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Research Article

Assessing the Knowledge and Practice of Water, Sanitation and Hygiene (Wash) among Female College Students

Deevena Jemima[1], Neelam Kumari[2], Nandini Dikshit[3] and Surya Kant[4]*

[1]*Department of Nutrition, Isabella Thoburn College, Lucknow, Uttar Pradesh, India*

[2]*Department of Nutrition, Isabella Thoburn College, Lucknow, Uttar Pradesh, India*

[3]*Junior Resident, Department of Respiratory Medicine, King George's Medical University, UP, Lucknow, Uttar Pradesh, India*

[4]*Professor and Head, Department of Respiratory Medicine, King George's Medical University, UP, Lucknow, Uttar Pradesh, India*

***Corresponding Author:** Surya Kant, Professor and Head, Department of Respiratory Medicine, King George's Medical University, UP, Lucknow, Uttar Pradesh, India.

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Abstract

It is very rightly said that abode of a health mind is always a healthy body. To maintain good health the most basic requirement however is to have a clean and safe environment. In spite of the widespread use of water purifiers and filtration devices majority people do not have access to clean water for drinking, cleaning and washing. School and college going students mostly have improper eating habits and mostly do not practice proper sanitization. Therefore, they are most prone to infections and if we inculcate the habits of properly washing, sanitization and use of clean and safe water in this age group it will lead to the development of healthier youth population. Clean and safe environment is therefore every child's birth right. Children who follow good hygiene practices have a healthy life and subsequently develop a robust constitution.

WASH stands for universal access to water, sanitation and hygiene which is a programme initiated by UNICEF that has a profound socio-economic impact. After the COVID pandemic struck a lot of awareness was propagated regarding the importance of hand hygiene, despite that three billion people worldwide, that includes millions of school-going children, have no access to hand washing facilities with soap water. The most vulnerable and affected are those living in rural areas, urban slums, disaster-prone areas and belonging to low socio income countries. This awareness is of utmost importance in COVID era since COVID infection spreads in three different ways, by contaminated person, by contaminated air and by contaminated objects. To curtail the spread of infection spread by contaminated objects it is very essential to practice proper sanitization and hand hygiene. Water, sanitation and hygiene practices play an important role in the prevention and transmission of many communicable diseases. In the wake of COVID-19 it is important that these practices be maintained along with proper food safety and sanitation procedures to prevent the spread of illness.

Water is the main cause of various communicable diseases. There are 4 types of water related diseases namely, water borne, water washed, water based and water related vector borne. Water related diseases are those diseases that spread by contaminated water like typhoid, water watershed diseases are those diseases that are spread by not following proper sanitization and hygiene like worm infestation, water based diseases are those that propagate by pathogens based in water like schistosomiasis whereas vector borne

diseases like dengue are cultivated near dirty and unsterile water bodies. By following proper methods of sanitisation and keeping self as well as the surroundings clean a good number of these diseases can be nipped in the bud. Provision of clean water for drinking and bathing will not solely prevent infection if proper sanitization techniques are not followed. Therefore, importance of washing and staying clean is of utmost importance for a healthy living. Hygiene and sanitation is specifically important for girls because they are highly susceptible to catch infections such as urinary tract infection and other genital infections. If women follow proper hygiene and they are provided safe access to clean water infections and death amongst infants and mothers will come down by one fourth of their actual number. Females who are mostly involved in cleaning and sanitization of their houses should specifically be made more aware of these practices in order to have a healthy family life. Therefore, this study in young college going females is a means to gauge the quality of basic awareness of hygiene practices in the community.

Keywords: WASH; Food Safety; Hygiene and Sanitation

Introduction

The WASH Programme initiated by UNICEF shows that clean water and good hygiene practices are essential for the survival and development of children. Adequate water, sanitation and hygiene services for households, schools and healthcare facilities are essential to prevent the spread of infectious diseases including COVID-19. The low levels of coverage of these basic services in many parts of the world reflect considerable inequalities between and within countries and play a role in the vulnerability of these populations to the pandemic [1].

