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Article

Knowledge, Attitudes, and Practices of Sanitation Among Primary School Learners in Sekhukhune District, Limpopo Province, South Africa: A Cross-Sectional Study

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Highlights

Public health relevance—How does this work relate to a public health issue?

- Addresses poor sanitation KAP among primary learners in rural South Africa, where inadequate WASH contributes to disease and school absenteeism.
- Examine the knowledge-practice gap in low-resource schools where sanitation continuity remains a public health challenge.

Public health significance—Why is this work of significance to public health?

- Identifies handwashing misconceptions (41%), low soap use (41%), open defecation (12.4% due to non-functional toilets), and learner discomfort (45.8%) as key behavioural gaps beyond infrastructure deficits.
- Demonstrates significant age-related differences in knowledge ($p < 0.001$), with older over-age learners (14 years) showing the lowest scores.

Public health implications—What are the key implications or messages for practitioners, policy makers and/or researchers in public health?

- Interventions must integrate enabling environments (functional toilets, soap, privacy, safety) alongside education to translate knowledge into practice.
- Policies should prioritize daily handwashing drills, learner WASH committees, maintenance budgets, and dedicated sanitation grants.

Abstract

Sanitation knowledge, attitudes, and practices (KAP) among primary school learners can aid in disease prevention through sanitation as well as in improving learner academic achievement. Despite this, evidence regarding sanitation KAP among rural South African primary school learners is inadequate. In this study, sanitation KAP among grade 6 learners in Sekhukhune District, Limpopo Province, were investigated. The study adopted a quantitative cross-sectional design among 249 learners chosen randomly from nine primary schools. Data were collected utilizing a structured questionnaire which was pre-tested prior to the study. Analysis was performed using SPSS version 29 with the help of the Pearson chi-square test at a significance level of 5%. Of the total sample size, 59.0% exhibited adequate knowledge about sanitation ($\geq 80\%$ correct answers). Nonetheless, 41% held erroneous views regarding hand washing that it was enough for hands to look clean even without the use of soap, while only 41.0% used soap always after defecating. Open defecation was noted by 12.4% of the learners, where non-functional toilets accounted for 73% of these cases. Over half (45.8%) of the respondents were embarrassed about using school toilets. Knowledge about ill effects of poor hygiene on one's health correlated significantly with the age of learners.

Keywords: sanitation; primary school learners; knowledge; attitudes; practices

1. Introduction

Sanitation knowledge and practices in primary schools play a significant role in learning, and health-reduced illnesses related to poor hygiene and poor water supply [1]. The Sustainable Development Goal (SDG 6) target for the year 2030 includes achieving universal and equitable access to safe and affordable drinking water, sanitation, and hygiene (WASH) for all and end open defecation [2–4]. Specifically, SDG target 6.2 calls for ending open defecation and providing adequate sanitation and hygiene for all, paying special attention to the needs of women and girls in vulnerable settings including schools[5,6].

There is a strong need for schools to ensure good sanitation practices for their pupils, as this will protect them from sanitation-related diseases and ensure good health and better performance in school [7]. In the State of the World's Children Report in 2020, the United Nations International Children's Emergency Fund (UNICEF) reported that more than 5.4 million school children all over the globe were faced with inadequate access to sources for drinking water [5]. According to UNICEF/WHO (2020), the impact of good sanitation attitudes among primary school learners has improved grades, with fewer sick days and absenteeism [5]. Various countries reported a lack of adequate sanitation knowledge in primary schools as a concern that needed urgent attention [8]. Sharma [9] argues that learners are more likely to have improved attendance and school performance if they have positive attitudes towards hygienic learning environments. Hutton and Chase [10] noted that sanitation through toilet provision and good hygiene are significant in maintaining the dignity and privacy of learners.

