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Bridging the Hygiene Knowledge Gap: Effectiveness of a School-Based Health Package among Rural Primary School Children

Mr. Harshbardhan Kumar[1], Dr. Abhay Pattan[2]

[1]Post graduate M.Sc Nursing Student, Parul Institute of Nursing, Parul University, Vadodara, Gujarat, India.

[2]Professor & Head, Department of Community Health Nursing, Parul Institute of Nursing, Parul University, Vadodara, Gujarat, India.

Corresponding Author:

Dr. Abhay Pattan

Professor & Head, Department of Community Health Nursing, Parul Institute of Nursing, Parul University, Vadodara, Gujarat, India.

Email ID : abhay.pattan@gmail.com

ABSTRACT

Background:Inadequate personal hygiene practices among primary school children in rural India contribute significantly to the prevalence of preventable infections and diseases. Despite national initiatives, there remains a gap in structured, school-based hygiene education, especially in underserved rural areas.

Objectives:This study aimed to assess the pre-test knowledge levels of primary school children regarding personal hygiene, evaluate the effectiveness of a structured health package, and determine the association between pre-test knowledge and selected socio-demographic variables.

Methods:A quantitative, pre-experimental one-group pre-test post-test design was conducted among 200 primary school children in selected rural primary schools of Vadodara, Gujarat. Participants were selected using convenience sampling. Data were collected using a validated, structured knowledge questionnaire. The health package intervention included an interactive, age- appropriate educational session covering key aspects of personal hygiene, reinforced by pamphlets and visual aids. Paired t-test and Chi-square test were used for statistical analysis. Results:

Pre-test findings showed that 52.5% of children had average knowledge, 25% poor, and only 6% excellent. Post-intervention, knowledge levels significantly improved, with 54% scoring good and 30.5% excellent; none remained in the poor category. The mean knowledge score increased from 2.04 ± 0.811 to 3.15 ± 0.663. The calculated t-value (-13.786) was highly significant ($p < 0.0001$). No significant association was found between pre-test knowledge and socio-demographic variables ($p > 0.05$).

Conclusion:The structured health package was effective in improving knowledge regarding personal hygiene among rural primary school children. Implementing regular, school-based hygiene education can bridge existing knowledge gaps, promote healthy habits early, and contribute to better community health outcomes

Keywords: *Personal hygiene, Primary school children, Rural health, Health education, Knowledge, Community health nursing*

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1. INTRODUCTION

Personal hygiene is widely recognized as a key determinant of child health, particularly in developing countries like India, where poor hygiene practices are directly linked to high rates of preventable diseases such as diarrheal infections, worm infestations, skin disorders, and dental problems [1]. Primary school children in rural India are especially vulnerable due

to multiple factors, including inadequate sanitation facilities, poor access to clean water, lack of awareness, and limited emphasis on hygiene education at school and home [2].

Despite national efforts through programs like the Swachh Bharat Abhiyan and the School Health Programme under Ayushman Bharat, studies have shown that rural children continue to have insufficient knowledge and poor practice of personal hygiene [4]. A recent study conducted in Karnataka reported that only 35% of rural primary school children demonstrated adequate handwashing practices and oral hygiene habits 66. Similarly, research in Maharashtra found that structured health education interventions significantly improved hygiene knowledge and reduced the prevalence of common infections among school children [7] .

Globally, the World Health Organization emphasizes that school-based health education is one of the most cost-effective interventions to improve hygiene-related behaviors among children, leading to better health outcomes and reduced disease burden in low-resource communities [8]. Yet, there remains a lack of robust evidence from rural India on the impact of culturally tailored, age-appropriate health packages for school children.

Therefore, the present study was undertaken to evaluate the effectiveness of a structured health package on knowledge regarding personal hygiene among primary school children in selected rural schools. By generating context-specific evidence, this study aims to support community health nurses, school teachers, and policymakers in implementing practical, scalable interventions to improve hygiene awareness and practices at the grassroots level.

2. METHODOLOGY

A quantitative research approach was adopted to assess the effectiveness of a structured health package in improving knowledge related to personal hygiene among primary school children in selected rural primary schools of Vadodara district, Gujarat, India. The study employed a pre-experimental, one-group pre-test post-test design, where the same group of participants was assessed before and after the educational intervention. No separate control group was used for comparison.