WASH ensures the provision of safe water, sanitation and hygiene in schools and communities to establish improved health, boost education achievement and also promote gender equity which has a positive impact on society [2]. According to the United Nations' sustainable development goals for water and health, health and well-being are influenced by access and quality to safe drinking water, waste water treatment and hygiene practices and settings [3]. In India, it was found that the water supply coverage was not as good as the figures showed and the national sanitation efforts continue to fall short of the target even after almost six decades of efforts to eradicate open defecation [4]. Less than 50 per cent of the population in India has access to safely managed drinking water. Chemical contamination of water, mainly through fluoride and arsenic, is present in 1.96 million dwellings. Moreover, two-thirds of India's 718 districts are affected by extreme water depletion, and the current lack of planning for water safety and security is a major concern [5].

While improving water quality is vital to avert the transmission of diarrhea and other diseases, improving the accessibility and availability of drinking water is also important. Inadequate sanitation is closely associated with diarrheal diseases, which worsens malnutrition and remains a leading global cause of child deaths. While access to a hygienic toilet facility is essential for reducing the transmission of pathogens, it is equally important to ensure safe disposal of the excreta produced. Sharing of sanitation facilities is also an important consideration given the negative impacts on dignity, privacy and personal safety, especially for women and girls. Hand washing with water and soap is among the most cost-effective interventions for reducing the transmission of diseases and has been identified as the top priority for hygiene monitoring [5]. In addition to safe drinking water and sanitation, unsafe food also poses universal health threats. A vicious cycle of diarrhea and malnutrition is created due to unsafe food, endangering the nutritional status of the most vulnerable population. A large percentage of food borne disease incidents are caused by foods that are improperly prepared or mishandled in food service establishments, at home, or at markets. Adopting basic hygienic practices when buying, selling and preparing food is not understood by all food handlers and consumers to protect their health and that of the wider community [6].

It is necessary that college students be educated to obtain useful knowledge about food hygiene and conduct proper personal food sanitation in their daily life [7]. In the wake of COVID 19, it has become very important to maintain good hygiene and sanitation practices. Thus, this study was conducted to check the knowledge

of female college students about food safety and the knowledge, practice of the WASH programme related to water, sanitation and hygiene as they play an important role in the family by bridging the generation gap between young children and parents.

Materials and Methods

A cross-sectional study was carried out to assess the knowledge of WASH, sanitation and Food safety practices among female College students in four different states namely Uttar Pradesh, Andhra Pradesh, Karnataka and Tamil Nadu. Data was collected from 124 subjects using a structured questionnaire after which statistical analysis was carried out in Microsoft Excel.

Taking about the first component of WASH that is water it was found that 55.6% of the subjects used mineral water for their daily consumption of which 60.5% of the subjects filtered their water before usage. In view sanitization practices it was inferred that 91.1% disposed garbage using municipal bins. 95.9% of the subjects had knowledge about vermicomposting, but did not practice it. Whereas, Hand washing was practised in 54.8% of the subjects who were washing their hands 10-15 times a day. In terms of coking practices only 61.8% of the subjects acknowledged the practice of cooking food at the right temperature to kill all infectious microorganisms. The main factors associated with improved sanitation and hygiene status were observed to be the availability of water, socio-economic status and the knowledge of improved hygiene practices.

Results

A total of 124 female students participated voluntarily in the study by filling out the questionnaire. The age of the subjects ranged between 18 to 22 years. the mean age of the subjects was 20 years. In spite of the fact that all the participants were college students, 23.4% of the subjects did not have any knowledge of WASH practices or had even heard about it. The present study, in figure 1 shows that majority of the participants (55.6%) used mineral water while participants who used tanker water was very minimum. When mineral water was used for drinking by their families, main source of water for other purposes such as cooking and washing was 45.5% well/borewell, 43.1% municipal water, 8.9% tanker. 23.6% of the subjects said that water was not always available from the main water source, while 76.4% of the subjects said that water was always available.

