Assessing the Knowledge and Practices of Hand Hygiene Among School Children in Islamabad

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Table of Content

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Abstract

Hand hygiene is the only effective and one of the inexpensive way to prevent infectious diseases among school-aged children, the most vulnerable group due to their increase exposure to crowded classrooms, irregular or inconsistent hygiene habits and poor sanitation. Hand hygiene is worldwide known as an easy way for preventing diseases, but Pakistani schools struggles with both hand hygiene knowledge and practices. This study examined the children in Islamabad to know about hygiene knowledge and how they act according to their knowledge. The objective of this study is to measure the children knowledge and their actual hygiene practices. A cross-sectional survey was conducted though a structured questionnaire from 240 students of age 6-14 years. Then the data was analyze through SPSS by descriptive analysis and p-values to check for the association between the gender, age ,grade and school type with hygiene practices. The results analyzed that the children knew a lot about the importance of hand washing almost 85.5% which is a majority of population, 84.1% knew that dirty hands can spread diseases. But the level of practices was very poor among children where 66.2% showed unfavourable hand hygiene practices, 49% didn't cover their mouth while coughing and almost 94.2% did not wash their hands after sneezing into their hands. The p-value analysis showed no significant link between hygiene practices and demographic variable where all p were less than 0.05 ($p>0.05$) which was a proof that knowledge practice gap is across all the groups. The study recommends that the schools should teach and provide an environment that can influence children about hand washing practices like hand washing duration, ensure the availability hygiene resources, ensures the active engagement of teachers and parents to develop and maintain healthy hygiene habits of school students ensuring hygiene habits sustainability.

Key Words:

Hand hygiene, Infectious diseases, Sanitation, WASH programs, Globally, COVID-19, Underdeveloped countries, Interventions, , Communicable diseases, Diarrhea, Overcrowded schools, Peer engagement, Epidemic, Parental involvement, Prevention, Vulnerable, Sustainability

Chapter 1

Introduction

1.1 Background

Hand hygiene is the first priority and one of the main concern of public health. Maintaining proper hand hygiene is very important and remains a basic measure to prevent infectious diseases that transmits quickly from person to person and across the communities. Proper hand-washing practices can prevent large number of infections diseases such as gastrointestinal (diarrhea, hepatitis A and choler), respiratory (influenza, COVID-19 and measles) and various skin infections (warts, conjunctivitis and fungal infections) and can be very effective in reducing the burden of mortality and incidence rates due to communicable diseases especially in developing and low-income countries i.e Pakistan, where communicable diseases always remain a major concern (Mbakaya, Lee & Lee, 2017). In many countries hand washing which is a simple way to prevent numerous diseases, becomes even more important as in developing countries many healthcare facilities are burdened the healthcare services becomes limited and even become out of access where only hand hygiene practices can play their effective and affordable role in the protection of communities health.

Where hand-hygiene plays an important role in preventing deadly diseases in children, neglecting hygienic practices lead to communicable diseases in school-going children specially in developing countries. Educational institutions have been recognized as an effective tool for educational interventions to promote awareness of hand hygiene practices and to promote healthy and hygienic behaviors among students. Habib et al. (2019) says that programs of health education programs improve children's awareness and practices of hand hygiene and it also suggests that the involvement of teachers and parents can highly play a positive role. Unhygienic hands can easily transfer bacteria during food consumption and food handling during cooking (Tunio et al., 2024).Children are more vulnerable to such infections, especially school going children due to lack of awareness, over-crowding , poor sanitation facilities and poor hygiene practices in school as demonstrated by Pradhan et al. (2020) in their study. The major part of children day is spend in schools where the way they behave have a

huge influence on their overall health. When a school environment fails to promote hygienic behavior in students it results in the children with poor hygiene behavior that can further run in communities and lead to a widespread of diseases.

Numerous studies shows the importance of hand hygiene interventions to prevent the spread of diseases and improving and affecting the health among school children positively. According to Ehemot-Nwadiaro et al. (2015) report that the lower awareness is directly linked to higher disease burden especially among school-aged children in low resource school environments. We can reduce diarrhea diseases which are more prominent in children and also reduces the mortality rates by promoting hand-washing practices especially washing hands with soap and other hand hygiene practices by 25-30%, which is one of the most cost effective intervention of public health. Schools play a central role in encouraging students to adopt better hygienic behaviors and implementing hand-washing interventions like visual reminders, educational campaigns and WASH program in schools. The study by Kaur et al. (2019) demonstrates that these interventions can be only effective when there is adequate education, proper hygiene resources, and better socioeconomic context. However, Pratinidhi et al. (2020) research conducted in rural community found that despite of adequate knowledge there are significant knowledge-practice gaps as 87% of students were aware of handwashing practices while 96% of students knew the importance of nail trimming still only 22% reported washing hands after using toilets which identify a huge gap. Only good knowledge alone does not lead to the right thing, but the lack of motivation, resources and reinforcement also leads to poor practices. Therefore, these factors need to be taken into consideration.

Recent pandemic of COVID-19 have emphasized the importance and positive impacts of hand washing in avoiding the spread of infectious diseases especially in the vulnerable population and communities like the elderly population with poor immunity and the school going children, founding by the study by Sandora et al. (2005). These interventions are helpful for the people in order to understand health, prevent the spread of diseases and improve overall well-being (Hashmi et al., 2020).
The study by Sandora et al. (2005) also demonstrated through their randomized controlled trail to highlight the effectiveness of alcohol-based hand sanitizer for reducing transmission of communicable illnesses and also the role of hand-hygiene education in preventing diseases significantly the gastrointestinal illnesses.

Furthermore, he added that the use of sanitizer can significantly reduce time consumption along with disease transmission. These finding proves that the use of simple hygiene tools and methods when used correctly which is also an effective mean even when the resources are limited and out of access.

The purpose of this research is to emphasize the importance and role of hand washing and hygiene interventions in the improvement of children's health and maintenance of hygienic behavior by various vulnerable communities. By reviewing the results of existing evidences, and collecting data from schools this study highlight the need for promotion of effective hygiene practices to effectively control the spread of infectious diseases in school going children and other vulnerable communities and to reduce the overall burden of diseases.

1.2 Research Gap

Many studies have shown the positive impact of hand hygiene in promoting health all over the world, but little research has done on the effectiveness of school-based hand hygiene interventions in the context of Pakistani schools. The available data only focus on the temporary campaigns and programs on small scale rather than long-term behavioral change. There is lack of in-depth research on persistent barriers that affect hygiene practices among school children that need to be taken into consideration in order to reduce disease transmission in our community.

Moreover, there is a need of research on how long-term interventions impact children behavior, role of parental and community support and systematic challenges in the way of sustaining these programs. This study target is to fulfill the gap by assessing hand hygiene practices , knowledge-practice gaps and the actual practices by school students across the semi-urban areas of Pakistan.

1.3 Problem Statement

Hand washing is very important for the control of infectious diseases transmission especially in vulnerable population like school-going children as they do not properly wash their hands or follow other hygienic behaviors an instructions that is due to multiple reasons like lack of proper sanitation, persistent supervision, sometimes limited knowledge, poor living conditions, lack of hygiene interventions and

overcrowding. Interventions regarding hand washing and WASH programs plays an important and effective role to promote hand hygiene, but evidence are limited to help us understand how much effective these interventions can be, and why they only last long for a short period of time. This study is to identify the key factors that impact the success of hand washing practices and maintain its sustainability in the vulnerable communities especially the schools. This study is also designed to identify knowledge-practices gaps in students hygiene practices.

