Contributing to Clean India
Improving *Educational Outcomes*

Evaluation of
Swachh Vidyalaya Abhiyan

Subansiri Lower HE Project
National Hydroelectric Power Corporation

Prepared by
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(An autonomous Research Institute of ICSSR, New Delhi & Govt. of Assam)

CSR & Environmental Sustainability

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Subansiri Lower HE Project, NHPC

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January, 2018

Cover photo source : DDWS

Creatives
Ratul Das
Colourplus

Printed at
Colourplus Advertising & Publishing
Rajgarh Main Road, Guwahati-781003
Contact No. +91 98640 33529 (M)

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एक कदम स्वच्छता की ओर

Swachh Vidyalaya

Contributing to Clean India and Improving Educational Outcomes

Context and Background

On 15 August, 2014, the Honourable Prime Minister of India made a pledge that within a year, "all schools in the country should have toilets with separate toilets for girls". Access to clean and safe drinking water and proper sanitation for both boys and girls are, in fact, two important norms of a school, inter alia, mandated by the Right to Education Act (2009). Notably, both water and sanitation are closely linked to one another and have well-known associations with increasing enrolment, improving retention and attendance of students, reducing drop-outs and thereby improving the educational outcomes of students and positively contributing to economic growth.

The pledge, thus, besides underscoring the emphatic commitment of the Government of India towards realising, in general, the vision of "clean India" by 2019, it further represents the obligation of the Government towards achieving desired educational outcome for each and every child in the country. This, also, indicates the massive amount of resources that would be necessary to honour the pledge made by the Honourable Prime Minister.

NHPC's Contribution

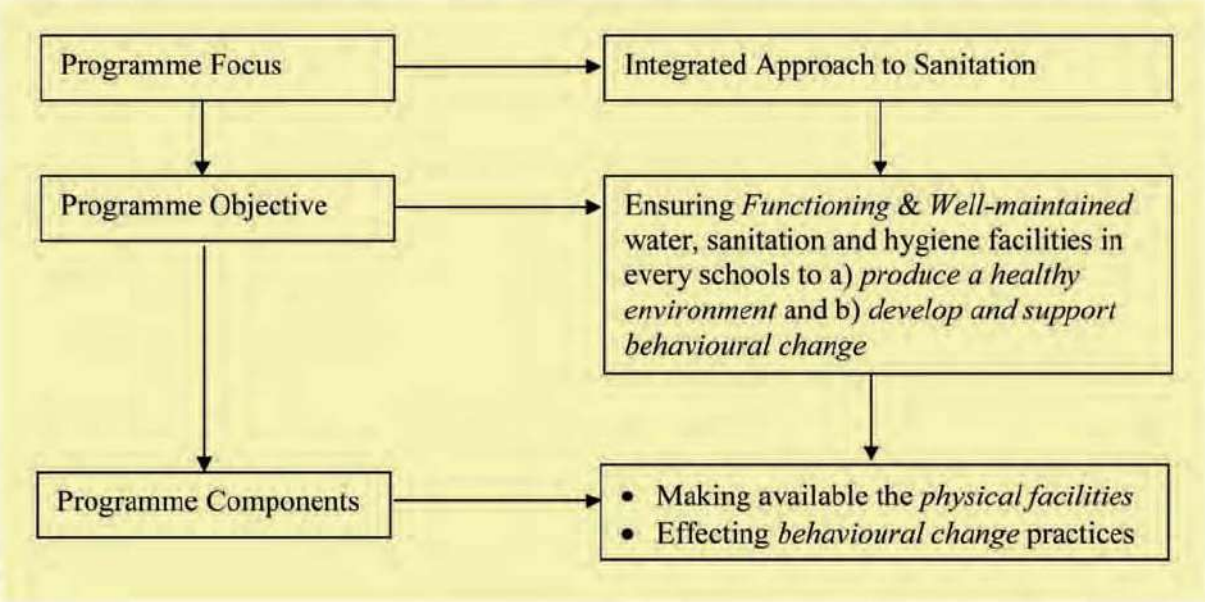
During 2014-2017, the Subansiri Lower Hydro Electric Project, NHPC constructed 3129 numbers of toilets in 2703 schools under the Swachh Vidyalaya campaign. Out of the total 3129 toilets constructed, 2240 have been new boys' toilet, 889 have been new girls' toilet. This constitutes about 37 percent of the total toilets constructed by NHPC in the country.

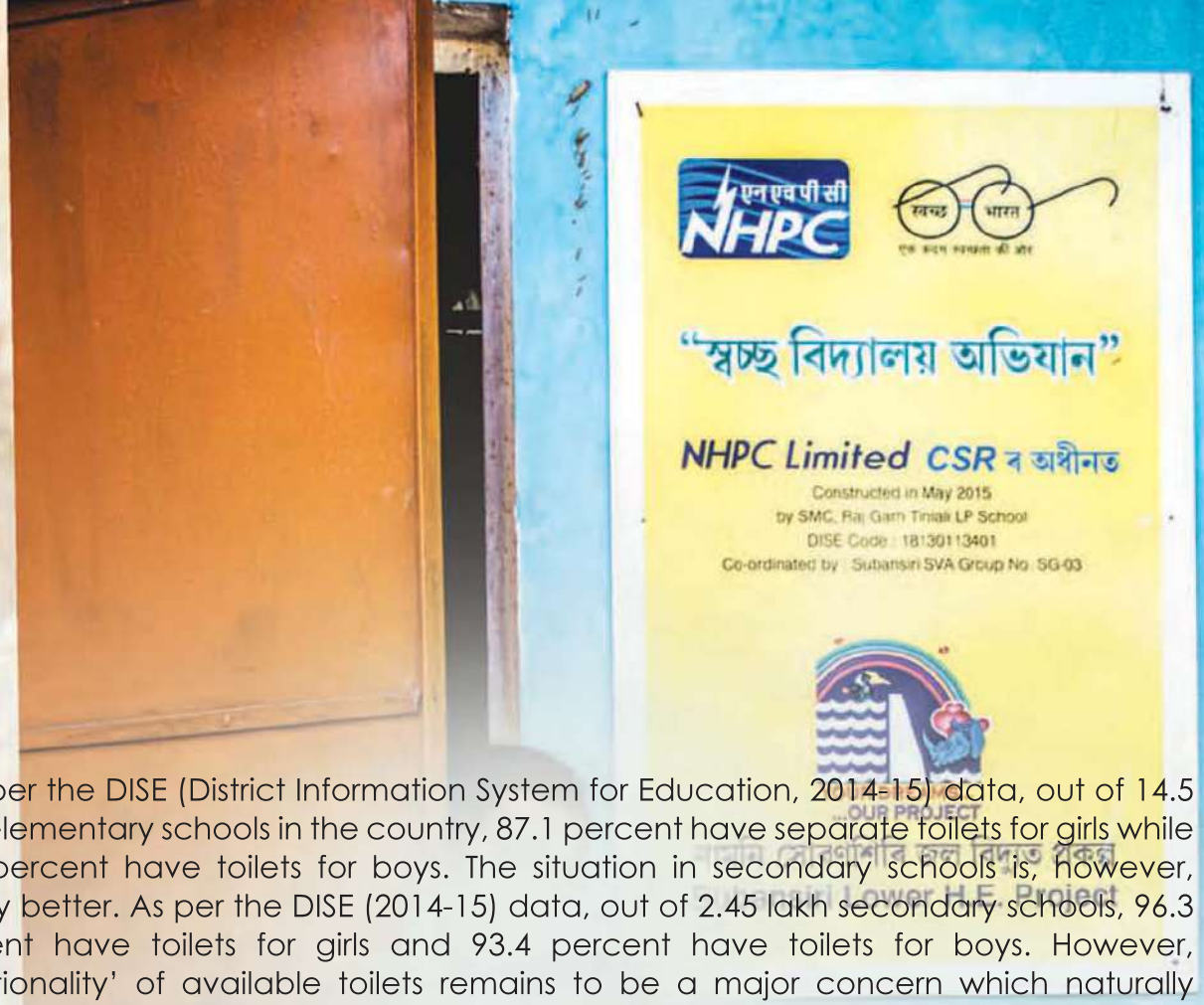
The toilets were constructed by Subansiri Lower HEP under the CSR initiatives of 2014-2017. A sum of Rs Rs. 57.4495 crore has been spent, which constitutes a major activity under its CSR for the years, thereby, necessitating an appropriate evaluation. The following provides a cumulative evaluation of the intervention taking the two years together.

Evaluation Framework

A robust and rigorous evaluation is premised on a carefully and scientifically designed evaluation framework. The framework draws on the essentials of the programme description for its various elements and components. The programme guideline of the Swachh Vidyalaya campaign clearly aims at ensuring every school in India to have a "set of functioning and well-maintained water, sanitation and hygiene facilities". The objective of the campaign is, according to the programme guideline, to "produce a healthy environment" and to "develop and support health and hygiene behaviour". Therefore, the campaign essentially entails two components – a) availability of the physical facilities and b) behavioural change practices. The overall "functionality", thus, depends on not in any one, but on both the components (Figure 1).

Figure 1: Essential Emphasis of the Swachh Vidyalaya – the Programme Components





As per the DISE (District Information System for Education, 2014-15) data, out of 14.5 lakh elementary schools in the country, 87.1 percent have separate toilets for girls while 95.4 percent have toilets for boys. The situation in secondary schools is, however, slightly better. As per the DISE (2014-15) data, out of 2.45 lakh secondary schools, 96.3 percent have toilets for girls and 93.4 percent have toilets for boys. However, 'functionality' of available toilets remains to be a major concern which naturally impedes the desired outcome and impact.

œ Given this context, Swachh Vidyalaya Abhiyan was launched in response to the pledge made by the Honourable Prime Minister in August, 2014. It was estimated that around 2.63 lakh schools are to be covered by constructing and renovating 4.10 lakh toilets within August 2014-2015, in order to ensure that every child has access to toilet facilities in their schools. These toilets were required in schools located mostly in hardest to reach and very difficult to access areas including areas facing problems of insurgency and extremism, remote mountainous terrains, densely crowded slums, and areas covered by forests and jungles.

The overall approach of Swachh Vidyalaya Abhiyan has been an integrated one driven by a comprehensive perspective on sanitation. The first level of integration is evident from the fact that the campaign attempted at combining three components viz. water, sanitation and hygiene through a set of 'facilities' created at the schools which include physical as well as human components. The second level of integration is observed in the Government's effort to pool resources for the programme. Besides the Government funding under routine and regular programmes related to clean India drive i.e. Swachh Bharat Kosh and area development fund of MPs and MLAs, all public and private sector companies were mandated to contribute to the campaign under the Corporate Social Responsibility (CSR) obligations. Due to such enormous efforts, the target of constructing 4.10 lakh toilets within a year has been achieved. It is, therefore, necessary that an objective assessment of campaign is carried out. In this section, an attempt is made to evaluate the programme with special reference to NHPC's contribution.

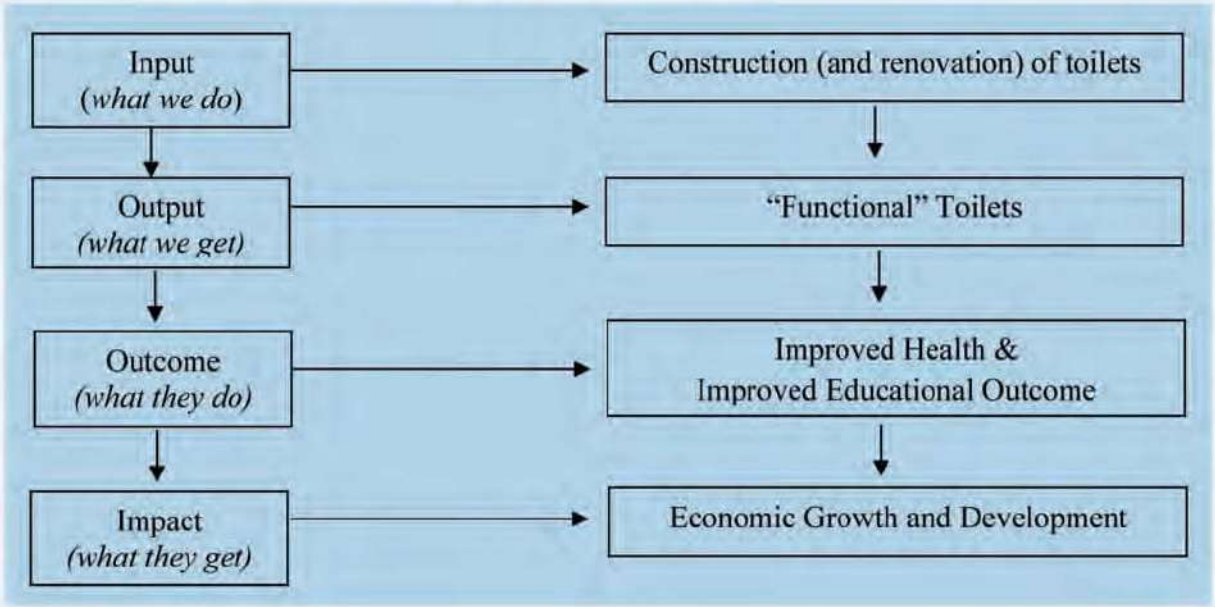
Towards the Theory of Change

All programmes are designed depending on an underlying Theory of Change (TOC). The TOC describes the logical path along which the desired intervention is envisaged to produce the results. This path, essentially, depicts the logical flow from programme inputs to programme outputs, then from programme outputs to programme outcomes, and finally, from programme outcomes to programme impact.

The programme guideline of the Swachh Vidyalaya Abhijan clearly provides an underlying TOC. It is maintained that improved sanitation and hygiene in schools results in improved health and less diseases, which, in turn, results in improved attendance of the students. This facilitates better educational outcome of the students leading to economic growth and development in the society.

More specifically, Swachh Vidyalaya intervention provides physical facilities i.e. construction of toilets with water as input, which is expected to result in a 'functional' toilet as output. The use of toilets by students results in an outcome of improved health and reduced morbidity reflected in their improved attendances. The better attendance is envisaged to result in better performances attracting more students to school leading to improved enrolment. This finally, will result in economic growth and development in terms of long term impact of the programme (Figure 2).

Figure 2: Swachh Vidyalaya – The Theory of Change



Evaluation Type, Criteria and Indicators

The present evaluation is aimed to be an outcome evaluation rather than an impact evaluation. The reason for this is simple – the short time-lag involved. The Swachh Vidyalaya interventions were carried out during 2014 – 2016. The evaluation is carried out within a year post-intervention. Impact being a long-term phenomenon, impact evaluation, therefore, is not feasible at this point of time.

The present evaluation is based on three evaluation criteria – efficiency, effectiveness and sustainability. It may, however, be mentioned that since the programme is implemented as a part of national commitment fulfilling the obligations of the Right to Education Act, the criteria of relevance is supposed to be automatically fulfilled.

The criterion of efficiency is applied at the level of output. The output is efficient only when the essential elements of Swachh Vidyalaya (given in pp.17-18 in the Guideline) are fulfilled. These elements include adequate sanitation, privacy and space, hand-washing facilities as well as practice, drinking water, regular operation and maintenance, capacity building and behavioural activities. The efficiency is, accordingly defined as functionality of the toilets – i.e. functional toilets are complete in respect of the essential elements – hence, more efficient in delivering the desired outcomes.

The criterion of effectiveness is applied at two levels – both at the level of output as well as outcome. Evidently, the output is effective when it is in use. On the other hand, the outcome is effective when anticipated results are obtained. There are two intended outcomes of the Swachh Vidyalaya campaign – improved health and improved educational performances. The first is captured through overall school attendance rate while the second is captured by the overall enrolment in the school.

Overall school attendance rate is taken as the percentage of number of students present multiplied by the number of working days to the total enrolment multiplied by number of working days. The attendance is taken as an indicator of good health reflected by reduced number of days when children fall sick and, hence, being absent. The overall enrolment is taken as an indicator of better educational performances attracting more students to the school.

The criterion of sustainability is applied at the level of outcome. The impact is consequent on the sustainability of the outcome. The two interconnected outcomes – improved health and improved educational performances are sustainable when comprehensive perspective of sanitation is put into practice. The comprehensive perspective of sanitation includes, apart from physical facility of functional toilets, the other two components viz. drinking water and better hygiene behavioural practices. Besides, maintenance of the toilets also contributes positively towards sustainability.

The above, thus, constitutes the Logical Framework (Log-Frame) of the present evaluation of the Swachh Vidyalaya campaign which is summarised in Table 1.

Table 1: Evaluation Log-Frame

Evaluation Criteria	*Level*	*Indicator*
Efficiency	Output	Whether the essential elements of Swachh Vidyalaya programme guideline have been fulfilled?
Effectiveness	Output	Whether toilet is in use?
	Outcome	Whether a) Attendance rate has improved & b) Enrolment has improved?
Sustainability	Outcome	Whether a) Complementary facilities available b) Better behavioural practices exist & c) Maintenance of the facility is ensured?

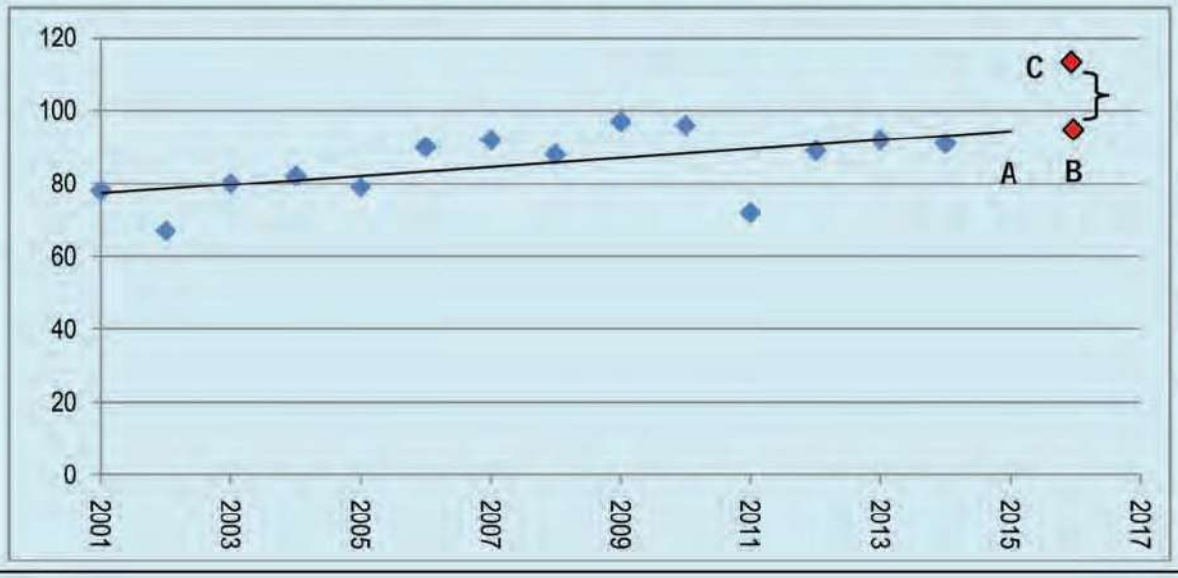
Evaluation Method

Generally speaking, evaluation attempts at obtaining attributable results emanating from any intervention. From the Log-Frame presented in Table 1, it is, however, obvious that barring the effectiveness of outcome intended to be measured in terms of improvement in the attendance rate and enrolment, other criteria of evaluation don't necessarily require any attribution. Notwithstanding, given the nature and the context of the programme, specific attribution even for the attendance rate and enrolment, is met with particular challenges.

The first challenge relates to the saturation nature of the programme. It is envisaged that all schools will be covered under the programme. This, therefore, entails the practical problem of obtaining an appropriate 'control group' i.e. a set of schools without intervention which are otherwise similar to those with intervention for making necessary comparisons for attribution. This eliminates the possibility of applying several standard evaluation methods – both experimental as well as quasi-experimental – such as randomised control trial, propensity score matching or double difference.

Box 1: Modified Pre-Post Method

In the diagram below based on the data for the period 2000-2016 a trend line is fitted. The projected value of for the year 2017, based on the past trend is obtained as B, where as the actually observed value is found to be C. The modified Pre-Post Method will consider the difference between B and C, rather than usual Pre-Post Method of considering A and C.



The second challenge is regarding the possible counterfactuals – determining what could have been the situation without the intervention. Usually, such a comparison is arrived at by examining 'pre' and 'post' scenarios provided all intervening factors are suitably controlled. It is observed that there is no specific new intervention that directly targets school attendance. Therefore, 'pre' and 'post' comparison is applied in case of attendance rate to evaluate the programme effect. Since the programme period was 2014-2016, attendance rate of August and September 2015 is compared with that of the August and September 2016.

The case of enrolment, however, offers some special challenges. First, there have been several competing programmes aiming at improving school facilities which implicate enrolment. To statistically control all such intervention presents myriad practical difficulties. Second, indicator like enrolment also contains a "trend element". It is, therefore, necessary to incorporate trend element in the 'pre' intervention scenario.

With a modified pre-post method, the present methodology utilises the enrolment data given by DISE for deriving the counterfactual scenario for enrolment. Based on the trend of last five years of enrolment, a projected enrolment is obtained for the select schools, which is taken as the counterfactuals. The observed enrolment is then compared with the projected enrolment to see the programme effect.

Two statistical tools are then applied to draw conclusions regarding effectiveness of the outcomes viz. attendance rate and enrolment. First, proportion of individual schools where post intervention scenario is better than the pre intervention scenario is obtained for evaluating success against the hypotheses. Second, averages of 'pre' and 'post' are compared by the paired-t test to evaluate the aggregate programme effect and success.

Sampling

The success of the Swachh Vidyalya Abhiyan, is defined as the two-third (i.e. 66 percent) of the schools qualifying or fulfilling the specific criteria with a margin of error 5 percent. This, in general, defines the confidence interval for population estimate to qualify the programme as a 'success'. Given this, a sample of 314 out of the total 2702 schools will be to be good enough to draw conclusions with a level of confidence of 95 percent, with a fixed design effect of 1.1.

District wise number of sample schools is provided in the table below. The schools are stratified on the basis of school type viz. primary/upper primary and secondary and then the sample schools have been selected at random. This sample size of the schools under the Swachh Vidyalya initiatives will be statistically robust for the proposed impact evaluation study. The sample schools were than selected at random. The sample distribution of schools is given in Table 2.

Table 2: Sample Distribution of Schools

STATE	DISTRICT	SAMPLE
ASSAM	BARPETA	5
	DARRANG	11
	DHEMAJI	61
	JORHAT	11
	KAMRUP	7
	LAKHIMPUR	158
	NAGAON	7
	NALBARI	8
	SIBSAGAR	15
	SONITPUR	14
ARUNACHAL PRADESH	PAPUM PARE	12
	WEST SIANG	5
TOTAL		314

Hypotheses

The present evaluation intends to test the hypotheses that the Swachh Vidyalaya interventions of Subansiri Lower HEP have been efficient, effective and sustainable.

Findings

As evident from the Log-Frame (Table 1), there are four main questions which the present evaluation intends to answer. The questions to which answers are attempted are:

a)Whether the interventions can be considered as efficient in terms of the output

b)Whether the interventions can be considered as effective with respect to the output

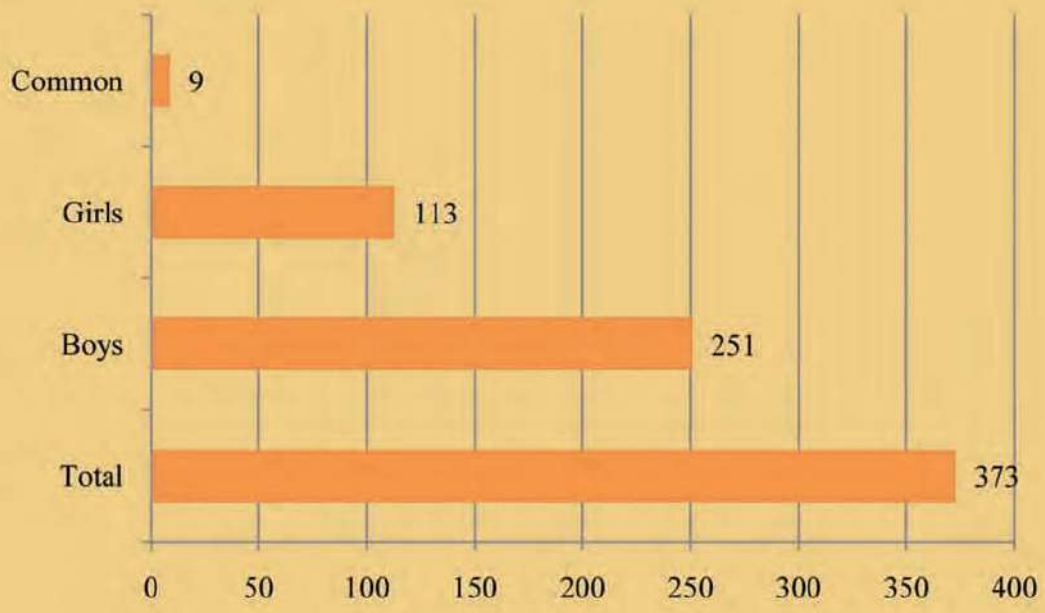
c)Whether the interventions can be considered as effective with regard to the outcome

d)Whether the interventions can be considered as sustainable in terms of the outcomes

Efficiency in terms of output

The efficiency in terms of output is measured by taking note of the "essential elements" of the programme. Efficiency has been defined as fulfilment of the essential elements mandated by the programme guideline. From the sample of 314 schools it is found that total number of toilets constructed is 373, which includes 251 boys, 113 girls and 9 common toilets (Figure 3).

Figure 3: Type of construction of sample toilets

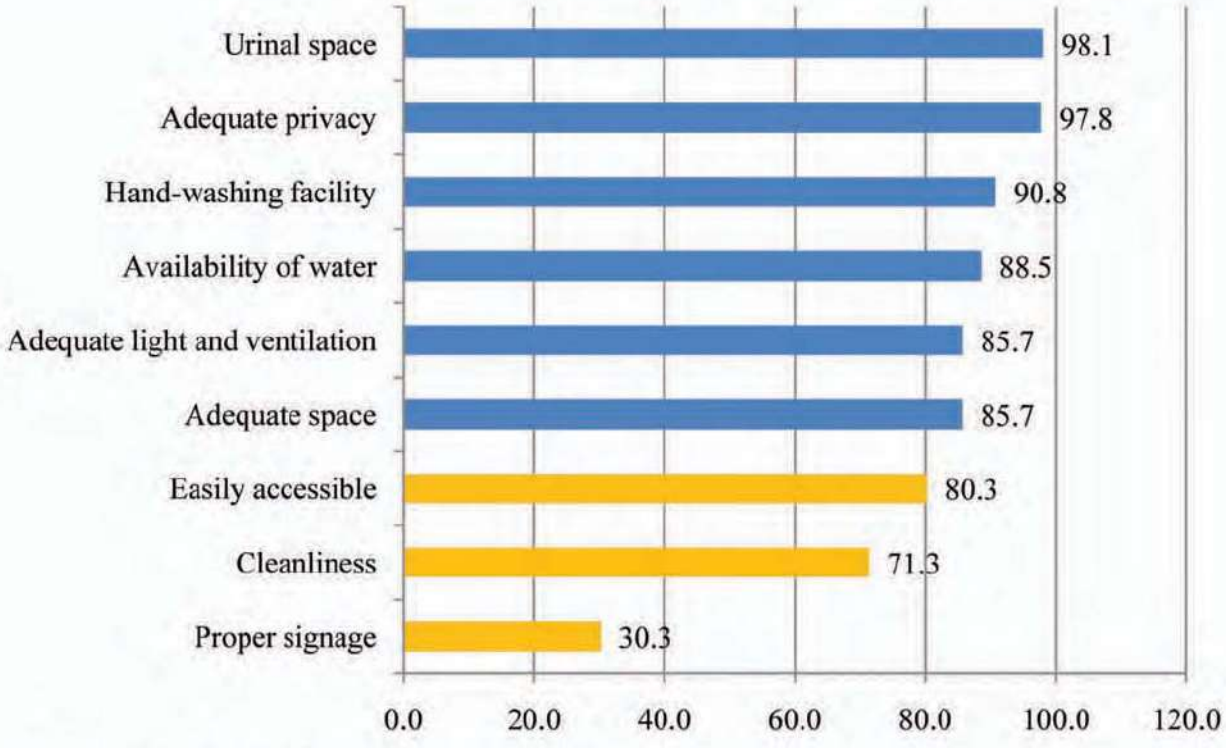


Source: Field Work, Sep-Oct, 2017

From the Figure 3, it is apparent that there are some schools where more than one toilet has been constructed. The school being the primary sampling unit, in such situation, the school has been considered to fulfil the essential elements when all the toilets built under the Swachh Vidyalaya campaign qualify to have the essential elements.

Following the programme guideline, nine "essential elements" of a "functional" toilets were considered for examining efficiency of the outcome which include availability of water, easy access, hand-washing facility, cleanliness, separate urinal, adequate space, adequate light and ventilation, adequate privacy and proper signage. The percentages of schools found to fulfil these essential elements are provided in Figure 4. From the Figure 4, it is obvious that the schools are lacking in three essential elements viz. accessibility, cleanliness and proper signage.

Figure 4: Schools fulfilling essential efficiency parameter of toilet (in percent)



Source: Field Work, Sep-Oct, 2017

To find out the overall efficiency of output, simultaneous fulfilment of the essential elements by schools needs to be considered. Given the nine elements, a school is considered to qualify efficiency criterion in terms of the output if two-third i.e. 6 out of 9 or more elements are fulfilled simultaneously. The number of criteria fulfilled simultaneously is given in Table 3.

Table 3: Number of criteria fulfilled simultaneously by school (Number)

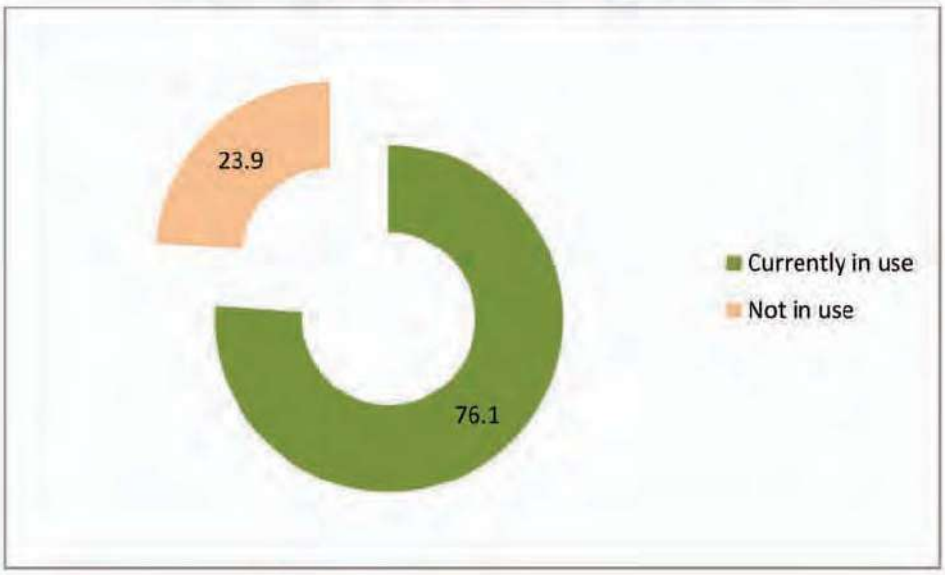
Number of Criteria	*Number of Schools*
3	3
4	15
5	15
6	50
7	64
8	104
9	63
Total	314

From the Table 3, it is evident that all together 89.5 percent school qualify the efficiency criterion of output. Given the assume margin of error of 5 percent, this gives a confidence interval of 84.5 to 94.5 percent for the population proportion. Clearly, therefore, it may be concluded that the interventions are efficient in terms of output.

Effectiveness of Output

As per the Log-Frame, the effectiveness of output is defined in terms of the use of the output i.e. toilet. When toilets are used by students, only then desired outcome can be expected. It is found that out of 373 numbers of toilets constructed, 76.3 percent of the toilets are in use (Figure 5). With 5 percent margin of error, this gives a confidence interval of 71.3 to 81.3 percent which is more than the expected proportion of 66 percent. Thus, it may be concluded that the interventions have been effective in terms of output.

Figure 5: Use of toilet (in percent)



Source: Field Work, Sep-Oct, 2017

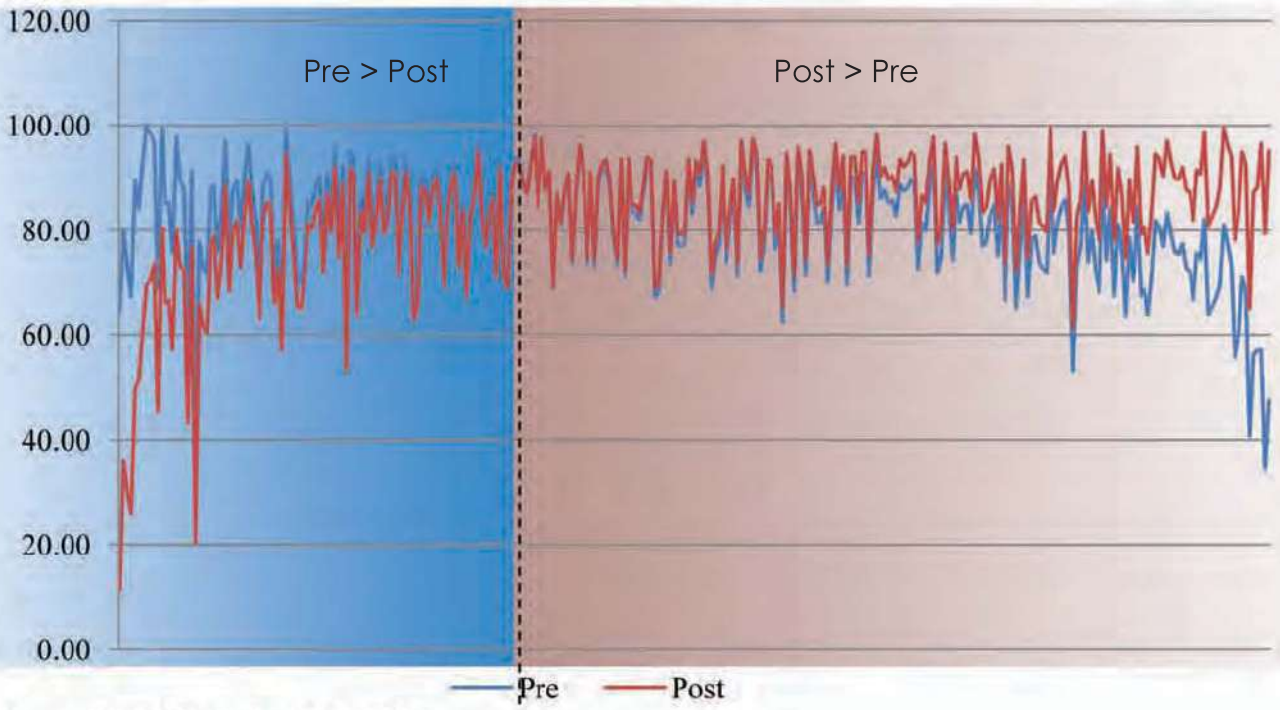
It is, also, found that efficiency and effectiveness are both inter-related. Efficient i.e. functional toilets tend to be more effective. It is observed that 74 percent of the total toilets are both efficient and effective. The inter-dependency is found to statistically significant (Chi-square 13.76, $p<0.05$) and hence can be expected in the population as well.

Effectiveness of Outcome

The Log-Frame defines effectiveness of the outcome in terms of two indicators – attendance rate and enrolment of students. As has been described earlier, the attendance rate is used to indicate the improved health and enrolment for improved educational performances of students.

The 'pre' attendance scenario in selected schools i.e. overall attendance rate of students in the months of August and September 2015 when compared with the 'post' attendance scenario i.e. overall attendance rate of students in the months of August and September 2016, it is found that 'post' scenario is better than the 'pre' scenario in 63.7 percent of the schools (Figure 6). This gives the confidence interval of 58.7 to 68.7 percent that contains the expected frequency of 66 percent. Therefore, **with reference to the indicator of attendance rate, the outcome of the intervention can be considered as effective.**

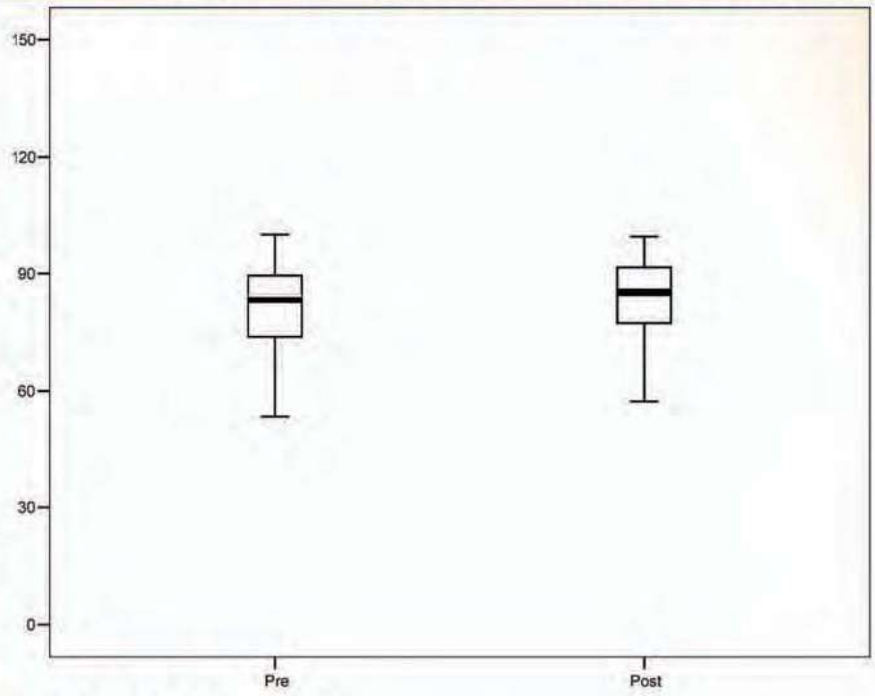
Figure 6: Pre-Post Attendance Rates in Schools (in ascending order of differences)



Source: Field Work, Sep-Oct, 2017

Further, it is observed that the average post attendance rate 82.7 percent is found to be higher than the average pre attendance rate of 81.2 percent (Figure 7). The difference in average attendance rate by 1.5 percent is found to be statistically significant ($t=2.367$, $p<0.05$). **The intervention, therefore, contributes to improvement in attendance rate, which can be generalised for the population as a whole.**

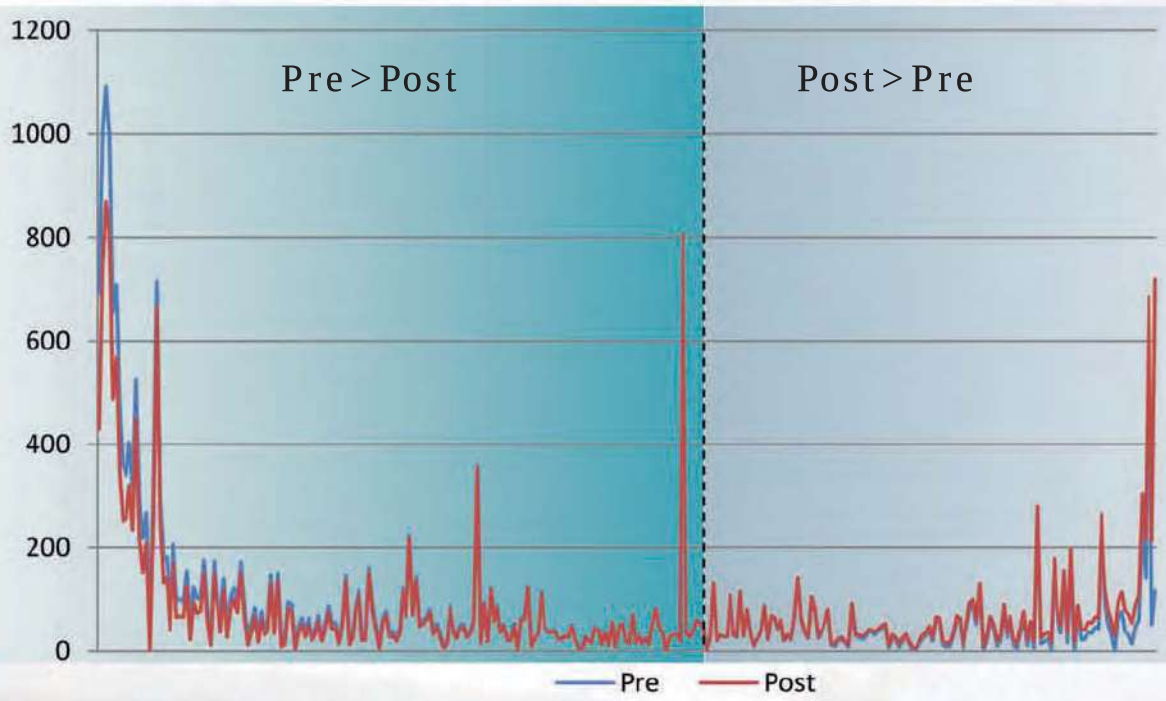
Figure 7: Pre-Post Average Attendance Rates in Schools



Source: Field Work, Sep-Oct, 2017

In case of the enrolment, 'pre' and 'post' scenario comparisons are carried out by 'modified method' (see Box 1). Data from sample reveal that 'post' enrolment scenario is better in 46.2 percent of the schools compared to 'pre' enrolment scenario (Figure 8). With a margin of error of 5 percent, this gives the confidence interval of 41. 2 to 51.2 percent which is less than the expected proportion of 66 percent. **Therefore, in terms of enrolment, the interventions can't be considered effective.**

Figure 8: Pre-Post Enrolment Scenarios in Schools (in ascending order of differences)



Source: Field Work, Sep-Oct, 2017

Overall, the average enrolment in pre-intervention scenario (given by the counterfactuals) is found to be 87.6 which is higher than the post intervention enrolment of 83.1 (Figure 8), difference is not found to be statistically significant (t=1. 614, p>0.05). This limits the conclusion regarding effectiveness of the outcome of the intervention in terms of increase in enrolment in schools.

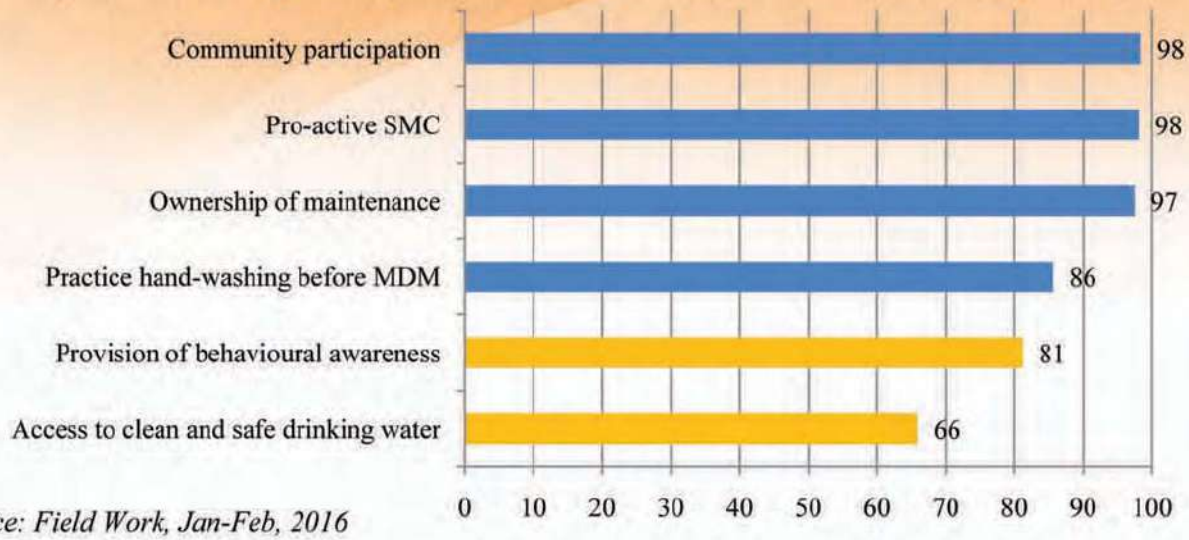
Notwithstanding, the increase in enrolment is to be seen in proper perspective. Given the fact that only one academic session has passed since the intervention, the time-lag is too short for assessing improvement in enrolment in school. Secondly, since all schools are being covered under the campaign, focusing on enrolment in any one particular school is met with practical limitations. Thirdly, enrolment depends on demographic distribution and factors which do not change in a short period of time. It is therefore expected that the intervention will start showing up results in improvement in enrolment by reducing over the period of longer time.

Sustainability of Outcome

The sustainability of the outcome is a primary requirement to continue the effectiveness of the outcome and resulting in impact envisaged. The Swachh Vidyalaya campaign takes thoughtful note of the comprehensive perspective of sanitation. This include, besides physical facilities of sanitation, access to drinking water and behavioural change. Moreover, ownership and maintenance of the facilities created are also vital ingredients of sustainability.

It is found that 66 percent of the schools have access to clean and safe drinking water. About 81 percent of the schools said to have provided behavioural awareness and 86 percent schools have reported to practice regular hand-washing before mid day meal (MDM). Likewise almost all schools (97.5 percent) said to have own the maintenance of the toilets while equally overwhelming number of schools reported to ensure community participation (98 percent) with a pro-active role of the school management committee (98 percent) (Figure 9).

Figure 9: Drinking Water, Maintenance and Behavioural Practices (in percent)



Source: Field Work, Jan-Feb, 2016

It may be noted that with a defined margin of error of 5 percent for all of these produces a confidence interval that contains the desired proportion of 66 percent. It is, therefore, concluded that the interventions qualifies the sustainability criteria in terms of outcome.

Summary of the Findings

Findings can be summarised and broad conclusions based on them can be presented as under:

- Swachh Vidyalaya interventions carried out under the CSR initiative of Subansiri Lower HEP's in the year 2014-2017 have been efficient in terms output. About 89.5 percent of schools found to have qualified the efficiency criterion of output. The efficiency in output is defined as simultaneously fulfilling two-third of the mandatory essential elements of the guideline of the Swachh Vidyalaya campaign in constructing 'functional' toilets.

- However, out of the nine such essential elements considered the schools mostly lack in three essential elements viz. proper signage, cleanliness and accessibility.

- The interventions have been found to be effective in terms of output. The effectiveness at the level of output is defined as usability of the output. It is found that 76.3 percent of the toilets are currently being used by students.

- It is, also, found that efficiency and effectiveness are both inter-related. Efficient i.e. functional toilets tend to be more effective. It is observed that 74 percent of the total toilets are both efficient and effective. Further, the inter-dependency is found to statistically significant.

- Most importantly, with reference to the indicator of attendance rate, the outcome of the intervention has turned out to be effective as the 'post' attendance scenario is found to be better than the 'pre' attendance scenario in 63.7 percent of the schools.

- Further, in aggregate terms, it is observed that the average post attendance rate of 82.7 percent is found to be higher than the average pre attendance rate of 81.2 percent and the difference in average attendance rate by 1.5 percent is found to be statistically significant (level of significance being 5 percent).

- The intervention, therefore, contributes to improvement in attendance rate, which can be generalised for the population as a whole.

- In terms of improving enrolment, however, the interventions cannot be considered effective. This, however, needs to seen keeping in view the too short a time-lag involved in assessing a long-run phenomenon like enrolment.

The intervention qualifies the sustainability criteria which consider, besides physical facilities of sanitation, access to drinking water and behavioural change.All these notwithstanding, **it is clear that interventions carried out under the CSR initiatives primarily fulfilled the physical requirement of toilets for school sanitation. It has been observed that the initiatives have hardly any convergence with the complementary facilities like that of drinking water and, most importantly, behavioural change practices in schools.** It has been realised that this is primarily because of the obligatory nature of the programme implementation, which focused more on accomplishment and achieving time-bound targets rather than desired outcomes. The mode of implementation, thus, has defeated the comprehensive perspective with which the programme was designed. The learning from this experience has been that both the programme design and the mode of implementation need to be consistent in perspective if the programme is to be successful in delivering the desired outcome.

WHAT LIMITS FUNCTIONALITY OF THE TOILETS?

Two things are found to be primarily responsible for most of the toilets remaining unused. The first is the behavioural practices i.e. cleanliness, which remain outside the present intervention. The second is the lack of access to the toilets. In 24 numbers of schools the toilets were not functional because those were found locked. The lack of water in 36 numbers of schools, is another limiting factor. The Swachh Vidyalaya guideline mandates provisioning of water in toilets. This important requirement is fulfilled by creating a facility for storage of water, rather than providing a source of water, in some of the cases. This, practically, did not solve the problem of water, rather introduced another problem of storing water for toilets. As a result, once the initial storage exhausted, the tanks remained empty.

The physical quality of the toilets is another important dimension of functionality. It was found that the interventions carried out under the CSR initiatives primarily aimed at providing a toilet block to ensure only the physical requirement for school sanitation, particularly in Arunachal Pradesh. It has been observed that the initiatives have fulfilled hardly any quality construction and convergence with the complementary facilities like water and, most importantly, cleanliness.

Besides, recognising the enrolment of students in the schools is also critical in delivering desired results. Field insights reveal that even lack of enrolment can impede functionality of toilets. For instance, in 574 No. Kulabari LPS of Lakhimpur District, Assam and Govt. Primary School, Lora, Arunachal Pradesh reported no enrolment of students for the academic year 2016-17.

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