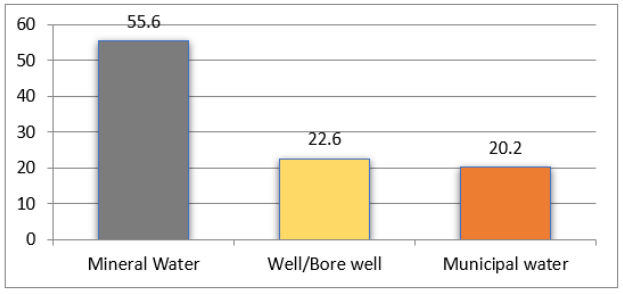

Figure 1: Main source of drinking water.

It is important that water to be consumed be purified before consumption. In the present study, shown in figure 2, it was found that 60.5% of the subjects filtered the water before consumption, 29.8% of the subjects boiled the water and 9.7% of the subjects purchased the drinking water from outside. Among those who used purification techniques, 62.3% of the subjects of the subjects used an RO for filtration of the water, while 31.6% of the subjects used filters that were a combination of filters such as Ro, Ion exchange, activated carbon and UV. Ceramic and bio sand household water filters were found to be most effective as having the greatest potential to become widely used and sustainable for improving household water quality to reduce waterborne disease and death [8]. Boiling is another method which had been effectively proved in reducing contamination in water [9].

Figure 2: Methods of drinking water purification.

Sanitation research focuses primarily on containing human waste and preventing disease [10]. Open defecation is still common in many places in India [11], therefore faced with a massive shortfall in meeting sanitation targets, some governments have imple-

mented campaigns that use subsidies focused on latrine construction to overcome income constraints and rapidly expand coverage [12]. In the present study, 85.4% of the subjects used flush/pour latrines, and a small percentage of subjects used dry pit latrines and composting toilets. 87.9% of the subjects stated that the toilet facilities were located inside the house while for 11.3% of the subjects it was located outside the house but inside the compound.

A huge accumulation of domestic waste has caused serious environmental contamination in rural areas of developing countries [13]. In this study, 91.1% of the subjects disposed their garbage in municipal waste bins while 8.1% of the subjects used other methods of waste disposal such as throwing it in street corners and vacant lots. On the knowledge about the colour codes of public dustbins, 80.6% of the subjects displayed basic knowledge about segregating and using appropriate waste bins for bio degradable and non bio degradable waste. When asked about a good way to manage household waste produced in our homes, 75.4% of the subjects said composting, while 21.3% of the subjects answered landfills. Proper education of the public, the provision of more communal trash bins, and the collection of waste by private contractors could help prevent exposing the public in municipalities to diseases [14].

Food waste, among the organic wastes, is one of the most promising substrates to be used as a renewable resource [15]. In the current study, though a majority, 95.9% of the subjects had knowledge about vermicomposting, it was not actively practiced in their homes.

Another important aspect of sanitation and hygiene is hand washing with soap, as it has been shown to reduce risk of leading causes of child mortality [16]. In the present study, figure 3 shows that 54.8% of the subjects said that they washed their hands atleast 10 - 15 times a day, 37.9% of the subjects said they washed their hands every hour or more, 7.3% of the subjects said they washed their hands less than 5 times a day.