1.4 Research Questions

1. How much school students are aware about hand hygiene practices?
2. What are the actual practices of hand hygiene among school students?

1.5 Objectives

1. To assess the knowledge of hand hygiene among school students.
2. To examine their hand hygiene practices.

1.6 Significance

This study holds a very important significance in promoting the strategies that are helpful and effectively preventing infectious disease in schools, orphanages and low-income countries. This study highlighting the best hand washing practices, methods and recommendations for healthcare workers, educators and policy makers to make effective interventions and bring sustainable hygiene behaviors among children and overall population to practice better hygiene practices and to implement interventions to promote sustainable hygiene practices.

Along disease control , the study also contributes to the sustainability of hygiene improvements by fostering awareness and practices change in children behaviors. Encouraging hygiene practices among children can lead to reduced incidence of communicable diseases, resulting in improved health quality. Moreover, the study findings shows that hygiene practices are not maintained over long-term therefore it suggests health educational programs and culturally appropriate and affordable interventions to ensure its sustainability.

This study motivates the educational and residential settings to create environments that motivates and empower students and caregivers to influence knowledge along with skills to play their role in broader goals of public health that is preventing diseases, reducing burdens on healthcare and improvements that are sustainable.

Chapter 2

Literature Review

Hand hygiene is globally known as an effective and the cheapest way to stop the spread of infectious diseases especially in the areas where children gather like schools and children learning center. Various studies around the globe had been done that highlighted children as the most vulnerable population to infectious diseases due to their high exposure to interaction and contaminated surfaces as their immune system is still under process for development. Therefore, they have a higher chance of getting infectious disease and handwashing is the only preventing method to avoid getting such deadly diseases.

Despite the widespread understanding of the importance of hand washing, we still face gaps between children knowledge of hand hygiene and their actual practices and proper implementation. The chapter summarize the evidences from national and international researches highlighting children knowledge, awareness and practices also evaluated challenges affecting the sustainability contributing to the field.

2.1 Knowledge of Hand Hygiene among Children

It is very important to understand the level of knowledge students have regarding hand hygiene. Many studies have illustrated that children have the basic awareness of hand hygiene practices but it is still little or not put in practice.

Mohamed et al. (2022) study found out that preschool children possess good knowledge about handwashing steps but still struggle with performance in absence of assistance. They are unable to do it independent due to their developing motor skills, forgetfulness and lack of supervision. It focus lies on young children but doesn't highlighted the environmental factors that affect handwashing practices like sink height, unavailability of soap and many others.

Similarly, Pratinidhi et al. (2020) study conducted in a rural area evaluates the knowledge and practices of school going children highlighting a significant knowledge-practice gap: 87% knew the importance of the knowledge of handwashing still 27% students washes their hands after using the toilet. Moreover, 96% of children

knew the importance of nail hygiene but only few practiced it. This suggests that environmental and behavioral factors highly influence hygiene behavior.

A study by Ejemot-Nwadiaro et al. (2015) is a major contribution to the field, as it used randomized controlled trails in developing countries confirming that generally children have the basic hygiene benefits awareness but their behaviors are heavily dependent on the availability of soap, clean water, and reinforcement.

Tunio et al. (2024) examined orphanage-based school in Pakistan providing further insights to it by revealing that knowledge of children was really good due to hygiene programs that ran for them and as they participated in those sessions provided them a significant recalls but still the knowledge alone is not sufficient without proper system. Developing countries as they are short in resources, faces more challenges creating hindrance in children hygiene practices even having better knowledge and behavior but lack of soap limits the children to follow proper hygiene practices. Although, COVID-19 pandemic increased hygiene awareness temporary but that did not last long-term behavioral change.

Overall, the study suggest that despite of children having great knowledge of hand hygiene, continuous and persistent transition of practice need continuous support, reinforcement, and appropriate environmental factors influencing hand washing practices.

2.2 Effectiveness of Hand Hygiene Interventions

Hygiene implemented interventions in schools, households or community significantly reduce disease transmission. It also improves hygiene practices and really contribute to improvements in students attendance in schools. School is an ideal educational environment for hygiene interventions because it aims to provide education to hundreds and thousand of children at the same time and follow the routine strictly. Kaur et al. (2019) concluded that “child-to-child” strategy is an effective way in which children are basically trained to share the knowledge they have by educating their peers about handwashing and its practices. Peer education approach made significant and notable improvements hygiene practices and it also proved to be beneficial in improving the collective responsibility of hygiene. This depends on the child ability of influencing their peers through observations of hygiene practices (Bandura’s social learning theory concept), but the study also show limitation in the

long-term follow-up which make hurdles in sustainability in long term hand hygiene practices.

Khan et al. (2021) study reported school based interventions in Karachi that resulted in significant improvements in children behavior of washing hands following a structured educational program. Their study evaluated that even short-term interventions has a huge impact and result in effectiveness when align with well demonstration of hand washing techniques, proper supervision and also teacher involvement. The limitation of the study lies in the noncontinuous reinforcement, supportive infrastructure that results reduction in the progress of children handwashing practices with in few months.

Tunio et al. (2024), worked in orphanage areas to report notable decline in microbial contamination on hands of school going learners by following a interventions like training sessions and monitoring. This study holds it's importance because it shows had used lab tests to show that the interventions really reduces germs and pathogens that are the main culprit of transmitting diseases among pupils. However, the interventions needed a lot of help from researchers, which create hurdle and make it different to use public schools where trained staff is generally not available.

Beyond educational institutions and classroom settings, household and community environment also plays a key role in structuring children's hygiene habits and bring a significant positive changes in students behaviors. Sandora et al. (2005) research found that by following a family based intervention of using alcohol-based sanitizers have significantly reduces the gastrointestinal diseases among children. The study demonstrated that the hygiene practices are to be reinforced at home by family care education and the presence of hygiene resources, both of these lead to improved outcomes. But the alcohol-based sanitizers maybe not affordable or culturally acceptable for everyone, specially in Pakistani low-income areas or communities.

Study by Qazi & Anwar (2021) evaluated an intervention that was based on sanitation of a community with low resources. Their study concluded that when there's active community engagement In the promotion of hygiene children observance and behavior improves which proves that norms of community and collective responsibility plays a major role in shaping children hygiene behavior. However, the study also points certain challenges that sustainability still becomes harder when the actual interest fades or slow down.

Mbakaya et al. (2017) and Ejemot-Nwadiaro et al. (2015) both Evaluated that interventions in household and schools plays its role by reducing 25-30% reduction in diseases like diarrhea that is mostly found in children of school-going age. These programs work even better when trained teachers involvement and availability of resources like soap is integrated into such programs. They suggested the necessity of multifaceted strategies that combine both education, infrastructure provision, community engagement and continuous reinforcement. But again the problem is in the sustainability of these programs and their effects. Interventions last long depending on external funding, institutional policies highlighting hygiene instead of treating these programs as time-bond campaigns.

2.3 Strategies for Implementation and Effective Practices

Successful execution of hand hygiene programs needs not only knowledge propagation but also need the supportive environment. Various studies spotlight the importance of merging behavioral, structural and pedagogical strategies. Hoyle et al. (2025), in a structured analysis of spread of hygienic habits in educational institutions within Wealthy Countries, found that the most effective action were those rooted in behavioral change theories, such as the Health beliefs model and the theory of planned behaviour. These techniques find out that children action are influenced or formed by perception of vulnerability, perceived benefit of behaviour and environmental clues.

