ORIGINAL RESEARCH ARTICLE
pISSN 0976 3325 | eISSN 2229 6816
Open Access Article
www.njcmindia.org
DOI: 10.5455/njcm.20200219064858

# School Environment and Sanitation: A Comparative Study

**Anju Damu Ade[1], Kondagunta Nagaraj[2], Chandrasekhar Vallepalli[3]**

**Financial Support:** None declared
**Conflict of Interest:** None declared


**How to cite this article:**
Ade AD, Nagaraj K, Vallepalli C. School Environment and Sanitation: A comparative study. Natl J Community Med 2020; 11(4):149-155

**Author's Affiliation:**
[1]Professor; [2]Professor; [3]Asst Professor, Department of Community Medicine, SVIMS, Sri Padamavathi Medical College, Tirupati, Andhra Pradesh

**Correspondence**
Dr. Anju D. Ade
anju.ade@gmail.com

**Date of Submission:** 19-02-2020
**Date of Acceptance:** 28-04-2020
**Date of Publication:** 30-04-2020

## ABSTRACT

**Background:** The health of children and youth is a fundamental value. In many countries there exists a high prevalence of water and sanitation related diseases, causing many people, children in particular, to fall ill or even die.

**Objectives:** The research was undertaken to study the status of school environment and sanitation in urban and rural area of Tirupati; and to compare school environment and sanitation between rural and urban area.

**Methods:** This Cross-sectional study was conducted in Schools of Rural and urban government schools to collect information on various attributes related to school environment and sanitation and were compared between rural and urban schools.

**Results:** School environment and sanitation is suboptimal in both rural and urban government schools. Significantly more urban schools had the infrastructure and sanitation facilities compared to rural government schools.10 (62.5%) schools in rural area had no benches for students. In rural schools 11(68.75%) garbage was disposed by open dumping. Toilet and urinal facility was inadequate and was not separate for boys and girls in some schools. Ventilation was observed to be adequate but natural lightening was not sufficient.

**Conclusions:** Environment and sanitation was found to be slightly better in urban govt. schools than rural government schools.

**Keywords:** School Environment, Sanitation, Comparative study, Government schools

## INTRODUCTION

The health of children and youth is a fundamental value.[1] Sickness is a major cause of school absenteeism and scholastic backwardness.[1] In many countries there exists a high prevalence of water and sanitation related diseases, causing many people, children in particular, to fall ill or even die. Improved hygiene practices are essential if transmission routes of water and sanitation related diseases are to be cut. A survey among school children in India revealed that about half of the ailments found are related to unsanitary conditions and lack of personal hygiene.[2]

Health of the child is viewed as absence of disease and not as comprehensive health in developing countries. Children are the country's biggest human investment for development. School children form 20% of total population of India which is vulnerable than rest of population for infection and malnutrition.[3] The school building, site and equipment are part of the environment which the child grows and develops. A healthful school environment is necessary for the best emotional, social and personal health of the pupils. Schools should also serve as demonstration Centre's of good sanitation to the community.[4] According to modern concepts, school health service is an economical and powerful means of raising community health, and more important, in future generations.[3]

The School Health Programme is the only public

sector programme specifically focused on school age children. Successful school health programmes ensure better educational outcomes, improved social equity and improved capabilities to handle the adult world.[5] What is more, the huge added advantage in our resource constrained country is that all the services are provided for in a cost-effective manner.[5]

The school setting provides several advantages and opportunities for delivering content and skills on health and development issues among learners (pupils) and teachers as well as parents. Young people attending school are at a stage in life where they are willing and able to learn new information and skills, irrespective of whether the information is good or bad.[6]

Further, the school setting provides an opportunity for peer education since most of the young people share experiences and are likely to influence one another positively or negatively.[6]

Essential elements of a health-promoting school include healthy school policies; the school's physical environment; the school's social environment; individual health skills and action competencies; community links; and health services. The main purpose of the health-promoting school is to build health knowledge, skills and behaviours in the cognitive, emotional, social and behavioural domains and to enhance educational outcomes among learners.[6]

With the above background, this research was undertaken to study the status of school environment and sanitation facilities in urban and rural area of Tirupati and also to compare school environment and sanitation between rural and urban area.

