

UNIVERSITY OF GHANA

COLLEGE OF HUMANITIES

**ASSESSING KNOWLEDGE AND HANDWASHING PRACTICES AMONG
PRIMARY SCHOOL CHILDREN IN TAMALE, NORTHERN REGION, GHANA**

BY

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
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DECLARATION

I, Hamdaratu Fuseini, affirm that, aside from the investigations of others which have been duly acknowledged, this dissertation is the product of my own original research conducted under supervision. It has not been submitted, either in whole or in part, for any other degree at this university or any other institution.



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Date: 28th April 2025



DEDICATION

I dedicate this work to my family and friends.



ACKNOWLEDGEMENT

I extend my deepest gratitude to Almighty Allah for His guidance and strength throughout this journey. My heartfelt thanks go to my academic supervisor, Dr. Martha A. Awo, for her meticulous guidance, support, and encouragement. I am also grateful to my family for their unwavering support and motivation during this period. Without their help, this accomplishment would not have been possible. I appreciate the support of my friends, whose encouragement has been invaluable.



ABSTRACT

This study assessed knowledge and handwashing practices among primary school children in selected private schools in Tamale, Northern Region, Ghana. Utilizing a mixed-method approach, the study involved 135 students in the quantitative component of the study and 25 participants in the qualitative component (15 students and 10 teachers) from five private schools, employing both closed-ended questionnaires and interview guides. The quantitative data was analysed to assess the factors associated with handwashing practices, while the qualitative data provided insights into norms surrounding handwashing practices, as well as facilitators and barriers to handwashing practices. The findings revealed that knowledge about handwashing was high among school children (moderate or high). Generally, there was no evidence of gender disparities in terms of knowledge, attitude, proper handwashing practices. The study found that class, knowledge, attitudes, availability of hand cleaning or drying materials and soap at handwashing point were the most important predictors of handwashing practices among children. The study identified a number of facilitators that influence handwashing practices including availability and proximity of basic handwashing infrastructure, social support and influence including support from teachers and parents. Further, peer influence and social norms, availability of soap and sanitizers were critical facilitators to handwashing. On the contrary, inconsistent availability of soap, water, and hand cleaning or drying materials at handwashing points, misconceptions or negative attitudes toward handwashing, limited time between class sessions or other school activities, and students sometimes forgetting or deprioritising the practice created practical barriers to regular handwashing (especially during peak times). These results highlight the need for tailored interventions to promote appropriate handwashing habits among children in school settings.

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CHAPTER ONE

1 INTRODUCTION

1.1 Introduction

Handwashing involves the practice of cleansing hands using plain or antimicrobial soap and water, which is a widely adopted preventive measure to minimize the spread of infectious diseases (Alula et al., 2018). Handwashing is a straightforward, convenient, efficient, and economically viable method to restrict the transfer of infectious diseases from one individual to another (Center for Disease Control and Prevention, 2022).

The promotion of handwashing boosts the sanitation of people, especially in developing countries. Appropriate handwashing has been shown to reduce the transmission of bacteria-related respiratory diseases, trachoma, and transmission of conjunctivitis (Mbakaya et al., 2017; Sijbesma & Christoffers, 2009; Tadesse et al., 2017). Despite substantial evidence highlighting the efficacy of handwashing, especially washing hands with soap, adherence to appropriate handwashing practices remains low in developing countries including Ghana (Eshetu et al., 2020).

The foundation for lifelong personal hygiene practices is typically established during childhood, serving as a critical factor in facilitating a healthy transition to adulthood and in shaping positive attitudes toward health and the utilization of healthcare services (Vivas et al., 2010). However, evidence indicates that many schools lack adequate water supply for sanitation and hygiene purposes, which undermines their ability to effectively manage essential hygiene systems such as handwashing facilities, which increases the risk of unhygienic practices (Eshetu et al., 2020). Inadequate access to handwashing facilities in schools significantly heightens the risk of intestinal helminth infections and diarrheal diseases among children. These preventable health conditions contribute to increased school absenteeism and

have detrimental effects on children's physical health, cognitive functioning, and social development (Eshetu et al., 2020; UNICEF, 2020).

Identifying these challenges and implementing targeted interventions, such as robust hygiene education programs and improved handwashing facilities, is crucial for fostering a culture of effective handwashing in schools. Such interventions are not only essential for the immediate well-being of the children but also contribute to broader public health objectives by reducing the incidence of preventable diseases in school environments (UNICEF, 2022).

1.2 Problem Statement

Approximately 80% of illnesses in developing nations are linked to inadequate hygiene, resulting in an annual death toll of approximately two million people due to diarrhoea, with a disproportionately higher mortality rate observed among children (Scott et al., 2007). Insufficient access to adequate hygiene and sanitation facilities amplifies the prevalence of communicable diseases among school children in developing nations (Vivas et al., 2010).

Handwashing is widely recognized as a fundamental public health practice for preventing the transmission of infectious diseases, particularly among vulnerable populations such as primary school children (levels 1 to 6). In the Ghanaian context, however, a significant disparity persists between the acknowledged importance of hand hygiene and its consistent practice among school-aged children (Smith et al., 2020).

Empirical studies have identified multiple factors contributing to this disconnect. In the Ablekuma Central Municipality, for example, although 75% of basic schools were equipped with handwashing stands, only 60% of these facilities were operational, with many lacking essential components such as running water and soap (Joseph Richmond Fianko & Josephine Akosua Gawu, 2020). Despite 72% of pupils demonstrating awareness that poor hand hygiene

could result in illnesses such as cholera, typhoid, dysentery, and diarrhoea, only 17.5% reported washing their hands after defecation, and 51% before eating (Joseph Richmond Fianko & Josephine Akosua Gawu, 2020).

Cultural norms and beliefs further influence hygiene behaviours, complicating efforts to instil consistent handwashing practices (Bishoge et al., 2023). Moreover, the absence of structured hygiene education programmes within primary schools contributes to limited understanding of the critical role handwashing plays in disease prevention and overall health promotion (Smith et al., 2020).

The persistent gap between handwashing knowledge and actual practice among primary school children in Ghana constitutes a significant public health concern. Within the confined and interactive environment of schools, the risk of transmitting communicable diseases such as diarrhoea, typhoid, and intestinal helminth infections is markedly elevated (Gbolu et al., 2023). This not only compromises the immediate health and well-being of schoolchildren but also poses broader epidemiological risks to families and communities, underscoring the urgency of implementing comprehensive and context-sensitive interventions (Gbolu et al., 2023).

Although several studies have examined the relationship between hygiene knowledge and handwashing behaviour among Ghanaian students, the existing literature has disproportionately focused on public primary and senior high schools, with limited attention to private primary institutions (Dajaan et al., 2018; Steiner-Asiedu et al., 2011). This represents a critical gap in WASH-related research, given that private schools account for a substantial share of Ghana's basic education sector. In certain districts, private institutions comprise up to 75% of all primary and junior secondary schools, yet they remain underrepresented in sanitation and hygiene assessments (Anthony Acquah Mensah et al., 2022).

In Tamale, Northern Region, where this study is situated, irregular water supply remains a pervasive challenge. Recent assessments in the Tamale area indicate that 79% of students lacked access to water within school premises, 55% reported inconsistent handwashing practices, and 56.6% engaged in open defecation due to inadequate sanitation infrastructure (Institute of Development Studies, 2024). While these figures pertain to senior high schools, they reflect systemic infrastructural deficits that likely extend to primary-level institutions, particularly in underserved urban and peri-urban settings.

Moreover, evidence from comparable contexts suggests that hygiene knowledge alone is insufficient to ensure consistent handwashing behaviour (Sadu et al., 2024). Private school students may exhibit distinct patterns of hygiene practice compared to their public-school counterparts, influenced by differences in resource availability, institutional priorities, and parental engagement (Appiah-Brempong et al., 2020). In light of these disparities, assessing the handwashing knowledge and practices of upper primary pupils (levels 5 and 6) in selected private schools in Tamale is essential for addressing equity gaps in water, sanitation, and hygiene (WASH) programming. Such an inquiry will contribute to a more nuanced and inclusive evidence base, thereby informing policy and practice that reflect the full diversity of Ghana's educational landscape.