In the current study, 67.7% of the subjects said that the minimum time for scrubbing one's hands to get rid of germs was 20 seconds, 26.6% of the subjects said 10 seconds. 65.3% of the subjects also used hand sanitizers frequently while 34.7% did not. Using correct techniques and adequate times for hand washing results in many benefits and prevention of many diseases such as students

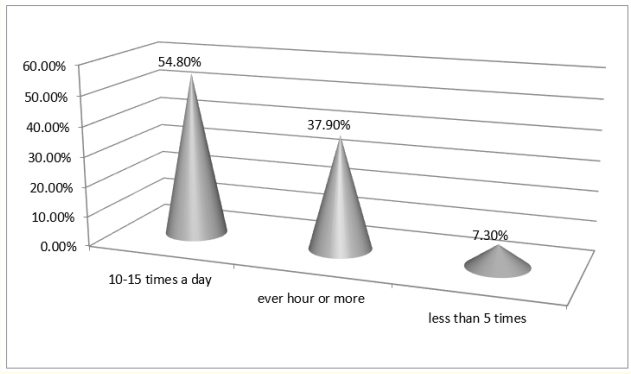

Figure 3: Frequency of hand washing.

with adequate knowledge of proper hygiene were more likely to have clean clothes and have a lower risk of parasitic infections [17] students with proper hand-washing behavior were less likely to report previous-month gastrointestinal symptoms [18].

College students are one of the most at-risk population groups for food poisoning, due to risky food safety behaviours. Knowledge seems to be an important factor in shaping the attitude of students regarding general and bacterial safety. Ethnicity plays a role in how people view the politics of food safety, and the safety of organic foods [19]. Therefore, a more systematic and targeted education on food safety is necessary for the age group of adolescents and young adults [20]. Testing their knowledge about food safety in the present study, 95.2% of the subjects said that fresh fruit and vegetables should be washed under running water thoroughly before consumption, while the rest did not know about this. 8.1% of the subjects said it was safe to use soap, detergent, sanitizer to clean fruit and vegetables, 91.9% of the subjects said it wasn't safe. 91.9% of the subjects knew that fresh fruit and vegetables should be kept separate from raw meat, poultry, seafood and eggs while storage to prevent contamination, 8.1% of the subjects did not know this.

A seen in figure 4, in the present study, 61.8% of the subjects said that cooking to a safe temperature was the best way to completely destroy the microorganisms present in food, 29.3% of the subjects said soaking in salt water and 8.9% of the subjects said washing.

Figure 4: Methods of microorganism destruction.

39.8% of the subjects said that it was important of refrigerate food within half an hour of preparation, 35.8% of the subjects said within one hour and 24.4% of the subjects said within two hours. There is a disconnection between middle school students' food safety knowledge, perceptions, and behaviours. A need for relevant and motivating food safety education exists in this group [21].

Discussion

This study provides a baseline information to show the need for interventions to improve access to clean water, sanitation facilities and hygiene behaviours (WASH) represent key opportunities to improve child health and well-being by preventing the spread of infectious disease and improving nutritional status [22]. Water, sanitation and hygiene interventions in schools focusing on operation and maintenance showed potential to improve toilet usability [23]. In a study conducted on school-based intervention survey on water, sanitation, and hygiene in the Philippines, it was found that this school-based WASH program appeared to increase knowledge and hygiene behaviours of school students, reduce absences due to diarrhoea, and increase hand washing at critical times among household members [24]. Safe drinking water is recognised as a human right is very essential for human welfare, health and productivity. Chemical and Physical contaminants such as human or animal faeces containing pathogens may contaminate drinking water causing harmful effects on health. Instances such as the Nitrate contamination in ground water of some rural areas of Rajasthan indicate that the consumption of such water may pose serious health hazardous in local residents [25].

The study showed that thought many participants used mineral water for consumption, some used water from sources such as borewell and tankers. Kundu (2018) stated that the water quality deterioration from the source to the point of consumption was significant and therefore necessitated effective interventions in collection, transport, storage and extraction practices when hand water contact was likely to occur [26]. The study also found that clean source water did not guarantee safe water at the point of consumption. Ensuring access to safe and sufficient water and sanitation and hygiene promotion in schools has great potential to improve health and education and to contribute to inclusion and equity, yet delivering school-based WASH intervention does not guarantee good outcomes. While further rigorous research will be of value, political will and effective interventions with high program fidelity are also key [27].

An important reason for contamination of water at the source is because of the improper disposal of domestic waste. According to a study conducted by Addo., *et al*. (2017) it was revealed that there is no proper management of domestic waste except in few households that segregate waste. Female respondents were less likely to practice waste management [28]. Considering the low waste management practice among households, there is a need for improved policy and enhanced education on proper waste management practice among households. The findings of the present study corresponds to the findings of Yoada (2014), which showed that showed that 61.0% of the subjects of the subjects of the households disposed of their waste at community bins or had waste picked up at their homes by private contractors [29]. The remaining 39.0% of the subjects of the subjects disposed of their waste in gutters, streets, holes and nearby bushes resulting in blockages in water flow especially during rainy season. Some of the barriers to appropriate waste disposal included lack of private location for disposal of menstrual hygiene products, limited options for formal trash collection and disposal, and the use of plastic bags for disposing children's feces [30]. Garg., *et al*. (2012) indicated that Food Industry Sludges may be converted into good quality manure by vermicomposting if spiked with other organic wastes in appropriate quantities [31]. Adi and Noor (2009) stated that coffee grounds can be decomposed through vermicomposting and help to enhance the quality of vermicompost produced rather than sole use of kitchen waste in vermicomposting [32].

Sanitation has been shown to improve drastically when handwashing has been implemented in the community, however, knowledge about correct techniques of handwashing has been found to be lacking in many age groups such as adolescents [33], mothers [34] and school students [35]. According to Rabbi and Dey (2013), socio-economic factors including education of household head and respondent, water availability and access to media have strong positive association with hand washing with soap [36]. Gap between knowledge and practice still persists in hand washing practices. Long term and extensive initiatives can aware people about the effectiveness of hand washing.

It has been suggested that the provision of water and sanitation infrastructures should go with the provision of health education on how to avoid WASH related diseases and possible ways to improve the well-being of the students both at home and in their various schools [37]. Parents and teachers are the most common source of knowledge providers about personal hygiene to the students. With the existing knowledge and practices related to personal hygiene among the students, parents and teachers can play positive and significant role to improve it further [38,39]. It has also been recommended that teacher-involved participatory hygiene education must be conducted to promote students' handwashing behaviors in areas at high risk for infectious diseases that can be prevented by handwashing [40]. Hand hygiene has been found to be effective regardless of the type of cleaning product used, i.e. antibacterial or plain soap, alcohol-based or alcohol-free hand sanitizer [41]. A reduction of 47 - 98% of the subjects risk of rhinovirus, rotavirus or norovirus infection was found with the use of an alcohol-based hand sanitizer, used in addition to routine hand washing [42]. However, Tuladhar., *et al*. (2015) conducted a study which showed that Washing hands with soap and water is better than using alcohol-based hand disinfectants in removing noroviruses from hands [43]. The present study correlates to the study conducted by Almansour., *et al*. (2016) among school students in Majmaah city, Saudi, where it was found that the students demonstrated good practice levels, despite fair knowledge and attitude levels [44].

Many studies conducted in various Universities, colleges and schools have shown that students displayed a poor knowledge about food safety and temperature control [45-47] had awareness that was limited to environmental hygiene and food handlers' hygiene [48]. As a result, food safety educational initiatives and awareness campaigns should be developed to better inform young adults about safe food handling practices and habits. However, in areas where food safety practices were taught through media and other sources, it was found that the students were much informed and practiced food sanitation practices better than their counterparts [49-52].

In the wake of COVID 19, these important practices such as handwashing with soap and hand hygiene practices [53], safe cooking practices [54], proper waste management [55] have been found to decrease the transmission of the virus. In the present study, though a large percentage of students knew about basic hygiene practices, to make sure that these practices are followed regularly, awareness programs should be conducted by the respective colleges. The main factors associated with improved sanitation and hygiene status were observed to be the availability of water, socio-economic status and the knowledge of improved hygiene practices. Religion and Ethnicity have not been considered in the present study as these factors will be observed specifically in future studies.