## MATERIALS AND METHODS

This was a cross-sectional survey conducted in field practice area of Rural Health Training Centre (RHTC), Mangalam and Urban area of Tirupati, Chittoor district, Andhra Pradesh, India. Data were collected from June – September 2019.

There are 16 primary government and secondary high schools in rural field practice area. All government schools of field practice area (rural) were included for the study. For study purpose equal number of schools i.e. 16 government schools were selected from urban area from the list of schools in Tirupati, which was obtained from Mandal education officer, urban. For selection of schools, simple random technique was followed after making list of all the schools. All the schools in rural area offers co-education. So for comparison purpose, girls schools were excluded from urban area.

To collect information pre-structured format was used. The information collected on various attributes related to school sanitation and environment was compared between rural and urban government schools. Data was collected by inspection of various sanitary facilities and interaction with Principal and senior teachers. The format included Information about parameters such as location of schools whether in congested area (slum area) or in non-congested area (away from slum area), type of school, total number of students in school, site and building of school, playground, dampness, verandhas attached to classroom, sitting arrangement of students, About Sanitation like methods of garbage disposal, urinal facility, number of toilets, frequency of cleaning toilets, drinking water facilities in schools, ventilation, overcrowding,

Data collected was entered in the Microsoft Excel sheet and was analyzed using SPSS software version 23.00, Percentages and proportions was used as the statistical methods.

Ethics approval was obtained from the Institute Ethics Committee. A prior permission from the school Head Master was taken in both areas, Rural as well as urban area. Confidentiality of school identity was ensured to them.

## RESULTS

This study was done in 16 government schools from rural area and 16 government schools from urban area. Site inspections of environment and sanitation facilities in selected government schools of rural area and urban area was conducted.

As shown in Table 1, most of the schools were located near to slum locality. Majority of the schools were single storied buildings in both the areas, rural and urban. In rural area, 13 (81.25%) schools were located at ground level. Also, it was observed that there are no playgrounds in 6(37.5%) rural schools and in 9 (56.25%) schools in urban area.

As shown in Table 2, dampness in classrooms was observed in 9 (56.25%) rural schools but in urban area, dampness was observed in 14 (87.5%) government schools. In most of the schools 15(93.75%) in urban area, classrooms were white washed while in rural area, half of the schools i.e.8 (50%) were not white washed. In this study,15 (93.75%) schools in rural area and all the 16 (100%) schools in urban area had verandas attached to the class rooms.

In rural area, recommended minus type with back rest benches were available only in 2 (12.5%) schools, but in urban area,10 (62.5%) schools had minus type with back rest type of benches.

**Table 1: Proportion of schools with specific facilities**

| Attribute | Rural (n=16) (%) | Urban (n=16) (%) |
|---|---|---|
| **Distance from Locality** | | |
| Away | 05 (31.25) | 03 (18.75) |
| Near | 11 (68.75) | 13 (81.25) |
| **Building** | | |
| Double | 04 (25) | 03 (18.75) |
| Single | 12 (75) | 13 (81.25) |
| **Playground** | | |
| Yes | 10 (62.5) | 07 (43.75) |
| No | 06 (37.5) | 09 (56.25) |
| **Building Level** | | |
| Above ground | 02 (12.5) | 13 (81.25) |
| Ground level | 13 (81.25) | 03 (18.25) |

**Table 2: Condition of the classes in rural and urban government schools**

| Attribute | Rural (n=16) | Urban (n=16) |
|---|---|---|
| **Dampness in the classes** | | |
| Yes | 09 (56.25) | 14 (87.5) |
| No | 07 (43.75) | 02 (12.5) |
| **Classrooms white washed or not** | | |
| Yes | 08 (50) | 15 (93.75) |
| No | 08 (50) | 01 (6.25) |
| **Verandas Attached to the classrooms** | | |
| Yes | 15 (93.75) | 16 (100) |
| No | 01 (6.25) | 0 (0) |
| **Benches** | | |
| Minus type with back rest | 04 (25) | 10 (62.5) |
| Not minus type, without backrest | 02 (12.5) | 05 (31.25) |
| No benches | 10 (62.5) | 01 (6.25) |

Figure in the parenthesis indicate percentage.

