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Original Research Article

Environmental factors influencing hygiene practices among pupils in selected public primary schools in Kiambu County, Kenya

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ABSTRACT

Background: Hygiene practices, including hand washing with soap and water, are essential for preventing diseases like diarrhoea, especially in developing countries. Poor hygiene, inadequate water, and sanitation contribute to over 60% of the disease burden among students. This study investigates how hygiene promotion approaches, such as school-led sanitation programs, affect cleanliness practices among public primary school students in Kiambu County, Kenya.
Methods: Analytical cross-sectional study design was used and 121 participants in public primary schools from Gatundu South, Juja, Ruiru, and Kiambu sub-counties. Data was collected using administered structured questionnaire, and Key Informant Interview. Quantitative data analysis was conducted using SPSS version 29.0 and involved univariate and bivariate analysis. Qualitative data was analyzed by thematic content analysis.
Results: The study involved 121 respondents, aged 22-59 years (mean age 38.29±8.1), with 52.9% being female and 49.6% had undergraduate degrees, and 39.7% were senior teachers. The pupil-to-toilet ratio in the schools was 1:29, which did not meet the recommended standards for boys (1:36) but met the standard for girls (1:24). Hygiene promotion activities included parades (66.1%), classroom sessions (61.2%), and health clubs (60.3%). Factors like observing, demonstrating, and inspecting hygiene practices were strongly linked to improved handwashing, with ORs of 5.4, 8.8, and 5.8, respectively.
Conclusions: The study found strong associations between hygiene practices and implementors' expertise, with significant environmental factors influencing student hygiene. The public health and community health volunteers should take more active role in dissemination timely and accurate information on hygiene and health promotion.

Keywords: Handwashing, Hygiene, Hygiene practices, Primary school, Sanitation

INTRODUCTION

Hygiene refers to the systematic adherence to cleanliness measures by individuals and their immediate environment, with the aim of preventing illness and minimizing the transmission of preventable diseases.[1,2] The term commonly denotes the measures and protocols employed to mitigate the transmission of diseases within domestic and educational settings. The primary contributors to the overall disease burden among students in these nations are a contaminated environment and inadequate hygiene practices, which together account for over 60% of the total burden. However, the leading causes of mortality among students in developing countries are attributed to the absence of safe water and sanitation facilities, as well as the widespread prevalence of substandard hygiene habits.[3,4] Evidently, adhering to

proper hygiene practices, specifically the act of washing hands with soap and clean water following each instance of using the toilet, has the potential to reduce the incidence of certain contagious diseases, such as diarrhoea.[5] However, it is likely that the most effective approach to improving child health outcomes in remote areas is through the implementation of comprehensive interventions. This approach places equal emphasis on hand washing with soap, as well as incorporating water, sanitation, and hygiene promotion. The necessity of maintaining personal hygiene, specifically through the practice of hand washing with soap and running water, is significantly amplified in rural regions. This is primarily due to the prevalence of illness among children, which serves as a clear indicator of severe environmental contamination.[6]

In addition to having negative health effects, poor hygiene standards also result in significant economic losses, a negative perception of nations and governments. For instance, politicians and administrators were forced into action as a result of the cholera epidemic that broke out in schools in Latin American cities.[7] The cholera, a disease they believed had long since been eradicated, was brought by a deteriorating water supply and poor hygiene standards.[8] According to Rheinländer et al, Peru experienced concurrent cholera outbreaks in its educational institutions, resulting in significant economic losses amounting to an estimated 200 billion US dollars.[9] These losses were incurred due to the loss of human lives, decreased productivity, reduced exports, and a decline in tourism. Hence, it is evident that educational institutions should prioritize the provision of clean water and hygienic facilities. This would serve as a catalyst for promoting the adoption of proper hygiene practices.

The value of school health promotion services, such as hand-washing, which has been demonstrated to lower school absenteeism, has increased as primary schools accessibility and availability in Kenya has remarkably improved.[10,11] Previous studies indicate that there is a small transfer of hygiene messages from children to parents. Essentially, this transfer makes schools an efficient medium and successful way to reach significant segments of the community for health promotional activities.[12,13] Consequently, more strategic collaborations targeted at sustainably extending hygiene programs in order to achieve larger coverage and enhance service delivery are necessary for the success of hygiene promotion interventions. In a research conducted in Western Kenya, it was found that 76% of the schools studied reported receiving support for water, sanitation, and hygiene (WASH) from non-governmental organizations.[14]

For that reason, school-led total sanitation, child hygiene, sanitation transformation, child to child, and school health clubs are just a few of the hygiene promotion strategies that have been utilized to improve students' hygiene practices. However, it can be challenging for programmers to choose the best strategy for hygiene promotion because there are so many distinct techniques available.[12] It is against this background this study proposes to investigate how the public primary school students' hygiene or cleanliness practices are affected by hygiene promotion approaches and strategies.

METHODS

This was an analytical cross-sectional design using both quantitative methods (issuing interviewer-administered questionnaires to target population comprising school head teachers, school health teachers, school senior teachers of public primary schools from selected Kiambu sub-counties) and qualitative methods (use of Key Informant Interview from the selected county education officers, public health officers, NGO workers, environmentalists and health/environmental club leaders). Data collection done between June 2024 to July 2024 after ethical approval from MKU, permit from National Council of Science and Technology (NACOSTI) and permission from Kiambu County's Ministry of education and Ministry of Health. Systematic random sampling method was used among 121 respondents from Gatundu South, Juja, Ruiru, and Kiambu sub-counties. The study included respondents from selected Kiambu sub-counties who had been in the services for not less than 6 months who consent to participate in the study. Further, it excluded respondents who were on leave i.e., annual, maternity, paternity, sick, academic, etc. during the study.

Self-administered structured questionnaires were used to collect quantitative data while Key Informant Guide was used to collect qualitative. Quantitative data was analyzed using statistical package for social science (SPSS) version 29.0. Descriptive data was presented using frequencies, percentages, means and standard deviation while inferential statistics used chi-square test to measure association between independent and dependent variables. P values less than 0.05 were considered statistically significant. The qualitative data obtained through Key Informant Interviews (KII) were organized into a table format, where the notes (responses) provided by the participants were summarized. This data then underwent a manual process of cleaning and coding in order to identify common themes and sub-themes that align with the objectives of the study.

RESULTS

Socio-demographic characteristics of study respondents

The study involved 121 respondents, whose age ranged from 22 years to 59 years., The mode of the age distribution was 36 years, median 38.0 years and the mean age 38.29±8.1. The findings showed that 47 (38.8%) were between 40-49 years, 42 (34.7%) between 30-39 years, whereas 11 (9.1%) were 50 years and above. Slightly more than half of the respondents or 64 (52.9%) were females and 82 (67.8%) were in marital union

during the study period. Additionally, 60 (49.6%) had an undergraduate degree and 6 (5.0%) were Ph.D. degree holders as summarized in Table 1. Most of the respondents 48 (39.7%) were senior teachers with 38 (31.4%) were deputy principal, further, 51 (42.1%) and 45 (37.2%) had between 6-10 years and 1-5 years working duration in the study area (Table 1).

Table 1: Socio-demographic characteristics of study respondents.

Characteristics		Frequency	Percent
Age group (years)	22-29	21	17.4
	30-39	42	34.7
	40-49	47	38.8
	50-59	11	9.1
Gender	Male	57	47.1
	Female	64	52.9
Marital status	Single	28	23.1
	Married	82	67.8
	Separated	8	6.6
	Divorced	3	2.5
Level of education	Diploma	45	37.2
	Degree	60	49.6
	Masters	10	8.3
	PhD	6	5.0
Designation	Deputy Principal	38	31.4
	Health teacher	17	14.0
	School Principal	18	14.9
	Senior teacher	48	39.7
Working duration in years	1 - 5	45	37.2
	6 - 10	51	42.1
	11 - 15	22	18.2
	16 - 20	2	1.7
	≥ 20	1	0.8

Adequacy of toilets based on student population

The Table 2 summarizes the responses of the participants with regard to the adequacy or Inadequacy of the toilets according to the total number of pupils of the studied schools by total number of toilets. Through physical counting, the researcher established that the studied schools had pupil-toilet ratio of 1:29. According to the Table 2, indicates that the ratio was 1:36 for boys and 1:24 for girls, thus schools did not meet the Ministry of Health (Public Health) of Kenya and the WHO required ratios of pupil to toilet of 1:30 for boys, however, meet recommended ratio of 1:25 for girls (Table 2).

The quantitative findings were supported by the qualitative findings from the key informant interviews with sub-county and county education and health officers who revealed that school WASH infrastructure did not meet Ministry of Education criteria. In line with that, one of the KII mentioned that;

"The toilets in some schools are inadequate…..some were filled up due to heavy rains…there is need to add not less than ten toilets, six for girls and four for boys in those schools" (KII 7).

Table 2: Adequacy of toilets based on student population.

Students population (boys & girls)	Total student numbers	Total number of toilets	Pupil-to-toilet ratio
All students	65754	2284	29
Total boys	31617	887	36
Total girls	34137	1397	24

Hygiene promotion activities in schools

Schools studied adopted various platforms to promote hygiene among the pupils, such as the parade time, in class rooms, health clubs and hygiene competitions. As shown in the Figure, hygiene promotion during the school parade 66.1%, (80), followed by hygiene promotion in classrooms at 61.2% (74), and then school health club sessions at 60.3% (73), were the most common hygiene promotion activities in the schools (Figure 1).

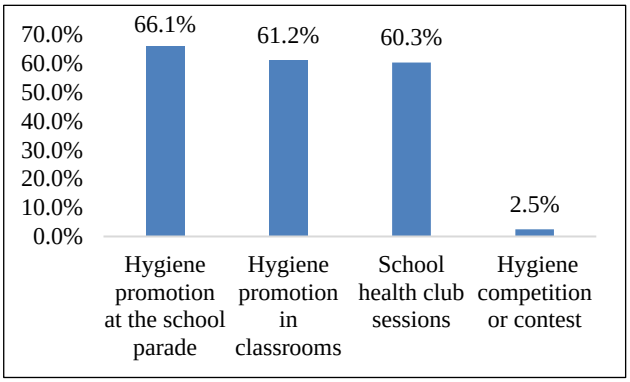

Figure 1: Hygiene promotion activities in schools.

The competency-based curriculum (CBC), exhibited a favourable reaction towards the implementation of hygiene protocols. As such, hygiene education was not only part of the schools' parades, but also curriculum and extra-curriculum activities, whereby the pupils' practices as they learn. These quantitative findings were supported by qualitative analysis as suggested by some of the illustrative direct quotes of the key informant's interviewees, such as;

"Hygiene education was integrated into the school curriculum and the pupils must participate…..this has increased the hygiene practices" (KII 6).

In addition, this study disclosed that a diverse range of instructional materials and activities pertaining to hygiene were employed in the schools that were included in the research. In view of that, health promotion during the

schools' parades was the most commonly utilized to offer guidance in hygiene practices. Additional health promotion items included models, depictions in the form of photographs and printed posters within the classroom as well as health clubs' sessions. Likewise, these findings were supported by qualitative results, as illustrated by one of the interviewees, in the direct quote, below;

"We provide teaching aids to schools across the area for ensuring that teachers and pupils are receiving the right information pertaining hygiene, ……also we evaluate the information given and how the pupils practice the hygiene in school" (KII 2).

Positive hygiene related behavioral changes

The positive hygiene related behavioral changes observed among the pupils. According to the Figure, majority of respondents 101 (83.5%) had noted positive hygiene related behavioral changes amongst the pupils, however, only 39 (32.2%) had adequate expertise within the school to support the selection of appropriate hygiene promotion approaches for pupils (Figure 2).