This study also highlights that the continuously reinforcement through posters, classroom reminders and teachers modelling is essential for developing long term habits. Pradhan et al. (2020) reported that in Pakistan the strategies were more effective when they include interactive teaching methods such as storytelling, group activities, visual prompts and repeated demonstrations. Their qualitative findings shows that lectures based approach are comparatively less effective than hands-on learning. The study also emphasizes that when children are supposed to teach one another, their motivation and engagement improves more.

International studies reinforce these conclusions. Sandora et al.(2005) examines that simplifying the process by offering easily approachable sanitizers resulted in better obedience. These practical considerations are especially important in large public school where monitored hand washing may not be achievable. A critical view across

literature is that enforcement should be institutionalized. Without unifying into school routine (e.g specific hand washing time before lunch), even well designed combining fail to produce consistent behaviour change. Moreover, teachers training also plays significant role as they act as daily role model and student mimic them. So when teachers actively take part in hygienic promotions, children's obedience increases.

2.4 Barriers and challenges to sustainability of Handwashing Practices

Despite of numerous studies supporting effectiveness of hand hygiene campaigns and interventions, extensive obstacles or barriers creates hindrances in their long-term success or sustainability. Luby et al. (2009) evaluated children in Karachi and found that they return to their old behaviors faster when there is no vigilance and out of resources like a school that have run out of soap or clean water revert children's habits. Reduction in children behaviour of washing hands because of depletion of resources means that sustainability requires support of resources. Scarce resources remain the most recurrent barrier that's reported as the reason for all issues.

Qualitative study by Pradhan et al. (2020) and the 2023 on promotion of hygiene in schools of Pakistan expose challenges like washrooms that are not maintained properly, dysfunctional taps or limited taps available, broken or dirty sinks, lack of soaps and overcrowding. These structural limitation or deficiencies directly have a huge effect on children's to practice proper hand hygiene even if they have a high level of awareness. Moreover, children face it challenging reaching out washbasins that are too high or it may be difficult to use. Therefore, their studies conclude that only awareness is not important, if their hindrance in implementation

Documentation published by Hashmi et al. (2017) highlighted the gaps in between the knowledge and practices even in between the healthcare professionals, stating that hygiene practices are not just limited to school age children. This study basically evaluates that hygiene behavior is influenced by environmental factors, social norms, and pressure, only awareness is not enough for its implementation unless not brought into practices. It's not surprising that if healthcare workers themselves struggle with the consistency of following hygiene practices, it's understandable that children would also have trouble in following them as well. This is more relative to school-aged children, who has less or lack self-regulation and are highly dependent on social factors and their environment than adults. Without routine reminders, teachers and

parents reinforcement and polices supporting hygiene behavior proves to be affective overtime.

Study by Mbakaya et al. (2017) says that hygiene habits are shaped by cultural beliefs, socioeconomic practices and of course community norms. There are communities where parent do not have any watch over the hygiene practices of their children or do not prioritize hygiene as they assume it be the responsibility of schools. Moreover, there's some cultural misconceptions like that handwashing is only necessary if there's visible dirt on hands, which lead to reduction in children motivation to wash hands after using toilets or before eating or having a meal.

Many hygiene initiatives gain attention when there's outbreaks like COVID-19, but once they are controlled people quickly stop following them. Hoyle et al. (2025) explained that many hygiene program do not have the capacity to last for long because they don't have long term or have limiting funding., they lack multi-sectoral collaboration, are not well integrated into systems, lack proper committees and do not have proper monitoring system o if have that's weak. These challenges shows that short-term efforts are not worth full or enough to achieve the goal of sustainability, a continuous support is needed to create a lasting impact and to bring a real change.

2.5 Successful Reviews of Pakistan

Pakistan has a higher risky environment for infectious diseases because of the crowded areas and schools, cultural norms, gaps in infrastructure and socioeconomic conditions. In Pakistan, this issue needs special attention. There are too many schools that don't get enough funding to get proper hygiene facilities. Also, hygiene is not the top priority in our educational policies. Fewer NGOs has started programs in some areas to reach out more students but it needs government support.

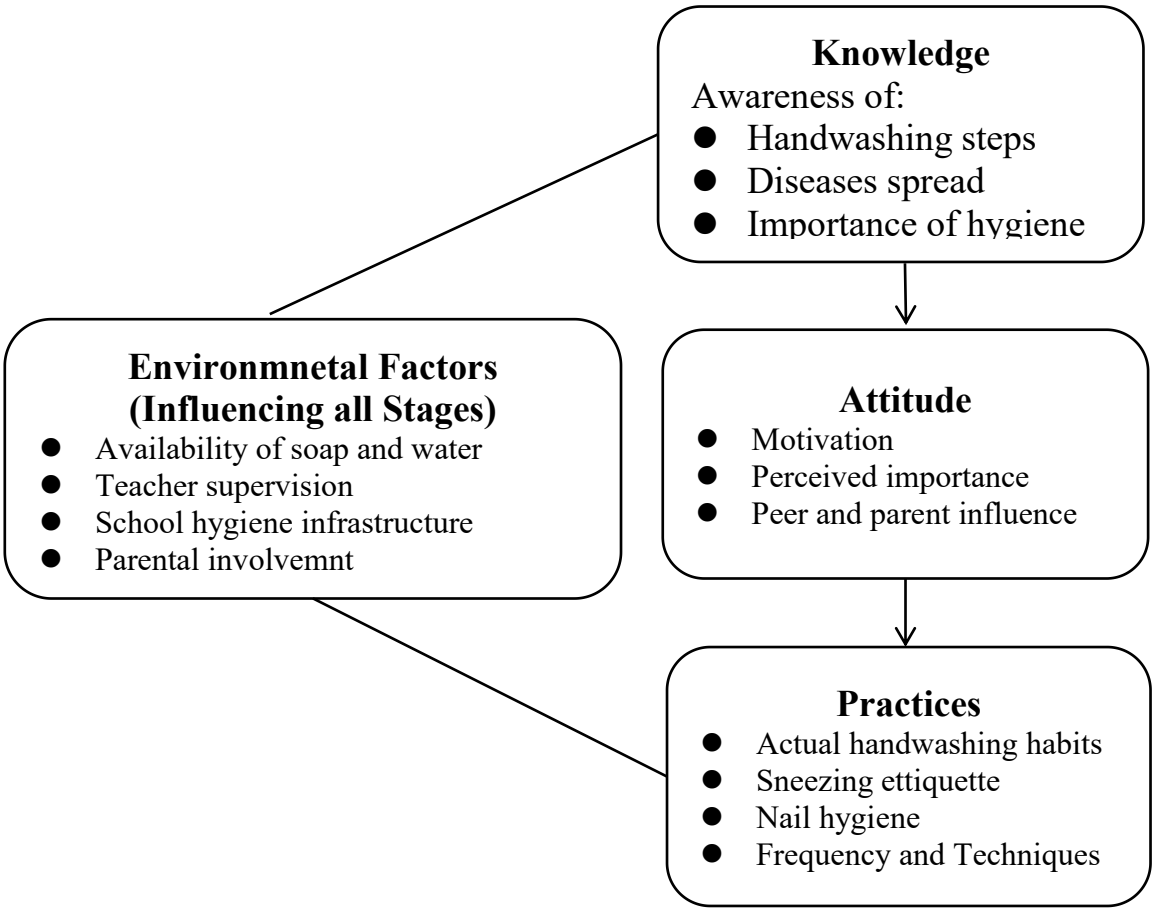
Pradhan et al. (2020) finds deep insights in hygiene facilities in Pakistani public and private schools that include the lack of soaps, poor availability of clean water and untrained teachers and staff. The studies of 2023 contribute majorly by emphasizing that promotion of hygiene is not enforced into children's daily routines in schools and is often ignored.

The evidence of gastroenteritis outbreak form the study of Islamabad has already demonstrated that the reason behind these outbreaks is the poor sanitation and poor hygiene practices that leads to rapid increase in emergencies related to health. The study further demonstrated that drinking contaminated water and poor hand hygiene is the main underlying cause of these deadly infectious diseases and require urgent hygiene investigation in schools.

In COVID-19 outbreak, study by Mohammad et al. (2023) stated that mothers plays a significant huge role in shaping their children habits especially relate to hygiene habits.Their study suggested that parents engagement and efforts should be maximized to gain fruitful impact in school-based interventions especially the young children the mother is the first place of learning for a child. Sandora et al. (2005) study highlights the fact that children get less sick in homes where hygiene education is thought and supported by their mothers. In-fact, schools play a huge role but it's not enough by its own, parental and community involvement can't be just ignored as it plays the main role in children behaviors by providing the environment for children to adopt things to their habits by observing and integrating practices into their behavior by watching others.

Khan et al. (2021) and Tunio et al. (2024) studies evaluated that interventions should be supervised, they should be structured, resources should well managed and all of this is when repeated, it then leads to sustainable impacts and improvement in the way of achieving hygiene habits and is followed by implementation of hygiene practices once habits are developed. These studies provided the proofs that making progress in Pakistan is possible with accurate policies and supporting hygiene programs. Moreover, the government needs to ensure schools with basic needs like soap, clean water and functioning washrooms to decrease the burden of diseases outbreak and transmission. Without this it seems impossible.

2.6 Conceptual Framework



Researches shows that children often have strong knowledge of hand hygiene but shows poor hygiene behaviors. The studies of Pakistan and other international studies evaluates a high awareness about the importance of hand washing, it's role in preventing the spread of diseases (Pratinidhi et al., 2020; Ejemot-Nwadiaro et al., 2015). The literature highlights the fact that knowledge does not always translate into practices which is a central principle of KAP model.

When students understands the concept of hygiene, their attitudes greatly affect their behaviour. Studies have note that children hygiene behavior influenced by parents and caregivers (Mohamed et al., 2023), teacher and school supervision (Khan et al., 2021), peer modeling (Kaur et al., 2019) and media advertisements (Sandora et al.,2005).

The global research shows a large knowledge-practice gaps (Pratinidhi et al., 2020 ; Opara et al., 2017). Children knows the steps but they are unable to practice those steps as they forget due to lack of motivation and supervision (Mohamed et al., 2022)

The KAP model evaluates the impact of external factors affecting the actual behaviors of hygiene. Poor hygiene resources was considered as a major barrier to better

hygiene practices (Pradhan et al., 2023). Pakistani schools faces the same problem of resource scarcity specially in low-income communities confirming that limited hygiene practices is also due to infrastructure not only knowledge.

KAP model fits to this study as it describes a clear gap between what they know and what they practice. The framework also explains the strong parents, teachers, peers and media influence on children attitudes and how external factors shape children hygiene behaviors, providing an accurate explanation for behavioral patterns observed by the study.

Chapter 3

Research Methodology

3.1 Study Design

This study uses a cross-sectional quantitative approach designed to assess the awareness and practices of hand hygiene among students of Islamabad. This design is aligns with my study as it provide a measurable data that can be analyzed statistically to identify potential risk of disease transmission and the areas where the knowledge-practices are lacking across different variables of gender, age, grade and school type.

This method is efficient, and cost effective making it suitable for my research to assess the state of hand hygiene among school students.

3.2 Data Collection Tools

To cater the population of 6-14 years, all participants were considered minor who were unable to provide legal consent. Therefore, data was collected through questionnaire and google form solved by students themselves with prior consent taken from their parents or guardians. This ensured the ethical guidelines for research where the parents or guardians were fully informed about the purpose, and voluntary nature of participation. The respondents were assured of their confidentiality. Assistance was provided to the lower age students as they were having lower literacy level than bigger students.

3.3 Research Instrument

The data was collected by using a structured questionnaire which was extracted from the article of Pradinidhi SA et al. (2020) which is a cross-sectional descriptive study assessing the knowledge practices related to hand washing, promoting hand hygiene practices among school students in Pakistan. Minor modification were done to match the local context while the original context was maintained.

Prior to the data collection, pilot testing was carried out to check the internal consistency of the questionnaire.

3.4 Study Population

The population frame for this study is mainly the students of age 6-14 years.
The study was conducted in Islamabad, Punjab, Pakistan. The sample size was calculated using Openepi.com that was determined with a sample of size 240, required with a 95% confidence level and a 5% margin of error.

3.5 Sampling Size and Techniques

A stratified sampling approach was utilized to increase representativeness and reduce sampling bias. The study population was stratified according to gender, age, school type (private and public) and class level, as these characteristics influence exposure to hygiene education. By using this sampling approach the study ensures the precision of the results, proportional inclusion of the students and enable subgroups analysis by comparing awareness by gender and evaluating practices differences in between public and private school students.
Sample size was calculated using Openepi to be 240, with 19.4% (Akram et al., 2021) prevalence rate for gastrointestinal diseases among children in Islamabad, Pakistan, with a 95% confidence interval and a 5% margin of error.

Age Group

The variable age was categorized into three strata; stratum 1 was of 6 to 8 year age (early childhood), stratum 2 consist of 9 to 11 years age students(pre-adolescence) and the 3rd stratum contained the children of age 12 to 14 years (early adolescence).

Gender

There were two basic genders in the study, the female group or the male group . The purpose of gender being a stratification factor was for the identification of hygiene knowledge-practice gap across the gender.

Grade Level

The grade level was also stratified into three categories consisting of stratum 1; 1-3 grade students, stratum 2; 4-6 grade students and 7-9 grade students making stratum 3. The grade levels were stratified according to the level of education and knowledge a student have. This ensured a balanced representation of students with varying level of education and knowledge about hand hygiene access and comprehension.

School Type (Public and Private)

School type was used as a variable for stratification to account for infrastructural differences and assess hygiene resources availability across public and private schools.

3.6 Data Analysis Procedures

Data was analyzed through IBM SPSS (version 26). Data cleaning was done by the removal of duplicated variables and reverse coding of certain responses of the variable like Yes=0 and No=1 was recoded as Yes=1 and No=0 by reverse coding method. Descriptive statistics (frequency, percentages, means and standard deviation) were analyzed to summarize participants characteristics and overall responses patterns. The results were stratified by gender, age, grade level and school type to examine behavioral differences across the groups. Bar charts, pie charts and tables were prepared by using SPSS techniques. Knowledge was computed by summing all the variables form questionnaire to create continuous variable to reflect the overall knowledge. To assess the association of hand hygiene practices whether poor or good across the demographic factors a chi-test were employed. This test allowed to determine whether the demographic characteristics served as a potential determinant for knowledge and practices.

3.7 Inclusion Criteria

Inclusion criteria for school children include:

1. Students who were enrolled public and private schools of age 6-14 year.
2. Students only with the will to participate and have parental consent were the part of the study.

3.8 Exclusion Criteria

This include:

1. Participants who were part of pilot testing phase of the questionnaire.
2. Students with physical or cognitive impairment who can not respond to questionnaire.

3.9 Ethical Consideration

The ethical consideration for this study include obtaining informed consent from the participants parents, ensuring that they are fully informed about the study's purpose, procedures, potential risks and benefits. Participation would be entirely voluntary and participants would have the right to withdraw at any stage without any negative consequences. Confidentiality of all data will be strictly maintained by anonymize personal information and securely storing the data, with access limited to authorize personnel only. Data collected will be used solely for research purpose.

Chapter 4

Results & Discussion

4.1 Results

In this research the sample size was 240, the results targeted the young female and male students of age 6 to 14 years from Islamabad. To achieve this, thorough sampling process was employed to ensure the calculation of the sample size was met. No questionnaire was left incomplete and invalid during the data entry and screening process. Hence, 240 responses were selected to be subjected to analysis. All these individuals along with their parents who were invited to participate consented and provided responses to study.

Table 1: Demographics

S no.	Questions	Frequency	Percentage%
1	Gender		
	Female	114	47.5
	Male	126	52.5
2	Age		
	6-8 years	88	36.7
	9-11 years	87	36.3
	12-14 years	65	27.1
3	Class		
	1-3 grade	88	36.7
	4-6 grade	86	35.8
	7-9 grade	66	27.5
4	School Type		
	Private	101	42.1
	Public	139	57.9

Total number of 240 students participated in this study. Their demographic study includes gender, age, grade level and school-type. Among 240 students almost 47.5%

were females while 52.5% were males given that total number n=114 and n=126 for females and males respectively. Which shows a higher male representation in the study.

Students were categorized into three groups of ages 6-8, 9-11, and 12-14 indicating middle childhood, late childhood and early adolescent. The largest representation was done by the the group of age 6-8 years which was 36.7, n=88 samples. Then comes the age of 9-11 years which almost made up 36.3%, n=87, and the remaining were 12-14 year making 27.1% with a total number of 65.

The students were taken from different classes and similarly they were also divided into three groups based on the grade levels. Almost 36.7% was shown from the grade 1-3 grade with a total number of 88, 35.8% were from grade 4-6 where n=86 and a total of 66 students participated from 7-9 grade making 27.5%.

Total of 101 students were from private schools making 42.1% of the total while 139 attendance were from public school showing more representation of 57.9%.
Overall, the distribution was balanced across the categories,with a bit higher representation from young age group and public schools.

Table 2: Mean, Median and St. Deviation for Knowledge and Practices Score

Variable	Mean	Median	Std. Deviation
Awareness	2.07	2.00	1.006
Practices	13.18	13.00	2.109

These statistical description analyzed a clear contrast between students knowledge and their actual practices. The awareness variable shows a mean of 2.07 and median of 2.00 with a lower standard deviation SD=1.006, which indicated that maximum students possesses a same level of awareness about hand hygiene but the practices variable shows a higher mean of 13.18 and a median of 13.00 along with higher standard deviation of SD=2.109, suggests hygiene practices are inconsistent. These greater variability shows that despite of majority children knowing a higher level of knowledge they still don’t follow what they know about hand hygiene in their daily routine. This study highlighted the main issue that is the gap between what children know and what they practice when it come to hand hygiene.

Table 3: Knowledge Frequencies and Percentages

S No.	Question	Gender		Total	Chi test	P-value
		Male	Female			
1	Do you know about the practice of handwashing?					
	Yes	98 (83.6%)	107 (87%)	205(85.5%)	0.307	0.580
	No	19 (16.4%)	16 (13%)	35 (14.5%)		
2	Do you think washing hands is necessary to live a healthy life?					
	Yes	79 (68.1%)	90 (73.2%)	169(70.4%)	0.516	0.473
	No	38 (41.9%)	33 (36.8%)	71 (29.5%)		
3	Can dirty hands spread diseases like diarrhea and flu?					
	Yes	98 (84.5%)	104(84.5)	202(84.1%)	0.000	1.000
	No	19 (25.5%)	19 (25.5%)	38 (15.8%)		
4	Do you know how long you should wash your hands?					
	Yes	77 (62.6%)	79 (68.1%)	156(65.5%)	0.573	0.449
	No	38 (41.9%)	46 (47.4%)	84 (34.5%)		

The results demonstrates that generally most of the participants are well aware of the hand hygiene knowledge and concepts. The table given above clearly shows the responses distribution based on gender and providing the chi-test values to associate gender based variations.

Evaluation of the participants responses highlighted the fact that maximum students that have participated had a high level of knowledge regarding hand hygiene and were aware of handwashing practices. It was like almost 85.5%, n=205 students said “Yes” they knew about handwashing and it’s importance which is a high percentage while only 14.5%, n=35 students reported “No”. The level of awareness was almost same

among female or males , males (83.6%), while in females (87%). The association between gender and awareness was not significant (chi test=0.307, p=0.580).

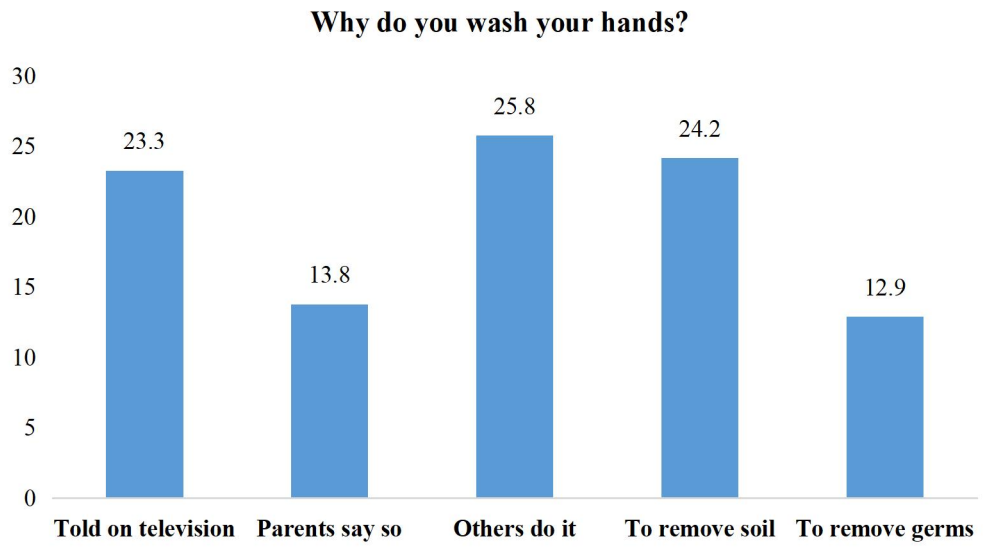
Maximum students reported hand washing as a key part for maintaining good health with 70.4% (n=169). Male participants stating “Yes” was 68.1% agreed while 73.2% females agreed to this fact. Similarly no association was seen (chi-test = 0.516, p=0.473).

Also a high level of participants recognized dirty hands as a mean of spreading infectious diseases among students. Same percentage of 84.5 was observed between both the genders but chi-test showed no gender difference (chi test= 0.516, p=0.473)

A significant gap that was observed in knowledge was about the duration of washing hands. Particpants were less confident about the duration that they should wash their hands. Only 65.5% (n=156) stated “Yes” . Females showed a little higher awareness of 68.1% while males showed 68.1% awareness.

Overall, the students showed a higher level of awareness of hand hygiene and it’s importance in preventing the transmission of diseases. Only a notable proportion was observed regarding the knowledge of hand washing duration among students. These results conclude that having a strong knowledge does not mean they will be accurately put into practices only observation of knowledge is not necessary.

Figure 1: Hand washing Motivators



The above figure shows the students motivation behind the behavior of handwashing. In today's life, media is the strongest influencer and a great factor behind this motivation, with 70 students saying that they wash their hand because it is

recommended by the TV. While about 60 students stated that they are influenced by their peers, they wash their hand because others do it. Maximum of 55 students were their who reported that they wash their hand only to remove the visible dirt and soil but here were only ~30 stating that washing hands is important from medical point of view because our hands carries pathogen that can cause diseases therefore, they wash their hands to remove germs. There were 35 more who stated that they are asked by their parents to wash their hands. Overall findings evaluated the fact that the motivation behind students behavior of hygiene are media, peers and parents.

Figure 2: Nail trimming Reasons

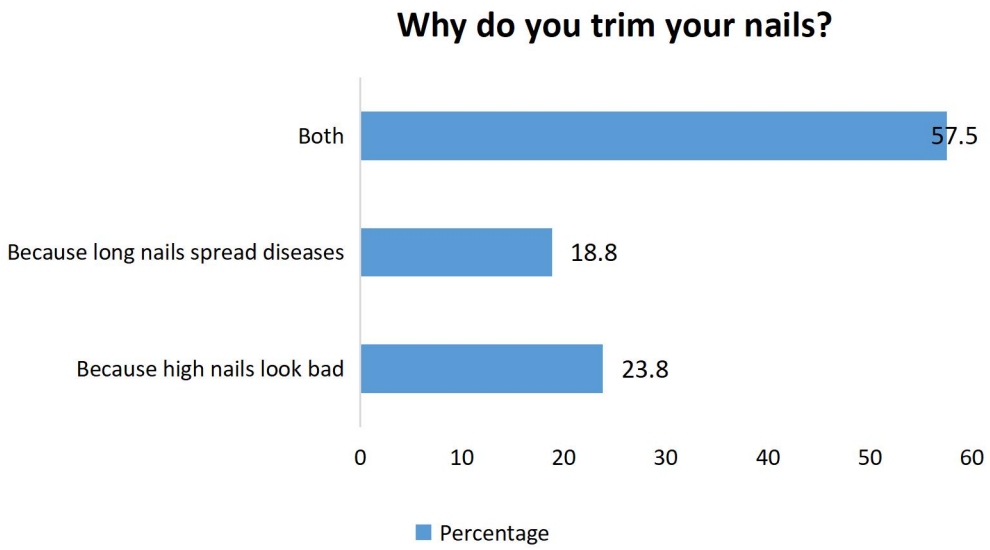


Figure 2 shows the reason that why students think they trim their nails as it's also a part of hand hygiene. Majority of students 57.1% said that the reason behind trimming their nails is for both reasons, to maintain appearance and to prevent diseases. Whereas, 24.4% responded that trimming their nails because they think long nails does not look good and 17.5% students stated that long nails is the reason behind spreading infectious diseases.. These results concluded that most of the students recognize the reason "both", maintaining appearance and avoiding diseases, as a reason for maintaining short nails.

Table 4: Practices of Hand Hygiene:

S No.	Variables/ Category	Unfavourable	Favourable	Total	Chi test	p-value
1	Gender					
	Female	63	51	114	0.325	0.569
	Male	65	61	126		
2	Age Group					
	6-8	52	36	88	2.526	00.283
	9-11	46	41	87		
	12-14	30	35	65		
3	Grade Level					
	Grade 1-3	52	36	88	2.819	0.244
	Grade 4-6	46	40	86		
	Grade 7-9	30	36	66		
4	School Type					
	Private	53	48	101	0.052	0.820
	Public	75	64	139		

The stratified analysis of hygiene practices performed by the students across gender age, grade level and school type has revealed no relative association. The study data analysis lead to the fact that despite of strong awareness of hand hygiene importance that students possessed, their actual practices were found really poor.

Maximum participants of about 69.2% (n=166) stated that they are motivated by the color,shape or smell of soaps while only 30.8% did not, which means that appealing products plays a role in encouraging behaviors of hand washing to some extant.

There were poor sneezing etiquette fount in students majorly leading to disease transmission. Only 15.4% students uses tissue for covering their mouth while sneezing. On the other hand, 49% (n=119) students admitted that they do not cover their mouth while sneezing which is a significant gap in respiratory hygiene.

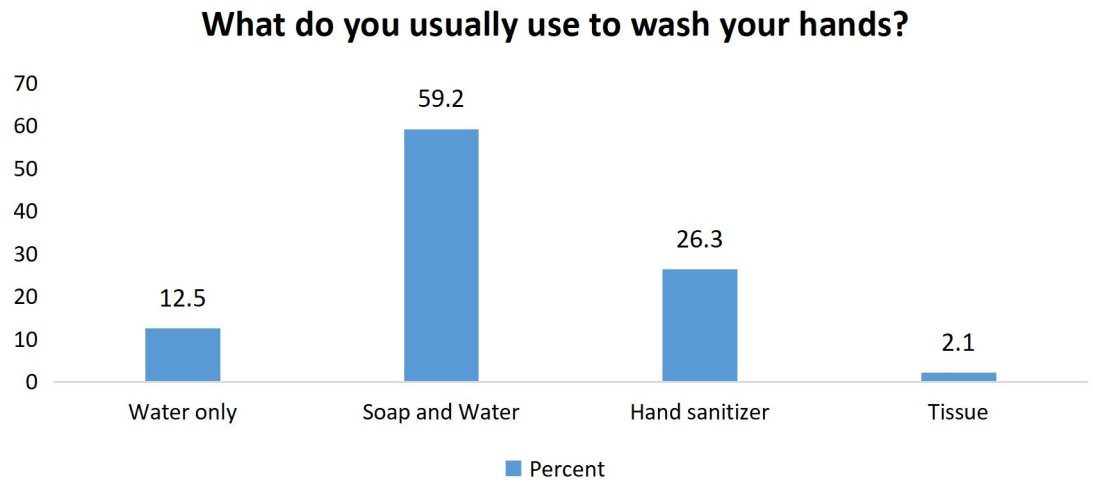
Similarly only 12.5% a small number of 13 students reported of sneezing into their elbows or sleeves wile 87.5% did not follow this technique of avoiding others from sneeze droplets that can affect a huge number of children, therefor, a proper adherence is recommended.

Following that majority of children do not wash hands after sneezing into their bare hands that was reported up to 94.2% while only 14 students from the whole of 240 students said that they wash hands afterwards. 55.8% (n=134) trim their nails once in a moth, 29.6% once in a week, while 14.6% of participants just could not recall the time they trim their nails. 68.8% participants believed that having long nails is unhygienic which is a good sign but still 31.3% (n=75) did not.

Mostly students reported their nails to be normally trimmed analyzing 78.3% (n=188), while 14.2 (n=34) reported long nails in which mostly were notably females and 7.5% (n=18) had dirty nails.