1.3 General Objective

The general objective of the study was to assess knowledge and practices of handwashing among primary school children in selected private schools in the Tamale Metropolis.

Specific Objectives: Specifically, the study seek to;

- i. Assess the relationship between knowledge and practices of handwashing among primary school children.
- ii. Assess gender and handwashing practices among primary school children.

- iii. Examine the factors influencing handwashing practices among primary school children.
- iv. Explore facilitators and barriers to handwashing among primary school children.

This study seeks to answer the following research questions;

- i. What is the relationship between knowledge and practices of handwashing among primary school children?
- ii. What are the gender differences in handwashing practices among primary school children?
- iii. What are the facilitators and barriers to handwashing among primary school children?
- iv. What are the factors influencing handwashing among primary school children?

1.4 Justification of the Study

This study holds significance on multiple fronts. Handwashing with soap under running water is a cost-effective public health intervention that can dramatically reduce the transmission of infectious diseases. Its impact is particularly pronounced in institutional settings such as schools, where the potential to curb outbreaks is substantial. Research has shown that unsafe water, poor sanitation, and inadequate hygiene practices contribute to 88% of global diarrhoeal cases, which claim approximately 1.5 million lives annually—most of them children (World Health Organization, 2019). Regular handwashing is a proven method for minimizing pathogen transmission (Lopez-Quintero et al., 2009), and its importance was further underscored during the COVID-19 pandemic, when it served as a frontline preventive measure (Olapeju et al., 2021; Szczuka et al., 2021). These realities highlight the urgency of understanding the knowledge and practices surrounding hand hygiene, especially among children.

Beyond its immediate health benefits, handwashing is deeply intertwined with the achievement of several Sustainable Development Goals (SDGs). It directly supports SDG 3: Good Health and Well-being by reducing preventable illnesses such as diarrhoeal and respiratory infections, particularly among children under five. Improved hand hygiene contributes to healthier populations and enhanced well-being across all age groups. The educational implications are equally compelling. Poor hygiene is a leading cause of school absenteeism, and regular handwashing helps reduce missed school days, thereby advancing SDG 4: Quality Education. Schools that provide adequate handwashing facilities foster environments conducive to both cognitive development and physical health.

From a gender equity standpoint, handwashing infrastructure plays a vital role in supporting SDG 5: Gender Equality. Girls are disproportionately affected by inadequate sanitation, especially during menstruation, when the absence of clean and private facilities can lead to absenteeism or even school dropout (Madison Weaver, 2024). Ensuring access to proper hygiene facilities enables girls to participate fully in education without interruption. Handwashing also aligns with SDG 6: Clean Water and Sanitation, which includes a specific target—SDG 6.2—focused on achieving equitable access to sanitation and hygiene and ending open defecation by 2030 (United Nations, 2017). Promoting handwashing practices is a tangible step toward meeting this goal and fulfilling broader WASH commitments.

The ripple effects extend further, touching on SDG 8: Decent Work and Economic Growth. Healthier populations experience fewer productivity losses, allowing for more consistent participation in education and the workforce. In water-scarce regions like northern Ghana, where Tamale is located, efficient water use for hygiene also intersects with SDG 13: Climate Action, by fostering resilience to climate-related challenges in water availability. Tamale's semi-arid conditions and persistent water scarcity make it a particularly relevant setting for

examining the barriers and opportunities surrounding handwashing in schools (Ngben, 2020; Ngben & Yakubu, 2023).

This study addresses a critical gap in the literature by shifting attention to private primary schools in Tamale, an area often overlooked in favour of public schools (Dajaan et al., 2018). Private schools in this context differ significantly from public ones in terms of resources, curriculum implementation, and student demographics, which can influence hygiene knowledge and practices in distinct ways. For instance, private schools may have varying access to water and sanitation facilities, different health education approaches, and serve students from diverse socioeconomic backgrounds. By focusing on upper primary students—who are generally responsible for managing their own hygiene without direct teacher supervision—this study provides valuable insights into how handwashing knowledge translates into independent behaviour (Steiner-Asiedu et al., 2011).

These nuances are crucial for designing targeted, effective interventions that are responsive to the specific environments and developmental stages of children in private school settings. This study contributes to both academic discourse and practical policy development by illuminating the multifaceted role of handwashing in health, education, gender equity, and sustainable development. Its findings are especially relevant for Ghana's efforts to meet SDG targets and improve child well-being through evidence-based, context-sensitive interventions.



CHAPTER TWO

2 LITERATURE REVIEW

2.1 Introduction

This section presents relevant literature related to handwashing knowledge and handwashing practices. The review begins with handwashing practices, followed by knowledge of handwashing practices, and availability and accessibility of handwashing facilities. This chapter also presents the theoretical framework underpinning the study and the conceptual framework that is guiding the study.

2.2 Handwashing Practices

Ensuring that primary school children have a strong understanding of handwashing practices is essential in preventing communicable diseases. Handwashing with soap and water is one of the most effective ways to reduce infections among school-aged children (Dwipayanti et al., 2021). However, studies have shown that while children may have knowledge of handwashing, their ability to practice it consistently is often hindered by environmental and behavioural factors (Lopez-Quintero et al., 2009). Additionally, evidence suggest that handwashing practices do not vary by gender (Sayantani Chatterjee et al., 2022). For instance, a study in Yirgalem Town, Southern Ethiopia on knowledge, attitudes, and practices of handwashing among Aderash Primary School children found that gender was not associated with the practice of handwashing (Eshetu et al., 2020). However, other studies have found differences in handwashing practices by gender (Tadesse, 2005). In schools across Bogotá, Colombia, researchers found that despite awareness of hygiene, students did not wash their hands regularly before meals, after playing, or after using the toilet (Nakayama et al., 2024). The study, which used a quantitative approach guided by the Theory of Reasoned Action and the Theory of Planned Behaviour, revealed that students' attitudes, peer influence, and available

facilities played a significant role in determining their hygiene behaviours (Lopez-Quintero et al., 2009).

Similarly, in Kintampo, Ghana, a study in public primary schools identified gaps between knowledge and practice, with environmental limitations often preventing students from washing their hands effectively (Dajaan et al., 2018).

Despite the known benefits of handwashing, schools often lack adequate facilities to promote good hygiene among pupils. Steiner et al., (2011) conducted research in private and public primary schools in the Greater Accra Region, Ghana, using mixed methods to evaluate handwashing compliance. The study found that in schools without designated handwashing stations, children were significantly less likely to wash their hands regularly. Schools that provided soap often stored it separately, making access difficult for students. Additionally, in schools where basins were shared, many students skipped handwashing altogether, fearing that using the same container as others would not properly clean their hands (Steiner-Asiedu et al., 2011).

Handwashing directly impacts health outcomes, particularly among children who are vulnerable to diarrheal diseases and respiratory infections. Regular handwashing has been shown to reduce the incidence of diarrheal diseases by 30% and significantly lower respiratory infection rates, as demonstrated in a meta-analysis (Aiello et al., 2008). In a study examining hygiene within Ghana's School Feeding Programme, researchers noted that while handwashing facilities were available, overcrowding and the use of shared containers undermined effective handwashing (Monney et al., 2013). The study emphasized the importance of structural improvements such as dedicated handwashing stations and clear hygiene education.

Encouraging students to wash their hands before meals and after toilet use is a priority in public health interventions. A study on hygiene education programs in Kenyan primary schools found

that incorporating hygiene lessons into the curriculum led to sustained improvements in handwashing frequency (Blanton et al., 2010). This is supported by Chaudhari et al. (2025), who found that structured school-based hygiene education significantly improved handwashing knowledge and practices among primary school children in India. Children typically acquire knowledge about handwashing from educational institutions like schools and their homes (Chaudhari et al., 2025). The impact of properly maintained handwashing stations was found to be significant, with student compliance increasing when schools provided dedicated facilities with soap and clean water (Pickering et al., 2019).