Conclusion

Water, sanitation and hygiene have many important benefits from prevention of diseases to improving the dignity of human life. It can be concluded from the study that even though the students displayed some basic knowledge of WASH and food safety practices, many did not know the various necessary techniques to implement these hygiene and safety procedures. Since it is important that positive steps are to be taken to improve living conditions, just having knowledge of hygiene and sanitation practices are not much effective in the long run. Therefore, intervention programs and other such events should be organized frequently especially in rural areas to promote the practice of maintaining these techniques. Colleges should incorporate the knowledge of these practices in their curriculum or offer programs which the students can attend to gain more knowledge and awareness.

Conflict of Interest

None declared.

Bibliography

1. Zar Heather J., *et al*. "Challenges of COVID-19 in children in low- and middle-income countries". *Paediatric Respiratory Reviews* 35 (2020): 70-74.

2. Olukanni David O. "Assessment of wash program in public secondary schools in South-Western Nigeria". *ARPN Journal of Engineering and Applied Science* 8.3 (2013): 222.

3. Hall Nina Lansbury. "Challenges of WASH in remote Australian Indigenous communities". *Journal of Water, Sanitation and Hygiene for Development* 9.3 (2019): 429-437.

4. Jha Nitish. "Access of the poor to water supply and sanitation in India: salient concepts, issues and cases. No. 62. working paper (2010).

5. Monney Isaac and Prince Antwi-Agyei. "Beyond the MDG water target to universal water coverage in Ghana: the key transformative shifts required". *Journal of Water, Sanitation and Hygiene for Development* 8.2 (2018): 127-141.

6. Yenealem Dawit Getachew., *et al*. "Food safety practice and associated factors among meat handlers in Gondar Town: a Cross-Sectional Study". *Journal of Environmental and Public Health* 2020 (2020).

7. Kim Jun-Mi and Nan-Sook Koo. "Comparison of food hygiene knowledge and performance of food major and nonmajor college students". *Journal of the Korean Society of Food Culture* 26.4 (2011): 323-330.

8. Sobsey Mark D., *et al*. "Point of use household drinking water filtration: a practical, effective solution for providing sustained access to safe drinking water in the developing world". *Environmental Science and Technology* 42.12 (2008): 4261-4267.

9. Sodha Samir V., *et al*. "Microbiologic effectiveness of boiling and safe water storage in South Sulawesi, Indonesia". *Journal of Water and Health* 9.3 (2011): 577-585.

10. Hyun Christopher., *et al*. "Sanitation for low-income regions: a cross-disciplinary review". *Annual Review of Environment and Resources* 44 (2019): 287-318.

11. Yogananth Nallathambi and Tarun Bhatnagar. "Prevalence of open defecation among households with toilets and associated factors in rural south India: an analytical cross-sectional study". *Transactions of the Royal Society of Tropical Medicine and Hygiene* 112.7 (2018): 349-360.

12. Barnard Sharmani., *et al*. "Impact of Indian Total Sanitation Campaign on latrine coverage and use: a cross-sectional study in Orissa three years following programme implementation". *PloS one* 8.8 (2013): e71438.

13. Han Zhiyong., *et al*. "Characteristics and management modes of domestic waste in rural areas of developing countries: a case study of China". *Environmental Science and Pollution Research* 26.9 (2019): 8485-8501.

14. Yoada Ramatta Massa., *et al*. "Domestic waste disposal practice and perceptions of private sector waste management in urban Accra". *BMC Public Health* 14.1 (2014): 1-10.

15. Cecchi Franco and Cristina Cavinato. "Smart approaches to food waste final disposal". *International Journal of Environmental Research and Public Health* 16.16 (2019): 2860.

16. Vujcic J and PK Ram. "Handwashing Promotion: Monitoring and Evaluation Module". United Nations Children's Fund, New York, NY (2013).

17. Vivas Alyssa., *et al*. "Knowledge, attitudes, and practices (KAP) of hygiene among school children in Angolela, Ethiopia". *Journal of Preventive Medicine and Hygiene* 51.2 (2010): 73.