Even with improvements achieved in some cases, the existence of a knowledge-practice gap is well-documented internationally, whereby learners have knowledge of sanitation practices yet they cannot practice because of structural challenges. In Southern Ethiopia, Eshetu et al. [11] showed that 47% of the primary schoolchildren had misconceptions about hand washing, in the sense that clean-looking hands do not necessarily require soap to be safe. In Namibia, Shilunga et al. [1] observed that 82% of learners understood that open defecation contributes to disease outbreaks, but few actually performed hand washing because of the non-availability of toilets and soap. In South Africa, McFarlane et al. [12] noted that 34% of learners in Gauteng were embarrassed to use school toilets, and Morgan et al. [13] showed that only 68% of learners washed their hands with soap in six Southern African countries. In Limpopo Province, Sibiya and Gumbo [14] observed that over-age learners scored poorly in knowledge on WASH, while Mamafha [15] indicated the failure of supply chains in delivering soap, which is required in the WASH program, to learners. However, evidence on sanitation KAP among learners in rural Sekhukhune District remains limited, particularly regarding the specific gaps of handwashing misconceptions, open defecation, learner discomfort with facilities, and age-related differences.

This study uses the health belief model that assumes that behaviors towards health matters are dependent on four major components, which include perceived severity, perceived benefits, perceived barriers, and self-efficacy. This model was used in analyzing how the knowledge and attitude held by learners affected their practices on sanitation or if structural barriers, such as non-operational toilets or lack of soap, had greater effects. Hence, the objective for this research includes finding out what is the state of knowledge, attitude, and practices of primary school learners regarding the issue of sanitation. These specific objectives include: (1) To analyze the level of sanitation knowledge among the grade six learners of the chosen primary schools in Sekhukhune district, focusing on any misconception about hand washing and germs; (2) To analyze the attitudes of learners on sanitation practices, especially the willingness of the learners to use school facilities and to advise their peers; (3) To evaluate sanitation practices, especially hand washing and open defecation practices, among the learners; and (4) To establish associations between sanitation knowledge attitudes and practices based on age and gender of learners, focusing especially on over-age learners having less knowledge than younger ones as indicated in previous Limpopo research..

2. Materials and Methods

2.1. Study Design and Approach

This study utilised the quantitative research approach to investigate the research problem and to achieve the objectives of the study. Furthermore, the study followed the descriptive research design. Descriptive studies involve gathering information in a practical field through the provision of a picture of the phenomena as it occurs naturally, thus describing the variables to answer the research question [16]. The selected study design was suitable for the study, as it ensured that the data acquired could be measured using numerical values for the statistical analysis of the population sample, to ensure that the results are valid and reliable.

2.2. Study Setting and Population

The study utilised a survey to measure the descriptive numbers related to the respondents' demographic characteristics and their level of sanitation knowledge, attitudes, and practices in schools. The study setting is a school environment, which is unique in nature and to some extent predisposes this research to raw data [16]. The study was conducted in primary schools of the Sekhukhune District, Greater Fetakgomo-Tubatse Municipality. Bogwasha Circuit has 18 primary public schools with a total of 8,607 learners, targeting 661 grade 6 learners as the accessible population.

2.3. Sampling and Sample Size

Simple random sampling using the fishbowl technique selected nine schools from 18. Sample size of 249 learners was calculated using Slovin's formula $n = N / (1 + N e^2)$, where $N=661$, $e=0.05$. While Slovin's formula was used for practicality, the authors acknowledge that power analysis is the preferred contemporary method; however, given the resource constraints of this study, the achieved sample size of 249 exceeds the minimum required for a 95% confidence level with 5% margin of error.

2.4. Data Collection Instrument

Data collection used a structured, validated questionnaire pre-tested for reliability. Content validity was established through review by three experts in public health and WASH research (Content Validity Index = 0.89). The questionnaire was pre-tested on 30 learners (10% of the sample) from a non-participating school in the same circuit. Reliability was assessed using Cronbach's alpha: knowledge domain $\alpha = 0.82$, attitudes domain $\alpha = 0.79$, practices domain $\alpha = 0.81$, indicating acceptable internal consistency.

2.5. Data Analysis

Data were analyzed using SPSS version 29.0. Descriptive statistics summarized demographic characteristics and responses to knowledge, attitude, and practice questions using frequencies (n) and percentages (%). Cronbach's alpha assessed internal consistency of the questionnaire: knowledge domain ($\alpha=0.82$), attitudes domain ($\alpha=0.79$), practices domain ($\alpha=0.81$). A composite knowledge score was calculated by summing correct responses across eight knowledge items (1 point per correct answer). Learners were categorized as having adequate knowledge ($\geq 80\%$ correct, $\geq 7/8$), moderate knowledge (50-79% correct, 4-6/8), or inadequate knowledge ($< 50\%$ correct, $\leq 3/8$). Pearson chi-square tests examined associations between categorical variables (age, gender) and KAP responses, with Fisher's exact test applied when expected cell counts were < 5 . Statistical significance was set at $p < 0.05$ (two-tailed). All 249 returned questionnaires were fully complete (0% missing data); therefore, no imputation was required, and all cases were included in the final analysis.

3. Results

3.1. Demographic Profile of Participants

Table 1 displays the demographic profile of participants. Of 249 participants, more were females (n=137, 55%) compared to males (n=112, 45%). Most participants were 11 years old (n=148, 59.4%), followed by 12 years (n=82, 32.9%), 13 years (n=16, 6.4%), and 14 years (n=3, 1.2%).

Table 1. Demographic profile of participants by age and gender.

Gender	11 years	12 years	13 years	14 years	Total
Male	61 (54.5%)	38 (33.9%)	10 (8.9%)	3 (2.7%)	112 (45%)
Female	87 (63.5%)	44 (32.1%)	6 (4.4%)	0 (0.0%)	137 (55%)
Total	148 (59.4%)	82 (32.9%)	16 (6.4%)	3 (1.2%)	249 (100%)

3.2. Sanitation Knowledge of Learners

Table 2 shows learners' responses to sanitation knowledge questions. Overall, 52.6% agreed that surfaces contain germs, 51.8% agreed that shaking hands can spread germs, and 42.6% agreed that human faeces contain germs. Regarding misconceptions, 31.3% strongly disagreed that visually clean hands are safe (correct answer), while 39.7% strongly disagreed that water-only handwashing is sufficient.

Table 2. Participants' responses to sanitation knowledge questions (N=249).

Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Surfaces contain germs	17 (6.8%)	2 (0.8%)	34 (13.7%)	131 (52.6%)	65 (26.1%)
Shaking hands can spread germs	16 (6.4%)	19 (7.6%)	15 (6.0%)	129 (51.8%)	70 (28.1%)
Human faeces contain germs	15 (6.0%)	13 (5.2%)	22 (8.8%)	106 (42.6%)	93 (37.3%)
If hands look clean, no need to wash	78 (31.3%)	69 (27.7%)	9 (3.6%)	47 (18.8%)	46 (18.4%)
Water-only handwashing is enough	99 (39.7%)	99 (39.7%)	13 (5.2%)	23 (9.2%)	15 (6.0%)
Playing near rubbish is not dangerous	96 (38.5%)	72 (28.9%)	7 (2.8%)	39 (15.7%)	35 (14.1%)
Open defecation spreads illness	29 (11.6%)	24 (9.6%)	14 (5.6%)	88 (35.3%)	94 (37.8%)
Poor hygiene causes diarrhoea/lung illness	4 (1.6%)	9 (3.6%)	23 (9.2%)	95 (38.2%)	118 (47.4%)

A composite knowledge score was calculated by summing correct responses across the eight knowledge items (1 point per correct answer). Learners who answered $\geq 80\%$ of knowledge questions correctly were classified as having adequate knowledge (n=147, 59.0%). Those scoring 50-79% were classified as having moderate knowledge (n=72, 28.9%), and those scoring $< 50\%$ as having inadequate knowledge (n=30, 12.1%).