Despite widespread awareness of handwashing in Ghana, many individuals struggle to practice it consistently due to limited opportunities and inadequate sanitation facilities in both schools and homes (Omari et al., 2022). These limitations prevent students from translating their hygiene knowledge into action (Elechi & Gladys, 2018). To improve hygiene outcomes, handwashing has to be consistent and the availability of the necessary facilities will enable students to uphold these practices. By adopting this practice both at school and at home, the burden of pathogens can be effectively reduced among school pupils.

2.3 Knowledge of Handwashing Practices

The handwashing habits of students are shaped by the understanding they gain about handwashing practices. A study in Hosanna town, Southern Ethiopia, used a cross-sectional quantitative survey to assess knowledge, attitude and practice about handwashing and associated factors among public primary school children. The study found that generally knowledge of handwashing was very high among students as 69.9% of them demonstrated good knowledge about handwashing which reflected in appropriate handwashing practices (Alula et al., 2018). In Bangladesh, another study used a mixed-methods approach to assess hygiene behaviours. The study was guided by behavioural and socio-cultural perspectives, emphasizing how economic status, social norms, and environmental accessibility influence

handwashing habits. The study found the increased prevalence of diarrhoea and other communicable diseases among school children stems from inadequate knowledge about handwashing, as well as non-adherence to personal and environmental hygiene (Hoque, 2003). Similarly, a study in Ghana employed a quantitative survey approach to examine mothers' handwashing behaviours at critical junctures, such as after using the restroom, after caring for a child, and before handling food. The research was informed by behavioural and socio-cultural perspectives, exploring factors such as education and child care quality, which influenced hygiene practices. The study found that handwashing with soap remained notably low among Ghanaian mothers. Specifically, only 4% of mothers engaged in handwashing with soap after defecation, and 2% after changing a child. The study identified several determinants influencing handwashing behaviour, including mother's education, knowledge of critical handwashing times, child age, and the quality of child care (Scott et al., 2007).

Children typically acquire knowledge about handwashing from educational institutions like schools and their homes (Sălceanu et al., 2023). A study in Indonesia used mixed methods to assess hygiene knowledge, attitudes, and practices, guided by the health belief model. Findings revealed that parents were the primary source of hygiene education, contributing 91.86%, followed by health workers (50%), teachers (34.9%), and friends (2.3%). The study further highlighted barriers to consistent handwashing, such as limited accessibility to soap and water, economic challenges, and cultural perceptions of hygiene (Setyautami et al., 2012).

Despite growing awareness, global research indicates that knowledge alone does not always translate into consistent handwashing behaviour. Studies show that almost half of schoolchildren do not consistently use soap, even when facilities are available (GHP, 2021). This underscores the need for behavioural change programs, including peer modelling and structured hygiene education, to reinforce proper handwashing practices.

Additionally, UNICEF's Hand Hygiene for All Initiative reports that nearly half of all schools worldwide lack handwashing facilities with soap and water, affecting 900 million school-age children (UNICEF, 2020). Limited accessibility to proper hygiene infrastructure remains a major challenge, with a global survey revealing that only 60% of children reported having soap available in school settings, while one in ten stated that soap was never available (UNICEF, 2021b; WHO, 2021). These findings highlight the need for policy-driven interventions to ensure consistent access to hygiene resources and prevent gaps in compliance.

Structured hygiene education within school curricula has proven to be highly effective. A study in Kenyan primary schools found that integrating hygiene lessons into classroom instruction resulted in sustained improvements in handwashing frequency (Blanton et al., 2010; Sălceanu et al., 2023). Similarly, WHO guidelines emphasize that teacher-led interventions, visual cues, and accessible infrastructure are essential in reinforcing hygiene behaviour among schoolchildren (WHO, 2018).

2.4 Availability and Accessibility of Handwashing Facilities

Availability and accessibility of handwashing facilities is critical to handwashing practices. A study conducted in the Eastern Region of Ghana, using an exploratory qualitative approach, interviewing parents, teachers, and health workers to explore hygiene barriers. The study found that there was a general awareness of handwashing and its importance among young people; nevertheless, they found it difficult to adhere to the practice because of nonavailability of basic items such as soap, water and knowledge of proper handwashing techniques. Additionally, the study found that ensuring access to clean water and soap for handwashing is crucial in reducing diarrheal diseases and respiratory infections. Even when a handwashing facility is available, sharing the same basin for handwashing may not effectively clean hands. Providing clean water and soap for handwashing can help decrease infections by approximately 30% (Tetteh et al.,

2021).

In many developing countries, schools lack sufficient handwashing facilities, and even where they exist, concerns remain about adequacy, proper placement, and accessibility. A quantitative observational study in sub-Saharan Africa assessed hygiene facilities in schools, revealing that poor infrastructure limits consistent handwashing behaviour. The study, grounded in public health models, emphasized how environmental determinants such as the proximity and availability of hygiene stations shape hygiene habits among students (Camille Morgan et al., 2017).

Adequate and well-maintained sanitation and handwashing facilities in schools are crucial for promoting good handwashing practices among students. Simply washing hands with soap can protect children from two of the leading global causes of paediatric mortality: diarrhoea and lower respiratory infections. A systematic review and meta-analysis to examine multiple intervention studies across different locations, finding that handwashing reduced respiratory infections by 16%, emphasizing the role of hand hygiene in disease prevention (Rabie & Curtis, 2006). It is particularly important to encourage schoolchildren to wash their hands with soap and water, especially before meals and after using the toilet. A study in low-resource school settings, using a policy analysis approach to assess the effectiveness of water, sanitation, and hygiene (WASH) standards in schools, informed by public health intervention frameworks, found structured hygiene education and infrastructure improvements to be very critical (John Adams et al., 2009).

A study in Ghana, using a quantitative survey explored handwashing knowledge, attitudes, and practices. The study was guided by health behaviour theories focusing on educational level and socio-economic barriers showed that while students recognize the importance of handwashing, insufficient access to sanitation facilities both at school and home prevents them from

consistently applying hygiene knowledge (Omari et al., 2022). Similarly, in Nigeria, a mixed-methods study combining quantitative surveys and qualitative interviews assessed barriers to hygiene infrastructure, emphasizing the need for accessible and well-maintained handwashing stations as part of behavioural change models (Elechi & Gladys, 2018; Rabie & Curtis, 2006).

While there appears to be studies on handwashing among students, there is limited empirical evidence on knowledge and practices of handwashing among upper primary private school children in Ghana, a gap this study seeks to fill.

2.5 Theoretical Framework

This study hinges on the Social Learning Theory to explain the relationship between knowledge and handwashing practices. The Social Learning Theory has been used to assess handwashing among children in other contexts (Biyikoglu Alkan et al., 2023). While the Health Belief Model could have been applied in this study, it has mostly been used to assess handwashing practices among adults, who can appreciate risk behaviours (White et al., 2020).

The Social Learning Theory was propounded by Albert Bandura, which emphasizes the role of observational learning and modelling in shaping behaviour (Bandura, 1977). Bandura's Social Learning Theory explains how children often observe, model, and imitate the behaviours, attitudes, and emotional reactions of peers and adults. The theory looks at how both cognitive factors and the environment influence human learning and behaviour, positing that learning has three components:

Observation: Children learn by watching others. This could include peers, parents, teachers, or even characters in the media.

Imitation: After observing a behaviour, children are likely to imitate.

Modelling: Children not only imitate behaviours but also adopt the underlying attitudes and practices.

The theory suggests that, for effective learning to happen, the learning process must incorporate the following principles:

Attention: Learning is negatively impacted if the learner is not engaged or is distracted.

Retention: Information is stored and can be recalled at a future point.

Reproduction: The child practices what they have learned.

Motivation: The child is motivated to repeat the behaviours based on the reaction when they imitate a behaviour.