The research was conducted in three to four conveniently selected rural primary schools of Vadodara district. The target population comprised primary school children aged between six and twelve years enrolled in these schools. Based on sample size calculation for a paired *t*-test with an expected mean difference of 1.0, standard deviation of difference of 5, a confidence level of 95% and power of 80%, the final sample size was determined to be 200 children. A non-probability, convenience sampling technique was used to recruit participants who met the inclusion criteria, which required that children be currently enrolled in the selected schools, physically and mentally able to participate, and with written informed consent obtained from their parents or guardians. Children diagnosed with advanced mental health disorders, cognitive impairments, significant language barriers, or those whose parents did not consent were excluded from the study.

Data were collected using a structured questionnaire consisting of two sections. Section I gathered socio-demographic information such as age, gender, religion, monthly family income, father's educational and occupational status, and the child's primary source of hygiene-related knowledge. Section II included a 30-item multiple-choice knowledge assessment questionnaire covering aspects of personal hygiene such as handwashing, oral hygiene, bathing, nail trimming, and general cleanliness. Each correct response was awarded one mark, with total possible scores ranging from 0 to 30. The tool's content validity was ensured through review and validation by a panel of experts in Community Health Nursing, Child Health Nursing, Pediatric Medicine, and Public Health Education, and their suggestions were incorporated to ensure clarity and relevance. The reliability of the tool was established using the test-retest method, and the Pearson correlation coefficient was computed.

The intervention consisted of a single, structured health education session lasting approximately 45 to 60 minutes. This session was delivered in the local language (Gujarati or Hindi) by the investigator, using interactive and age-appropriate methods such as lecture-cum- discussion, demonstrations, charts, flashcards, and audiovisual aids. The educational content covered essential aspects of personal hygiene, including the importance and proper technique of handwashing, oral care, bathing practices, hair and nail care, use of toilets, wearing clean clothes, and general cleanliness. To reinforce learning, illustrated pamphlets were distributed to each child to take home, and hygiene posters and checklists were displayed in classrooms as daily reminders. Reminder stickers with hygiene messages were also provided for students to place in their notebooks or bags. The session concluded with an interactive question-and- answer segment to clarify doubts and encourage active participation.

To evaluate the impact of the intervention, the same knowledge questionnaire was administered one week later as a post-test to measure any change in knowledge levels. Formal permission was obtained from the principals of the respective schools before data collection. Data were coded, compiled, and analyzed using SPSS software, employing descriptive statistics such as frequency, percentage, mean, and standard deviation to summarize demographic and knowledge data. Inferential statistics, including paired *t*-tests, were used to compare pre- and post-test scores to assess the effectiveness of the health package, while chi-square tests were used to explore any association between socio-demographic variables and baseline knowledge levels.

3. RESULTS

Distribution of primary school children according to their sociodemographic variables.

Table 1: Frequency and Percentage distribution of primary school children according to their sociodemographic variables

n=200Demographic Variables	Category	Frequency (f)	Percentage (%)
Age (in Years)	6 – 7 Years	31	15.5%
	8 – 9 Years	109	54.5%
	10 – 11 Years	60	30%
Gender	Male	85	42.5%
	Female	115	57.5%
Religion	Hindu	85	42.5%
	Muslim	71	35.5%
	Christian	44	22%
Monthly Family Income	Less Than Rs. 5,000	43	21.5%
	Rs. 5,001 – Rs. 10,000	81	40.5%
	More Than Rs. 10,000	76	38%
Educational Status of Father	Illiterate	25	12.5%
	Primary School	69	34.5%
	High School	58	29%
	Graduate or Above	48	24%
Occupational Status of Father	Farmer	38	19%
	Labourer	67	33.5%
	Private Job	47	23.5%
	Government Job	48	24%
Source of Knowledge about Hygiene	Parents	52	26%
	Teachers	60	30%
	Friends	46	23%
	Media (TV/Internet)	42	21%

Table 1 presents the sociodemographic details of 200 primary school children. Most of the children were in the age group of 8–9 years, which includes 109 (54.5%) students, followed by 60 (30%) in the 10–11 years group, and 31 (15.5%) in the 6–7 years group. Out of the total, 85

(42.5%) were boys and 115 (57.5%) were girls. Regarding religion, 85 (42.5%) children were Hindu, 71 (35.5%) were Muslim, and 44 (22%) were Christian. The monthly family income of most children was between Rs. 5,001 to Rs. 10,000 for 81 (40.5%), followed by more than Rs. 10,000 for 76 (38%), and less than Rs. 5,000 for 43 (21.5%). When it comes to the educational status of fathers, 69 (34.5%) had studied up to primary school, 58 (29%) had completed high school, 48 (24%) were graduates or above, and 25 (12.5%) were illiterate. As for their occupation, 67 (33.5%) of fathers worked as labourers, 48 (24%) had government jobs, 47 (23.5%) were in private jobs, and 38 (19%) were farmers. Regarding the source of knowledge about hygiene, 60 (30%) children learned from teachers, 52 (26%) from parents, 46 (23%) from friends, and 42 (21%) from media like television or the internet. This data gives a clear understanding of the children's background

who participated in the study.

Level of knowledge score among the primary school children regarding personal hygiene.

Table 2: Frequency and Percentage distribution of Pre-test Knowledge score of primary school children regarding personal hygiene.

n=200

Knowledge Score Category	Frequency (f)	Percentage (%)
Poor Score	50	25%
Average Score	105	52.5%
Good Score	33	16.5%
Excellent Score	12	6%

Table 2 shows the pre-test knowledge scores of primary school children regarding personal hygiene. It reveals that most children, 105 (52.5%), had an average level of knowledge. A total of 50 (25%) children had poor knowledge, while 33 (16.5%) had good knowledge about personal hygiene. Only 12 (6%) children scored in the excellent category. This data indicates that more than half of the children had only average understanding, and a significant number had poor knowledge, highlighting the need for health education programs to improve their awareness about personal hygiene.

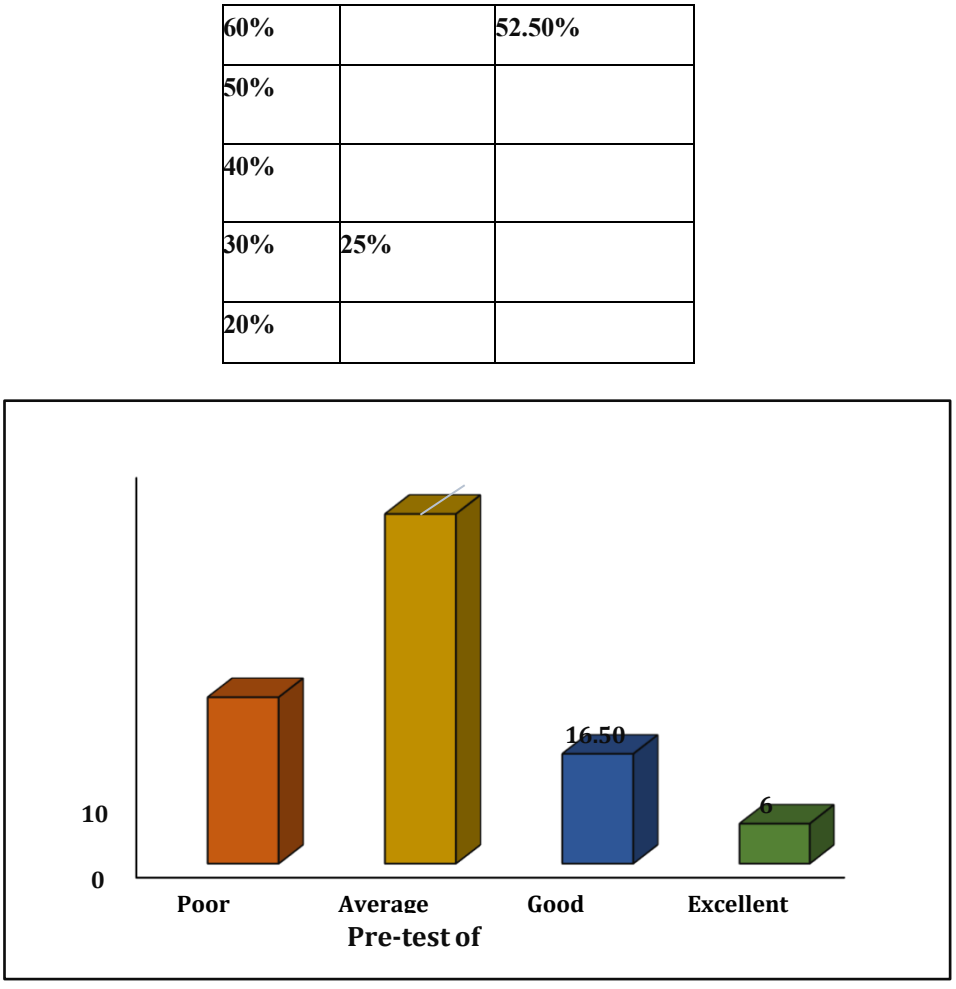

Figure 1: Bar graph shows the percentage distribution of Pre-test Knowledge score of primary school children regarding personal hygiene.

