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STeP Sanitation Technology Platform
For partners, STeP sought to aggregate and synthesize secondary data to provide insights into the school market.

With over 1.5 million schools, the school market in India may be of interest to many organizations supporting research and development and launch of new sanitation technologies. To support our partners and others who may be exploring opportunities in India, the Sanitation Technology Platform (STeP) has aggregated and synthesized available secondary data related to opportunity. When possible, we have supplemented findings with targeted, primary research conducted by STeP and its partner, Purple Audacity.

Within this report, we have outlined the current state of sanitation in Indian schools, the financial and social impact sizes of the opportunity to improve sanitation, proposed key stakeholders, and possible paths to market entry.

How should this body of work be used?

We propose that the findings herein provide a useful orientation to the size and scale of the challenge and opportunity, as well as background on government initiatives and orientations. This body of work could also be used to inform follow-on research and to direct the activities of interested and engaged parties as they consider their own product development and market launch strategies.
STeP turned to a variety of secondary sources including from private and public sources.

Data Collection
STeP collected the following data:

- Current state of Indian government school sanitation programs,
- Aggregate investment needed to place adequate toilets in Indian schools,
- Partnership models for toilet construction, and
- Primary user insights on toilet features.

Proposed Next Steps
STeP proposes the following next steps:

- Share findings to date with key partner organizations;
- Identify gaps through discussion and vetting;
- Answer additional questions;
- Generate and leverage new data as needed; and
- Expand initial findings and assumptions with primary research.
Despite the Government of India’s focus on sanitation, sources suggest a significant shortfall in school toilets.

Improving sanitation in schools is a national-level priority in India, with significant public attention and ongoing, programmatic interventions. As a point of reference, India has ~1.5 million schools vs. 150,000 in the United States.

The need and aspirations of the India Swachh Bharat Swachh Vidyalaya (SBSV) mission are sizeable—the government has expressed intentions to install 400,000+ toilets; however, sources suggest a significant shortfall.

The financial opportunity for partners of the government could be sizable—data suggest that the total investment required to bring functioning toilets to all Indian schools will be $1 billion to $6 billion.

CSR funds are being directed to sanitation, as firms recognize that the social impact (e.g., access to proper toilets and sanitation in schools) could increase educational performance by 25%, as well as boosting health outcomes for 250 million Indian children.

Main paths to partnership for school sanitation flow through Indian state- and district-level governments, with some opportunities to partner with public and private companies. State governments serve as key partners for external organizations seeking access to market for toilets in Indian schools; state- and district-level governments make most school sanitation decisions. Indian public- and private-sector company CSR programs may provide windows for partnership as well.

Our primary research indicates that to ensure toilet access, toilet technology should be robust with respect to electricity and water access, as well as cost-effective and installable in local conditions.

We are also reminded that access alone is not enough: toilets must fit into a program of cleaning, maintenance, user training, and user engagement to ensure that sanitation outcomes are actually achieved.
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While lack of toilets and waste treatment create sanitation challenges, this research focuses on quantifying access.

**Access to toilet facilities**

More than 50% of the Indian population still practices open defecation.

**Treatment of toilet wastewater**

Around 70% of urban Indian sewage is returned to water sources untreated.

Sanitation and toilet facilities do not adequately meet the needs of the Indian population.

Almost 20% of India’s population has no toilet in the home.
- 18.6% of Indian homes have no toilet.
- A further 8.8% of homes have pit latrines susceptible to overflow.
- 12.6% of households have a family member that practices open defecation.
- Rapid population growth and urbanization have amplified the impacts.

Public and community toilets do not bridge the gap.

<table>
<thead>
<tr>
<th>City</th>
<th># of toilets/1000 people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mumbai</td>
<td>0.06</td>
</tr>
<tr>
<td>Kolkata</td>
<td>0.01</td>
</tr>
<tr>
<td>Delhi</td>
<td>0.03</td>
</tr>
<tr>
<td>Chennai</td>
<td>0.11</td>
</tr>
<tr>
<td>Bangalore</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Poor sanitation is a serious drain on India’s economy and well-being.