In the context of this study, the Social Learning Theory is used to explain the relevance of handwashing practice among children as it is a strong indicator that young children have the potential to learn new behaviours, such as handwashing, by watching other adults such as parents, teachers, and peers wash their hands. If there is positive reinforcement (praise, rewards) for proper handwashing it reinforces handwashing behaviour among children. (Bandura, 1977).

2.6 Conceptual Framework

Drawing on Social Learning Theory, this study conceptualizes handwashing behaviour among primary school children as a product of both individual learning and external environmental conditions. Children acquire knowledge about handwashing primarily through observation—watching parents, teachers, and peers engage in hygiene practices. This observational learning fosters internalization of norms, attitudes, and perceived expectations, which can influence children's likelihood to imitate and model appropriate handwashing behaviours. Hence, knowledge of handwashing (independent variable), largely shaped by social exposure, can lead

to improved hygiene practices (dependent variable), as children adopt behaviours they perceive as socially endorsed and beneficial (Figure 2.1).

However, the pathway from knowledge to practice is neither direct nor uniform. It is shaped by a number of mediating factors that reflect the structural and environmental realities within which children operate. These include:

Infrastructure and accessibility: The number, location, and functionality of handwashing stations, as well as the consistent availability of water and soap, are critical enablers or barriers. Even when children possess adequate knowledge, the absence of usable facilities can inhibit practice.

Temporal constraints: The time available for handwashing during school hours, especially in contexts with high student-to-water-point ratios affects the feasibility of regular hygiene behaviour. Limited time may discourage children from engaging in handwashing even when they understand its importance.

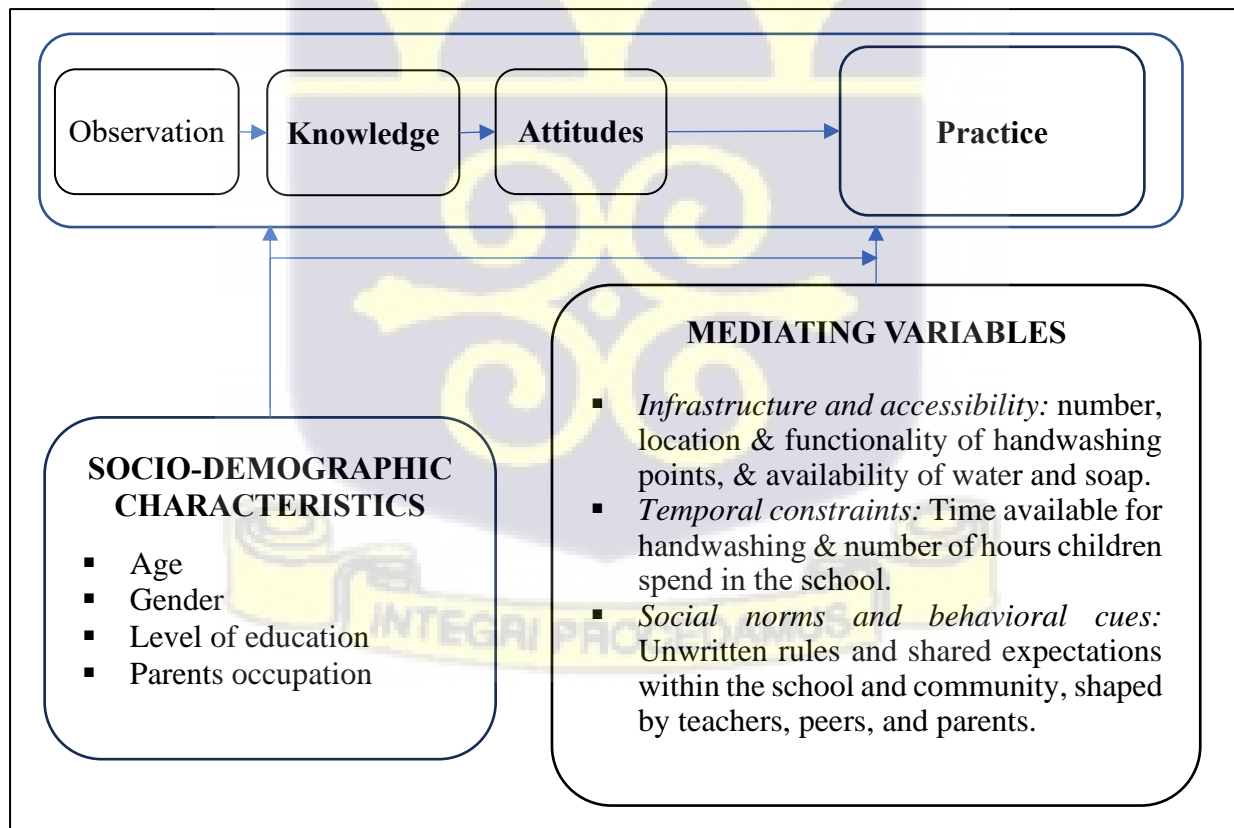
Social norms and behavioural cues: Unwritten rules and shared expectations within the school and community, shaped by teachers, peers, and parents play a pivotal role in reinforcing or undermining hygiene behaviours. Children are more likely to adopt handwashing practices when they perceive them as socially endorsed and consistently modelled by influential figures (UNICEF, 2021a).

Attitudinal mediators: Children's attitudes toward handwashing, shaped by both observed behaviour and personal experiences, mediate the relationship between knowledge and practice. Positive attitudes can strengthen the likelihood of behavioural adoption, while negative or indifferent attitudes may weaken it.

Socio-demographic characteristics: Variables such as age, gender, level of education, and parents' occupation serve as control factors that influence both the acquisition of knowledge and the enactment of behaviour. For instance, there is evidence of significant correlations between gender and handwashing practices, suggesting that demographic factors may shape both exposure to hygiene education and responsiveness to social cues (Valerie A. Curtis et al., 2009).

By integrating both cognitive and contextual dimensions, this framework reflects the complexity of handwashing behaviour and provides a more holistic basis for interpreting empirical findings. It emphasizes that while knowledge is essential, practice is contingent upon enabling environments, supportive social structures, and the broader realities of children's lived experiences.

Figure 2. 1: Conceptual framework



Source: Author's construct, 2024

CHAPTER THREE

3 METHODOLOGY

3.1 Introduction

This chapter details the research methods utilized in this study. It provides an overview of the study design, the geographical area of the study, and the data sources. Additionally, it describes the data collection instruments, the sampling methods and procedures, the sample size and techniques, as well as the data analysis processes.

3.2 Study Site

The study was conducted in Tamale Metropolis (Figure 3.1), located in the savannah terrain of northern Ghana. Tamale is characterized by flat landscapes with scattered trees and shrubs. Its strategic location, approximately 600 kilometres north of Accra, positions it as a vital node in Ghana's spatial fabric. Tamale Metropolis shares boundaries with several districts in the Northern Region of Ghana, including Savelugu Municipal, Tolon, Sagnarigu Municipal, North Gonja, and West Gonja districts. These neighbouring districts contribute to the geographic and administrative landscape of the region, fostering interconnectedness and collaboration in various aspects of governance, development, and resource management.