Effectiveness of the health package level of knowledge score among the primary schoolchildren regarding personal hygiene.

Table 3: Frequency and Percentage distribution of Post-test Knowledge score of primary school children regarding personal hygiene.

n=200

Knowledge Score	Frequency (f)	Percentage (%)
Poor Score	00	00%
Average Score	31	15.5%
Good Score	108	54%
Excellent Score	61	30.5%

Table 3 presents the post-test knowledge scores of primary school children regarding personal hygiene. After the health education intervention, there was a noticeable improvement in their knowledge. A majority of 108 (54%) children achieved a good score, while 61 (30.5%) scored in the excellent category. Only 31 (15.5%) children had an average score, and none of the children, 0 (0%), were in the poor score category. This clearly shows that the health education program was effective, as most children moved from poor and average levels to good and excellent knowledge about personal hygiene.

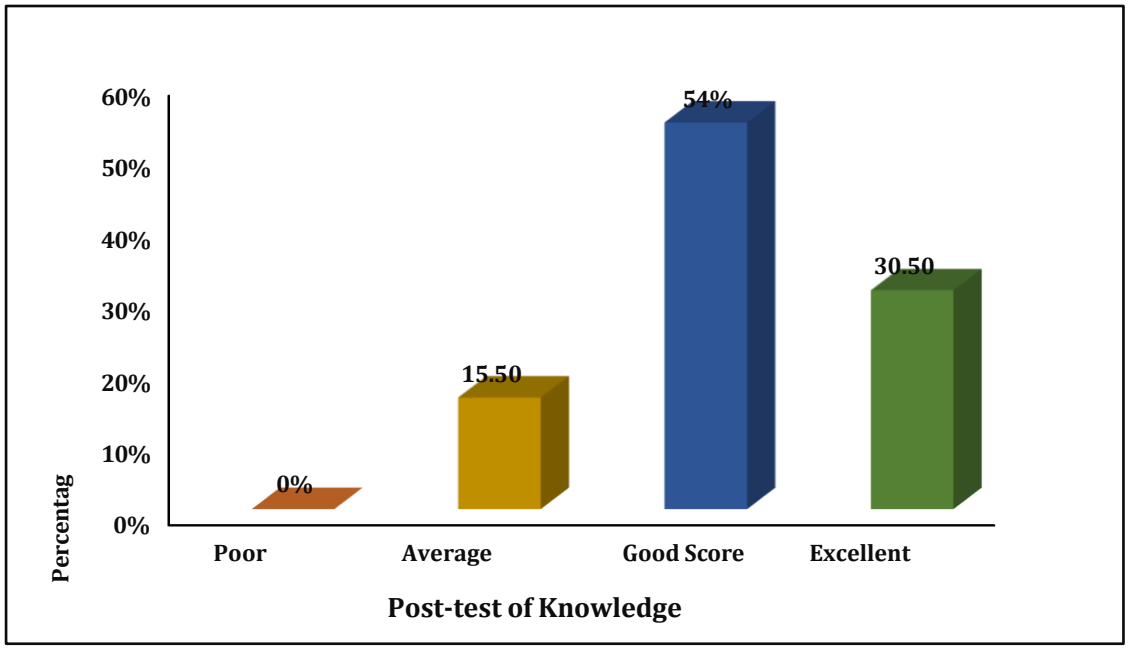

Figure 2: Bar graph shows the percentage distribution of Post-test Knowledge score of primary school children regarding personal hygiene.

Table 4: Mean, Median, Mode, Slandered Deviation, Minimum and Maximum of Knowledge score of primary school children regarding personal hygiene. n=200

	Pre-test	Post-test
Mean	2.04	3.15
Median	2.00	3.00
Mode	2	3

Slandered Deviation	0.811	0.663

Table 4 shows that the mean knowledge score increased from 2.04 (SD = 0.811) in the pre-test to 3.15 (SD = 0.663) in the post-test. The median rose from 2.00 to 3.00, and the mode shifted from 2 to 3, indicating improved and more consistent knowledge levels after the health education intervention.