18. Lopez-Quintero., *et al*. "Hand washing among school children in Bogota, Colombia". *American Journal of Public Health* 99.1 (2009): 94-101.

19. Booth Rachelle., *et al*. "Food safety attitudes in college students: A structural equation modeling analysis of a conceptual model". *Nutrients* 5.2 (2013): 328-339.

20. Cheng Yinchu., *et al*. "Food safety knowledge, attitude and self-reported practice of secondary school students in Beijing, China: A cross-sectional study". *PloS one* 12.11 (2017): e0187208.

21. Haapala Irja and Claudia Probart. "Food safety knowledge, perceptions, and behaviors among middle school students". *Journal of Nutrition Education and Behavior* 36.2 (2004): 71-76.

22. Darvesh Nazia., *et al*. "Water, sanitation and hygiene interventions for acute childhood diarrhea: a systematic review to provide estimates for the Lives Saved Tool". *BMC Public Health* 17.4 (2017): 101-111.

23. Buxton Helen., *et al*. "The impact of an operation and management intervention on toilet usability in schools in the Philip-

pines: a cluster randomised controlled trial". *BMC Public Health* 19.1 (2019): 1-11.

24. Vally Hassan., *et al*. "The impact of a school-based water, sanitation and hygiene intervention on knowledge, practices, and diarrhoea rates in the Philippines". *International Journal of Environmental Research and Public Health* 16.21 (2019): 4056.

25. Suthar Surindra., *et al*. "Nitrate contamination in groundwater of some rural areas of Rajasthan, India". *Journal of Hazardous Materials* 171.1-3 (2009): 189-199.

26. Kundu Arti., *et al*. "Drinking water safety: Role of hand hygiene, sanitation facility, and water system in semi-urban areas of India". *The American Journal of Tropical Medicine and Hygiene* 99.4 (2018): 889.

27. McMichael Celia. "Water, sanitation and hygiene (WASH) in schools in low-income countries: A review of evidence of impact". *International Journal of Environmental Research and Public Health* 16.3 (2019): 359.

28. Addo Henry O., *et al*. "Correlates of domestic waste management and related health outcomes in Sunyani, Ghana: a protocol towards enhancing policy". *BMC Public Health* 17.1 (2017): 1-10.

29. Yoada Ramatta Massa., *et al*. "Domestic waste disposal practice and perceptions of private sector waste management in urban Accra". *BMC Public Health* 14.1 (2014): 1-10.

30. Yeasmin Farzana., *et al*. "Piloting a low-cost hardware intervention to reduce improper disposal of solid waste in communal toilets in low-income settlements in Dhaka, Bangladesh". *BMC Public Health* 17.1 (2017): 1-11.

31. Garg VK., *et al*. "Management of food industry waste employing vermicomposting technology". *Bioresource Technology* 126 (2012): 437-443.

32. Adi AJ and ZM Noor. "Waste recycling: Utilization of coffee grounds and kitchen waste in vermicomposting". *Bioresource Technology* 100.2 (2009): 1027-1030.

33. Yalçın S Songül., *et al*. "Hand washing and adolescents. A study from seven schools in Konya, Turkey". *International Journal of Adolescent Medicine and Health* 16.4 (2004): 371-376.

34. Demberere Tendai., *et al*. "Knowledge and practices regarding water, sanitation and hygiene (WASH) among mothers of under-fives in Mawabeni, Umzingwane District of Zimbabwe". *Physics and Chemistry of the Earth, Parts A/B/C* 92 (2016): 119-124.

35. Weaver Emma RN., *et al*. "Water, sanitation, and hygiene facilities and hygiene practices associated with diarrhea and vomiting in monastic schools, Myanmar". *The American Journal of Tropical Medicine and Hygiene* 95.2 (2016): 278.