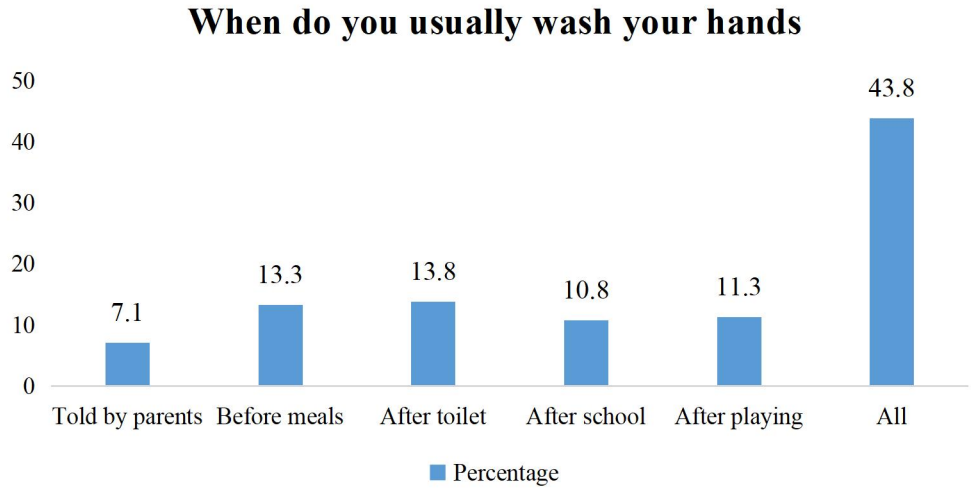
The overall conclusion of Table 4 shows all the variable and their results in strata; gender, age, grade level and school type. The chi-test shows no significant statistical associations with hand washing practices outcomes. All p-values are below 0.05 (>0.05). These results support the gap in knowledge-practice that exist across the categories, which mean a very poor and unfavorable practices were found equally among the groups across all demographic groups.

Figure 3: Hand cleaning Methods



Majority of 59.2% reported that they use soap and water for cleaning their hands, which is a good analyzed factor, whereas, 26.3% students also considered sanitizer as a best material for cleaning hands. Few (12.5%, n=30) reported only water. On the other hand, only 5 (2.1%) students said that they clean their hands by using tissue.

Figure 4: Hand washing motivators



A significant number of participants (43.8%, n=105) responded to "All", means that they usually wash their hands after told by parents, before meals, after using toilet, after attending the school and even after playing. 13.3% children only wash their hands after using toilet, 32 students making 13.3% children consider washing their hands before having a meal and 11.5% (n=27) students responded that they wash their hands after playing, while only few students said they wash there hands when told by their parents.

The overall results shows that majority of students consider washing their hand after or before all the activities that goes on in their life. Only a notable students 13.3% or 13.8% which are notably equal wash their hands after using toilet or before having a meal which is the important gap to notice.

Figure 5: Good/Poor handhygiene Practices

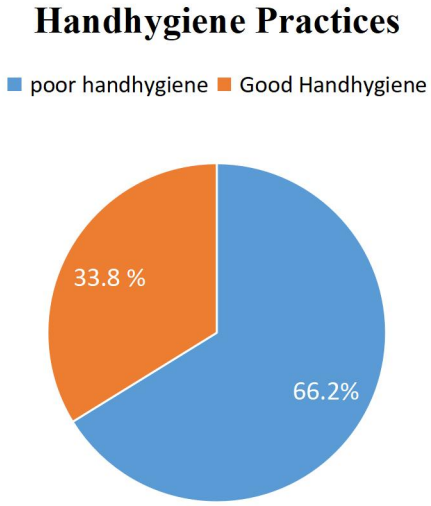


Figure 5 shows the overall practices of hand washing by school going students (participants) that the maximum students responses evaluated that they really exhibit the poor hand hygiene behaviors. Generally 66.2% participants were classified into having a poor hand hygiene which is not a small percentage while only 33.8% were categorized for having a good hand hygiene practices.

These result show that almost two-third of the population is still far away from proper hand hygiene practices despite of having a great level of knowledge about the importance of hand washing. This highlight a significant gap that need to be targeted for the sake of hygiene promotion and bringing behavioral interventions.

4.2 Discussion

The results of this study shows that there's a significant gap found between what children knew and what they generally do in their daily life Majority of students reported to have strong knowledge-85.5% reported that they knew about washing hands and almost 84.1% stated that dirty hands are the reason behind the transmission of diseases but still their behaviors were not aligned along with knowledge that they have. The earlier studies in Pakistan and other countries shows the related patterns and context. Farabi et al. (2025) states that almost 97.9% students in Charsadda knew the importance of handwashing but a very little of only 33% - resulted in good hygiene practices, from this evaluation it has been confirmed that only having knowledge is not only factor we need, implementing it into practice is what matters. This study report the same results by stating that the basic awareness is high but practice of correct technique is absent like students not knowing the duration of hand washing. This issue is essential to underline as correct duration is important to remove the amount of pathogens present on hands.

This current study also highlights the gap in sneezing etiquette among students evaluating a higher risk of respiratory infections among students: only 5.8% washed their hands after sneezing and 12.5% students coughed into their elbows which is notably a very small number to avoid the transmission where nearly half of the students reported not covering their mouth while sneezing. Such type of behaviors specially among children increases the likelihood of disease transmission among children within a crowded environments like schools. Similar patterns were observed by Rabie and Curtis (2006) that consistent hygiene interventions promotes hand

washing but there's limited guidance on sneezing etiquette leading to a poor sneezing practices among school-aged children.

A noticeable patterns are to be seen by the evaluation of the motivational level for hand washing practices like when asked by parents to wash hands, observing others doing the same act or advertisement/cartoons promoting the use of soap or importance of washing hands on television emphasizing the importance of social factors in promotion of hand hygiene. This finding resembled to the study by Pradhan et al. (2020) which promotes the child-to-child approach for improved promotion of a consistent hygiene instead of only traditional instructions.

The same gap that was observed in children was nail hygiene. Majority of 68.8% participants think having long nails is unhygienic or looks bad still 14.2% kept long and 7.5% even had dirty nails with visible dirt beneath their nails that's the major cause of multiple infectious diseases. Many students reported trimming their nails once a month. These results resembles mostly to the study in rural school environment by Opara et al. (2017) where majority of 80% students knew handwashing as it prevent diseases but it did not lead to good hygiene practices where lack of clean water affected hand washing practices. All of this indicates parental engagement, proper monitoring and important hygiene facilities like water is essential to maintain good hygiene practices not only the knowledge alone.

The results when received specially in those areas where children actually have received hand washing practices training the comparison of our study with other researches like a study by Malik et al. (2022) conducted in Khyber Pakhtunkhwa in schools where students were given hand hygiene was taught lead to in improvements in their behavior a lot. But this study has not covered such school with such programs that's why the children were observed with majority of practicing poor hand hygiene which concludes that hand hygiene interventions are really important but taught only once is not enough to bring a persistent or everlasting positive change, a continuity in such programs is necessary along with daily reminders, monitoring and repeated training to shape and build good hygiene habits in school-aged children in Pakistan.

School infrastructure also appear to play a huge role in building children hygiene behavior as in low-income area schools in Islamabad that has been made the part of this study had a limited access to soap, water and clean water preventing children to adopt good hygiene. In Bibi et al. (2022) same barriers were observed Chiniot, where

the children did had the best hygiene knowledge but they were short of physical resources. Such infrastructure barriers explains why having only knowledge does not mean translation into actions.

