been interviewed including mission directors, technical consultants, PMUs and IEC consultants to get comprehensive understanding of SBM at the state level
- ▶ The responses from the KIIs will be anonymized and the names of the interviewees would not be shared or made public unless requested by the interviewee.



# Appendix H. Study tools

## Literature Review

Literature review and desk research were used to answer questions under the criteria of, 'Effectiveness', 'Efficiency', and 'Sustainability'. Desk review involved review of relevant literature from established sources such as SBM programme guidelines, PubMed, Science Direct, systematic reviews from Campbell Collaboration, Cochrane Library, WHO research, World Bank, UNICEF, DFID R4D, 3IE, Lancet. Responses collected from KIIs were used wherever there is lack of literature on these criteria.

## Secondary Data Analysis

The following data has been collected through secondary sources for the impact model:

Sub-Study	Data Requirement	Data sources	Reliability
Health	Adjustments for medical treatment costs: SBM-G	CPI-Healthcare (Rural)	Government publication
	Adjustments for treatment costs rural vis-a-vis urban	NSSO 71st round	Government publication
	Ratio of improved sanitation	NARSS for rural and JMP for urban	NARSS: Third-Party Independent Survey  JMP: Based on various government publications/ independent surveys
	Diarrhea prevalence rate	Using the paper, Andres LA, Briceño B, Chase C, Echenique JA (2011), 'Sanitation and externalities: evidence from early childhood health in rural India', and ratio of improved sanitation, we would estimate prevalence rate.	World Bank research paper

Sub-Study	Data Requirement	Data sources	Reliability
	Percentage cases seeking treatment	NFHS 2015-16	Government publication
	Value of Statistical Life (VoSL)	Majumder & Madheswaran, 2018; Value of statistical life in India: A Hedonic Wage Approach; The Institute for Social and Economic Change, Bangalore	Published in Institute for Social and Economic Change Journal
	Household composition	NSSO 71st round, NFHS 2015-16	Government publication
Time use	Value of treatment time saved: SBM-G	CPI-Healthcare (Rural)	Government publication
	Value of treatment time saved rural vis-à-vis urban	NSSO 71st round	Government publication
	Number of household members (chief wage earners, primary caregivers, etc.)	NFHS 2015-16	Government publication
Property Value	Property value: Rural vis-à-vis urban	Published survey data	IEC 360o Survey
	Adjustments to property value: SBM-U	House Price Index (RBI)	RBI publication
	Toilet construction by type	<ul style="list-style-type: none"> <li>▶ NARSS</li> <li>▶ Ministry of Drinking water and sanitation</li> <li>▶ Ministry of Urban Development</li> </ul>	NARSS: Third-Party Independent Survey Government publication

Sub-Study	Data Requirement	Data sources	Reliability
Sanitation input market	Toilets constructed in schools	Swachh Bharat Swachh Vidyalaya reports	Government publication
	Drainage systems	NARSS, MNREGA and ODF-S portal	Government publication
	Input mix and prices	Technical specifications report by UNICEF and ministry	Government publication
Sanitation output market	Infrastructure in terms of SLWM, FSTPs, GOBAR-DHAN projects, compost pits, FSM	<ul style="list-style-type: none"> <li>▶ Ministry of Jal Shakti</li> <li>▶ Ministry of Urban Development</li> </ul>	Government publication
Social outcomes		Available literature and KIs on social benefits with access to IHHL	Reputed Journals and KIIs



# Appendix I. Assumptions and limitations

Under the model, followings assumptions have been made:

1. Key dates and timelines for the prospective and retrospective modelling have been provided in the table below:

Retrospective Modelling		
Sub-study	Timeframe for analysis	Key caveats
Health and Time use	Till 2018-19	Includes data till March 2019
Sanitation input market	Till 2018-19	Includes data till March 2019
Sanitation output market	Till 2018-19	Includes data till March 2019
Property value	Till 2018-19	Includes data till March 2019
Prospective modelling		
Sub-study	Timeframe for analysis	Key caveats
Health and Time use	2019-20 to 2023-24	Includes impact from March 2019 till 2023-24
Sanitation input market	2019-20 to 2023-24	Rural areas (till October 2019 and till 2023-24); Urban areas (till July 31st and till 2023-24)
Sanitation output market	2019-20 to 2023-24	Includes data from March 2019 till 2023-24
Property value	2019-20	Includes data till 2019-20

2. In the table below, depending on data availability, we have highlighted what all economic impacts (both from input side and output side) in case of solid and liquid waste management have been modelled.

2014-15 to 2019-20		2023-24 Projections			
Sanitation Input	Rural	Urban	Sanitation Input	Rural	Urban
SWM	Yes	Yes	SWM	Yes	Yes
FSTP	No	No	FSTP	No	No
STP	No	No	STP	No	Yes
Sanitation Output	Rural	Urban	Sanitation Output	Rural	Urban
SWM	No	Yes	SWM	No	Yes
FSTP	No	No	FSTP	No	No
STP	No	No	STP	No	No

- It is assumed that 50% of construction and demolition (C&D) waste intake can be treated.
- It is assumed that C&D waste recycling plants produce nine products in equal proportion. Similar principles have been applied in case of material recovery facilities which produces 15 types of products.
- Year-wise production of SWM infrastructure during 2014-15 to 2019-20 is not available. In the model, output has been equally distributed across the SBM period.
- Date of commencement of SWM infrastructure is not available. We have captured the project cost of all temporary non-functional and operational plants in estimation of sanitation input market impact.
- Input mix is available for twin-pit latrine only. Similar input mix has been applied to single pit and septic tank toilets.
- Cost of construction of each of toilet is taken as average spending on IHHL as reported in UNICEF cost-benefit study (2017). Based on our field interactions, cost of IHHL varies from Rs. 14,131 in Jharkhand, Rs. 12,593 in Maharashtra, Rs. 12,000 in Bihar.
- IEC expenditure has been taken as given in report in BMGF study June 2019. It has been proportionally distributed across years based on distribution of IEC expenditure reported in SBM-G MIS.
- In case input mix is not available, construction multiplier has been applied to estimate economy-wide impact. Input-Output Multiplier of 2015-16 has been used for the analysis.
- In case of rural areas, percentage of households using improved sanitation facilities for 2013-14, 2017-18, 2018-19 are sourced from UNICEF-WHO Joint Monitoring Programme database,

NARSS 2017-18 and NARSS 2018-19 respectively. Estimates for usage in the interim years, i.e. 2014-15, 2015-16, and 2016-17 are estimated using progress in toilet construction.

12. In case of urban areas, percentage of households using improved sanitation facilities for the period 2014-15, 2015-16, 2016-17, 2017-18 are sourced from UNICEF-WHO Joint Monitoring Programme database. Estimates for percentage of households using improved sanitation facilities in 2018-19 in urban areas are considered to be same as the percentage of ULBs certified to be ODF. It should be noted that SBM-U only covers areas under the jurisdiction of ULBs. Other areas such as census towns, outgrowth areas are not covered. This is a potential limitation.
13. GDP and GVA for 2023-24 have been sourced from the IMF.
14. USD conversion is made at 02-January-2020 exchange rate of Rs. 71.3429 to 1 USD.



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