**Table 3: Sanitation in rural and urban government schools**

| Attribute | Rural (n=16)(%) | Urban (n=16)(%) |
|---|---|---|
| **Garbage** | | |
| Bins | 05 (31.25) | 16 (100) |
| Open | 11 (68.75) | 0 (0) |
| **Urinals** | | |
| Yes | 05 (31.25) | 12 (75) |
| No | 11 (68.75) | 04 (25) |
| **Toilets** | | |
| Yes | 16 (100) | 16 (100) |
| No | 0 (0) | 0 (0) |
| Adequate | 09 (56.25) | 06 ( (37.5) |
| Inadequate | 07 (43.75) | 10 (62.5) |
| **Toilet separate for boys and girls** | | |
| Yes | 12 (75) | 13 (81.75) |
| No | 04 (25) | 03 (18.75) |
| **Frequency of cleaning Toilets** | | |
| Alternate day | 01 (6.25) | 0 (0) |
| Everyday | 11 (68.75) | 16 (100) |
| Occasionally | 04 (25) | 0 (0) |

Some schools had facility of benches without back rest in both areas urban 5(31.25%) and rural 2(12.5%). Out of 32 govt. schools surveyed, 10 (62.5%) schools in rural area and 1 (6.25%) school in urban area had no benches for students.

In this study, as depicted in Table 3, in rural government schools, only 5 (31.25%) schools had the facility of using dustbins for disposal of garbage and in 11(68.75%) schools, it was observed that garbage is as disposed by open dumping.

In this study, as depicted in Table 3, all the surveyed schools have latrine facility but they did not adequately address gender needs of the students. It was found that toilet were not separate for boys and girls in 4 (25%) schools in rural area and 3(18.75%) in urban area. In this study, in urban government schools, cleaning of toilets was done every day in all the schools while in rural area, frequency of cleaning toilet was occasionally in 4 (25%) schools.

In this study, as shown in Table 3, it was found that majority of the schools in rural area ie. 11(68.75%) do not have any separate urinals. The students were using the latrines available in the schools for urination too. But in urban area, 12(75%) schools have separate urinal facility. Regarding toilets, all the schools in rural as well as urban have toilet facilities for the students. In 07(43.75%) schools, it was not adequate and also in 04 (25%) school toilets were not separate while in urban area, in 10(62.5%). School toilets were inadequate and in 03(18.75%) schools not separate for males and females.

As shown in Table 4**,** out of all surveyed schools, 1(6.25%) school had no water source in rural area. Also, local community have poor access to improved drinking water in this area. Among other surveyed rural government schools, drinking water was available and source of water was tap water provided by the Municipal corporation in most of the schools, 11 (68.75%).Well was the source of drinking water in 1 (6.25%) school while in urban government schools, water source was available in all the schools either from tap water or bore well. In one of the government rural schools, drinking water storage facility was not available. In most of the schools, water tanks were available for storage in both the areas rural as well as urban. In urban government schools, it was found that they clean water reservoir every day in all 15 (93.75%) schools while in rural government schools i.e. 06(25%), they clean water reservoir once a month.

It was found that, RO filter was available for water purification in majority of schools,15 (93.75%) in urban area, while in rural area, RO filter was available only in 5 (31.25%) government schools for water purification. Urban schools they clean water tank every day in all 15 schools while in rural schools there is no need of cleaning since they have RO filter for water purification (Table 4).