Malka Sadiq et al. (2025) observed 88% of children population in Swat who washed hands before eating and after toilet. These noticed differences were due to the provided facilities or resources., support from parents or social factors. Moreover, study Pradhan et al. (2020) explains that hygiene practices can only be improved when training, facilities and community and parental involvement are combined along with awareness.

The overall results of this study agrees with the fact proved by many studies that only information alone is not enough to create a wholesome, long-lasting and sustainable impact of healthy behavior. The biggest concern of this study is not washing hands after sneezing and covering mouth after sneezing, which highlight the need of hygiene programs in schools plus improving the availability of resources like soap, clean water to facilitate and encourage students hygiene behavior, routine-based monitoring and training, peer-to-peer knowledge sharing and motivating students to learn from each other and parents engagement in the development of their best hand hygiene behavior that can lead to reduction in the spread of infectious diseases among school-going children.

4.3 Future Recommendation

This study suggested the need for school-based interventions through integration of multiple techniques. Schools should cooperate in this by helding sessions of handwashing in routine basis, that should highlight the necessity of handwashing before meals, after using toilets, after playing and after coughing while teacher can play their role in it by simply reinforcing students hygiene behaviors through posters, poems and other class activities.

Improving hygiene infrastructure is another essential factor, as schools should ensure a consistent availability of hygiene resources that are soap and clean water, installing students friendly sinks that children can easily reach and are clean in appearance, proper sanitation and the maintenance of washroom to encouraging students towards hygiene behaviors as lack of soap, broken taps, overcrowding and dirty washrooms affect students following hygiene behavior in a worse way.

Placing educational posters in schools emphasizing sneezing etiquette by teaching children how to sneeze properly and to wash their hands afterwards. Plus the proper disposal of tissue when sneezed into it.

A day should be consider for a routine checkup of nails in schools like “nail-check Friday” where teachers should monitor the check on students nails and educate those students having long and dirty nails about there effects of spreading diseases all around. Parents should also play their critical role in guiding their children the correct hygiene practices from home. A platform can be set for parents through meetings in schools and teachers sending information and sending reminders through Whatsapp to engage them actively in this matter.

Lastly, at policy-level, their should be polices established that support the sustainability of the effects of these interventions and they should be formally integrated into the national and even the educational curriculum. The schools must receive WASH funding so that they can have access to hygiene facilities and can maintain them accordingly. Furthermore the health sectors should collaborate and ensure hygiene training every year for both teachers and parents encouraging the long-term improvements in hygiene behaviour in school-aged children.

4.4 Limitation

This study had a limited geographic scope as data was only collected from the selected schools (public and private) of Islamabad.

Secondly, the data collection and the study conduction time was very short to observe a long-term behavior that almost change among with the time to observe the sustainability factor that whether the students hygiene behavior improves with time or not.

Thirdly, the study may shows some biasness, as the responses that were collected was self-reported questionnaire done by children as children may have reported over positive hygiene behaviors, covering the true extent of poor behaviors.

Finally, as the sampling was done through stratified method which have also lead to limited access to certain variable that could have proved to be influential like parental education, condition of house sanitation, which might have provided the study with some more deeper information regarding hand washing practices and children behaviors.

4.5 Conclusion

The study assessed the awareness and practices of hand hygiene among school-going children of age 6-14 year in Islamabad. The findings show a clear pattern that the children possess a strong awareness about the importance of hand hygiene but their actual practices are significantly poor. Although 85.5% of students were aware of hand hygiene and almost 80% recognized the role of hand hygiene in the prevention of infectious diseases. Only 1/3rd evaluated favourable hygiene practices.

The most concerning gap revealed was the gap in sneezing etiquette and post sneezing handwashing where almost 49% did not cover their mouth while sneezing, 94.2% did not wash their hands after sneezing, these behaviors increases the vulnerability to respiratory diseases especially in the crowded environments in schools. Similarly the wrong nail-trimming habits ensure a poor hygiene practices among school students.

The absence of significant association between gender, age, class or school type demonstrate that poor hand hygiene are widespread among all groups. This strongly support the presence of knowledge-practices gap despite of having better awareness.

Children require continuous reinforcement, availability of resources, soap an clean water, teachers and parents supervision, guidance and involvement along with schools supportive infrastructure for the hygiene habits to become habitual and sustainability.

Overall, this study concludes that improving hand hygiene among schools children requires sustained, multi-level interventions, including school-based programs, community participation, parental and teachers engagement and policy support through WASH initiatives. By strengthening these components the spread of the infectious diseases can be significantly reduced and this can ultimately improve the health of school-aged children in Pakistan.

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Informed Consent Information:

Study Title: Assessing hand hygiene knowledge and practices among school going children in Islamabad

Researcher: Ruba Iqbal

Email: ruba.iqbal2003@gmail.com | **Phone:** +92-3300249664

Your child is invited to take part in a short (10-15 min) questionnaire about hand washing habits. The questions are simple and age-appropriate. Participation is voluntary. You may withdraw your child at any time. No names or personal information will be collected. All responses will be kept confidential. There are no risks, and while your child may not directly benefit, the study may help improve hygiene in schools

By signing below, you agree to allow your child to take part in this study.

Gender:_____

Age:_____

Class:_____

School (Private/Public):_____

Signature(Parent/Gaurdian):_____

- **Section A: Awareness / سیکشنA: آگاہی**

1. Do you know about the practice of handwashing?

A)Yes B)No

2. Do you think washing hands is necessary to live a healthy life?

A)Yes B)No

3. Why do you wash your hands?

A) Told on television B) Because parents say so C) Others do it D) To remove soil/dust E) To remove germs/pathogens

- **Section B: Practices / سیکشنB: عادات**

1. What do you usually use for cleaning your hands?

A) Water only B) Soap and Water C)Hand sanitizer D) Tisuue

2.When do you usually wash your hands?

A) When told by parents B) Before meals C) After using the toilet

D) After reaching home from school E) After Playing F) All

3.Does the color, shape and smell of soap motivates you to wash hands?

A)Yes B)No

- **Section C: Knowledge of Benefits / سیکشنC: فوائد کا علم**

1. Can dirty hands spread diseases like diarrhea and flu?

A) YES B) NO

2. Do you know how long you should wash your hands?

A) YES B) NO

- **Section D: Sneezing and Cough Etiquette / سیکشنG: چھینکنے اور کھانسنے کے آداب**

1. How do you cover your mouth or nose when sneezing?

A) With a handkerchief/tissue B) With bare hands C)Do not cover

2.Do you sneeze into your sleeve or elbow instead of hands?

A)Yes B)No

3. Do you wash your hands after sneezing or coughing?

A)Yes B)No

- **Section E: Nail Hygiene / سیکشنD: ناخنوں کی صفائی**

1.How often do you trim your nails?

A) Once a week B) Once a month C) Don''t remember

2. Why do you trim your nails?

A) Because long nails look bad B) Because long nails spread disease C) Both D) Don't know

3.Do you think having long nails is unhygienic?

A)Yes B)No

4. What is the current condition of your nails?

A) Normal nails B) Long nails C) Dirty nails

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Matches with neither in-text citation nor quotation marks

11 Missing Quotations 1%
Matches that are still very similar to source material

0 Missing Citation 0%
Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

5% Internet sources
3% Publications
8% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.