3.3. Attitudes Toward Sanitation

Regarding attitudes toward sanitation, 71.5% (n=178) of learners agreed or strongly agreed that keeping the school toilet clean is their responsibility. Concerning comfort using school toilets, only 54.2% (n=135) agreed or strongly agreed, indicating discomfort among nearly half of the learners (45.8%). Regarding willingness to remind a friend to wash hands after toilet use, 68.3% (n=170) agreed or strongly agreed, suggesting positive peer influence potential.

Table 3. Participants' attitudes toward sanitation (N=249).

Attitude Statement	Agree/Strongly agree
Keeping the school toilet clean is my responsibility	178 (71.5%)
I feel comfortable using the school toilet	135 (54.2%)
I would remind a friend to wash hands after toilet use	170 (68.3%)

3.4. Self-Reported Sanitation Practices

Self-reported handwashing after toilet use "always" was reported by 58.6% (n=146), while 24.5% (n=61) reported "sometimes" and 16.9% (n=42) reported "rarely or never." Use of soap for handwashing "always" was reported by only 41.0% (n=102). Open defecation "ever practiced" was reported by 12.4% (n=31) of learners, primarily due to non-functional school toilets, which was cited by 73% of those reporting open defecation.

Table 4. Self-reported sanitation practices of learners (N=249).

Practice Item	Always	Sometimes	Rarely/Never
Wash hands after toilet use	146 (58.6%)	61 (24.5%)	42 (16.9%)
Use soap when washing hands	102 (41.0%)	67 (26.9%)	80 (32.1%)

3.5. Association Between Sanitation Knowledge and Demographic Characteristics

Table 3 depicts the association between sanitation knowledge items, age, and gender. A significant association was found between age and knowledge that poor hygiene leads to illness ($p < 0.001$). A significant association was also found for knowledge that human faeces contain germs ($p = 0.027$). No significant gender differences were observed for any knowledge item.

Table 3. Association between sanitation knowledge items, age, and gender (N=249).

Response	11 years (n=148)	12 years (n=82)	13 years (n=16)	14 years (n=3)	Age p-value	Male (n=112)	Female (n=137)	Gender p-value	
Surfaces contain germs	SD	10 (6.8%)	5 (6.1%)	1 (6.3%)	1 (33.3%)	0.653	10 (8.9%)	7 (5.1%)	0.461
	D	1 (0.7%)	1 (1.2%)	0 (0%)	0 (0%)		0 (0%)	2 (1.5%)	
	N	21 (14.2%)	10 (12.2%)	3 (18.8%)	0 (0%)		13 (11.6%)	21 (15.3%)	
	A	82 (55.4%)	44 (53.7%)	4 (25.0%)	1 (33.3%)		59 (52.7%)	72 (52.6%)	
	SA	34 (23.0%)	22 (26.8%)	8 (50.0%)	1 (33.3%)		30 (26.8%)	35 (25.5%)	
Shaking hands can spread germs	SD	10 (6.8%)	6 (7.3%)	0 (0%)	0 (0%)	0.122	8 (7.1%)	8 (5.8%)	0.781
	D	14 (9.5%)	4 (4.9%)	1 (6.3%)	0 (0%)		11 (9.8%)	8 (5.8%)	

Human faeces contain germs	N	5 (3.4%)	8 (9.8%)	1 (6.3%)	1 (33.3%)	0.027	6 (5.4%)	9 (6.6%)	0.85 9
	A	78 (52.7%)	45 (54.9%)	6 (37.5%)	0 (0%)		57 (50.9%)	72 (52.6%)	
	SA	41 (27.7%)	19 (23.2%)	8 (50.0%)	2 (66.7%)		30 (26.8%)	40 (29.2%)	
	SD	9 (6.1%)	5 (6.1%)	1 (6.3%)	0 (0%)		8 (7.1%)	7 (5.1%)	
	D	7 (4.7%)	6 (7.3%)	0 (0%)	0 (0%)		7 (6.3%)	6 (4.4%)	
If hands look clean, no need to wash	N	13 (8.8%)	3 (3.7%)	4 (25.0%)	2 (66.7%)	0.730	9 (8.0%)	13 (9.5%)	0.16 1
	A	67 (45.3%)	34 (41.5%)	5 (31.3%)	0 (0%)		45 (40.2%)	61 (44.5%)	
	SA	52 (35.1%)	34 (41.5%)	6 (37.5%)	1 (33.3%)		43 (38.4%)	50 (36.5%)	
	SD	45 (30.4%)	26 (31.7%)	5 (31.3%)	2 (66.7%)		40 (35.7%)	38 (27.7%)	
	D	40 (27.0%)	25 (30.5%)	4 (25.0%)	0 (0%)		27 (24.1%)	42 (30.7%)	
Water-only handwashing is enough	N	7 (4.7%)	2 (2.4%)	0 (0%)	0 (0%)	0.213	2 (1.8%)	7 (5.1%)	0.58 0
	A	32 (21.6%)	15 (18.3%)	0 (0%)	0 (0%)		18 (16.1%)	29 (21.2%)	
	SA	24 (16.2%)	14 (17.1%)	7 (43.8%)	1 (33.3%)		25 (22.3%)	21 (15.3%)	
	SD	64 (43.2%)	30 (36.6%)	3 (18.8%)	2 (66.7%)		48 (42.9%)	51 (37.2%)	
	D	54 (36.5%)	37 (45.1%)	8 (50.0%)	0 (0%)		39 (34.8%)	60 (43.8%)	
	N	9 (6.1%)	2 (2.4%)	1 (6.3%)	1 (33.3%)	0.213	5 (4.5%)	8 (5.8%)	0.58 0
	A	11 (7.4%)	10 (12.2%)	2 (12.5%)	0 (0%)		12 (10.7%)	11 (8.0%)	
	SA	10 (6.8%)	3 (3.7%)	2 (12.5%)	0 (0%)		8 (7.1%)	7 (5.1%)	

Playing near rubbish is not dangerous	SD	58 (39.2%))	30 (36.6%))	6 (37.5%))	2 (66.7%))	0.695	42 (37.5%))	54 (39.4%))	0.08 2
	D	38 (25.7%))	27 (32.9%))	7 (43.8%))	0 (0%)		25 (22.3%))	47 (34.3%))	
	N	3 (2.0%))	4 (4.9%))	0 (0%))	0 (0%))		3 (2.7%))	4 (2.9%))	
	A	25 (16.9%))	12 (14.6%))	1 (6.3%))	1 (33.3%))		20 (17.9%))	19 (13.9%))	
	SA	24 (16.2%))	9 (11.0%))	2 (12.5%))	0 (0%))		22 (19.6%))	13 (9.5%))	
Open defecation spreads illness	SD	16 (10.8%))	11 (13.4%))	2 (12.5%))	0 (0%))	0.940	12 (10.7%))	17 (12.4%))	0.24 3
	D	14 (9.5%))	8 (9.8%))	1 (6.3%))	1 (33.3%))		6 (5.4%))	18 (13.1%))	
	N	9 (6.1%))	3 (3.7%))	2 (12.5%))	0 (0%))		8 (7.1%))	6 (4.4%))	
	A	53 (35.8%))	30 (36.6%))	4 (25.0%))	1 (33.3%))		40 (35.7%))	48 (35.0%))	
	SA	56 (37.8%))	30 (36.6%))	7 (43.8%))	1 (33.3%))		46 (41.1%))	48 (35.0%))	
Poor hygiene causes diarrhoea/lung illness	SD	1 (0.7%))	1 (1.2%))	1 (6.3%))	1 (33.3%))	<0.001	1 (0.9%))	4 (2.9%))	0.40 4
	D	3 (2.0%))	3 (3.7%))	3 (18.8%))	0 (0%))		6 (5.4%))	3 (2.2%))	
	N	16 (10.8%))	6 (7.3%))	1 (6.3%))	0 (0%))		9 (8.0%))	14 (10.2%))	
	A	54 (36.5%))	35 (42.7%))	6 (37.5%))	0 (0%))		47 (42.0%))	48 (35.0%))	
	SA	74 (50.0%))	37 (45.1%))	5 (31.3%))	2 (66.7%))		49 (43.8%))	68 (49.6%))	

SD = Strongly disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly agree.

4. Discussion

This research focused on examining the knowledge, attitudes, and practices of 249 Grade 6 learners from Sekhukhune District primary schools, Limpopo Province. The findings indicated that there was a relatively good knowledge, attitude, and practice of sanitation among these learners, as

59.0% had adequate knowledge ($\geq 80\%$), while more than 80% positively responded to all attitude items. However, there were notable differences among learners' ages, knowledge, and practices.

While the results indicate that 59.0% of the learners have appropriate sanitation knowledge, there is still considerable room for improvement, making the Sekhukhune District moderately positioned relative to other African regions [17]. The fact that 41% of the learners believe that visually clean hands do not require washing is similar to the findings by Eshetu et al. [11] in Southern Ethiopia, where 47% of children attending primary schools hold similar views. Nevertheless, this percentage is significantly higher than the 28% obtained by Alemu [18], in several African countries. On the contrary, studies conducted in high-income countries reveal significantly low percentages [19–21]. For instance, Lopez-Quintero et al. [22], show that only 12% of American children attending schools hold the view that visually clean hands can be used without washing. Geographically, the result showing that 78.8% of the learners understand that open defecation causes diseases is consistent with the findings by Shilunga et al. [1], in Namibia, where the same percentage was obtained.

Nevertheless, the current research's results, whereby only 41% always used soap, are far lower compared to the results reported by Morgan et al. [13], whereby 68% of the respondents across six Southern African countries always used soap. These differences may arise from logistical challenges in distributing the soap in Limpopo schools since the soap is usually not available, even though it is supposed to be available due to policies [15]. In this regard, although there is enough knowledge on the matter, there are still misconceptions and gaps in practice.

Another well-studied issue in the health behavior field is the knowledge-behavior disconnect, which the study confirms is still present. Even though 78.8% of the learners were aware that open defecation causes diseases, 12.4% had engaged in open defecation at some point in their lives. While most learners knew that handwashing prevented disease, 41.0% washed their hands using soap regularly. These results are supported by studies conducted by Shilunga et al. [1], and Eshetu et al. [11]. In the current study, there were three factors that contributed to ODF: infrastructure malfunction (73% of people who practiced ODF had non-functional toilets), availability issues (only 41% always used soap), and lack of comfort in the facilities (45.8% felt uncomfortable). By applying the Health Belief Model, the learners showed high perceptions of seriousness and benefits, but also high perceptions of barriers and low levels of self-efficacy. This implies that interventions should target barriers, providing functional toilets and soap all the time instead of educational measures alone. Contrary to the findings of McFarlane et al. [12], who reported that the learners in Gauteng had "non-progressive attitudes" which were difficult to change, the current study showed that 68.3% of the learners would advise their friends to wash their hands.

Regarding age, most studies find that older learners have more knowledge than younger learners [23,24]. The present study found the opposite pattern for the small subsample of 14-year-old learners ($n=3$), who demonstrated the lowest knowledge scores. This finding should be interpreted with extreme caution due to the small sample size. If confirmed in larger studies, possible explanations include grade retention (over-age learners may have repeated grades due to academic difficulties), socioeconomic disadvantage, or disengagement from school. This finding diverges from Eshetu et al. [11], but is consistent with Sibiyi and Gumbo [14], who found that in Vhembe District (also Limpopo), over-age learners scored lower on WASH knowledge. Future studies with larger samples of over-age learners are needed.

Attitude towards sanitation affects the influence of knowledge on behavior. It was found in this research that learners had favorable attitudes, 71.5% were willing to take responsibility in ensuring that the toilets are kept clean, 68.3% said that they will inform a friend to wash his/her hand, while 54.2% said that they feel comfortable using school toilets. This is not good since 45.8% felt uncomfortable using the toilets, which is a much higher proportion than 34% reported by McFarlane et al. [12], in Gauteng, but lower than the 62% of respondents reported by Morgan et al. [13], in six Southern African countries. Such attitudes arise due to a lack of privacy, uncleanliness or fear of getting harmed. Learners with such an attitude delay the use of the toilet, thus causing UTIs, practice open defecation or even reduce fluid intake, resulting in dehydration [25,26]. This necessitates

improvement in attitudinal levels through improvement in facilities, as recommended by WHO/UNICEF [5], on “Girl-friendly toilets”.

In contrast to most of the earlier studies, there was no statistically significant relationship observed between gender and the knowledge, attitude, and practices (KAP) relating to sanitation in this study. This finding contradicts the findings of Morgan et al. [13], and Irehovbude and Okoye [27], that girls consistently score better than boys on all accounts. There can be multiple reasons behind these findings, including measurement sensitivity, sampling bias, contextual bias (possibly boys and girls have received similar schooling in this context), and social desirability bias. However, though not statistically significant, the pattern is the same as observed in other studies where females score better on average, but by just a little margin.

It is clear from the results that knowledge is only one factor; there must be an enabling environment that includes facilities like proper toilets, availability of soap, privacy, and security. It would be advisable for the policymakers to allocate a separate school sanitation grant, include the WASH competencies within the school curriculum at the Grade R level, and ensure daily hand-washing practice drills under supervision. It is imperative that schools form Learner WASH Committees and regularly maintain their facilities, which can help resolve the current problem of 12.4% open defecation as noted. Future studies should look at peer-based interventions supported by 68.3% of the learners.

Strengths and Limitations

This study has several strengths: it addresses an evidence gap in rural Limpopo, has an adequate sample size (N=249), used a validated instrument (CVI=0.89; Cronbach’s α >0.79), achieved a 100% response rate, and contextualized findings within the broader evidence base. Limitations include the cross-sectional design (no causality), self-reported data (potential social desirability bias), single circuit (limited generalizability), potential COVID-19 inflation of KAP scores, no objective measures, unmeasured household confounders, and the very small subsample of 14-year-old learners (n=3). While sanitation KAP were generally satisfactory, significant gaps remain. Addressing these gaps requires not only education but also functional toilets, consistent soap supply, privacy, and safety. This is not merely an educational issue but a fundamental child health and dignity imperative.

5. Conclusions

This study found that while 59.0% of grade 6 learners in Sekhukhune District demonstrated adequate sanitation knowledge, significant gaps persist. Critically, 41% held handwashing misconceptions, only 41.0% always used soap, 12.4% practiced open defecation (73% due to non-functional toilets), and 45.8% felt uncomfortable using school toilets. Age was significantly associated with knowledge ($p < 0.001$). Knowledge alone is insufficient; an enabling environment with functional toilets, soap, privacy, and safety is essential. Policymakers should prioritize WASH curriculum integration, daily handwashing drills, dedicated sanitation grants, and routine facility monitoring. Addressing sanitation gaps is a child health and dignity imperative, critical to achieving SDG 6 by 2030

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Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Turfloop Research Ethics Committee (TREC/616/2022/:PG) and the Limpopo Department of Basic Education (Ref:2/2/2). Permission was also sought from traditional authorities in the Greater Fetakgomo-Tubatse Municipality as per local protocol.

Informed Consent Statement: Written informed consent was obtained from parents or legal guardians of all participating learners, and written assent was obtained from learners aged 12 years and above. Participation was voluntary, and respondents were assured of confidentiality through anonymized questionnaires. No incentives were provided for participation.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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