- UNICEF estimates that only 31% of Indians use improved sanitation facilities.

- Poor sanitation means that diarrheal disease is endemic in Indian children.
  - Diarrhea is the second leading cause of death for children under age 5 in India.
  - 48% of Indian children experience malnutrition, largely due to diarrhea.
  - India shows a greater incidence of child malnourishment than Democratic Republic of the Congo or Somalia.

- In 2006, the total economic costs of poor sanitation were estimated at ~6% of GDP.
Recognizing the importance of sanitation in schools, the government is implementing school-focused programs.

Among the purported benefits, the SBSV program points to improved educational outcomes.

- The SBSV program intends to improve educational outcomes (e.g., 25% higher test performance).
- The SBSV program aims to provide key access point for populations with lagging sanitation access more generally.
- The initiative recognizes that separate toilet facilities for girls are empowering and increase retention.

The SBSV program has set targets for the availability of toilets and maintenance.

- The SBSV program aimed to have sex-separate toilets in all schools by August 2015.
- The SBSV program also emphasizes the importance of maintenance and student education.

“Clean India: Clean Schools”
Prime Minister Modi inaugurated the SBSV program in August 2014, with the goal of placing toilets in all Indian schools within a year.

The size of the Indian school system makes it a key access point for providing sanitation to children.

1.5 million schools
United States: ~150,000

260 million students
United States: ~75 million

Primary and middle schools in India, thousands of schools

2005-06: 1,120
2010-11: 1,300
2014-15: 1,450

Primary and middle school enrollment in India, millions of students

2005-06: 169
2010-11: 193
2014-15: 197

Government data suggest that school toilet access is relatively good.

Percentage of schools with separate toilets for girls, by state, 2014

Percentage of schools with any toilet or toilets for boys, by state, 2014

- <80% of schools with toilet
- 80-90% of schools with toilet
- >90% of schools with toilet

Source: U-DISE, 2013-14, NUEPA, New Delhi
The SBSV program reports success, claiming to deliver over 400,000 toilets in one year.

In-school toilet units approved for construction under the SBSV program, nationally, 2014–2015

- 417,796 total toilets approved for construction
- Government claims 100% of toilets completed by August 2015, leaving all Indian schools with functioning toilets

States with greatest government-acknowledged need in 2014

Additional data suggest that the SBSV program has not met its objectives.

Third-party sources cite inconsistencies in reports vs. reality.
- The Indian government claimed that the SBSV program was a success in August 2015.
- Third-party evidence challenges the validity of the data.
- Direct government sanitation campaigns began as early as 1999 with the Total Sanitation Campaign, causing additional skepticism that work is now complete.

At least some schools still have no toilets.

“Many schools we checked, from [Delhi to Jharkhand and Karnataka, in areas both urban and rural], do not have toilets.”
—The Wire (India)

Many new and existing toilets are unusable.

“Toilets in schools in...Delhi, Uttar Pradesh, Karnataka [and elsewhere]—either already built or new—do not have water or are not maintained. That makes them useless.”
—The Wire (India)

Government data records improbable speed of completion for new toilets.

Average number of toilets reported to be constructed each day during the first 7 months of SBSV: 109. During the last 15 days: 5,933.
—Downtoearth.org.in

Case study: An independent study in Odisha state suggests serious shortfalls against SBSV goals even after the deadline.

The SBSV program claimed successful placement of toilets in all schools in Odisha.
- The program aimed to complete 43,500 toilets in Odisha by August 2015.
- Notionally, this would translate to 100% coverage and ensure separate toilets for girls in every school.

An independent analysis suggests a major shortfall.
- Research conducted by the Right to Education forum (RTE) in October 2015 found otherwise.
- The analysis included a survey of 160 schools across the state.
- The analysis suggests that 36% of schools in Odisha still have no functioning toilet.

RTE study of Odisha schools found considerable water, sanitation, and hygiene (WSH) shortfall

% of schools without functioning toilet
% of schools without functioning toilet for girls
% of co-ed schools without sex-separate functioning toilets
% of schools without handwash facilities

36% 43% 59% 76%

Although some discrepancies on school sanitation efforts exist, with SBSV, three findings emerge.

1. The installation of toilets is ongoing, yet more is needed.

Across India, work is continuing to meet the SBSV program targets, as government partners continue to work toward fulfilling commitments. Surveys make it clear that the SBSV program did not fully meet the need for toilets in Indian schools.

2. The installation of toilets is ongoing, yet more is needed.

Across India, work is continuing to meet the SBSV program targets, as government partners continue to work toward fulfilling commitments. Surveys make it clear that the SBSV program did not fully meet the need for toilets in Indian schools.

3. The investment pace going forward may fluctuate.

State-level investment in toilet construction has fluctuated in prior years, and the national government may or may not continue to channel substantial funding and CSR commitment into school toilets after conclusion of the SBSV program.
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To meet the SBSV goals, an estimated $1 billion to $6 billion investment would be required.

**Total investment required for sufficient, functioning toilets in all Indian schools**

<table>
<thead>
<tr>
<th></th>
<th>Low-case estimate</th>
<th>High-case estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Schools in need of toilets</strong></td>
<td>~300,000 (~20%)</td>
<td>~670,000 (~45%)</td>
</tr>
<tr>
<td><strong>Toilets per school</strong></td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td><strong>Cost per toilet</strong></td>
<td>$850</td>
<td>$1,500</td>
</tr>
</tbody>
</table>

**Methodology and rationale for key variables**

**High case**
- Schools in need of toilets: ~670,000 (~45%)
- Toilets per school: 6
- Cost per toilet: $1,500

**Low case**
- Schools in need of toilets: ~300,000 (~20%)
- Toilets per school: 4
- Cost per toilet: $850

**Rationale**
- **Schools in need of toilets**: The Annual Status of Education Report (ASER) reveals that sex-separate toilets are available and functioning in only 55% of schools nationally. This figure forms the basis for the high estimate. The District Information System for Education (DISE) reported toilets available in 93% of schools, but this figure does not account for nonfunctioning toilets and does not agree with numerous other sources; 80% was chosen as a conservative, low estimate.
- **Toilets per school**: SBSV standards are sex-separate toilet units per 40 students; 96% of schools are coeducational, which suggests 2 toilets per 40 students in almost all cases. DISE reports an average of 130 students per school, implying ~6 toilets per school, which grounds the high case. Low case is conservative to reflect uncertainty.
- **Cost per toilet**: An averaging of data from published project information provides an average cost per installed toilet under the SBSV program rubric of ~$1,500; forming the basis for the high-case estimate.

**Sources**: ASER, DISE, Times of India, RTI analysis; *To standards laid out in SBSV program materials
The opportunity varies across states, with the greatest opportunity in Uttar Pradesh and Madhya Pradesh.

States with the largest, absolute investment need
- Uttar Pradesh ($200 million – $1 billion)
- Madhya Pradesh ($130–780 million)
- West Bengal ($75–440 million)
- Bihar ($65–$380 million)

Low-case estimate: Indian states require a total investment greater than $50 million.

High-case estimate: 19 Indian states require a total investment greater than $50 million.
Firms are recognizing value in triple bottom line to include social impact, including use of CSR funds to aid initiatives.

Diarrhea kills 300,000 children under age 5 in India every year. Incidence among children is >40%.

Over 30% of children graduating primary school in India cannot perform basic arithmetic.

Across India, enrollment rates are lower and dropout rates higher for girls versus boys.

Proper in-school sanitation can reduce diarrheal incidence by 30%.

Proper in-school sanitation can improve academic performance by at least 25%.

Separate, working toilets for girls can increase girls’ enrollment by at least 33%.

With 250 million children in Indian schools, marginal improvements in outcome could have substantial, absolute, social consequences.

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All elements of the value chain need addressing, but this research specifically focuses on facilities construction.

<table>
<thead>
<tr>
<th>Facilities construction</th>
<th>Maintenance</th>
<th>Wastewater treatment</th>
<th>Training and education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building out sanitation facilities at each school</td>
<td>Cleaning and maintaining sanitation facilities</td>
<td>On- or off-site treatment of waste</td>
<td>Educating stakeholders on proper use and upkeep</td>
</tr>
<tr>
<td>• Sex-segregated toilets with washing point: one unit per 40 students</td>
<td>• Day-to-day facilities cleaning and upkeep</td>
<td>• Pit latrine excavation, septic tank pumping, or proper sewage disposal</td>
<td>• Teacher and administrator capacity building</td>
</tr>
<tr>
<td>• Water supply in each toilet block for flushing</td>
<td>• Annual repair</td>
<td></td>
<td>• Integration of hygiene training into school curriculum or daily activity routine</td>
</tr>
<tr>
<td>• Group handwashing facilities: one outlet per 10 students</td>
<td></td>
<td></td>
<td>• Female teachers to instruct girls in menstrual hygiene</td>
</tr>
<tr>
<td>• Drinking water: one source inside school</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Focus of this landscape assessment

Partnership with state government facilitates multilayered involvement by external NGOs.

**State government**
- Plans and allocates funding for state-wide facilities initiatives

**School district administration**
- Implements plan and controls funding at the district level

**Single school administration**
- Implements plan in individual school; contracts installation and maintenance

**External contractors (mainly small/local)**
- Perform installation and maintenance

**Teachers and student body**
- Use facilities; report on needs for additional upkeep or modification

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**External contractors and NGOs (mainly large/international)**
- Partner with state- and district-level administrators to provide technology and services

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**Opportunity for international and NGO contractors primarily resides with state- and district-level partnerships**
State government will be key partner for entities seeking to provide toilet facilities.

<table>
<thead>
<tr>
<th>National government</th>
<th>State government</th>
<th>Local government and school administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-level standards setter</td>
<td>Key decision maker</td>
<td>Ground-level executor</td>
</tr>
<tr>
<td>Supervises national-level sanitation programs, influences technical norms, and maintains national datasets</td>
<td>Tracks district- and school-level needs, allocates direct investment, and sets actual program expenditures</td>
<td>Oversees operation of facilities, maintenance, and continuity of funding at microlevel</td>
</tr>
</tbody>
</table>

National government launches SBSV program that sets standard of clean water access for all schools

Rajasthan state government partners with UNICEF to pilot and roll out 10,000 units of new water pump technology to district schools

Schools assist in locating supplemental funding, contracting local maintenance for repairs as needed

Case study: A partnership between the Rajasthan government and UNICEF enabled new pump technology.

Rajasthan launched a WSH program in 2000 with assistance from UNICEF.

- Rajasthan and UNICEF piloted the program in three districts: Alwar, Tonk, and Jhalawar.
- Rajasthan and UNICEF scaled up the WSH program in 2005–2006 and are currently implementing it across Rajasthan.
- UNICEF has provided key assistance in data gathering, planning, best practices sharing, and funding across the life of the program.
- The Rajasthan Council of Elementary Education (RCEE) is a key government agency.

Under the Rajasthan WSH project, UNICEF partnered with other NGOs and public institutions to deliver, test, and scale up various innovative sanitation devices.

Force-and-lift pump technology is a success story for the NGO/state government partnership, moving from pilot to scale in Rajasthan schools.

- The technology is a robust refit for existing hand pumps (pumps into tank for toilet flushing while also providing a stream at the pump).
- Rajasthan and UNICEF initially piloted the technology in 150 model schools in 2013. Data suggested success.
- The Rajasthan government secured funding to install 10,000 units across the state.

Public-sector tenders and private-sector CSR also drive toilet purchase and installation.

For international and NGO contractors, a partnership opportunity exists for fulfilling tenders from Indian companies.

Case studies: Indian PSIs issue tenders for CSR toilet construction activities.

GAIL RFP strongly delimits the technical specifications of toilets.

- GAIL is the largest state-owned natural gas processing company in India. By law, 2% of net profits go to CSR.
- GAIL issued tender in December 2014 under the SBSV program to build 1,000 school toilets. It targeted schools in Madhya Pradesh, Andhra Pradesh, and Odisha.
- Tender explicitly stipulates specifications and technological options for toilets.
- GAIL invites bidders to choose among a pit latrine, septic tank, and DRDO toilet technology.
- It is unclear how bids will be weighed against price and technological category.

REC Power Distribution Company’s RFP is directed at construction firms.

- REC Power Distribution Company is a state-owned grid infrastructure company.
- REC issued tender in February 2015 for the construction of ~4,500 toilets in schools.
- REC targeted schools in Madhya Pradesh, Telangana, and Bihar.
- The highly specific scope of work suggests that intended bidders are construction firms.
- The toilet design is contractually specified down to the thickness of tiles on the wall.

A large cast of multisector players are actively engaged in the school toilet landscape.

As state and district government funders:
- State and district government ministries
- Development corporations and education councils

As executing partners:
- NGOs, local and international
- Local construction and maintenance contractors

As CSR-obliged corporate partners:
- Indian, state-owned corporations
- Large-scale, private-sector corporations

As executing partners:
- Bharat Petroleum
- NTPC
- GAIL
- Tata Consultancy Services
- Vedanta

Examples of corporate partners include:
- Tata Consultancy Services
- Vedanta
- Bharat Petroleum
- NTPC
- GAIL

Examples of NGOs include:
- UNICEF
- Bill & Melinda Gates Foundation
- Bill & Melinda Gates Foundation

Examples of local construction and maintenance partners include:
- Banka BioloCo
- The Human Waste Managers
Partnerships are essential in order to penetrate the school toilet market.

Key Insights

There is no single clearly defined channel by which toilets are provided to schools in India. In general, state-level relationships will be important for multinational partners. State governments can direct interest and make contacts for one-off projects, and provide opportunity for longer programmatic partnerships.

This influence extends to government-run schools, and partnerships are often driven at the state and district levels. Individual schools have limited autonomy.

Partnerships are possible with Indian and multinational corporations fulfilling CSR obligations. Size and scale may vary.
STeP conducted primary research to more thoroughly understand the needs of users and attitudes of stakeholders.

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Number of individuals interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td>1</td>
</tr>
<tr>
<td>Public school administrators</td>
<td>4</td>
</tr>
<tr>
<td>Public school teachers</td>
<td>1</td>
</tr>
<tr>
<td>Students</td>
<td>4 (2 girls, 2 boys)</td>
</tr>
<tr>
<td>Parents</td>
<td>3</td>
</tr>
</tbody>
</table>
Context and infrastructure in schools means that toilets will need to meet several key criteria to ensure access.

To ensure access, toilets should be:

- **Robust with respect to water access:** Large numbers of Indian schools do not have regular water access, or inconsistently/never pay for it.

- **Robust with respect to electricity access:** Large numbers of Indian schools do not have regular electricity access, or inconsistently/never pay for it.

- **Cost-effective and installable:** Budgets for upgrades are limited, and high costs will be an impediment. Installation likely needs to be feasible for local labor.

- **Retrofittable:** Toilet systems that can be retrofitted into existing school toilet facilities may be more easily adopted in some contexts, but given the gaps, not all toilet systems need to be retrofittable.

Source: STeP primary research
User insights from primary research make it clear that access alone is not enough.

<table>
<thead>
<tr>
<th>Divya, secondary school student</th>
<th>Pankajam, parent</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Divya says the toilets at her school smell and are often overcrowded. Mosquitos breed in the bathroom. There is nowhere to dispose of sanitary napkins. The people meant to clean the bathrooms often just stand around and chat. There are no waste bins in the toilet rooms, and garbage is present in the toilets.</em></td>
<td><em>Pankajam’s son does not use the bathroom all day at school, as the odor makes him feel like vomiting whenever he gets near the school toilets. Pankajam’s niece does not go to school when she has her period. She and other parents have lodged a complaint about the state of toilets with the school.</em></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Zarina and Jasmin, school administrators</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>The toilets at Zarina and Jasmin’s (private) school are equipped only with buckets for washing. There is no flushing, as flushes are expensive. Water and electricity are present, but their use is regulated due to cost. The school pays salaries for outside cleaning staff. Hygiene is part of the school curriculum.</em></td>
<td><strong>In order to meet user needs and provide sanitary solutions, toilets must be paired with attention to usage patterns, maintenance, and training.</strong></td>
</tr>
</tbody>
</table>

Source: STeP primary research
Other factors, such as cleaning and maintenance, must be integrated into a comprehensive solution.

To meet user needs, toilets should be:

- **Regularly cleaned**: An overwhelming complaint from students and parents is a lack of cleanliness and odor, presenting users with unsanitary conditions that then discourage proper use.

- **Properly maintained**: Many schools fail to provide toilet access simply because toilets are inoperable and repairs have not been arranged.

- **Paired with a waste management solution**: Toilet access is not sufficient without a method for toilet waste management.

- **Paired with training on use and hygiene**: Students need instructions on sanitary practices. Proper training on toilet use will limit maintenance needed.

- **Outfitted for disposal of sanitary products**: Girls must be comfortable using toilets and toilets must meet their needs.

- **Designed to encourage proper use**: Intuitive designs, robust materials, cleanable surfaces, and features that prevent community tampering should be incorporated into designs to ensure longevity.

*Source: STeP primary research*
Case study: Corporate CSR installation of biodigester toilets indicates limitations of toilet access as a singular goal.

Swarna Tollway purchased Banka Bioloo biodigester toilets for two government schools.

- Swarna Tollway is an Indian corporate entity. Banka Bioloo produces biotoilets under license from DRDO.
- Swarna committed to toilet provision under CSR.
- Swarna staff selected Banka Bioloo after Googling vendors and determining that Banka Bioloo’s offered price was the lowest.

The biotoilet system was only 6 months old but already beginning to show limitations.

- Toilets were not installed on level terrain, and the tilt causes waste and flush water to flow out the front door.
- Virtually no training was provided to school staff on the proper use and maintenance of toilets.
- There are no ongoing operations and maintenance plans in place.

A hands-off approach from key stakeholders, including Swarna Tollway, inhibited system function.

- Lack of training from Banka Bioloo and Swarna Tollways meant that improper cleaning may break the system.
- As part of CSR, Swarna was under no obligation to provide operations and maintenance for the system at any stage.

Source: STeP primary research
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# Landscape Assessment

# Primary Insights

## Next Steps
An information summary and possible next steps are included to support discussion.

The data in this deck are relevant for multinational corporations, NGOs, and government aid agencies interested in engagement with toilet access in Indian schools.

This deck addresses several questions:
• What is the current state of toilet access in Indian schools, and what is the broader context?
• What is the total required one-time investment to install toilets in Indian schools? What is the potential social impact payoff?
• What is the general landscape of players acting to provide toilet access to Indian schools? What is the general role of the government in this landscape?
• What additional insights about potential toilet products are derived from on-site primary research at Indian schools?

Several questions remain outstanding:
• What is the exact role of state, district, and municipal governments in approving toilet construction in individual schools? Who exactly is in control of the selection and planning process?
• Especially at the state level, who exactly is responsible for managing relationships with multinationals and NGOs?
• What is the state-by-state need for engagement and partnership with NGOs?

Key activities to address outstanding questions might include:
• Interviews with key stakeholders in NGO organizations with experience in state-level partnerships for toilet access (e.g., UNICEF India), and
• Interviews with Indian government officials.