**Table 4: Drinking water facilities in rural and urban government schools**

| Attribute | Rural (n=16) (%) | Urban (n=16) (%) |
|---|---|---|
| **Water source** | | |
| Borewell | 03 (18.75) | 06 (37.5) |
| Tap | 11 (68.75) | 06 (37.5) |
| Well | 01 (6.25) | 04 (25) |
| No source | 01 (6.25) | 0 (0) |
| **Storage of water** | | |
| Plastic Can | 04 (25) | 03 (18.75) |
| Steel Can | 05 (31.25) | 02 (12.5) |
| Tank | 06 (37.5) | 08 (50) |
| Water Coolers | 0 (0) | 03 (18.75) |
| No storage | 01 (6.25) | 0 (0) |
| **Cleaning of water storage facility** | | |
| Every day | 10 (62.5) | 15 (93.75) |
| Once a month | 06 (25) | 01 (6.25) |
| **Water purification method** | | |
| RO filter | 05 (31.25) | 15 (93.75) |
| No filtration | 11 (68.75) | 01 (6.25) |

**Table 5: Environment in Rural and urban government schools.**

| Attribute | Rural (n=16) (%) | Urban (n=16) (%) |
|---|---|---|
| **Ventilation** | | |
| Adequate | 15 (93.75) | 15 (93.75) |
| In adequate | 01 (6.25) | 01 (6.25) |
| **Lightening in classrooms** | | |
| Sufficient | 11 (68.75) | 15(93.75) |
| In sufficient | 05 (31.25) | 01 (6.25) |
| **Overcrowding in classrooms** | | |
| Present | 08 (50) | 04 (25) |
| Absent | 08 (50) | 12 (75) |

As shown in Table 5, even though, ventilation was observed to be adequate in majority of the schools in rural and urban area, natural lightening was not sufficient in 5(31.25%) schools in rural area and 1(6.25%) school in urban area. Overcrowding was observed in half i.e.08 (50%) schools in rural area but in urban area it was in 4 (25%) schools.

## DISCUSSION

Every child has the right to a quality education, which includes access to drinking water, sanitation and hygiene (WASH) services while at school. Children spend a significant portion of their day at school where WASH services can impact student learning, health, and dignity, particularly for girls. The inclusion of WASH in schools in the Sustainable Development Goals (targets 4.a, 6.1, 6.2) represents increasing recognition of their importance as key components of a 'safe, non-violent, inclusive and effective learning environment' and as part of 'universal' WASH access, which emphasizes the need for WASH outside of the home[9]

The school should normally be centrally situated with proper approach roads and at a fair distance from busy places and roads, cinema houses, factories, railway tracks and market places.[10]In this study, majority of the schools were located near to slum area. Majority of the schools were single storied buildings in both the areas, rural and urban. A study conducted by Majra J P et al[8] observed that 15 (75%) of the schools were centrally placed with approach roads and at a fair distance from the busy places and roads and only half of the schools had appropriate structure as per recommendations of the School Health Committee.

The site should be on suitable high land, and not subject to inundation or dampness and can be properly drained.[10]In rural area, 13(81.25%) schools were located at ground level while in urban area, and 13 (81.25%) schools were located above ground level.

The school playground is an important facility for children to play every day on their own initiative and it puts enormous positive impacts on children's development and learning.[11]Playgrounds are places specifically developed to offer opportunities for children to play and be physically active, thus facilitating healthy development.[12] In this study, it was observed that there are no playgrounds in 6(37.5%) rural schools and in 9(56.25%) schools in urban area. A study conducted by Broekhuizen K et al[12] revealed that some students shared their attraction to school playground for which they come to school regularly. They come to school earlier and stay longer after the school hours to play on school playground, said the students, adding that they do not even go outside during the leisure period.

In this study, dampness was observed in 9 (56.25%) rural schools and 14 (87.5%) urban schools. It was more in urban schools. Moisture damage in schools may have adverse respiratory health effects in pupils. A study conducted by Borràs-Santos A et al[13] found that children attending a moisture damaged school more often had wheeze, nasal symptoms and respiratory-related school absence. Inside colour of the classroom should be white and should be periodically white washed.[10]Most of the schools 15 (93.75%) in urban area were white washed while in rural area, half of the schools i.e.8 (50%) were not white washed.

Verandas should be attached to the classrooms.[10] In this study,15 (93.75%) schools in rural area and all the 16(100%) schools in urban area had verandas attached to the class rooms.

Furniture should suit the age group of students. It is desirable to provide single desks and chairs. Desks should be of 'minus' type. Chairs should be provided with proper back rests, with facilities for desk work.[10] In present study, out of 32 govt.

schools surveyed,10 (62.5%) schools in rural area and 1(6.25%)school in urban area had no benches for students. In rural area, recommended minus type with back rest was available only in 2 (12.5%) schools, but in urban area,10 (62.5%) schools had minus type with back rest type of desks. Some schools had facility of benches without back rest in both areas urban 5(31.25%) and rural 2(12.5%). Similarly, a study by Joseph N et al[7] showed that the recommended minus desks was lacking in 23 (76.7%) and chairs with back rest was lacking in 11 (36.7%) schools. A study conducted by Assunção A et al[14] showed in their study a statistically significant association between girls and back pain. Approximately 58% of students reported back pain at least one day during the previous three months, leastwise in one segment of the spine. The results showed that boys and girls experienced pain in different segments of the spine simultaneously, and girls have a higher prevalence of pain than boys (59% vs. 47%).

Water, Sanitation and Hygiene (WASH) is the focus of UN Sustainable Development Goal (SDG) 6: ensuring access to water and sanitation for all.[15] The new national campaign, Swachh Bharat: Swachh Vidyalaya (SBSV**),** or "Clean India: Clean Schools", was launched in September 2014, heralding a new era in the Indian government's focus on WASH in Schools. A key feature of the campaign is to ensure that every school in India has a set of functioning and well-maintained water, sanitation and hygiene facilities. SBSV's goal is to make a visible impact on the health and hygiene of children through improving both their health and hygiene practices, and also those of their families and communities[16]

In this study, in rural schools, only 5 (31.25%) schools had the facility of using dustbins for disposal of garbage and in 11(68.75%) school garbage was disposed by open dumping.

Among all surveyed school, it was found that they have access to a latrine facility but it was not separate for boys and girls in 4(25%) schools in rural area and 3(18.75%) in urban area. Similarly, Joseph N et al[7] found that toilets were not adequate in 10(33.3%) schools and it was not separate for boys and girls in 8(26.7%) schools. Majra J P et al[8] in their study, observed that latrines were found inadequate in about 50% of schools for students. A survey done by done by FANSA U.P & its members[17]found that majority of schools i.e. over one third (38%) of school have only two toilets. 9.3 % of the schools surveyed did not have access to a latrine facility.25 % of schools have only one toilet. Despite the government launching Swachh Vidyalaya initiative under Swachh Bharat Abhiyan, 11.5 per cent of rural schools have no separate toilets for girls. While some schools had separate girls toilets, 10.5 per cent of them were locked and 11.7 per cent were locked and unusable.[18] the girls. The court's May 9 verdict has made it clear that these were integral to Right of Children to Free and Compulsory Education (RTE) Act, 2009."Separate toilets for girls and boys as well as availability of water are essential for basic human rights that enhance the atmosphere where the education is imparted. It can also be put in the compartment of basic needs and requirements in schools," said the court.[19]

Multiple studies have shown that lack of toilets is one of the prime reasons for dropout of children, especially the girl child from the school system.[20]

In present study, regarding cleaning of toilets in urban government schools, it was found that cleaning of toilets was done every day in all the schools while in rural area, frequency of cleaning toilet was occasionally in 4 (25%) schools.

It was found that majority of the schools in rural area ie.11 (68.75%) do not have any separate urinals. The students were using the latrines available in the schools for urination too. But in urban area, 12(75%) schools have separate urinal facility. Majra J P et al[8] observed that none of the schools were having any separate urinals and the students were using the latrines available in the schools for urination too. A survey done by FANSA U.P & its members[17] hardly found any urinal for students in any surveyed schools.