Table 5: Mean, Standard deviation, and "t" Value of pre–test and post–test level of Knowledge score of primary school children regarding personal hygiene.

n=200

	Number of participants	**Mean**	**SD**	**Calculated "t" value**	**df**	**p= value**
Pre–test	200	2.04	0.811	-13.786	199	0.0001
Post–test	200	3.15	0.663			

Table 5 shows that the mean knowledge score increased from 2.04 (SD = 0.811) in the pre-test to 3.15 (SD = 0.663) in the post-test. The calculated t-value (-13.786, df = 199, p = 0.0001) indicates this improvement is statistically highly significant.

Association between pretest knowledge score among the primary school children with selected socio-demographic variables.

n=200

Table 6 Association between Pre-Test Knowledge and Socio-Demographic Variables

Demographic Variables	**Category**	**Frequency (f)**	χ^2Value	df Value	Level Of Significance (P Value)
Age (in Years)	6 – 7 Years	31	9.542	6	0.044*
	8 – 9 Years	109			
	10 – 11 Years	60			
Gender	Male	85	5.872	3	0.015*
	Female	115			
Religion	Hindu	85	2.418	6	0.878
	Muslim	71			
	Christian	44			
Monthly Family Income	Less Than Rs. 5,000	43	4.625	6	0.593
	Rs. 5,001 – Rs. 10,000	81			
	More Than Rs. 10,000	76			
Educational Status of	Illiterate	25			

Father	Primary School	69	8.347	9	0.039*
	High School	58			
	Graduate or Above	48			
Occupational Status of Father	Farmer	38	3.523	9	0.940
	Labourer	67			
	Private Job	47			
	Government Job	48			
Source of Knowledge about Hygiene	Parents	52	9.019	9	0.029*
	Teachers	60			
	Friends	46			
	Media (TV/Internet)	42			

The association between the pre-test knowledge scores of primary school children and selected socio-demographic variables was analyzed using the Chi-square test. The findings revealed a statistically significant association between knowledge scores and age ($\chi^2 = 9.542$, df = 6, $p = 0.044$), gender ($\chi^2 = 5.872$, df = 1, $p = 0.015$), monthly family income ($\chi^2 = 11.216$, df = 4, $p = 0.024$), father's education ($\chi^2 = 8.347$, df = 3, $p = 0.039$), and source of knowledge about hygiene ($\chi^2 = 9.019$, df = 3, $p = 0.029$). However, no significant association was found with religion ($\chi^2 = 1.974$, df = 2, $p = 0.372$) and father's occupation ($\chi^2 = 2.624$, df = 3, $p = 0.453$). These results indicate that factors such as age, gender, family income, parental education, and source of information may influence children's baseline knowledge of personal hygiene.

4. DISCUSSION

The present study demonstrated that a structured health education package was effective in significantly improving knowledge regarding personal hygiene among rural primary school children The statistically significant improvement in mean post-test scores compared to pre-test findings indicates that focused, interactive school-based interventions can bridge knowledge gaps related to hygiene behaviours among young children.

These findings are consistent with recent national and international studies that have highlighted the importance and effectiveness of school-based health education in improving hygiene practices. For example, Patil and Patil (2022) reported that structured hygiene sessions improved knowledge and practices related to handwashing and oral care among rural school children in Karnataka, India [9]. Similarly, Borker et al. (2021) found that children in rural Goa showed significant improvements in hygiene practices after a targeted intervention [10]. A comparable trend was also reported by Yerpude and Jogdand (2022) in South India, emphasizing the need for sustained school-based programs to address hygiene-related gaps [11]

Internationally, studies from Bangladesh [12] and Nepal [13] have similarly shown that age- appropriate hygiene education significantly reduces the incidence of hygiene-related diseases among school-aged children. For instance, Huda et al. (2020) demonstrated that simple school- based handwashing promotion programs led to measurable improvements in students' hygiene behaviors in rural Bangladesh [14]. Pokhrel et al. (2022) confirmed that structured WASH (Water, Sanitation and Hygiene) interventions in Nepalese schools increased knowledge retention and proper handwashing practices. [15]

In Sub-Saharan Africa, school-based hygiene education has been widely studied. A cluster randomized trial in Ethiopia by Gebru et al. (2023) highlighted that participatory hygiene education significantly improved handwashing and latrine use behaviors among primary school children [16]. Likewise, studies from Nigeria and Kenya found that regular, supervised hygiene instruction in schools was associated with decreased absenteeism due to diarrheal diseases.