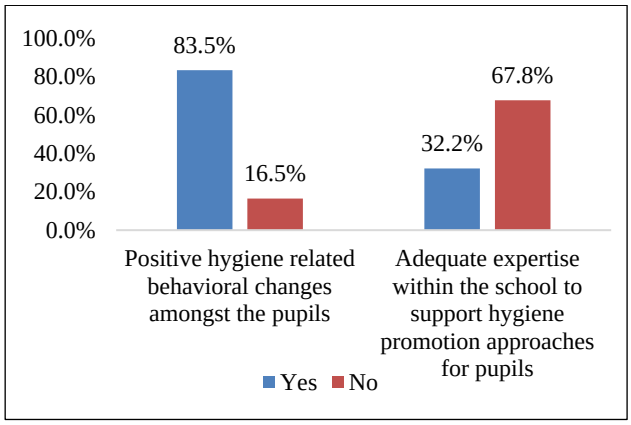

Figure 2: Positive hygiene related behavioural changes.

A notable hygiene-related behavioral change was observed, this important observation was made, which was further confirmed by the key interview response in one of the schools who responded as under:

"The children have again embraced the hand washing practice as was during Covid-19 epidemics and they ensure they follow the steps we have trained them. There is actually a noticeable improvement in the general cleanliness" (KII 5).

Environmental factors influencing hygiene practices

According to this table, most of respondents observed healthy hygiene practices among the pupils had higher rates of hygiene practices 38 (46.3%), further, respondents demonstrated hygiene practices 42 (43.3%), offered books and materials with information on hygiene practices 39 (40.6%), and inspect pupils' personal hygiene 45 (40.9%) had pupils demonstrating adequate hand hygiene practices. Further analysis showed a strong association between healthy hygiene practices among the pupils such as practicing adequate handwashing after using toilets among the pupils and factors such as observing healthy hygiene practices, demonstrated hygiene practices, and inspection of pupils' personal hygiene, with their adjusted ORs being 5.4, 8.8, and 5.8, respectively. This implies that demonstrated hygiene practices had the strongest association with the healthy hygiene practices among the pupils in the selected schools. Additionally, the observed associations of the aforementioned explanatory factors) with practicing adequate handwashing after using toilets were statistically significant as shown here; association between observing healthy hygiene practices among the pupils (OR=5.424; 95% CI=1.135-8.327; p=0.021), demonstration of hygiene practices (OR=8.831; 95% CI=2.211-13.270; p= 0.004), and inspection of pupils' personal hygiene (OR=5.808; 95% CI=1.124-12.069; p= 0.007.

Table 3: Environmental factors influencing hygiene practices.

		Yes	No	OR	95% CI		Sign
		N (%)	N (%)		Lower	Upper	
Observe healthy hygiene practices among the pupils	Yes	38 (46.3)	44 (53.7)	5.424	1.135	8.327	0.021
	No	10 (25.6)	29 (74.4)	Ref			
Demonstrate hygiene practices	Yes	42 (43.3)	55 (56.7)	8.831	2.211	13.270	0.004
	No	6 (25.0)	18 (75.0)	Ref			
Offer books and materials with information on hygiene practices	Yes	39 (40.6)	57 (59.4)	1.987	0.380	2.563	0.053
	No	9 (36.0)	16 (64.0)	Ref			
Boil drinking water in the school	Yes	3 (30.0)	7 (70.0)	1.507	0.434	7.606	0.051
	No	45 (40.5)	66 (59.5)	Ref			
Inspect pupils' personal hygiene	Yes	45 (40.9)	65 (59.1)	5.808	1.124	12.069	0.007
	No	3 (27.3)	8 (72.7)	Ref			

The quantitative findings were supported by the qualitative data as indicated by some of the responses from the interviewees. KII, especially the health staff, indicated to have regular training to all teachers on

hygiene mostly during COVID-19 and some few years later, but that intense training have ceased, although there is follow-up training once in a while.

"Certainly, there are changes in children's handwashing behaviour. We provide materials to schools on hygiene, further, the CBC has also introduced hygiene in classroom. What I have observed is that these days teachers demonstrate on procedures for washing hands after using the toilet using soap and running water as well inspect hygiene on regular bases" (KII 2).

DISCUSSION

The findings from this study indicate even though the estimated median toilet-to-pupils ratio is 1:27 which was within the national and global targets, it is only 51 out of 121 or 42.1% of the studied schools can be said to have met the WHO pupil-to-toilet recommended ratio. This findings contradict those of a study by Mbula done in Machakos County that found that 64% of schools had inadequate toilets to cater the pupils populations.[15] However, these disparities can be explained by the differences in the calculation of the ratio, as the findings of the current estimates obtained using not the actual, but the median values of the toilets and students' numbers of the schools. Essentially, the latrine to student ratio is a major issue in most public schools, as hundreds of pupils share a single restroom, providing little privacy, particularly for girls. The Ministry of Health and the Ministry of Education recommended a ratio of 1 toilet for every 25 females and 1 toilet, including urinals for every 30 boys.[2,1] This is in order for the sanitation facilities to give adequate privacy to all pupils, which at present is in contradiction to the current recommendation.

All the schools had running water, but only 51 (42.1%) of them provided hand washing soap. This is inconsistent with a study by Cairncross & Valdmanis revealed that the majority of public schools had adequate hand detergents, running water, restrooms with open roofs and cubicles that were separated by no doors.[16] In addition, the majority of the restrooms were filthy, with urine on the floor and excrement on the walls. Such circumstances do not support good hygiene habits. Therefore, it is necessary to construct separate, gender-appropriate restrooms that offer the entire school community privacy, enough water, soap, and disposal facilities for hand washing. According to WHO, report, effective programming for hygiene promotion results from having a clear grasp of the current situation, making realistic assessments of what is feasible, and enlisting the expertise of numerous players.[17] The realization that particular contextualized local demands will impact the choice of strategies and approaches for health promotion is one of the characteristics that a school must demonstrate in order to be recognized as health promoting.

The findings observed associations of the aforementioned explanatory factors with practicing adequate handwashing after using toilets were statistically significant as shown here; association between observing healthy hygiene practices among the pupils, demonstration of hygiene practices, and inspection of pupils' personal hygiene. This concurs with those of previous research by Warero and Walden et al that indicated teachers regularly observes hygiene practices among pupils and punished those who did not practice hygiene.[18,19] They also educate and demonstrate to pupils the need for hygiene and use of sanitation facilities. The same study also found that the presence of sufficient sanitation facilities within a community was linked to a decrease in the transmission of soil transmitted Helminths, resulting in a 40-50% reduction in the likelihood of infection. This assertion is further corroborated by the results of a cluster randomized study conducted by Walden et al on the topic of WASH in schools in Egypt.[19] The study demonstrated that the implementation of the WASH intervention led to a decrease in *A. lumbricoides* infection. Additionally, the provision of latrines was found to be effective in reducing hookworm infection. According to another study conducted by Ngure et al, the presence and utilization of latrines have been found to decrease the risk of contracting soil-transmitted helminths.[20]

The study was limited to the selected public primary schools from Gatundu South, Juja, Ruiru, and Kiambu sub-counties. The researcher anticipated that respondents may intentionally provide inaccurate data or withhold information due to the sensitive nature of the information being sought. The researcher provided assurance to the respondents that the information they provide was handled with strict confidentiality and anonymity. The researcher informed the participants that the questionnaires distributed to them was devoid of any identifying markers, and that they weren't obligated to disclose personal information such as phone numbers, names, or email addresses. Additionally, the researcher communicated to the participants that the questionnaires were securely disposed of once the data provided by the respondents has been collected. The researcher took measures to ensure that the language employed in the questionnaires is both considerate and conducive to the reader's comfort.

CONCLUSION

The study found that the adequate hygiene practices can be determined (predicted) by implementors of the hygiene promotion activities such as the school teachers, non-governmental organizations (NGO) officers, national and/or county government officers, combination of implementors (p=0.0001), and adequacy of expertise within the school to support the selection of appropriate hygiene promotion approaches for pupils (p=0.0001). The study found a strong association between environmental factors and hygiene practices among pupils in selected schools. Most respondents observed healthy hygiene

practices, demonstrated them, offered information on hygiene, and inspected pupils' personal hygiene. The strongest association was found between demonstrated hygiene practices and healthy hygiene practices, with adjusted odds ratios of 5.4, 8.8, and 5.8, respectively. The observed associations were statistically significant.