36. Rabbi Sifat E and Nepal C Dey. "Exploring the gap between hand washing knowledge and practices in Bangladesh: a cross-sectional comparative study". *BMC Public Health* 13.1 (2013): 1-7.

37. Mourad Khaldoon A., *et al*. "Assessing Students' Knowledge on WASH-Related Diseases". *International Journal of Environmental Research and Public Health* 16.11 (2019): 2052.

38. Ghanim Mohammed., *et al*. "Knowledge and practice of personal hygiene among primary school students in Sharjah-UAE". *Journal of Health Science* 6.5 (2016): 67-73.

39. Garg Ankur., *et al*. "Impact of a school-based hand washing promotion program on knowledge and hand washing behavior of girl students in a middle school of Delhi". *Indian Journal of Public Health* 57.2 (2013): 109.

40. Sun Chang., *et al*. "Correlates of School Children's Handwashing: A Study in Tibetan Primary Schools". *International Journal of Environmental Research and Public Health* 16.17 (2019): 3217.

41. Malherbe H., *et al*. "Validated or promising interventions in the prevention of infectious diseases in young people through hand hygiene in schools: synthesis of the literature". *Public Health* 1 (2013): 57-63.

42. Tamimi Akrum H., *et al*. "Impact of the use of an alcohol-based hand sanitizer in the home on reduction in probability of infection by respiratory and enteric viruses". *Epidemiology and Infection* 143.15 (2015): 3335-3341.

43. Tuladhar Era., *et al*. "Reducing viral contamination from finger pads: handwashing is more effective than alcohol-based hand

disinfectants". *Journal of Hospital Infection* 90.3 (2015): 226-234.

44. Almansour Mohammed., *et al*. "Knowledge, attitude, and practice (KAP) of food hygiene among schools students' in Majmaah city, Saudi Arabia". *Journal Of Pakistan Medical Association: JPMA* 66.4 (2016): 442-446.

45. Gavaravarapu Subba Rao M., *et al*. "Focus group studies on food safety knowledge, perceptions, and practices of school-going adolescent girls in South India". *Journal of Nutrition Education and Behavior* 41.5 (2009): 340-346.

46. Barrett Tressie., *et al*. "Evaluation of the fight BAC! The story of your dinner campaign video: A multistate study". *Journal of Food Protection* 83.4 (2020): 584-598.

47. Al-Shabib Nasser Abdulatif., *et al*. "Study on food safety concerns, knowledge and practices among university students in Saudi Arabia". *Food Control* 73 (2017): 202-208.

48. Türkistanlı Taha Talip and Coşkan Sevgili. "Food hygiene knowledge and awareness among undergraduate maritime students". *International Maritime Health* 69.4 (2018): 270-277.

49. Osaili Tareq M., *et al*. "Food safety knowledge and practices among college female students in north of Jordan". *Food Control* 22.2 (2011): 269-276.

50. Lazou Thomai., *et al*. "Food safety knowledge and food-handling practices of Greek university students: A questionnaire-based survey". *Food Control* 28.2 (2012): 400-411.

51. Hassan Hussein F and Hani Dimassi. "Food safety and handling knowledge and practices of Lebanese university students". *Food Control* 40 (2014): 127-133.

52. Rajbhandari Ajay Kumar., *et al*. "Knowledge and practice of personal hygiene among secondary school students of grade nine and ten". *Journal of Patan Academy of Health Sciences* 5.2 (2018): 107-113.

53. Gupta Mohit Kumar and Shari R Lipner. "Hand hygiene in preventing COVID-19 transmission". *Journal of the American Academy of Dermatology* 82 (2020): 1215-1216.

54. Olaimat Amin N., *et al*. "Food safety during and after the era of COVID-19 pandemic". *Frontiers in Microbiology* 11 (2020): 1854.

55. Sarkodie Samuel Asumadu and Phebe Asantewaa Owusu. "Impact of COVID-19 pandemic on waste management". *Environment, Development and Sustainability* 23.5 (2021): 7951-7960.

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