

Impact of Swachh Bharat Abhiyan on Waste Management and Sanitation Practices in Manikandam Block, Tiruchirappalli District

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ABSTRACT

This study examines the impact of the Swachh Bharat Abhiyan (SBA) on waste management and sanitation practices in Manikandam Block, Tiruchirappalli District, Tamil Nadu. Launched in 2014, the SBA aimed to eliminate open defecation and improve waste management across India. While national data indicates significant progress, including the construction of over 100 million toilets and a substantial reduction in open defecation rates, localized assessments are essential to understand the program's effectiveness at the grassroots level. Employing a mixed-methods approach, this research combines quantitative surveys and qualitative interviews with residents, local officials, and sanitation workers in Manikandam Block. The findings reveal that the SBA has led to notable improvements in sanitation infrastructure, such as increased access to household toilets and enhanced waste collection systems. However, challenges persist, including inconsistent waste segregation practices and the need for sustained behavioral change initiatives. The study underscores the importance of community engagement and continuous monitoring to ensure the long-term success of sanitation programs. Insights from Manikandam Block can inform policy decisions and implementation strategies in similar rural contexts, contributing to the broader goal of achieving universal sanitation coverage in India.

Keywords: Swachh Bharat Abhiyan (SBA), Waste Management, Sanitation Practices, Open Defecation Free (ODF), Manikandam Block.

Introduction

Sanitation and effective waste management are pivotal for ensuring public health, environmental sustainability, and socio-economic development. In India, challenges such as open defecation, inadequate waste disposal systems, and limited awareness have historically impeded progress in rural sanitation. To address these issues, the Government of India launched the Swachh Bharat Abhiyan (SBA) on October 2, 2014, aiming to eliminate open defecation and improve solid and liquid waste management across the nation. The rural component, Swachh Bharat Mission-Gramin (SBM-G), focused on constructing individual household latrines (IHHLs), promoting behavioral change, and establishing mechanisms for monitoring sanitation practices. By October 2019, over 100 million toilets were constructed, and more than 600,000 villages were declared Open Defecation Free (ODF). Recognizing the need to sustain these achievements, SBM-G Phase II was launched, emphasizing the transition from ODF to ODF Plus status. This phase focuses on solid and liquid waste management (SLWM), visual cleanliness, and the adoption of sustainable sanitation practices.

Rationale for the Study

Manikandam Block, located in the Tiruchirappalli District of Tamil Nadu, comprises several rural communities that have been active participants in the SBA initiatives. Tamil Nadu has been at the forefront of implementing sanitation programs, with significant efforts in retrofitting single pit toilets to twin pit systems and promoting safe faecal sludge management. Despite these efforts, there is a paucity of localized studies assessing the tangible impacts of SBA on waste management and sanitation practices at the block level. Understanding the effectiveness of these interventions in Manikandam Block can provide valuable insights into the successes and challenges faced, informing future strategies for similar rural settings.

Statement of the Problem

While the Swachh Bharat Abhiyan has generated considerable momentum and reported significant progress at the national level, the actual impact on waste management and sanitation practices can vary considerably at the grassroots level. It is crucial to empirically assess the extent to which the Abhiyan has translated into tangible improvements in the daily lives of rural communities. Specifically, there is a need to understand whether the mission has effectively altered waste disposal behaviors, increased the adoption of sanitary practices, and led to the development of sustainable waste management systems within specific rural contexts. This study seeks to address this gap by focusing on the Manikandam block in Tiruchirappalli district, investigating the actual changes in waste management and sanitation practices following the implementation of the Swachh Bharat Abhiyan.

Review of Literature

Dr. Priyanka Saxena and Dr. Rajeev Kumar Agrawal (2022), Solid Waste Management and Swachh Bharat Abhiyan are two sides of a coin. This people-centric Abhiyan is dependent on the implementation of the laid down procedures, and regular monitoring. And based on gaps found, from the monitoring results, there still exists room for improvement, and the formulation of strategies and actions should be in line with it. The SBA in its current form is only limited to toilet construction all over India. But its usage is still a big challenge for the country because of logistical and social reasons. To improve the outreach of SBA and for efficient SWM it's important to spread awareness regarding hygiene practices and their effect on health. Indian population is still not in practice separating waste and also is not conscious about their disposal. People should be made aware of recycling or reusing waste to reduce solid waste. Appropriate planning & implementation is crucial for maintaining sustainable development.