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REFERENCES

1. MoE and MoH. Kenya School Health Policy. Minist Heal. 2018;24(6):1-74.
2. MoH. National School Health Policy. Minist Educ Mini8stry Public Heal. Published online 2016:1-46. https://drive.google.com/file/d/0B1DAmtM1BcbMMU5LY0VNbnl1NlU/view. Accessed 01 November 2024.
3. UNICEF. Water, Sanitation and Hygiene in Schools: What We Do and Why: Education and Child Development. United Nations Child Fund. 2020;96(154):879-962.
4. WHO. Water, Sanitation and Hygiene: Sanitation and Hygiene Promotion in Schools. WHO Libr Cat Data. 2019;67(30):1593-1633.
5. Gensch R, Ferron S, Sandison P. Compendium of Hygiene Promotion in Emergencies. Int J Hyg Environ Health. 2020;227(98):311-9.
6. Buck ED, Remoortel HV, Hannes K, Govender T, Naidoo S, Avau B, et al. Approaches to promote handwashing and sanitation behaviour change in low- and middle-income countries: a mixed method systematic review. Campbell Syst Rev. 2017;13(1):441-7.
7. Cheurfa E, Salaün C, Norotte T, Ackun L, Boot N. Cost-effectiveness of Water, Sanitation and Hygiene (WASH) promotion approaches used in basic schools in Ghana. J Water, Sanit Heal Environ. 2020;157(42):114-9.
8. Buck ED, Remoortel HV, Hannes K, Govender T, Naidoo S, Avau B, et al. Approaches to promote handwashing and sanitation behaviour change in low- and middle-income countries. Campbell Collab. 2017;13(8):178-83.
9. Rheinländer T, Thanh Xuan LT, Ngoc Hoat L, Dalsgaard A, Konradsen F. Hygiene and sanitation promotion strategies among ethnic minority communities in Northern Vietnam: A stakeholder analysis. Health Policy Plan. 2022;27(7):600-12.
10. Anyango MJ. Water, Sanitation and Hygiene Practices as Predictors of Diarrhoea Occurrence among School Age Children in Ganze Sub County, Kenya. Trop Med Int Heal. 2019;79(35):750-6.
11. Kathuni S, Akunga D, Kitur E, Letema S. School hygiene promotion approaches and their influence on pupil's hygiene practices in public primary schools in Dagoretti, Nairobi City County, Kenya. Glob J Heal Sci. 2021;6(1):18-26.
12. Nzioki JM, Korir A. Effective methods for community sanitation and hygiene promotion in the developing world : a scoping review effective methods for community sanitation and hygiene promotion in the developing world : a scoping review. Africa J Tech Vocat Educ Train. 2020;5(1):175-85.
13. Asako T, Maruyama K. Improving water, sanitation, and hygiene in schools: a guide for practitioners and policy makers in Bomet County. Int J Environ Res Public Health. 2020;18(4):141-50.
14. Pewu L. Factors influencing compliance with the water sanitation and hygiene (wash) programme: hand hygiene practices in second cycle schools in the ledzokuku municipality of the greater accra region of Ghana. Int J Hyg Environ Health. 2019;220(7):539-50.
15. Mbula ES. Factors influencing implementation of hygiene practices in public secondary schools in central division of Machakos District in Machakos County. Int J Environ Res Public Health. 2018;213(10):2282-95.
16. Cairncross S, Valdmanis V. Water supply, sanitation, and hygiene promotion. Int J Epidemiol. 2021;19(4):788-94.
17. WHO. Improving health and learning through better water, sanitation and hygiene in schools. WHO Reg Off Eur. 2019;42(18):1-140.
18. Warero A. Assessment of sanitation facilities in public primary schools in Kajiado centeral district. Environ Health Perspect. 2020;7(1):29-33.
19. Walden VM, O'Reilly M, Yetter M. Introduction to hygiene promotion: tools and approaches. J Glob WASH. 2019;93(10):111-21.
20. Ngure FM, Reid BM, Humphrey JH, Mbuya MN, Pelto G, Stoltzfus RJ. Water, sanitation, and hygiene (WASH), environmental enteropathy, nutrition, and early child development: Making the links. Ann N Y Acad Sci. 2020;13(1):118-28.

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