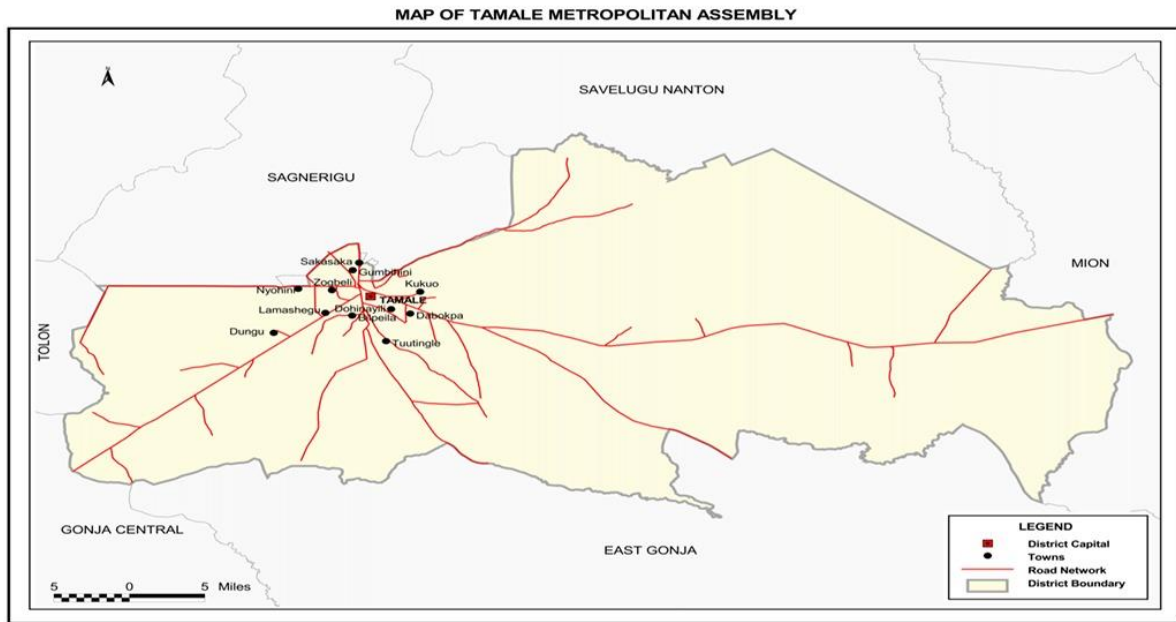
Tamale was selected as the study area due to its strategic location and accessibility, serving as a major urban centre in northern Ghana and a regional hub for commerce, education, and health services. Its rapid population growth, driven by rural-to-urban migration and the pursuit of economic opportunities, reflects a diverse mix of urban and semi-rural characteristics, making it an ideal setting for studying handwashing practices, coupled with the persistent water crisis has the potential to certain personal hygiene practices such as regular bathing and handwashing. Moreover, the presence of numerous primary schools in the area, coupled with ongoing hygiene promotion initiatives, supports the relevance of the study (GSS, 2014).

Over the years, Tamale has experienced remarkable population growth. As of the latest census, the metropolis is estimated to be home to over 560,000 residents, reflecting its status as one of Ghana's fastest-growing urban centres (Yahaya, 2022). Agriculture serves as a cornerstone of the local economy, with the fertile lands surrounding the city supporting the cultivation of crops such as maize, millet, and yam. Additionally, trade and commerce thrive in Tamale, with the bustling Tamale Central Market serving as a focal point for commercial transactions. The city's strategic location along major transportation routes enhance its role as a regional trading hub, attracting merchants and traders from across the Northern Region and beyond (Tamale Metro Assembly, 2022).

Several socio-economic activities in Tamale can be linked to handwashing practices, further justifying its selection as the study area. The bustling markets and trade activities necessitate good hygiene practices, including handwashing, to prevent food contamination and disease transmission. Agriculture, particularly in the handling and processing of crops like maize and yam, emphasizes the importance of hand hygiene in ensuring food safety. Educational institutions in the metropolis actively incorporate hygiene education into their programs, making schools ideal settings for studying handwashing knowledge and behaviours among children. Additionally, healthcare facilities and public health campaigns in the city promote handwashing as a critical practice for infection prevention, particularly in maternal and child health services. Community water and sanitation projects, which include handwashing stations, further highlight the intersection between socio-economic development and hygiene (Osumanu & Amin, 2023).

This combination of factors makes Tamale a uniquely suitable location for assessing knowledge and handwashing practices among primary school children, as it offers insights into the interplay of hygiene behaviours, community dynamics, and socio-economic activities.

Figure 3. 1: Map of study area



Source: Ghana Statistical Service (www.gss.gov.gh)

3.3 Study Design

This study utilized a mixed-method design to achieve the objectives, the study employed both quantitative and qualitative methods to collect primary data.

3.4 Mixed-Methods Approach

Mixed-methods studies involve combining or integrating qualitative and quantitative methods in undertaking research (Creswell, 2013). The advantage of this methodological approach is the fact that it offsets the weakness of solely quantitative or qualitative approaches. The reason for using the mixed methods approach is because neither the quantitative nor qualitative method is sufficient by itself to capture the nuances this study seeks to explore, which includes factors that influence handwashing practices and social norms (i.e., handwashing before meals and for religious activities) that underpin these practices (Ivankova et al., 2006).

This study used the convergent parallel mixed methods approach, where the researcher merged quantitative and qualitative data to provide a comprehensive analysis of the research problem (Creswell, 2013). This approach involved collecting, analysing, and interpreting both

numerical data (quantitative) and narrative data (qualitative) to explore different aspects of the research question and gain insights from multiple perspectives (Creswell, 2013; Creswell & Creswell, 2017).

The quantitative method was used to assess the predictors of handwashing practices among private primary school children in Tamale, Northern Region. The qualitative component was used to adduce deeper insights into social norms related to handwashing practices among private school primary children in Tamale to provide context to the qualitative study.

The mixed method approach was used to ensure that the qualitative data enriched the quantitative findings by providing context, depth, and human-centred insights. While the quantitative data captures relationships, such as the link between knowledge and practices of handwashing among primary school children, the qualitative data explains the underlying factors, including facilitators and barriers, driving those numbers. The qualitative data helped identify nuances that might have been overlooked, such as gender dynamics in handwashing practices, factors influencing these practices, and the role of social norms and infrastructure. Additionally, it provided lived experiences, offering deeper insight into facilitators like teacher encouragement and barriers such as inconsistent access to soap and water.

Subsequent sections provide details of the quantitative and qualitative procedures including the source of data, sampling procedure, data collection, data management, and data analysis.

Selection of schools: For the study, Tamale Metropolis was strategically zoned into five areas: North, South, East, West, and Central. One private school was conveniently selected from each zone, considering logistical factors such as proximity and cost-effectiveness. The selected schools and their respective communities are as follows:

- Kabitha Memorial School, located in Jisonaayili

- Royale School Complex, situated in Kalpohini
- Pearls Academy, based at Nobisco
- Kapuya International School, located in Nyohini
- Fachi Little Flower School Complex, situated in Russian Bungalows

To maintain focus, only students from primary classes 5 and 6 were included in the study. This decision was based on their independence in managing personal hygiene practices, making them suitable for assessing handwashing knowledge and practices.

3.4.1 Quantitative Procedures.

This section outlines in detail the quantitative procedures that was used in this study.

3.4.1.1 Source of Quantitative Data

The quantitative data for this study was collected among private primary school children who have received limited research attention related to this topic as discussed earlier (see instrument in appendix). The data was collected in the Tamale metropolis, Ghana. The data was collected in five private schools from primary five and six students using a standardized questionnaire. The quantitative instrument was developed using information from peer-reviewed literature and standard surveys like the Demographic and Health Survey. The instrument was pretested to ensure respondents understood the questions before use in the main study.

3.4.1.2 Quantitative Sample Size Calculation

Based on the population of the students in the respective classes (see Table 3.1), The sample size was calculated based on the following formula:

$$n = \frac{N}{1 + N(e^2)}$$

Where, n = Sample size (134)

$N =$ Population size (203)

$e = 0.05$ (5% margin of error)

The minimum sample size derived from this formula is 134.

Table 3.1 shows how the sample was distributed by school and class. For instance, in the Little Flower School, a total of 58 school children were interviewed, 34 in class 5 and 24 in class 6. In each class, it was ensured that there was a fair representation of females and males in the study.



Table 3. 1: Number of interviews conducted by school

School	Primary 5		Primary 6		Total	
	Population	Interviewed	Population	Interviewed	Population	Interviewed
Little flower	35	34	34	24	69	58
Kabita memorial school	11	12	5	8	16	20
Royale school complex	51	2	18	4	69	6
Pearls academy	35	19	25	18	60	37
Kapuya International School	9	8	9	6	18	14
Total number of students	141	75	91	60	232	135



3.4.1.3 Quantitative Sampling Approach

Selection of students: In all the five selected school's 89 students in primary five and 58 students in primary six were interviewed. This study focused on primary five and six children because they are able to understand the concepts and thematic areas of this study.