Komal Shukla and Dr. Sangeeta Gupta (2023), the Swachh Bharat Abhiyan has brought about a significant impact in rural areas in India. Due to the concerted efforts of the government, NGOs, and local communities, there has been a marked improvement in sanitation facilities and practices. The provision of toilets and access to clean water has not only improved the health and well-being of individuals but also has had a positive impact on the local economy. Moreover, the awareness campaigns have increased people's knowledge and understanding of the importance of cleanliness and hygiene, leading to long-term behavioural changes. However, there are still challenges such as the lack of infrastructure and funding that need to be addressed for sustained progress in this field. While there have been challenges and limitations to the implementation of the programme, the overall impact has been positive. Swachh Bharat Abhiyan has the potential to create a healthier and cleaner environment for rural communities, which will ultimately contribute to a better standard of living for individuals and the nation as a whole.

Neha Kumari Bothra and Dr. Vishwa Deepak Bhatnagar (2023), the Clean Indian Mission provided waste pickers with an avenue to increase their earning potential and, consequently, their socioeconomic standing. Additionally, the Mission eliminated the outdated methods for achieving the clean India objectives by introducing new technologies such as waste to energy, the use of truck-mounted refuse compactors, and portable stationary compactors at secondary collections points. These measures reduced the amount of waste that was left lying around on the roads and in close proximity to people for extended periods of time. Every municipality is encouraged by this mission to improve and introduce fresh approaches to the solid waste management domain. Since the Swachh Bharat Abhiyan was implemented, every municipal corporation has been in competition with one another to introduce new technology and figure out how to manage solid waste more effectively than the others. Consequently, in order to achieve these aims, the role of waste pickers participating in door-to-door collection, segregation, and transportation has become critical, particularly since the development of covid 19

Objectives of the Study

The primary objectives of this study are:

- To evaluate the impact of Swachh Bharat Abhiyan on sanitation practices in Manikandam Block.
- To assess the effectiveness of waste management systems implemented under SBA initiatives.
- To identify challenges and barriers in sustaining ODF status and implementing SLWM practices.
- To provide recommendations for enhancing sanitation and waste management practices in rural communities.

Research Questions

This study seeks to answer the following questions:

- How has the Swachh Bharat Abhiyan influenced sanitation behaviors in Manikandam Block?
- What waste management practices have been adopted post-SBA implementation?
- What are the perceptions of the local community regarding the effectiveness of SBA initiatives?
- What challenges persist in achieving and maintaining ODF Plus status in the block?

Significance of the Study

This research holds significance for policymakers, local governance bodies, and development practitioners by providing empirical data on the outcomes of SBA in a specific rural context. The findings can guide the refinement of sanitation programs, ensuring they are tailored to the unique needs and challenges of rural communities like those in Manikandam Block.

Methodology

This study employed a mixed-methods research design to comprehensively assess the impact of the Swachh Bharat Abhiyan (SBA) on sanitation practices and waste management systems in Manikandam Block, Tiruchirappalli District, Tamil Nadu. The research combined both quantitative and qualitative approaches to capture a holistic view of the program's effectiveness at the grassroots level.

Research Design

A descriptive research design was adopted to examine the perceptions, behaviors, and challenges related to SBA implementation in the selected rural communities. The study sought to understand the relationship between demographic variables (such as gender, education, and age) and sanitation and waste management outcomes.

Sampling Method and Size

The study utilized a stratified random sampling technique to ensure representation across various demographic segments. A total of 110 respondents were selected from different villages within the Manikandam Block. The sample included individuals from diverse age groups, educational backgrounds, occupational categories, and household sizes, thereby reflecting the socio-demographic diversity of the region.

