

Sanitation, Health, and Economic Gains: Assessing Impact of Swachh Bharat Mission (Gramin) in Tribal Jharkhand

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Abstract

This study assesses the economic impact of the Swachh Bharat Mission (Gramin) in the tribal areas of Jharkhand, with special reference to Khunti district. The analysis is based on primary data collected through a household questionnaire survey conducted in 12 villages across four blocks of the district. Based on both literature review and field evidence, the study identifies the major cost and benefit components associated with improved sanitation under SBM(G).

On the cost side, the study examines two tangible components, namely the initial cost of toilet construction and the recurring operation and maintenance costs, including expenditure on handwashing and cleaning. On the benefit side, the study identifies three tangible benefits, namely averted health expenditure, increased property value, and income generated for sanitation and construction workers, along with one intangible benefit, which is reduced access time. The data are analysed using the Benefit Cost Ratio method to evaluate the overall economic viability of the programme.

The findings shows that the benefits of improved sanitation exceed the associated costs by 5.65 times, indicating a strong positive economic return from SBM(G) in the study area. The programme has not only reduced medical expenditure and improved the health status of tribal households, but has also contributed to greater dignity and better living standards. The study therefore concludes that investment in rural sanitation generates substantial economic and social gains and that SBM(G) has a significant positive impact in the tribal areas of Jharkhand.

Keywords: Benefit, Cost, Health, Tribal, Swachh Bharat Mission

Introduction

Sanitation is an important component of human development because it directly affects health, productivity, dignity, household expenditure, environmental quality and overall quality of life. Inadequate sanitation increases the risk of fecal contamination in household, thereby raising the risk of diarrheal diseases and other infections. The consequences extend beyond direct health effects and include medical expenditure, loss of productive time, reduced labour productivity and dignity, inconvenience, and environmental degradation. The World Health Organization recognises sanitation as an important determinant of health and human well-being, with benefits extending to disease prevention, nutrition, dignity and women's safety. Therefore, therefore, sanitation should not be viewed merely as a household infrastructure issue but as an investment capable of generating economic and social returns.

In India, sanitation has historically remained a major development challenge, particularly in rural areas. Although economic growth and improvements in living standards have enabled better access to basic

services, sanitation-related behaviours have been influenced by economic, social, cultural, and infrastructural factors. Research on rural India has shown that open defecation cannot be explained simply by income or poverty; social norms, perceptions regarding purity and pollution, household characteristics and the physical design of sanitation facilities have also played important roles (Coffey et al., 2017; Vyas & Spears, 2018).

Against this background, the Government of India launched the Swachh Bharat Mission (SBM) in October 2014 with the objective of accelerating sanitation coverage, eliminating open defecation and encouraging behavioural change. In the rural areas- under Swachh Bharat Mission (Gramin) [SBM (G)] emphasis was placed on constructing household toilets, bringing about behavioural change, ensuring community participation, subsequently sustaining Open Defecation Free (ODF) status, and improving solid and liquid waste management. This program brought about a significant shift in the scale of government investment in the sanitation sector. Its importance is not limited merely to the construction of household toilets but also extends to the potential economic and social benefits resulting from improved sanitation.

The economic rationale for sanitation investment is particularly important in rural and tribal regions. Actually, the economic rationale for investing in sanitation is that improved sanitation can yield benefits far greater than the immediate value of the toilet facilities themselves. Improved sanitation can reduce illness and associated medical expenditure, reduce the time required to access sanitation facilities outside the home, increase household convenience and privacy, improve property value and create local employment during toilet construction and maintenance. Additionally, it also provides dignity, privacy and safety, which are difficult to express in monetary terms but nevertheless constitute important welfare gains. The economic significance of sanitation in India has been demonstrated in several studies. Hutton et al. (2020), estimated that the societal benefit-cost ratio of sanitation investment under SBM was positive even under partial open-defecation-free conditions, with higher returns under full sanitation coverage. Similarly, UNICEF's (2018) national economic assessment identified health, time, property-value and intangible welfare benefits associated with household sanitation.

However, national-level estimations do not reflect the actual economic experience of tribal households. Tribal communities often live in geographically and economically distinct environments, where they experience geographical, infrastructural and socioeconomic constraints. Consequently, their access to public services, health services, markets, water and sanitation infrastructure differs significantly from national averages. Jharkhand is particularly relevant in this context because a substantial proportion of its population belongs to Scheduled Tribes and many rural households depend on natural resources and agriculture for their livelihoods.

Despite the growing literature on sanitation in India, relatively limited research has examined the economic return of improved sanitation specifically among tribal households in Jharkhand using household-level primary data. The present study addresses this gap by examining the costs and benefits of improved sanitation in selected tribal villages of Khunti district.

Khunti district provides an important setting for examining the economic implications of sanitation improvement among tribal households. The district has a predominantly rural character (91.5% population are rural population) and contains a substantial tribal population (71.61%). The present study to move beyond a simple assessment of toilet coverage and examines whether the economic benefits associated with improved sanitation outweigh the costs borne by households.

The study estimates the economic viability of SBM(G) using a Benefit-Cost Ratio (BCR) framework. It considers two major categories of costs i.e., *initial toilet construction and recurring operation and maintenance* and five major benefit components, comprising three tangible benefits and one intangible benefit identified through the field study. By focusing on household-level economic consequences in tribal

areas, the study contributes to the literature on the economic evaluation of rural sanitation programmes in India.

Relevance of the Study

The study is particularly important because sanitation investments in tribal areas may generate benefits that are not fully captured through conventional infrastructure indicators such as the number of toilets constructed. Health expenditure savings, time savings, changes in property value, employment generation and improvements in dignity are all relevant to assessing the broader impact of sanitation.

Literature Review

The review of literature is a basic pillar of any research work. In this section the study has been done a literature review on economic benefits of SBM.

Novotny et al. (2024) examined the implementation and outcomes of SBM in rural Ranchi district, Jharkhand. Their study found a substantial increase in toilet coverage and a decline in open defecation. However, the authors also identified continuing challenges in sanitation and hygiene knowledge. This study provides direct evidence that the impact of SBM in Jharkhand involves both infrastructure expansion and behavioural transformation.

A major contribution to the economic literature on SBM was made by Hutton et al. (2020). Their cost-benefit analysis considered household financial costs, government expenditure, medical costs avoided, mortality benefits, productive time savings and property-value gains. The study estimated positive economic returns from sanitation investment and demonstrated that benefits were particularly substantial when sanitation coverage and use were high.

Nair et al. (2025) examined public expenditure and sanitation amenities using state-level panel data. Their findings indicate that public expenditure associated with SBM contributed to improvements in household latrine coverage and created a more supportive sanitation environment.

Chakrabarti et al. (2024) examined district-level data covering 35 states and 640 districts over 2011–2020 and found an inverse association between SBM toilet construction and infant and under-five mortality. Their findings provide recent evidence of the potential population-health effects of large-scale sanitation investments.

Pattanayak et al. (2010) examined the economic benefits of water and sanitation interventions in rural India. Their analysis considered medical expenses, lost income, caregiving costs, time costs and other household coping expenditures. The study demonstrated that environmental health interventions can generate substantial household-level economic savings.

UNICEF (2018) similarly examined the financial and economic impacts of SBM. The assessment identified several benefits of household toilets, including reductions in health expenditure, savings in time, increased property value and intangible gains associated with convenience, privacy, safety and status. Importantly, the report estimated that respondents perceived an increase in the value of properties associated with having a toilet.

The present study builds upon this UNICEF literature by applying a similar economic framework at a smaller geographical scale and focusing specifically on tribal households in Khunti district.

Research Gap

The literature demonstrates that sanitation produces health, economic, environmental and social benefits. However, three gaps remain.

1. Most of the literature evaluates economic impact of SBM at the national or multi-state level.
2. There are very few studies which has been specially focused on tribal household of Jharkhand.

3. Existing literatures emphasise sanitation coverage and health outcomes, while household-level economic components are not always examined together

Against the above drawback, the present study attempts to address these gaps through primary household-level evidence from 12 villages in four blocks of Khunti district.

Objective of the Study

The core objective of the study is to assess the economic impact of improved sanitation under the Swachh Bharat Mission (Gramin) in tribal household of Khunti district, Jharkhand. To fulfil this particular objective the other objectives are as follows:

1. To identify the major costs associated with improved sanitation under SBM(G) among tribal households in Khunti district.
2. To identify and assess the tangible and intangible benefits associated with improved sanitation.
3. To estimate the Benefit-Cost Ratio (BCR) of improved sanitation among the surveyed households.
4. To examine the contribution of improved sanitation to household health, economic welfare and living conditions.
5. To suggest measures for improving the sustainability and economic effectiveness of rural sanitation interventions in tribal areas.

Research Methodology

Study Area

The study was conducted in Khunti district of Jharkhand. Khunti is predominantly rural and has a substantial tribal population. The district provides an appropriate setting for examining sanitation interventions because it has been declared an Open Defecation Free in 15th November 2018 (PIB). Hence the study is an attempt to check the ground level reality.

Here it should be noted that the study focuses specifically on villages covered by the household survey and does not attempt to generalise the findings to all households in the district Jharkhand.

Research design

The study used a descriptive and economic evaluation approach. Primary household-level data were collected through a structured questionnaire covering all the objectives of the study.

Sampling and Data Collection

The study used both primary and secondary data. Secondary data were obtained from reports of Government, UNICEF, WHO, research articles, etc. the primary data were through a structured household questionnaire administered in the selected villages. 12 villages across four blocks of Khunti district were randomly selected.

Identification of Variables

On the basis of previous studies and field survey, the present study has been identified toilet construction cost and operation and maintenance cost as the cost-side variable, while income generation for construction worker, reduction in medical expenditure, time savings and increase in property value are considered benefit-side variables.

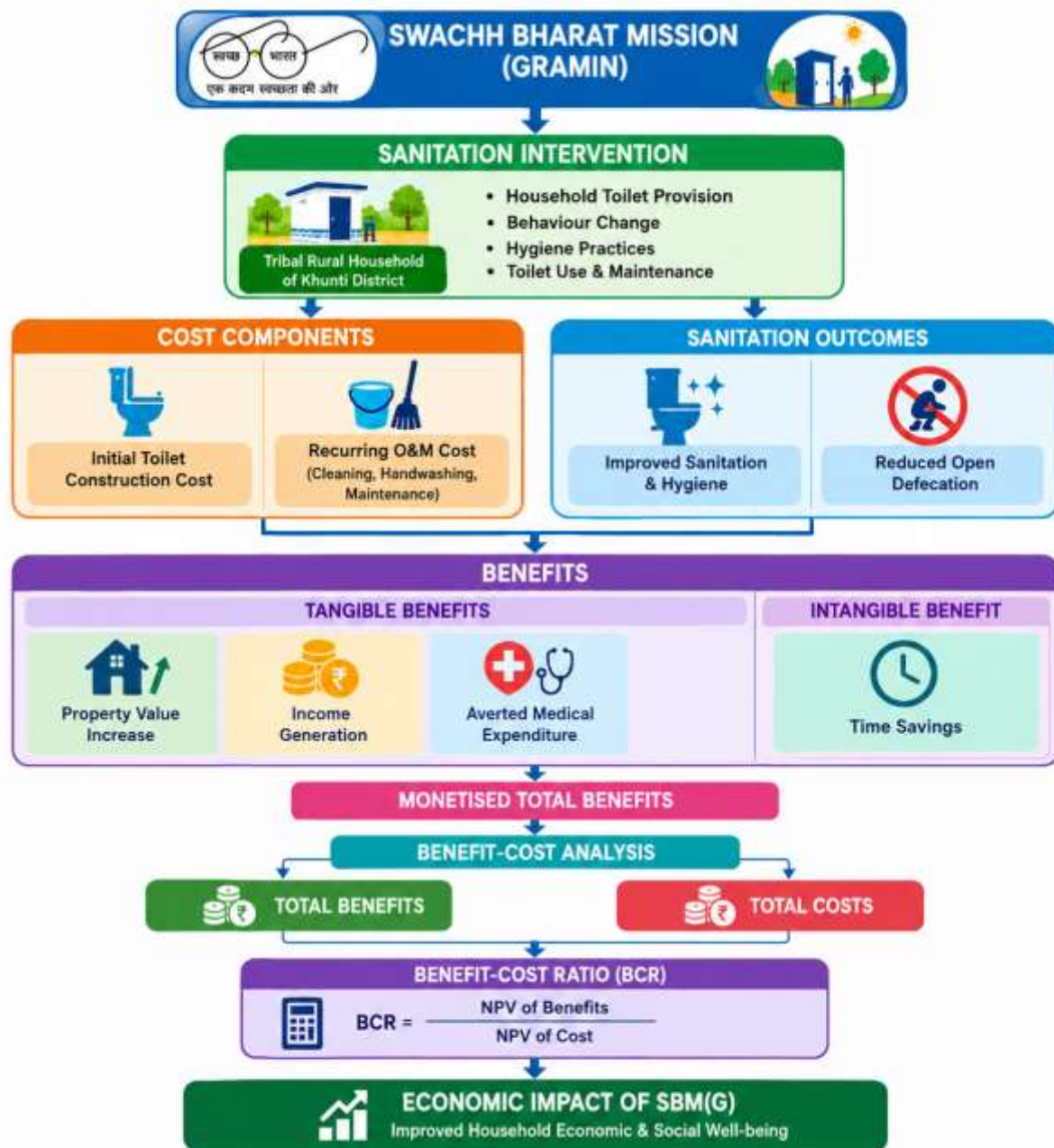
Data Analysis

After collection of data the study evaluate the economic impact of SBM(G) by using the Benefit-Cost Ratio (BCR).

Conceptual Framework of the Study

The conceptual framework for the study was prepared on the basis of the objectives and analysis framework used i.e, Benefit-Cost Analysis. The conceptual framework of the study present below:

Figure:1 Conceptual Framework for Assessing the Economic Impact of SBM(G) in Tribal Rural Households of Khunti District



Source: Author's own conceptualization

Result and Discussion

To assess the benefit-cost ratio, the variables were identified into two categories: Cost and Benefits.

Cost components for improved sanitation

The field survey identifies two major cost components: Toilet construction cost and operation and maintenance cost (O&M cost).

Toilet Construction Cost: The construction cost includes expenditure incurred for construction of the toilet. It consists of expenditure on construction materials, labour pit construction, superstructure, water-related arrangements and other associated expenses.

Operation and Maintenance Cost: The second cost component consists of expenditure which is required to maintain sanitation facilities functional. It includes cleaning material, water used for cleaning, handwashing expenditure, and routine maintenance.

$$\text{Total Cost} = \text{Toilet Construction Cost} + \text{Operation \& Maintenance Cost}$$

Benefits drawing from improved sanitation: The study categorizes the benefits into two categories: tangible and intangible benefits.