3.4.1.4 Quantitative Data Collection

Data for this study was collected directly using a tablet-based electronic data capture system (ODK Collect). The data collection system was programmed to have embedded data checks as well as pre-defined skip patterns and prompt mechanisms for immediate data queries. Each tablet was password-protected to keep the information of respondents safe. The password was accessible to the data collector. At the end of each day, data was uploaded to the ODK server.

The information of respondents was kept confidential. Respondents' names were not recorded on any of the interview materials and all documents has been kept in a secure (lockable) cabinet in the researcher's home.

3.4.1.5 Measurement of Quantitative Variables

This section describes the measurement of key variables in the study. The dependent variable in this study is handwashing practices and the independent variable is knowledge of handwashing.

Three self-reported questionnaires, adapted from previously published studies was utilized for this study to assess the knowledge, attitude, and self-reported practices regarding hand hygiene (Ergin & Ozsacmaci, 2011; Rosen et al., 2009; Speaks, 2016).

The hand hygiene questionnaire instrument consisted of three scales: knowledge, attitude, and self-reported practice regarding hand hygiene. A demographic section was added to the questionnaire to elicit information on participants' age, gender, race, level of education

completed, and questions on whether participants have had formal training on hand hygiene. The subsequent sections present details for each variable.

Dependent Variable

Handwashing practices: School children's reported handwashing practices at critical times was assessed using five items: (1) handwashing with soap after toilet use; (2) handwashing with soap before eating; (3) handwashing with soap after eating; (4) handwashing with soap after playing; and (5) handwashing with water and soap after touching money. Each item was measured on a three-point scale 'always' response was equal to 3, "sometimes" equal to 2, "never" equal to 1 point, and "not applicable" was equal to 0. A summary index score was created by summing the scores of all five items, above the median was declared as good handwashing practice coded as '1', and a score below the median was recorded as fair handwashing practice, coded as '0'.

Independent Variable

Knowledge of handwashing: Knowledge of handwashing with soap is the level of know-how primary school children demonstrate on proper handwashing with soap practices. This was measured with five questions where students were asked to indicate whether the following statements were 'True' or 'False': (1) Soap must be applied before wetting hands; (2) Washing of upper wrist region is important; (3) Washing in between the fingers is not important; (4) Handwashing must last at least 5 minutes; and (5) Washing hands in a basin is a good practice. A composite variable was computed by summing up coding all correct responses as '1' and wrong responses as '0' and summing them up. The score ranged from '0' to '5'. The score was re-categorized into children who recorded 0-2 as having 'Poor knowledge', 3 & 4 as having 'Moderate knowledge' and 5 as having 'good knowledge'.

Other Variables

Hand hygiene Attitude scale: Attitude toward handwashing with soap was measured on a scale of 1-4, Strongly disagree, disagree, strongly agree and agree on the following questions: (1) Handwashing is not important; (2) Handwashing before meals is important; (3) Handwashing is pleasant; and (4) Handwashing wastes time. Questions 1 and 4 were reverse coded to be in line with questions 2 and 3. A summary variable was then created, for all participants who indicated acceptance on all four questions coded as '1' equal to good attitudes and '0' equal to poor attitudes.

The following variables were also assessed (see study instruments in Appendix):

- Availability, number of water points in the school
- Accessibility of water points in the school
- Functionality, availability of water & soap availability at washing points
- Time, number of hours children school spend in the school
- Social norms

Socio-Demographic Characteristics

This section outlined the socio-demographic characteristics that were used in this study—sex, age, level of education, and religion—reflecting individual factors that can promote knowledge of handwashing. Sex was measured as a nominal variable measured as male and female. Age in this study was treated as a categorical variable based on the age range of the school children. Education was measured as a categorical variable (ordinal), class 5 and class 6. Religion was a nominal variable and for this study measured as Christian, Muslim, No religion, and Other. Ethnicity was measured as a categorical variable (nominal), Mole Dagomba, Akan, Ewe and Other.

3.4.1.6 Methods of Quantitative Analysis

The quantitative data was analysed using the STATA version 17 statistical analysis tool. The findings are presented in tables and charts, employing statistical analysis tools such as univariate analysis (e.g., frequencies), bivariate analysis (e.g., cross-tabulations including chi-square), and multivariate analysis (e.g., binary logistic regression model).

The univariate analysis provided insights into individual variables' distributions and variability. For instance, frequencies were used to assess the distribution of handwashing practices, knowledge of handwashing, and the socio-demographic variables. Bivariate analysis was used to explore the relationships between pairs of variables, offering valuable insights into associations. In this study, cross-tabulation was used to assess the association between the knowledge of handwashing and the other socio-demographic variable on one hand, and handwashing practices on the other.

The binary logistic regression technique was employed to analyse how knowledge of handwashing influences handwashing practices, while accounting for other contributing factors. This method provided valuable insights into the most significant predictors, allowing for a deeper understanding of the interplay between various variables. By controlling for confounding factors, the analysis facilitated informed hypothesis testing and decision-making, highlighting the key determinants of handwashing practices among private primary school children.

3.4.2 Qualitative Procedure

Key Informant Interviews (KIIs) were utilized to gather qualitative insights into the facilitators and barriers associated with handwashing practices by school children in private schools. Key Informant Interviews aided in gaining a deeper understanding of the factors that influence handwashing practices among school children in private schools. The purpose of these

interviews was to gather detailed, first-hand insights from individuals who have direct experience or knowledge of the school environment and the children's behaviours.

3.4.2.1 Qualitative Sample

The number of participants interviewed was predetermined, hence a total of 25 key informants were interviewed. Interviews were conducted with 10 teachers (2 from each school) and 15 peers (3 from each school).

3.4.2.2 Qualitative Data Collection

These interviews were conducted with teachers and peers using semi-structured interview guides (see guide in appendix). Participants were asked questions for participants to respond; however, data collectors probed further on issues that came up during the interview.

3.4.2.3 Qualitative Sampling Procedure

Purpose sampling: Unlike quantitative research where the discussion of sampling is centred around probability sampling, the discussion of sampling in qualitative research tends to revolve around purposive sampling (Bryman, 2012). The purpose sampling was used to select participants for the qualitative interviews. In each school, random conversations were had with students and three of them selected based on their knowledge and the purpose of the study (Babbie et al., 2021). For teachers, the headteachers identified two of them for interviews.

3.4.2.4 Qualitative Data Management

Audio-Recording Interviews: The KIIs were audio-recorded with the permission of the interview participants.

Field Notes and Transcription: Field notes were written up after each KII and transcriptions of the KIIs started immediately after the first interview.

Coding: The transcripts and field notes were reviewed and coded (coding refers to the process of labelling and organizing data to identify themes, patterns, and relationships. It involves

assigning codes—short labels or phrases—to segments of text, such as interview transcripts or field notes, to simplify and structure the data for analysis) (Bryman, 2012; Miles et al., 2013). The coding was done in line with the study’s theoretical underpinning. The codes were arranged under broad themes and sub-themes (Bryman, 2012; Miles et al., 2013).

3.4.2.5 Qualitative Data Analysis

Thematic Analysis Approach

The thematic analysis for this study was conducted using the Dedoose qualitative analysis software. The process began with an initial phase of familiarization, where the transcripts and field notes, were thoroughly read. This step allowed for a comprehensive understanding of the data and facilitated the identification of initial insights and ideas.

Following this, an open coding procedure was employed. Using Dedoose, segments of text were reviewed and systematically assigned symbolic codes to capture salient responses, unique circumstances, and recurring patterns. These initial codes were then categorized into preliminary themes, grouping related ideas to form patterns that aligned with the study’s conceptual framework.