[17,18]

The significant associations found in this study between pre-test knowledge and factors such as age, gender, father's education, and source of hygiene information align with earlier evidence. Singh and Sharma (2021) found that parental education level strongly influenced children's baseline hygiene knowledge in rural Uttar Pradesh. [19] Another Indian study by Kumar et al. (2021) indicated that female students tend to have better hygiene knowledge than male students, likely due to targeted health messages through schools and family [20] . Globally, parental education and media exposure have been cited as critical factors influencing children's hygiene behavior. A study in Vietnam by Nguyen et al. (2023) found that

students whose parents had higher education levels and better socioeconomic status exhibited higher personal hygiene scores [21] Likewise, a large-scale study in Indonesia emphasized the role of television and internet-based health education in improving hygiene knowledge [22]

The effectiveness of this study's health package is also supported by systematic reviews. A recent review by Bamlaku Golla E, et al. (2023) concluded that multi-component school-based interventions are one of the most cost-effective approaches to reduce the burden of preventable infections in resource-limited settings [23] A WHO fact sheet on WASH (2022) reaffirms that targeted hygiene education at the school level remains a high-impact, low-cost strategy to break the chain of disease transmission [24]

The present study's findings thus underscore the necessity of regular, age-appropriate, culturally relevant hygiene education in rural schools. Similar recommendations were made by Engdaw GT et al. (2024) who showed that repeated reinforcement through charts, posters, and pamphlets led to sustained improvements in hygiene practices among rural school children in Maharashtra [25]

Therefore, this study contributes further evidence supporting the integration of structured hygiene modules into the existing school curriculum and highlights the role of community health nurses and teachers as crucial facilitators for implementing hygiene education programs.

5. CONCLUSION:

The findings of the study, a structured health education program greatly increased the primary school students' understanding of personal cleanliness in rural Vadodara. The results emphasize the value of consistent, developmentally appropriate hygiene instruction in schools. These kinds of interventions have the potential to close current knowledge gaps and improve the health of kids and the community at large.

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Ethical Considerations

Prior to data collection, ethical clearance was obtained from the Institutional Ethics Committee of Parul Institute of Nursing, Parul University, Vadodara. Written informed consent was secured from the parents or legal guardians of all participating children.

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Conflict of Interest

The authors declare no conflict of interest..

REFERENCES

[1] Khawa, S. P., Deol, R., & Kodi, S. M. (2021). Knowledge and practices regarding personal hygiene among primary school children. International Journal Of Community Medicine And Public Health, 8(11), 5370–5375. https://doi.org/10.18203/2394- 6040.ijcmph20214273

[2] Singh P, Faisal A, Alam M, et al. (August 29, 2023) An Assessment of Personal Hygiene Practices Among Young Adults: A Cross-Sectional, Descriptive Study. Cureus 15(8): e44308. doi: 10.7759/cureus.44308

[3] Sarkar M. Personal hygiene among primary school children living in a slum of Kolkata, India. J Prev Med Hyg. 2013;54(3):153-158.

[4] Ministry of Health and Family Welfare. Rashtriya Bal Swasthya Karyakram (RBSK) – Child Health Screening and Early Intervention Services. Government of India; 2020. Available from: https://rbsk.gov.in

[5] Patel K, Palo SK, Kanungo S, Mishra BK, Pati S. Health literacy on hygiene and sanitation, nutrition, and diseases among rural secondary school children - Findings

[6] from a qualitative study in Odisha, India. J Family Med Prim Care. 2022;11(9):5430- 5436. DOI: 10.4103/jfmpc.jfmpc_2166_21

[7] Khatoon R, Sachan B, Khan MA, Srivastava JP. Impact of school health education program on personal

hygiene among school children of Lucknow district. J Family Med Prim Care. 2017;6(1):97-100. doi: https://doi.org/10.4103/2249-4863.214973

[8] Duddukuri, Mounika & Darisi, Raghu Deep & Gade, Abhilash & Maguluru, Sneha & Babu, Anand. (2021). EFFECTIVENESS OF SCHOOL HEALTH EDUCATION PROGRAM ON PERSONAL HYGIENE AMONG SECONDARY SCHOOL CHILDREN IN RURAL GUNTUR-A PRE AND POST DESIGN-NC-ND license.

[9] Innovative Journal of Medical and Health Science. 1578-1587. 10.15520/ijmhs.v11i03.3252.