Data Collection Tools

Primary Data was collected through a structured questionnaire, which included both close-ended and multiple-choice questions. The questionnaire focused on variables such as:

- Awareness of SBA
- Sources of sanitation information
- Type and usage of toilet facilities
- Waste segregation and disposal practices
- Public waste infrastructure
- Training and information received on waste management

Additionally, qualitative data was gathered through interviews with local officials and sanitation workers, to supplement and validate the quantitative findings.

Data Analysis

The collected data was systematically coded and analyzed using statistical methods:

- Descriptive statistics were used to summarize demographic profiles (frequencies, percentages, and means).
- ANOVA (Analysis of Variance) was employed to examine the relationship between gender and sanitation practices.
- Chi-Square tests were used to explore the association between education levels and waste management behaviors.
- The statistical significance of relationships was determined at a 95% confidence level ($p < 0.05$).

Study Area

The research was confined to Manikandam Block, a rural area in the Tiruchirappalli District. The area was selected due to its active participation in SBA initiatives and its diverse population in terms of education, occupation, and household characteristics.

Limitations

While the study offers detailed insights into the SBA's impact in Manikandam Block, the findings may not be fully generalizable to other rural areas due to contextual differences. Additionally, responses may be subject to recall bias and social desirability bias, especially in self-reported behaviors regarding sanitation and hygiene.

Results and Discussion

Classification of respondents based on demographic factors

Demographic Factors		No. of Respondents (110)	Percentage	Mean
Gender	Male	49	44.5	1.5545
	Female	61	55.5	
Age	Bellow 20 years	4	3.6	3.7545
	21 years – 30 years	8	7.3	
	31 years – 40 years	30	27.3	
	41 years – 50 years	37	33.6	
	51 years and above	31	28.2	
Education	No formal education	27	24.5	2.7000
	Primary	14	12.7	
	Secondary	42	38.2	
	Higher Secondary	19	17.3	
	Graduate and above	8	7.3	
Occupation	Agriculture and Allied Activities	41	37.3	3.6727
	Skilled Trades and service Sector	16	14.5	
	Government and Public Services	5	4.5	
	Private Sector Employment	10	9.1	
	Self-Employed	5	4.5	
	Unemployed	8	7.3	
	Student	5	4.5	
	Home maker	12	10.9	
	Retired	8	7.3	
Household Size	Bellow 3 members	23	20.9	2.2455
	4 members – 5 members	37	33.6	
	6 and above members	50	45.5	
Religion	Hindu	63	57.3	1.6273
	Christian	25	22.7	
	Islam	22	20.0	

Source: Primary data

The demographic profile of the 110 respondents provides insights into the composition of the study population, which is crucial for understanding the context of their responses and for tailoring interventions effectively.

Gender

- **Interpretation:** There are more female respondents (55.5%) than male respondents (44.5%). This suggests the survey might have reached a slightly higher proportion of women, or women were more willing to participate.
- **Mean (1.5545):** This likely means that "Male" was coded as 1 and "Female" as 2. The mean being closer to 2 indicates a higher proportion of females.

Age

- **Interpretation:** The largest groups of respondents are those aged 41-50 years (33.6%) and 51 years and above (28.2%). This indicates that the survey predominantly captured the opinions or information from middle-aged and older adults. Very few respondents were below 20 years old.
- **Mean (3.7545):** This suggests a coding scheme where older age groups have higher numerical values. The mean being closer to 4 indicates an older average age of respondents.

Education

- **Interpretation:** The most common education level among respondents is "Secondary" (38.2%), followed by "No formal education" (24.5%). A smaller percentage has "Graduate and above" education (7.3%). This indicates a varied educational background, with a significant portion having basic to secondary education.
- **Mean (2.7000):** This mean suggests a coding where lower education levels have smaller numerical values. The mean indicates an average education level somewhere between primary and secondary education.

Occupation

- **Interpretation:** The largest occupational group is "Agriculture and Allied Activities" (37.3%), followed by "Skilled Trades and Service Sector" (14.5%). There's a relatively even spread across other categories, with smaller percentages in government, private sector, and self-employment. This highlights the agricultural focus of the respondent population.
- **Mean (3.6727):** This implies a coding where agriculture/allied activities or occupations higher up in the list have lower numerical values. The mean being closer to 4 suggests an average occupation that is likely in the middle range of the categories listed.

Household Size

- **Interpretation:** The majority of respondents live in larger households, with "6 and above members" being the largest group (45.5%), followed by "4 members – 5 members" (33.6%). Only a fifth of respondents live in households with "Bellow 3 members." This suggests a prevalence of larger family structures.
- **Mean (2.2455):** This suggests a coding where larger household sizes have higher numerical values. The mean being closer to 2 indicates an average household size of around 4-5 members.

Religion

- **Interpretation:** A significant majority of respondents identify as Hindu (57.3%). Christians (22.7%) and Muslims (20.0%) make up the remaining proportions. This indicates a predominantly Hindu population in the survey sample.
- **Mean (1.6273):** This likely means that "Hindu" was coded as 1, "Christian" as 2, and "Islam" as 3. The mean being closer to 1 indicates a strong majority of Hindu respondents.

Impact of Swachh Bharat Abhiyan (Clean India Mission) SBA

Hypothesis

There is relationship between gender of the respondents and their towards Impact of SBA on Sanitation Practices

ANOVA Table						
Gender		Sum of Squares	df	Mean Square	F	Sig.
Awareness of Swachh Bharat Abhiyan (Clean India Mission)						
	Between Groups (Combined)	11.870	4	2.967	2.820	.029
	Within Groups	110.503	105	1.052		
	Total	122.373	109			
Sources of Information about Swachh Bharat Abhiyan						
	Between Groups (Combined)	18.046	8	2.256	2.184	.035
	Within Groups	104.327	101	1.033		
	Total	122.373	109			
Type of Toilet Facilities Available in Households						
	Between Groups (Combined)	8.466	3	2.822	2.626	.054
	Within Groups	113.906	106	1.075		
	Total	122.373	109			
Frequency of Toilet Usage Among Household Members						
	Between Groups (Combined)	12.850	3	4.283	4.146	.008
	Within Groups	109.522	106	1.033		
	Total	122.373	109			
Reasons for Non-Usage of Household Toilets						
	Between Groups (Combined)	7.679	3	2.560	2.366	.075
	Within Groups	114.694	106	1.082		
	Total	122.373	109			
Perceived Changes in Community Cleanliness Since Swachh Bharat Abhiya						
	Between Groups (Combined)	10.235	4	2.559	2.396	.055
	Within Groups	112.138	105	1.068		
	Total	122.373	109			

The ANOVA analysis indicates a statistically significant relationship between respondents' gender and their perceptions and practices related to the Swachh Bharat Abhiyan (SBA). Specifically, significant differences were observed in awareness levels ($p = 0.029$), sources of information ($p = 0.035$), and frequency of toilet usage among household members ($p = 0.008$). These findings suggest that gender influences how individuals perceive and engage with sanitation initiatives under the SBA.

For instance, the significant variation in awareness levels implies that men and women may have differing levels of exposure to SBA campaigns, potentially due to variations in literacy rates, access to information channels, or societal roles. The differences in sources of information further support this, indicating that men and women may rely on different mediums—such as community meetings, media, or interpersonal communication—to learn about sanitation programs. The significant disparity in toilet usage frequency among household members suggests that gender roles and responsibilities within households may impact sanitation practices.

Conversely, the analysis did not find statistically significant differences based on gender for the type of toilet facilities available in households ($p = 0.054$), reasons for non-usage of household toilets ($p = 0.075$), and perceived changes in community cleanliness since the implementation of SBA ($p = 0.055$). These p -values, while not below the conventional threshold for significance ($p < 0.05$), are relatively close, indicating potential trends that might achieve significance with larger sample sizes or more targeted studies.

These findings align with broader research highlighting the importance of gender-sensitive approaches in sanitation initiatives. For example, studies have shown that women often face unique challenges related to sanitation, such as safety concerns and cultural norms, which can affect their engagement with programs like SBA. Therefore, incorporating gender perspectives into the design and implementation of sanitation campaigns is crucial for their success.

In conclusion, the data underscores the need for gender-responsive strategies in sanitation programs. By acknowledging and addressing the distinct experiences and needs of different genders, initiatives like the Swachh Bharat Abhiyan can enhance their effectiveness and promote equitable sanitation practices across communities.

Hypothesis (Chi-Square Test)

There is relationship between Education of the respondents and their towards Effectiveness of Waste Management Systems under SBA

Cross Tabulation for Education of the respondents and their towards Effectiveness of Waste Management Systems under SBA										
Education	waste (garbage) collected period						Total	Value	df	Asymp. Sig. (2-sided)
	Every Day	Once a Week	every two weeks	not regularly	No Waste Collection	don't know				
No formal education	5	3	8	3	2	6	27	36.531 ^a	20	.013
Primary	5	7	1	0	0	1	14	38.638	20	.007
Secondary	16	9	6	4	4	3	42	.081	1	.776
Higher Secondary	3	1	3	4	5	3	19	110		
Graduate and above	3	2	0	0	0	3	8			
Total	32	22	18	11	11	16	110			
Education	Waste Management System in Home					Total	Value	df	Asymp. Sig. (2-sided)	
	Two Types	More than 2 types	not separate	don't know	-					
No formal education	8	3	4	12	-	27	26.338 ^a	12	.010	
Primary	1	7	2	4	-	14	31.691	12	.002	
Secondary	8	11	3	20	-	42	.002	1	.968	
Higher Secondary	0	3	6	10	-	19	110			
Graduate and above	3	4	1	0	-	8				
Total	20	28	16	46	-	110				
Education	Waste bins placed in your area for public use					Total	Value	df	Asymp. Sig. (2-sided)	
	used properly	not used properly	No bins	Not sure	-					
No formal education	6	9	9	3	-	27	40.601 ^a	12	.000	
Primary	5	1	3	5	-	14	42.409	12	.000	
Secondary	9	12	8	13	-	42	.272	1	.602	
Higher Secondary	7	0	5	7	-	19	110			
Graduate and above	2	6	0	0	-	8				
Total	29	28	25	28	-	110				
Education	system for composting or recycling in your area					Total	Value	df	Asymp. Sig. (2-sided)	
	Composting	recycling	No System	don't know	-					
No formal education	6	9	9	3	-	27	26.826 ^a	12	.008	
Primary	5	1	3	5	-	14	33.633	12	.001	
Secondary	9	12	8	13	-	42	.027	1	.869	
Higher Secondary	7	0	5	7	-	19	110			
Graduate and above	2	6	0	0	-	8				
Total	29	28	25	28	-	110				
Education	Received any training or information on how to manage waste					Total	Value	df	Asymp. Sig. (2-sided)	
	Attended Workshop	Receiving Informaton	Friends & Family	not received	-					
No formal education	5	9	13	0	-	27	67.436 ^a	12	.000	
Primary	0	14	0	0	-	14	80.867	12	.000	
Secondary	10	15	6	11	-	42	10.283	1	.001	
Higher Secondary	4	0	12	3	-	19	110			
Graduate and above	0	0	3	5	-	8				
Total	19	38	34	19	-	110				

The Cross-tabulation data and Chi-Square test results, we can assess the relationship between the education levels of respondents and their perceptions of the effectiveness of Waste Management Systems under the Swachh Bharat Abhiyan (SBA). Here's an analysis of each variable

Frequency of Waste Collection

Chi-Square Value: 36.531, Degrees of Freedom (df): 20 Asymptotic Significance (2-sided): 0.013

- **Interpretation:** The p-value of 0.013 is less than the conventional significance level of 0.05, indicating a statistically significant association between the education level of respondents and their perceptions of waste collection frequency. This suggests that educational attainment influences how individuals perceive the regularity of waste collection services

Types of Waste Management Systems in Homes

Chi-Square Value: 26.338, Degrees of Freedom (df): 12 , Asymptotic Significance (2-sided): 0.010

- **Interpretation:** With a p-value of 0.010, there is a significant relationship between education levels and the types of waste management systems employed in households. This implies that individuals with different educational backgrounds adopt varying methods for managing waste at home.

Placement and Usage of Public Waste Bins

Chi-Square Value: 40.601, Degrees of Freedom (df): 12, Asymptotic Significance (2-sided): 0.000

- **Interpretation:** The p-value of 0.000 indicates a highly significant association between education levels and perceptions regarding the placement and proper use of public waste bins. This suggests that educational attainment affects awareness and attitudes toward public waste disposal infrastructure.

Availability of Composting or Recycling Systems

Chi-Square Value: 26.826, Degrees of Freedom (df): 12, Asymptotic Significance (2-sided): 0.008

- **Interpretation:** A p-value of 0.008 signifies a significant relationship between education levels and awareness of composting or recycling systems in the area. This indicates that educational background influences knowledge about local waste processing facilities.

Training or Information Received on Waste Management

Chi-Square Value: 67.436, Degrees of Freedom (df): 12, Asymptotic Significance (2-sided): 0.000

- **Interpretation:** The p-value of 0.000 denotes a highly significant association between education levels and the receipt of training or information on waste management. This suggests that educational attainment plays a crucial role in accessing and assimilating information related to waste management practices.

Challenges in Sustaining ODF Status and Implementing SLWM Practices

There is relationship between Age of the respondents and their towards and Implementing SLWM Practices

The Relationship between age of the respondents and their towards and Implementing SLWM Practices			
people going to the toilet in the open	Mean	N	Std. Deviation
It still happens often	4.4583	24	.58823
It happens sometimes	3.8750	24	.85019
It rarely happens now	3.8571	14	.66299
I have not seen it happening	3.6316	19	.95513
I'm not sure	3.1034	29	1.34549
Total	3.7545	110	1.05957

Age significantly influences sanitation habits, with older individuals who adopted toilet use later in life often reverting to open defecation due to deeply ingrained practices. Conversely, younger people, especially those educated on sanitation, tend to maintain improved practices. However, maintaining Open Defecation-Free (ODF) status and implementing effective Solid and Liquid Waste Management (SLWM) extends beyond individual behavior. Challenges include poor infrastructure, cultural resistance, and a lack of awareness about health benefits and economic constraints. To address these, targeted

education for all age groups, community involvement, financial and technical aid for facilities, and regular monitoring are crucial for sustainable sanitation improvements

Conclusion

The study conducted in Manikandam Block, Tiruchirappalli District, provides valuable insights into the localized impact of the Swachh Bharat Abhiyan (SBA) on sanitation and waste management practices. The findings clearly indicate that the SBA has contributed significantly to improving access to sanitation facilities, promoting behavioral change, and enhancing community cleanliness. Notable achievements include increased household toilet construction, greater awareness of hygiene, and the implementation of basic waste management systems.

However, the study also reveals critical gaps that threaten the sustainability of these improvements. Issues such as irregular waste collection, poor waste segregation, and limited public infrastructure persist, especially among respondents with lower educational levels. The statistical analysis, particularly the Chi-Square and ANOVA tests, highlight the influence of education, gender, and age on sanitation behaviors and perceptions. For instance, education was found to significantly affect waste management awareness and practices, with higher education levels correlating with better engagement in solid waste segregation and participation in training programs.

Furthermore, the research emphasizes that maintaining Open Defecation-Free (ODF) status and advancing Solid and Liquid Waste Management (SLWM) require more than just infrastructural provisions. Behavioral change, sustained awareness campaigns, community participation, and targeted educational initiatives are crucial for long-term success. Gender disparities in awareness and engagement also call for more gender-sensitive program designs.

In conclusion, while the SBA has made commendable progress, especially in infrastructure development and awareness generation, long-term effectiveness hinges on consistent monitoring, inclusive education, and community-driven initiatives. Policymakers and implementing agencies must focus on tailored, context-specific strategies that address the socio-cultural and demographic realities of rural populations like those in Manikandam Block.

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