The next phase involved an iterative process of refining and organizing themes. Through constant comparison of themes, the preliminary themes were reviewed and adjusted for clarity and coherence. This stage included exploring dimensions like social norms, community values, and barriers and facilitators of handwashing practices. Using these refined themes, an index of central themes and sub-themes was developed, which was represented in a matrix for further analysis.

A combination of deductive and inductive approaches was utilized during the analysis. Deductive coding was informed by pre-identified dimensions of the study, while inductive

coding allowed for the emergence of new insights from repeated readings of the data. These combined approaches ensured that both expected and additional findings were captured.

Finally, the thematic analysis culminated in a systematic application of the coding framework to explore dimensions like social support, access to facilities, and student behaviours. This analysis was supported by narrative construction, where quotes from participants were used to illustrate key findings. The process highlighted commonalities and variations across the data, enabling a nuanced understanding of the handwashing practices among primary school children.



CHAPTER FOUR

4 FINDINGS

4.1 Introduction

This chapter presents the findings of the study, derived from both the quantitative and qualitative analyses. The findings are organized to address the research objectives and provide insight into the patterns, relationships, and significant observations that emerged from the data. This chapter starts with the presentation of the socio-demographic characteristics of both participants in the quantitative and qualitative studies. Second, the findings on the relationship between knowledge, gender, and practices of handwashing among primary school children in selected private schools in Tamale. The findings of objectives 1 and 2 are presented together because the analysis was conducted together (i.e., all the analysis was conducted by gender). Third, it presents the factors influencing handwashing practices among primary school children; and fourth, the findings on the facilitators and barriers to handwashing among primary school children are presented.

4.2 Descriptive Characteristics of Study Participants

This section presents the descriptive characteristics of participants in the quantitative and qualitative components of the study, which included students and teachers. In the quantitative study, a total of 135 school children in private schools were interviewed. The school children were between the ages of 9 and 14 years with a mean age of 10.4 years (± 0.9). From Table 4.1, of those interviewed, 72 were males and 63 females, and most (61.5%) of the children were in class 5. More than seven out of ten (73.6%) of the male children were in class five whilst 52.4% of the female children were in class 6. Also, majority (71.1%) of the children were of the Mole- Dagomba ethnic group. The median household size of the children was 6 members (IQR: 5-9 children).

Table 4. 1: Socio-demographic characteristics of children in the quantitative survey

Characteristics	Total N=135	Gender of child		P-value
		Male N=72	Female N=63	
Age of respondent (in years), Mean (±SD)	10.4 (±0.9)	10.4 (±1.0)	10.3 (±0.9)	0.530 ^T
Age of respondent (in years)				0.710
9	20 (14.8)	9 (12.5)	11 (17.5)	
10	65 (48.1)	37 (51.4)	28 (44.4)	
11	35 (25.9)	17 (23.6)	18 (28.6)	
12	13 (9.6)	7 (9.7)	6 (9.5)	
13	1 (0.7)	1 (1.4)	0 (0.0)	
14	1 (0.7)	1 (1.4)	0 (0.0)	
Class of respondent				0.002
Class 5	83 (61.5)	53 (73.6)	30 (47.6)	
Class 6	52 (38.5)	19 (26.4)	33 (52.4)	
Ethnicity				0.210
Mole Dagomba	96 (71.1)	50 (69.4)	46 (73.0)	
Akan	10 (7.4)	4 (5.6)	6 (9.5)	
Ewe	8 (5.9)	7 (9.7)	1 (1.6)	
Other	21 (15.6)	11 (15.3)	10 (15.9)	
Religion				0.590
Christian	46 (34.1)	26 (36.1)	20 (31.7)	
Muslim	89 (65.9)	46 (63.9)	43 (68.3)	
Father's education				0.590
None	8 (5.9)	6 (8.3)	2 (3.2)	
Primary	4 (3.0)	2 (2.8)	2 (3.2)	
Secondary	4 (3.0)	1 (1.4)	3 (4.8)	
Tertiary	106 (78.5)	56 (77.8)	50 (79.4)	
Don't know	13 (9.6)	7 (9.7)	6 (9.5)	
Mother's education				0.610
None	5 (3.7)	3 (4.2)	2 (3.2)	
Primary	4 (3.0)	2 (2.8)	2 (3.2)	
Secondary	11 (8.1)	7 (9.7)	4 (6.3)	
Tertiary	104 (77.0)	52 (72.2)	52 (82.5)	
Don't know	11 (8.1)	8 (11.1)	3 (4.8)	
Household size, Median (IQR)	6 (5-9)	6 (5-9)	6 (5-9)	0.810 ^W
Household size				0.590
2-5 members	43 (31.9)	21 (29.2)	22 (34.9)	
6-10 members	77 (57.0)	44 (61.1)	33 (52.4)	
11+ members	15 (11.1)	7 (9.7)	8 (12.7)	

T: P-value from the Welch's t-test of equality of means

W: P-values from the Wilcoxon rank sum test of equality of medians.

All other p-values are from the Fisher's exact test

The qualitative component of this study (key informant interviews) was conducted among 25 participants (15 students and 10 teachers). The students who participated in the qualitative

study were between the ages of 10 and 14 years and students who were 11 years was the highest (46.7%). Data on age of teachers were not collected. Female participants dominated among both teachers (70%) and students (60%). In all the selected schools, five interviews were conducted; however, the ratio of teachers to students who were interviewed in each school varied (Table 4.2).

Table 4. 2: Characteristics of qualitative study participants

Variable	Students		Teachers		Total	
	Number	Percent	Number	Percent	Number	Percent
Age of participant	Na					
10	3	20.0	Na	Na	3	12
11	7	46.7	Na	Na	7	28
12	3	20.0	Na	Na	3	12
13	1	6.7	Na	Na	1	4
14	1	6.7	Na	Na	1	4
Gender						
Female	9	60.0	7	70.0	16	64
Male	6	40.0	3	30.0	9	36
School						
Kabita	3	20.0	2	20.0	5	20
Royal Academy	4	26.7	1	10.0	5	20
Pearls Academy	3	20.0	2	20.0	5	20
Kapuya intern	2	13.3	4	40.0	5	20
Little flower	3	20.0	1	10.0	5	20
Religion						
Christian	7	46.7	6	60.0	11	44
Moslem	5	33.3	4	40.0	11	44
Other	3	20.0	0		3	12
Total	15	100.0	10	100.0	25	100.0

4.3 Relationship Between Knowledge, Gender and Practices of Handwashing Among Primary School Children

4.3.1 Bivariate Association Between Demographic Characteristics and Level of Handwashing Practices

Table 4.3 shows the association between socio-demographic characteristics of children and the level of handwashing practices. The results show that there was no significant difference between males and females, even though good handwashing practice was a little bit higher

among female compared to male children. With respect to class, there was a significant difference between school children in class 6 and class 5, the data show that good handwashing practices was higher among children in class 6. It was also found that there was a significant relationship between household size and handwashing practices as households with larger sizes appear to have good handwashing practices.