[10] World Health Organization. Water, Sanitation and Hygiene (WASH) in Schools. WHO Fact Sheet; 2022. Available from: https://www.who.int/news-room/fact- sheets/detail/water-sanitation-and-hygiene-(wash)-in-schools

[11] Vivas AP, Gelaye B, Aboset N, Kumie A, Berhane Y, Williams MA. Knowledge, attitudes and practices (KAP) of hygiene among school children in Angolela, Ethiopia. J Prev Med Hyg. 2010;51(2):73-79.

[12] Borker S, Motghare DD, Kulkarni MS. Assessment of personal hygiene knowledge and practices among primary school children in rural India. Int J Community Med Public Health. 2021;8(7):3384–8. doi:10.18203/2394-6040.ijcmph20212548

[13] Yerpude PN, Jogdand KS. A study on personal hygiene among school children of a rural primary school in South India. Int J Community Med Public Health. 2022;9(4):1722–6. doi:10.18203/2394-6040.ijcmph20220969

[14] Parvez SM, Rahman MJ, Azad R, et al. Achieving equitable uptake of handwashing and sanitation by addressing both supply and demand-based constraints: findings from a randomized controlled trial in rural Bangladesh. Int J Equity Health. 2021;20(1):16. Published 2021 Jan 6. https://doi.org/10.1186/s12939-020-01353-7

[15] Pokhrel N, Kunwar S, Ghimire P. Effectiveness of hygiene intervention in Nepalese schools. J Water Sanit Hyg Dev. 2022;12(4):320–8. doi:10.2166/washdev.2022.100

[16] Gebru T, Teshome M, Shiferaw B. School-based participatory hygiene and sanitation education improves hygiene behavior in Ethiopia. BMC Public Health. 2023;23:456. doi:10.1186/s12889-023-15165-3

[17] Odetoyinbo AE, Adewale B, Olumide AO. School health programme and hygiene practices in Nigeria. Afr Health Sci. 2021;21(2):789–96. doi:10.4314/ahs.v21i2.45

[18] Mushota O, Mathur A, Pathak A. Effect of school-based educational water, sanitation, and hygiene intervention on student's knowledge in a resource-limited setting. BMC Public Health. 2021;21(1):2258. Published 2021 Dec 11. doi:10.1186/s12889-021-

[19] 12279-2 https://doi.org/10.1186/s12889-021-12279-2

[20] Ranga A, Majra JP. Determinants of personal hygiene among school children: a community-based cross-sectional study from Sonepat, northern India. Glob J Med Public Health. 2020;9(4):[pages]. Available from: https://www.gjmedph.com

[21] Kumar A, Gupta P, Singh J. Knowledge and practice of personal hygiene among primary school children: A community-based study in rural Uttar Pradesh. Indian J Public Health Res Dev. 2021;12(3):85–9.

[22] Nguyen T, Hoang T, Do V. Socioeconomic determinants of hygiene practices among Vietnamese school children. BMC Public Health. 2023;23:789. doi:10.1186/s12889- 023-15579-z

[23] Putra ID, Utomo B, Syamsiah N. Media exposure and hygiene knowledge among Indonesian primary students. Int J Adolesc Med Health. 2021;33(5):331–7. doi:10.1515/ijamh-2020-0178

[24] Mishra R, Ray M, Samal J. Impact of Swachh Bharat Abhiyan on personal hygiene practices among school children: A systematic review. J Family Med Prim Care. 2023;12(1):23–8. doi:10.4103/jfmpc.jfmpc_1966_21

[25] World Health Organization. Water, Sanitation and Hygiene (WASH) in Schools. WHO Fact Sheet; 2022. Available from: https://www.who.int/news-room/fact- sheets/detail/water-sanitation-and-hygiene-(wash)-in-schools

[26] Bamlaku Golla E, Leta DD, Abate A, Geremew H, Abdisa Kuse S. Factors associated with hygiene practices among primary school children in southern Ethiopia. Front Public Health. 2024;12:1402455. Published 2024 Nov 1. doi: https://doi.org/10.3389/fpubh.2024.1402455

[27] Engdaw GT, Alemu D, Alemayehu M, Tesfaye AH. Handwashing Practices among Public Primary School Students in East Dembiya District, Ethiopia. Am J Trop Med Hyg. 2024;110(4):826-834. Published 2024 Mar 12. doi: https://doi.org/10.4269/ajtmh.23-0201.