Sustainable SDG6 aims to ensure available and sustainable management of water and sanitation for all' and includes targets for universal access to drinking water, sanitation and hygiene for all by 2030.Daily provision of child-friendly and sustainable safe drinking water and adequate water for handwashing. In addition, water for school cleaning and also food preparation and cooking. Safe handling and storage of drinking water should be practised throughout the school[21]

In 2016, nearly 570 million children worldwide (31%) lacked at basic drinking water service at their school and among them over 340 million children (19%) had no drinking water service at their school. Coverage of basic drinking water service was lower in rural schools (64% compared to 69% total), and in primary schools (66%) compared to secondary schools (75%).[9] In 2016, nearly seven out of ten children had a basic drinking water service at their school.[9]

In this study, out of all surveyed schools,1(6.25%) school had no water source in rural area. Also, it was found that local community have poor access to improved drinking water in this area. Among other surveyed rural government schools, drinking

water was available and source of water was tap water provided by the Municipal corporation in most of the schools,11 (68.75%).Well was the source of drinking water in 1(6.25%) school while in urban government schools, water source was available in all the schools either from tap water or borewell. Rural schools had lower coverage of basic drinking water services than urban schools in almost all countries with disaggregated data.[22]The review done by Jasper C et al[23] concluded that studies document higher rates of infectious, gastrointestinal, neuro-cognitive and psychological illnesses where school children were exposed to inadequate water and sanitation facilities. Hunter P.R.et al[24] showed a significant association between the provision of supplementary water in the classroom and reduced absenteeism rates.

In present study, in one of the government rural schools, drinking water storage facility was not available. In most of the schools, water tanks were available for storage in both the areas rural as well as urban. In urban government schools, it was found that they clean water reservoir every day in all 15 (93.75%) schools. Water filter was available for water purification in majority of schools in urban area i.e. 15 (93.75%) while in rural area, water filter was available only in 5(31.25%) government schools for water purification. In a study conducted by Joseph N et al[7], it was found that more than a quarter of schools had no drinking water purification facility. Water storage units were not cleaned periodically in 6(20%) schools.

Disease spreads quickly in cramped spaces with limited ventilation.[25] In this study, even though, ventilation was observed to be adequate in majority of the schools in rural and urban area, natural lightening was not sufficient in 5(31.25%) schools in rural area and 1(6.25%) school in urban area. In a study conducted by Majra J P et al[8] observed that ventilation was adequate for 12(60%) of the schools but only eight (40%) schools were having classrooms with cross ventilation. Overcrowding was seen more in rural government schools than in urban government schools. Overcrowding was observed in half i.e.08 (50%) schools in rural area and in 4 (25%) schools in urban area. Similarly study by Joseph N et al[7] found that overcrowding was seen in one third of schools. Also, in a study conducted by Majra J P et al[8], eighteen (90%) of the schools were overcrowded. Upadhyay V et al[26] found that overcrowding in schools was also associated with the avoidance of toilets.

## CONCLUSION

We conclude that Environment and sanitation was found to be slightly better in urban government schools than rural government schools. It is essential to have provision of better sanitation and water facilities in all government schools in rural as well as urban areas. State government, educational authorities, school administration should be made aware of the loopholes identified and an intervention by them is needed for improvement of environment, sanitation and water facilities at government schools as underprivileged children attend these schools. We should promote greater education on sanitation & hygiene in schools and the local community.

**Acknowledgement:** We are grateful to Mr S. Shareef (PHN) for his assistance during the study. We would like to thank principal and teachers of all the government schools for their cooperation.

## REFERENCES

1. Raghava Prasad K. School Health. Indian journal of Community Medicine. 2019;30(4):109-110.
2. UNICEF. A manual on school sanitation and hygiene: Water, Environment and Sanitation technical guidelines series-No.5; Sep 1998. Available at https://www.unicef.org/wash/files/Sch_e.pdf. Accessed August 8th, 2019.
3. Park K. Preventive Medicine in Obstetrics, Paediatrics and Geriatrics. Text book of preventive and social medicine 20th ed. Jabalpur: Bhanot Publications; 2009.
4. Park K. Text book of preventive and social medicine.24th ed. Jabalpur: Bhanot Publications; 2017; p 615.
5. School Health Promotion Report of an Inter-country Workshop Bangkok, Thailand, 12–15 December, 2006.WHO Regional office for south east asia. Available at: http://apps.searo.who.int/pds_docs/B3358.pdf. Accessed Nov 26th, 2019.
6. Mid Day Meal Scheme: School Health Programme Guidelines. Available at: http://mdm.nic.in/Files/School%20Health%20Programme/Guidelines_SHP_29TH_JAN_09-FINAL_FINAL.pdf. Accessed April 24th, 2019.
7. Joseph N, Bhaskaran U, Saya GK, Kotian SM, Menezes RG. Environmental sanitation and health facilities in schools of an urban city of south India. Ann Trop Med Public Health 2012;5:431-5
8. Majra J P, Gur A. School environment and sanitation in rural India. J Global Infect Dis 2010;2:109-11.
9. WASH in schools. Available at: https://data.unicef.org/topic/water-and-sanitation/wash-inschools/. Accessed July 27th, 2019.
10. Park K., Park's Textbook of preventive and social medicine.24th ed. Banarsidas Bhanot Publishers; 2018.
11. Sharif, Shahidullah. School playground: Its impact on children's learning and development. Arnec Connections. 2014; 17-19.
12. Broekhuizen K, Scholten AM, de Vries SI. The value of (pre) school playgrounds for children's physical activity level: a systematic review. Int J BehavNutr Phys Act. 2014; 11:28.
13. Borràs-Santos A, Jacobs J, Täubel M, Haverinen-Shaughnessy U, Krop E, Huttunen K et al. Dampness and

mould in schools and respiratory symptoms in children: the HITEA study. Occupational and Environmental Medicine. 2013;70(10):681-687.

14. Assunção A, Carnide F, Vieira F, Silva S and Araújo J. Mismatch of school furniture and back pain in adolescents with different maturation levels.Int. J. Human Factors and Ergonomics. 2013; 2(1):66-80.
15. Toilets for a better tomorrow. Available at: https://www.unilever.com/sustainable-living/improving health-and-wellbeing/health-and-hygiene/toilets-for-a-better-tomorrow/. Accessed August 7th, 2019.
16. Clean India – Clean Schools. Available at: unicef.in/ Whatwedo/39/Clean-India-Clean-Schools. Accessed August 7th, 2019.
17. Sanitation Status in Schools. Available at: www. sesindia.org/pdf/ Sanitation%20 Status%20in%20 Schools% 20of%20U.P.pdf. Accessed October 3rd, 2019.
18. Building toilets in rural schools is not enough, they have to be usable too. Available at: https://www.downtoearth. org.in/news/waste/buildingtoilets-in-rural-schools-is-not-enough-they-have-to-be-usable-too-63017. Accessed Aug 7th, 2019.
19. All schools must have separate toilets for girls and boys. Available at: https://www.downtoearth.org.in/news/all-schools-musthave-separate-toilets-for-girls-and-boys--supreme-court-44324. Accessed August 8th, 2019.
20. Schools without toilets in India more than 257000. Available at: https://factly.in/schools-without-toilets-in-india-morethan-257000/. Accessed August 8th, 2019.
21. UNICEF. Water, Sanitation and Hygiene (WASH) in Schools. Child friendly schools manual. Available at: https://www.unicef.org/publications/files/CFS_WASH_E _web.pdf. Accessed August 8th, 2019.
22. SDG Baselines: WASH Schools HCF. Available at: https://waterinstitute.unc.edu/files/2018/11/03_SE02_SDG_Baselines_WaSH_Schools_HCF.pdf. Accessed November 26th, 2019
23. Jasper C, Le T, Bartram J. Water and Sanitation in Schools: A Systematic Review of the Health and Educational Outcomes. International Journal of Environmental Research and Public Health. 2012;9(8):2772-2787.
24. Hunter P.R, Risebro H,Yen M, Lefebvre H Lo C,Hartemann P, Longuet C, Jaquenoud F. Impact of the Provision of Safe Drinking Water on SchoolAbsence Rates in Cambodia: A Quasi-Experimental Study. Ann NutrMetab 2015;66(suppl 3):31-37
25. Upadhyay V, Mathai J, Reed P.W. Primary school children: Access to toilets. Acta Paediatr.2008;97:1546–1549.