1. **Tangible benefits:** Tangible benefits consist of those benefits which can be observed physically.
 - a. **Averted health expenditure:** The value of averted health expenditure was estimated as the difference between health expenditure under the earlier sanitation conditions and expenditure after sanitation improvement, based on household responses.
 - b. **Increase in property value:** This variable is based on previous economic evaluations of SBM, which have included property-value appreciation as an economic benefit of sanitation.
 - c. **Income generated for sanitation and construction workers:** Construction of sanitation facilities creates demand for labour and related services. Income generated for sanitation workers, masons and construction workers is therefore considered as an economic benefit associated with the sanitation programme.
2. **Intangible Benefits:**
 - a. **Reduced access time:** the value of time spend was measured by Households with toilets located within or close to the home can save time that would otherwise be spent travelling to outdoor defecation locations.

$$\text{Value of Time Saved} = \text{Time Saved} \times \text{Labur per hour}$$

Therefore, the benefit structure can be expressed as follows:

$$\text{Total Benefit} = \text{Tangible Benefit} + \text{Intengible Benefit}$$

Or,

$$\begin{aligned} \text{Total Benefit} &= (\text{Averted health expenditure} + \text{Increase in property value} \\ &+ \text{Income generated for sanitation and construction workers}) + (\text{Time Save}) \end{aligned}$$

Table:1 Cost and Benefit Components

Category	Variables	Nature
Cost	Toilet construction	Tangible
	Operation and maintenance	Tangible
	Handwashing and cleaning expenditure	Tangible/recurring
Benefit	Averted health expenditure	Tangible
	Increase in property value	Tangible
	Income generated for sanitation/construction workers	Tangible
	Reduced sanitation access time	Intangible

Source: Author compilation

Benefit-Cost Ratio

After collecting the data, the study assessed economic impact of SBM(G) by using the Benefit-Cost Ratio (BCR):

$$BCR = \frac{NPV \text{ of Cost}}{NPV \text{ of Benefit}}$$

The interpretation is as follows, If

- $BCR > 1$: Benefits exceed costs and the intervention is economically viable.

- $BCR = 1$: Benefits are equal to costs.
- $BCR < 1$: Costs exceed benefits.

Table:2 Result of Cost Benefit Analysis (CBA)

Components	Result
Total Cost	513400
Total Benefit	432411
Discount rate	8%
Time	10
NPV of Cost	513400
NPV of Benefit	2101698
Benefit Cost Ratio (BCR)	5.65

Source: Author compilation

A BCR of 5.65 indicates that the estimated economic benefits are five times greater than the associated costs. In other words, for every one unit of economic cost, approximately 5.65 units of benefit are generated. This finding is broadly supported by Hutton et al. (2020) study, they also found a positive BCR. This result provides evidence that investing in sanitation in the surveyed tribal villages of Khunti district is economically beneficial. The present study's BCR also needs to be interpreted in the context of the benefits included. This study incorporates both tangible and intangible dimensions of benefits. Therefore, the positive economic return reflects not only direct financial savings but also broader welfare benefits associated with improved sanitation.

Conclusion and Suggestions

In conclusion the result demonstrates that sanitation investment provides a substantial economic return in the surveyed tribal areas of Khunti district. The study also demonstrates that the benefits of SBM(G) extend beyond conventional financial returns. Improved sanitation can reduce household medical expenditure, improve health, save time, enhance property value and create local employment. At the household level, access to a toilet can additionally contribute to privacy, convenience, dignity and improved living conditions. At the same time, the evidence indicates that the benefits of sanitation depend on actual use, maintenance and sustained behavioural change.

The study therefore concludes that SBM(G) has contributed not only to the expansion of sanitation infrastructure but also to economic and social improvements among tribal households in the study area. Consequently, Rural sanitation should be treated as an investment in human development; it improves health, household economic security and social well-being.

However, the sustainability of these benefits depends on the continued use and proper maintenance of the toilets, the availability of water, and sustained behavioural change. To achieve these, it is suggested that under SBM (G) programme the government should not only provide the economically vulnerable households to amount of toilet construction but should also provide to recurring operation and maintenance costs, to ensure the long-term functionality of sanitation facilities. Furthermore, policymakers should conduct a periodic monitor and economic evaluation to assess the sustainability of sanitation investments, changes in household expenditure and the wider welfare benefits associated with improved sanitation. These measures can help enhance the long-term effectiveness of SBM(G) and contribute to better health, dignity and living standards among tribal communities.

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