Table 4. 3: Association between demographic characteristics of children and level of handwashing practices

Characteristics	Total N=135	Level of handwashing practices		P-value
		Fair practice N=67	Good practice N=68	
Gender of child				0.660
Male	72	37 (51.4)	35 (48.6)	
Female	63	30 (47.6)	33 (52.4)	
Age of respondent, Mean (±SD)	10.4 (±0.9)	10.3 (±0.9)	10.4 (±0.9)	0.480 ^T
Age of respondent				0.650
9	20	10 (50.0)	10 (50.0)	
10	65	35 (53.8)	30 (46.2)	
11	35	16 (45.7)	19 (54.3)	
12	13	5 (38.5)	8 (61.5)	
13	1	0 (0.0)	1 (100.0)	
14	1	1 (100.0)	0 (0.0)	
Class of respondent				<0.001
Class 5	83	53 (63.9)	30 (36.1)	
Class 6	52	14 (26.9)	38 (73.1)	
Ethnicity				0.430
Mole Dagomba	96	48 (50.0)	48 (50.0)	
Akan	10	7 (70.0)	3 (30.0)	
Ewe	8	4 (50.0)	4 (50.0)	
Other	21	8 (38.1)	13 (61.9)	
Religion				0.950
Christian	46	23 (50.0)	23 (50.0)	
Muslim	89	44 (49.4)	45 (50.6)	
Father's education				0.320
None	8	1 (12.5)	7 (87.5)	
Primary	4	2 (50.0)	2 (50.0)	
Secondary	4	2 (50.0)	2 (50.0)	
Tertiary	106	55 (51.9)	51 (48.1)	
Don't know	13	7 (53.8)	6 (46.2)	
Mother's education				0.510
None	5	2 (40.0)	3 (60.0)	
Primary	4	2 (50.0)	2 (50.0)	
Secondary	11	8 (72.7)	3 (27.3)	
Tertiary	104	51 (49.0)	53 (51.0)	
Don't know	11	4 (36.4)	7 (63.6)	
Household size, Median (IQR)	6 (5-9)	6 (5-7)	7 (6-10)	0.003 ^W
Household size				0.036
2-5 members	43	28 (65.1)	15 (34.9)	
6-10 members	77	34 (44.2)	43 (55.8)	
11+ members	15	5 (33.3)	10 (66.7)	

T: P-value from the Welch's t-test of equality of means

W: P-values from the Wilcoxon rank sum test of equality of medians.

All other p-values are from the Fisher's exact test

4.3.2 Sources of Information on Handwashing Among Children

Among the 135 children, 98.5% reported having learned about handwashing in school. The most common source of information on proper handwashing steps was from their teachers (72.6%), followed by parents (62.2%) and the television (40.7%). Less than a fifth (14.1%) learned proper handwashing practices from books (Table 4.4). In terms of sources of information and gender disparity among the children, there were no variations between male children and female children ($p>0.05$).

Table 4. 4: Sources of information on handwashing in schools by gender of children

Variable	Total N=135	Gender of children		P- value
		Male N=72	Female N=63	
Learn about handwashing in school				0.920
No	2 (1.5)	1 (1.4)	1 (1.6)	
Yes	133 (98.5)	71 (98.6)	62 (98.4)	
Sources of information about proper handwashing steps				
<i>Parents</i>	84 (62.2)	43 (59.7)	41 (65.1)	0.590
<i>Siblings</i>	2 (1.5)	2 (2.8)	0 (0.0)	0.500
<i>Teachers</i>	98 (72.6)	56 (77.8)	42 (66.7)	0.180
<i>Peers/friends</i>	4 (3.0)	2 (2.8)	2 (3.2)	1.000
<i>TV</i>	55 (40.7)	31 (43.1)	24 (38.1)	0.600
<i>Books</i>	19 (14.1)	9 (12.5)	10 (15.9)	0.630

All p-values are from the Fisher's exact test

The qualitative data also revealed that children predominantly learn about handwashing in school. It was found that schools had policies and guidelines related to handwashing, which required that students wash their hands before eating, after visiting the toilet and often after outdoor games or breaks. The guidelines were part of the schools' health and safety measures, ensuring that students maintain good hygiene practices throughout the day. Teachers shared their perspectives on how these measures are implemented in schools. Their statements below highlight the consistency and emphasis on hygiene practices across different schools:

As per our school policies, students are required to wash their hands during and after break times, as well as after visiting the washrooms. [PID 15, Teacher, Little flower, Female]

Our policy requires students to wash their hands at least three times a day: before eating, after using the toilet, and after returning from the playground. [PID 3, Teacher, Pearls academy, Male]

Our policy clearly requires students to wash their hands before meals and after using the toilet. Additionally, it encourages handwashing after outdoor activities, such as playing during break. We emphasize this practice regularly to ensure good hygiene habits. [PID 18, Teacher, Little flower, Female]

In addition to the policies, it was also found that teachers educated students about the importance of hand hygiene by highlighting the importance of handwashing in various ways. They incorporate hygiene lessons into the curriculum, conduct classroom discussions, and use practical demonstrations to teach proper handwashing techniques. Additionally, they use videos, posters, and regular reminders to reinforce the importance of handwashing. These efforts ensure that students understand and practice good hand hygiene regularly. To provide further insight, several teachers shared their approaches:

We teach about hand hygiene during our health science classes.

We also conduct practical demonstrations, especially for younger students, to show them the correct handwashing techniques. Posters and reminders are displayed around the

school to reinforce these lessons. [PID 18, Teacher, Little flower, Female]

Our health science classes include teaching about hand hygiene. Additionally, we focus on practical demonstrations to guide younger students on proper handwashing. Posters and reminders across the school further support these efforts. [PID 3, Teacher, Pearls academy, Male]

Through hygiene lessons and classroom discussions, we teach students about proper handwashing. We also use demonstrations to ensure they understand and practice good techniques. [PID 2, Teacher, Royal School Complex, Female]

4.3.3 Knowledge of Children on Handwashing Practices

Regarding children's knowledge about handwashing practices, more than eight out of ten (83.0%) children indicated that soap must be applied before wetting hands; 98.5% indicated that washing of upper wrist region is important, and 88.1% indicated that handwashing must last at least 5 minutes. Also, more than a third (64.4%) of the children indicated that washing between the fingers was important, and a little more than half (54.1%) indicated that washing hands in a basin was not a good practice (Table 4.5).

Comparing the knowledge of children on proper handwashing practices between males and females. There were no significant disparities between the gender of the children by the five knowledge items on proper handwashing practices ($p>0.05$).

Overall, 6.7% of children have poor knowledge of proper handwashing practices, 59.3% had moderate knowledge of proper handwashing practices and 34.1% had good knowledge of

handwashing practices. However, the evidence did not show significant differences in knowledge of handwashing practices between female and male children ($p=0.971$).

Table 4. 5: Knowledge of children on proper handwashing practices by gender

Knowledge items	Total N=135	Gender of children		P-value
		Male N=72	Female N=63	
Soap must be applied before wetting hands				0.360
No	23 (17.0)	10 (13.9)	13 (20.6)	
Yes	112 (83.0)	62 (86.1)	50 (79.4)	
Washing of upper wrist region is important				1.000
No	2 (1.5)	1 (1.4)	1 (1.6)	
Yes	133 (98.5)	71 (98.6)	62 (98.4)	
Washing in between the fingers is not important				1.000
No	87 (64.4)	46 (63.9)	41 (65.1)	
Yes	48 (35.6)	26 (36.1)	22 (34.9)	
Handwashing must last at least 5 min				0.190
No	16 (11.9)	6 (8.3)	10 (15.9)	
Yes	119 (88.1)	66 (91.7)	53 (84.1)	
Washing hands in a basin is a good practice				0.230
No	73 (54.1)	35 (48.6)	38 (60.3)	
Yes	62 (45.9)	37 (51.4)	25 (39.7)	
Overall knowledge on proper handwashing practices				0.971
Poor knowledge	9 (6.7)	5 (6.9)	4 (6.3)	
Moderate knowledge	80 (59.3)	42 (58.3)	38 (60.3)	
Good knowledge	46 (34.1)	25 (34.7)	21 (33.3)	

All p-values are from the Fisher's exact test

The high level of knowledge of handwashing among school children was also found to be high in the qualitative data demonstrated through handwashing techniques including steps in handwashing and focussed areas for handwashing, as well as their knowledge on common mistakes in handwashing.

Steps in handwashing: Students described proper handwashing steps, emphasizing the sequence of wetting hands, applying soap, and scrubbing thoroughly. Key steps included rubbing hands together, washing between fingers, under nails, and on the backs of hands. The process ends with rinsing hands under clean water and drying with tissue. Some students specified washing for at least three minutes to ensure cleanliness.

First, you need to wet your hands using clean running water. Then, apply soap and rub your hands vigorously, ensuring you wash in-between your fingers and under your nails. After that, rinse your hands thoroughly and dry them with tissue. The process should take no less than three minutes. [PID 8, Student, Kapuya International School, Male]

You put small water in your hands and put soap, then you will rub them together. