

*Full Length Research Paper*

# **A study of sanitation of toilets in elementary and senior Secondary schools located in rural areas of Uttarakhand state in India**

**Abhimanyu Kumar<sup>1\*</sup> and Anshu Taunk<sup>2</sup>**

<sup>1</sup>Government Post Graduate College, Ranikhet, India.

<sup>2</sup>Delhi High Court, India.

Accepted 8 February, 2010

**This paper is based on the primary data collected from the teachers and the students studying in the elementary and senior secondary schools situated in rural areas of the state of Uttarakhand in India. The study was conducted in six districts of Uttarakhand. All these schools were randomly sample. Data were collected through interview schedule in an unbiased manner. The sample included 200 elementary and 142 senior secondary schools situated in the rural areas of six Districts of Kumoun Mandal (Commissionary) of Uttarakhand.**

**Key words:** Sanitation, schools, toilets facility, rural area.

## **INTRODUCTION**

The study is related to the sanitation of lavatories used in elementary and senior secondary schools situated in the rural areas of Uttarakhand. Therefore, before discussing this issue, it is desirable to present the definition of sanitation, Elementary schools, secondary schools, senior secondary schools, rural areas and Uttarakhand.

## **SANITATION**

Sanitation is basically a hygienic disposal or recycling of waste. It also is considered as a practice that allows protection of health with the help of hygienic measures (UNESCO, 2003). It is also commonly understood as a term that is used for treatment of waste in its original form. "Sanitation" is understood to mean "the promotion of hygiene and prevention of disease by maintenance of sanitary conditions". In the nineteenth century the term "sanitary" was understood to mean something "relating to health, or relating to or used in the disposal of domestic waterborne waste" (Merriam-Webster's Collegiate Dictionary, eleventh edition year, 2003: 84) (Sinha and

Menon, 1999). The 1999 protocol on water and health to the 1992 convention on the protection and use of trans-boundary watercourses and international lakes defines sanitation as "the collection, transport, treatment, and disposal or reuse of human excreta or domestic water-waste, whether through collective systems or by installation, serving a single household or undertaking". This understanding of the term includes, not only the removal of waste from direct contact with human beings, but also its treatment and possible safe reuse (Kumar, 1988). It has been found that poor water and sanitation facilities have many other serious repercussions. A direct link exists between water, sanitation and health, and nutrition and human well-being.

Consumption of contaminated drinking water, improper disposal of human excreta, lack of personal and food-related hygiene and improper disposal of solid and liquid waste have been major causes of many diseases in India and it is estimated that around 30 million people suffer from water-related diseases (Blackwell, 2004). Children, particularly girls and women, are the most affected. Therefore, India is burdened with sanitation related diseases as listed below. (Central Bureau of Health Intelligence, Ministry of Health and Family Welfare, 1998 - 99).

About 30 million persons in rural areas suffer from

\*Corresponding author. E-mail: [kumar\\_abhi004@yahoo.co.in](mailto:kumar_abhi004@yahoo.co.in).

sanitation-related diseases.

Five of the top killer diseases of children aged 1 - 4 years in rural areas are related to water and sanitation. There is economic loss of rupees 12 billion annually due to loss of man-days on account of diseases (Suri and Kalapana, 2008).

As far as school sanitation is concerned UNICEF (Central Bureau of Health Intelligence, Ministry of Health and Family Welfare, 1998 - 99) in its assessment on school sanitation and health education (SSHE) has noted that there are about 600,000 primary schools in rural India in which only one in every 10 schools has adequate toilets and urinals. According to the WHO report, 2000. Round table discussion. Health inequalities and the health of the poor. (Bulletin of the world health organization 2000: 75 – 85) Children die every day due to lack of sanitation in India (India, 2009).

## ELEMENTARY SCHOOLS

An elementary school is an institution where children receive the first stage of compulsory education known as elementary or primary education. Elementary schools are the preferred term in some countries, particularly those in North America primary school is the preferred term in the United kingdom, India, Pakistan, Australia, Latin America, South Africa and New Zealand and in most publications of the United Nations educational, Scientific and cultural organization (UNESCO, 2003).

## SECONDARY SCHOOL / SENIOR SECONDARY SCHOOL

Secondary school/Senior secondary school is a term used to describe an educational institution where the final stage of compulsory schooling, known as secondary education, takes place. It follows on from elementary or primary education. A school that is intermediate in level between elementary school and college and that usually offers general, technical, vocational, or college preparatory curricula.

S:(n) secondary school, lyceum, lycee Gymnasium, middle school (a school for students intermediate between elementary school and college, usually grades 9 to 12).

## RURAL AREAS

Rural areas (referred to as "the countryside") are large and isolated areas of a country, often with low population density.

## UTTARAKHAND

Uttarakhand is a state located in the northern part of India. It was carved out of Himalayan and adjoining districts of Uttar Pradesh on 9 November 2000, becoming the 27<sup>th</sup>

state of the Republic of India. It borders Tibet on the north, Nepal on the east, the Indian states of Uttar Pradesh to the south, Haryana on the west and Himachal Pradesh on the North West. The region is traditionally referred to as Uttarakhand in Hindu scriptures and old literature, a term which derives from Sanskrit *uttara* meaning north and *khandā* meaning country or part of a country. It has an area of 20,682 km<sup>2</sup> (53,566 km<sup>2</sup>) (Setty and Ross, 1987).

Describing a clean environment as an indicator of nation's development, President A.P.J Abdul Kalam called for a mission to provide sanitation to all rural homes by 2010 (President's address at the Nirmal Gram Puraskar Function at Vigyan Bhawan, 23.03.2006, New Delhi). He also called upon all concerned to "educate children right from the age of three to make use of sanitary facilities". Some other points, which he highlighted, are as follows:

1. Families and teachers should take up the task as a part of the sanitation campaign. Inadequate sanitation facilities were the greatest health hazard for rural India with water-borne diseases such as hepatitis, leprosy and tuberculosis, commonly affecting people.
2. Provision of sanitation facilities to all homes, schools hospitals and community halls in rural areas should be made (Sripati and Thiruvengadam, 2004)
3. The sanitation mission must be executed through village Panchayats.

Human excreta forms an important cause of pollution and every society has a responsibility to ensure its safe removal. The problems of improper excreta disposal can lead to:

1. Soil pollution
2. Water pollution
3. Contamination of foods
4. Propagation of files

The diseases, which can occur due to environmental pollution and inadequate sanitation are typhoid and paratyphoid fever, dysenteries, diarrhoeas, cholera, hookworm, ascariasis, viral hepatitis and a host of other intestinal infections and parasitic infestations.

Of course, several national level surveys have been conducted on the status of school sanitation, yet, few studies have been conducted on their use, cleanliness and technology used in the toilets in schools. Moreover, scant studies have been conducted in the field of sanitation in elementary and senior secondary schools. On these grounds, the present study has a special significance for the policy makers, educationists and researchers to get details of the sanitation facilities available and their quality in various educational institutions, particularly in elementary and senior secondary schools in rural areas of the state (Vrat, 2006).

**Table 1.** Percentage of schools in Uttarakhand having toilet facility (2004).

Categories	Combined toilets	Exclusive girl's toilets
Primary schools	56.93	41.86
Primary schools with upper primary sections	69.61	72.48
Primary schools with upper primary, secondary and higher secondary sections	44.25	32.91
upper primary	63.61	69.31
upper primary schools with secondary and higher secondary sections	41.81	28.24

Source: Arun C Mehta Elementary Education in India - Analytical Report 2004, NEUPA, New Delhi.

**Table 2.** Number of elementary and senior secondary schools included in the sample.

District	Elementary schools	Senior secondary schools	Total
Almora	21	12	33
Pithoragarh	48	38	86
Nainital	36	22	58
Bageshwar	17	17	34
Champawat	29	25	54
Udham Singh Nagar	49	28	77
Total	200	142	342

**Table 3.** Percentage of schools with toilet facilities.

District	Elementary schools	Senior secondary schools	Total
Almora	21(100.00)	12(100.00)	33(100.00)
Pithoragarh	46(95.83)	37(97.36)	83(96.51)
Nainital	36(100.00)	22(100.00)	58(100.00)
Bageshwar	11(64.70)	14(82.35)	25(73.52)
Champawat	27(93.10)	25(100.00)	52(96.29)
Udham Singh Nagar	49(100.00)	28(100.00)	77(100.00)
Total	190(95.00)	138(97.18)	328(95.90)

Note: figures in parenthesis shows percentages to the total.

## OBJECTIVES

The objectives of this study are as follows:

1. To study the status of toilets in elementary and senior secondary schools situated in rural areas of Uttarakhand state.
2. To study the type of infrastructure used in toilets of these schools.
3. To study the status of cleanliness of these toilets.

## RESEARCH METHODOLOGY

With a geographical area 53,485 km<sup>2</sup> spread across 13 districts Uttarakhand is unique in its topography and large rural population 75% of total. The study was conducted in six districts of Uttarakhand. The elementary and senior secondary schools were covered in the study. All these schools were randomly selected. The total number of schools selected were 342 including 200

elementary and 142 senior secondary schools. The sample covered sufficient number of elementary and senior secondary schools from each district of kumaun mandal (Commissionary) of Uttarakhand state. This paper is based on simple and rapid comparisons of frequency percentages are suggested as an alternative to scoring and scaling methods in analyzing simple percentages of status of toilets where more mathematical sophisticated ones are now in use. The only apology is that for some data and purposes a quick and easy method seems more sensible than a time consuming and complex one. This is most obviously, when the data to be analyzed are subject to large biased errors or when assumptions underlying the more advance techniques are not even approximately met. Unfortunately, at present much sociological research has been conducted against such odds. A typical illustration is current study of status. Although the term "status" is a highly intangible concept and is not subject to exact measurement. Therefore, simple percentage method is used in analyzing the status of toilets in elementary and senior secondary schools located in the rural areas of Uttarakhand (Tables 1 and 2).

Table 3 shows the percentage of schools using toilets in rural areas of various districts of Uttarakhand. The percentage of elementary schools having toilets is 95 and that of senior secondary

**Table 4.** Percentage of toilets with functional water supply.

District	Elementary school	Senior secondary school	Total
Almora	18(85.71)	8(66.66)	26(78.78)
Nainital	33(91.66)	15(68.18)	48(82.75)
Pithoragarh	28(60.86)	30(81.08)	58(69.87)
Bageshwar	8(72.72)	3(21.42)	11(44.00)
Champawat	23(85.18)	23(92.00)	46(88.46)
U.Singh Nagar	15(30.61)	26(92.85)	41(53.24)
Total	125(65.78)	105(76.08)	230(70.12)

Note: figures in parenthesis shows percentages to total.

**Table 5.** The use of toilets in Elementary and Senior Secondary Schools.

Districts	Not used		Used by all		Teachers only		Total
	Elementary schools	Senior secondary schools	Elementary schools	Senior secondary schools	Elementary schools	Senior secondary schools	
Almora	1(3.03)	00	16(48.48)	7(21.21)	6(18.18)	3(9.09)	33
Nainital	1(1.72)	1(1.72)	35(60.34)	17(29.31)	3(5.17)	1(1.72)	58
Pithrogarh	1(1.20)	1(1.20)	40(48.19)	35(42.16)	4(4.81)	2(2.40)	83
Bageshwar	1(4.00)	00	15(60.00)	8(32.00)	1(4.00)	00	25
Champawat	00	00	29(50.76)	19(36.53)	2(3.84)	2(3.84)	52
UdhamSingh Nagar	5(.6049)	3(3.81)	24(31.16)	34(44.15)	6(7.79)	5(6.49)	77
Total	9(2.74)	5(1.52)	159(49.47)	120(36.58)	22(6.70)	13(3.96)	328

Note: figures in parenthesis shows percentages to total.

schools is 97.18.

All toilets have been constructed under the Serve Shikhya Abhiyan Scheme of the government of India under the supervision of the village education committee, which mainly consisted of the headmaster of the schools, one teacher of the school, Gram Pradhan (Head) of the village and one scheduled caste (Dalit) member of the Panchayat. However, as opined by the school teachers, the role of village education committee is largely confined to the construction of toilets and it hardly takes care of the operation and maintains of these toilets. It is also observed that in a few villages non resident Indians have contributed money to villages' education committee for the construction of good quality school toilets. The village Panchayats largely undertakes the construction of toilets as their duty with the help of grant available from government. As there is no specific grant for operation and maintenance of these toilets, they do not take interest in their operation, and maintenance, and also in construction of toilets in elementary and senior secondary schools.

Out of the total elementary schools with toilets, 65.78% have functional toilets with proper water supply, whereas 76.08% of all senior secondary schools have functional toilets with water supply (Table 4). The toilets of nearly 34% of elementary schools and 24% of secondary schools toilets have remained non-functional because of the following reasons: breakage in the toilets on account of faulty construction, lack of water supply to the toilets and poor monitoring of cleanliness and lack of proper operation and maintenance. The elementary schools locked their toilets and used them whenever they needed. They are of the view that, because of lack of sweepers and functional water supply, children make the toilets dirty and unfit for further use. The lack of assured water supply to the toilets and absence of sweepers are the two main reasons for

which teachers do not allow children to defecate in the combined toilets unless there is an emergency.

Table 5 shows that 2.74% of toilets in six districts of Uttarakhand state are not used by elementary school children at all and 1.52% of toilets are not used by senior secondary school children at all. Again by analyzing Table 5, it has been observed that 49.47% of toilets in elementary schools and 36.58% of toilets in senior secondary schools are used by all children and teachers. The study further shows that 6.70% of toilets in elementary schools and 3.96% of toilets in senior secondary schools have been used by teachers only. Thus, the following conclusion has been arrived at by analyzing Table 5. Those toilets are being used in most of the elementary schools in comparison to senior secondary schools. This is due to the awareness of the pupils of the senior secondary schools and their percentage is less in comparison to the elementary schools as their pupils fulfill their sanitation needs in their homes.

The cleanliness of toilets is vital both for health and hygiene of the pupils. As far as cleanliness of school toilets is concerned 19.42% of toilets of elementary schools of six districts of Uttarakhand are cleaned by children, whereas 3.18% of toilets in senior secondary schools are by children. Again, by analyzing the table, it has been observed that 28.66% of the toilets of the elementary schools have been cleaned by the sweepers, whereas 37.57% of toilets of senior secondary schools have been cleaned by sweepers. The study further shows that 9.55% of toilets of elementary schools are not at all cleaned by any one, whereas 1.59% of toilets of senior schools are in the same condition.

From the above Table 6, it can be inferred that maximum cleanliness in toilets has been maintained by senior secondary schools.

**Table 6.** Percentage of toilets cleaned by children and sweepers in Elementary and Senior Secondary Schools.

Districts	By children		By sweeper		Not cleaned		Total
	Elementary Schools	Senior Secondary Schools	Elementary Schools	Senior Secondary Schools	Elementary Schools	Senior Secondary Schools	
Almora	8(25.00)	3(9.37)	8(25.00)	12(37.50)	1(3.12)	00	32
Nainital	9(16.07)	00	13(23.21)	22(39.28)	10(17.85)	2(3.57)	56
Pithoragarh	15(18.50)	2(2.46)	18(22.22)	30(37.03)	14(17.28)	2(2.46)	51
Bageshwar	8(33.33)	00	4(16.66)	12(50.00)	00	00	24
Champawat	6(11.53)	00	21(40.38)	20(38.46)	4(7.69)	1(1.92)	52
UdhamSingh Nagar	15(21.73)	5(7.24)	26(37.68)	22(31.88)	1(1.44)	00	69
Total	61(19.42)	10(3.18)	90(28.66)	118(37.57)	30(9.55)	5(1.59)	314

Note: figures in parenthesis shows percentage to total.

**Table 7.** Techniques used in the construction of toilets.

District	Single pit lined pour flush	Single pit unlined pour flush	Double pit lined pour flush	Double pit unlined pour flush	Single direct pit lined pour flush	Single direct pit unlined pour flush	Septic tank	Total
Almora	5(5.00)	15(15)	19(19)	4(4)	00	00	57(57)	100
Nainital	2(1.3)	24(16)	17(11.3)	8(5.3)	25(16.6)	31(20.6)	43(28.6)	150
Pithoragarh	3(2.8)	00	3(2.8)	00	00	00	98(94.2)	104
Bageshwar	14(18.4)	2(2.6)	5(6.5)	00	2(2.26)	00	53(69.7)	76
Champawat	6(4.2)	12(8.3)	15(10.4)	10(6.9)	9(8.2)	31(21.6)	60(41.9)	143
U.singh Nagar	1(0.75)	21(15.9)	41(31.0)	4(3.0)	1(0.75)	3(2.2)	61(46.2)	132
Total	31(4.3)	74(10.4)	100(14.1)	22(3.1)	26(3.6)	65(9.2)	372(52.7)	705

Note: figures in parenthesis shows percentage to total.

Use of the appropriate and user-friendly technique in the construction of toilets motivates children to use them and keeps them clean for a large period. Data in Table 7 reveal that toilets in 52.7% of elementary and senior secondary schools are provided with a septic tank. Table 7 also reveals that the toilets with septic tanks are 46.2 and 94.2% respectively in economically developed district of Pithoragarh and Udham Singh Nagar. In these two districts world bank has also contributed funds for the construction of toilets in schools. A large number of Kumauni Diasporas are from these two districts. On the country, in economically backward districts of Nainital and Champawat, only 28.6 and 41.9% of elementary and senior secondary schools respectively have toilets with septic tanks.

## DISCUSSION

### Causes of poor sanitation of toilets of elementary and senior secondary schools

1. Lack of appropriate sanitary facilities.
2. Backwardness in pupils regarding sanitary techniques.
3. Lack of literacy in pupils regarding sanitation.
4. Lack in construction and maintenance of school toilets in particular area.
5. Lack of awareness in pupils regarding sanitation standards and the adverse health impact of unsanitary conditions.

6. Lack of social mobilization regarding implementation of sanitation programmes.

7. Lack of sanitation training starting with information, education, communication, implementation and follow-up services.

## THE MAIN FINDINGS OF THE STUDY

1. To focus the negligence of duty of village education committee towards the construction, operation, maintenance and sanitation of toilets in elementary and senior secondary schools located in rural areas.
2. To highlight the disinterest shown by village Panchayats towards construction, operation, maintenance and sanitation of toilets in elementary and senior secondary schools located in rural areas inspite of grant available from the government.
3. The study also focuses on the behaviour of teachers of Elementary Schools towards the use of toilets by children. Commonly they are of the view that they do not allow children to defecate in combined toilets as they make it dirty and unfit for use but by doing this they are not aware that an adverse effect on the health and hygiene of the pupils will be seen in near future.

4. Another findings of the study is that rural masses are uneducated, uninformative, non-communicative, unaware and backward therefore they lack implementation of the sanitation programmes and follow up made by the government.

5. The major finding of the study is that by the general analysis of the tabulated data it has seen that sanitation of toilets in senior secondary schools is better than in Elementary Schools. Therefore, best efforts are to be made by all sections of the society to improve the condition in coming years.

6. This paper is general study of the status of sanitation of school toilets located in the rural areas of Uttarakhand. Therefore, no specified test is applied to know the level of significance.

7. This paper is confined only to the study of sanitation of toilets in Elementary and senior secondary schools located in the rural areas of Uttarakhand. The urban area has been excluded because is to do the study of it both areas on wide scale in short span of time simultaneously.

#### **STEPS TO BE TAKEN BY THE GOVERNMENT TOWARDS THE SANITATION OF TOILETS IN RURAL AREAS**

1. A nation-wide campaign is necessary to make people aware of the adverse effects of open air defecation which is responsible for infections and a number of diseases. The people should be motivated not to be bare-footed while going for open defecation as this will save them from parasitic diseases. This type of education will be necessary until adequate toilet facilities are available in the villages.

2. The NGOs should be identified either by the state government s or the district administration. The selection of NGOs should be based on their experience, expertise and infrastructure.

3. The NGOs identified for implementation of the programme should be given proper training in various aspects of the programme. A comprehensive programme of giving them training at various levels has been prepared which forms part of the project report.

4. The entire range of training starting with information, education, communication implementation and follow-up should be given to the same NGO. It has been experienced that if the work is divided among various organizations, it becomes a case of divided responsibilities that hamper progress of the work.

5. Interest-free bank loans should be provided to all the schools situated in rural areas.

6. The implementation of the programme will require social mobilization on a large scale which will include people belonging to various groups. Politicians and policy makers will have to be involved in a big way so that they can take interest in policy decisions in favour of sanitation programmes. The social mobilization would also include

village elders, doctors, lawyers and school teachers. Print media, radio and television will have to be fully involved in the implementation of the programmes.

7. School sanitation will form an important component of the programme as it is through school teachers and students that the message of sanitary toilets will reach the villages. The NGOs which have been identified by the state governments or district administration, in a particular area for construction of toilets , should also be allowed to do construction and maintenance work of toilets in schools in that area, as also to impart training about construction and maintenance to teachers and students.

8. The following recommendations of the planning commission in the 10<sup>th</sup> five year plan should be accepted in implementation of the rural sanitation programme successfully.

#### **STEPS TAKEN BY THE GOVERNMENT TOWARDS THE SANITATION OF TOILETS IN RURAL AREAS**

School sanitation has been introduced as a major component to encourage wider acceptance of sanitation among rural masses. The states/UTs are required to formulate project proposals under the TSC (Total sanitation campaign) in order to claim central government assistance. To add vigour to the implementation of TSC government of India has separately launched an award scheme 'Nirmal Gram Puraskar' (NGP) for fully sanitized and open defecation free Gram Panchayats, block and districts Under the TSC, so far 559 projects in 30 States/UTs have been sanctioned with the total project outlay of about Rs.6240.27 crore. The Central, State and Beneficiary/Panchayat contributions are about Rs.3675.38 crore, Rs.1424.09 crore and Rs.1140.80 crore respectively. The components sanctioned in the 559 projects are:

- i.) Construction of 499 lakh individual household latrines
- ii.) 656690toilets for Schools
- iii.) 36098 community sanitary complexes
- iv.) 199033 toilets for Balwadis/Anganwadis and
- v.) 4030 rural sanitary marts/production centers.

Besides, funds have been earmarked for start-up activities, Information, Education and Communication (IEC) and administrative charges. The total numbers of household toilets constructed up to 2005 - 06 are 14, 48, 1807. (Source: National Portal Content Management Team, Reviewed on, 2009)

#### **Conclusion**

The conclusion were arrived on the basis of classification of raw data collected from elementary and senior secondary schools situated in the rural areas of 6 district

of Uttarakhand. The collected data were related to the use of toilets, maintenance of toilets, operation of toilets, cleanliness of toilets and techniques used in the construction of the toilets. It was found that 95% of elementary schools and 97.18% of senior secondary schools have toilets in them. As regards the operation and maintenance of toilets it was found that 65.78% elementary schools and 76.08% of senior secondary schools have functional water supply. However as regards the cleanliness of toilets in elementary and senior secondary schools, they are cleaned both by sweepers and children. This is due to the lack of administrative facilities that they are not exclusively cleaned by sweepers. This is a big lacuna on the part of the education department, and thus, has to be very sincerely eliminated. The 11<sup>th</sup> schedule of 73<sup>rd</sup> constitutional amendment envisages that village panchayat should look after the functioning, maintenance, operation and construction of toilets in these schools and also entrusted that teachers would coordinate with the village panchayat for the overall construction, maintenance and operation of these toilets. Further, while analyzing data of interview schedule it was found that if village community is motivated towards the adoption of sanitation services, cross visits, interpersonal communications and demonstration workshops, a great impact would be observed on sanitation relating to the elementary schools situated in these areas. The study has also depicted that efforts are being made toward this end. Despite tough terrains and weak economical condition of the rural masses in the state, continuous efforts at the village, block, district and state

levels have shown some positive results in the form of increased physical and financial progress and increased number of open defecation-free status villages. Keeping in view the current increase in demand for sanitation services, it is anticipated that the state will achieve full sanitation coverage in near future.

## REFERENCES

- Blackwell F (2004). *India: A Global Studies Handbook*, United States of America: ABC-CLIO, Inc., ISBN 1-57607-348-3
- Central Bureau of Health Intelligence, Ministry of Health and Family Welfare 1998-99
- India (2009). *A Annual (53rd edition)*, New Delhi: Additional Director General (ADG), Publications Division, Ministry of Information and Broadcasting, Government of India, ISBN 978-81-230-1557-6.
- Kumar R (1988). *Child Development of India Health Welfare Management*, Ashsih Publishing House, New Delhi, vol, II,
- UNESCO (2003). *United Nations World Water Development Report*, UNESCO.
- Setty ED, Ross EL (1987). *A Case Study in Applied Education in Rural India*, *Commun. Dev. J.*, 22(2): 120–129, Oxford University Press.
- Sinha BD, Menon PSK (1999). *Environmental Sanitation, Health and Panchayati Raj*. Institute of Social Science. Concept Publishing Company, New Delhi.
- Sripati V, Thiruvengadam AK (2004). "India: Constitutional Amendment Making The Right to Education: A Fundamental Right", *International J. Const. Law*, 2(1): 148–158, Oxford University Press.
- Suri RK, Kalapana R (2008). *Infrastructure: S&T Education*, *Sci. Technol. India* edited New Delhi: Spectrum, ISBN 81-7938-294-6.
- Vrat P (2006). "Indian Institutes of Technology", *Encyclopedia India 2*: 229-231 edited by Stanley Wolpert, Thomson Gale: ISBN 0-684-31351-0.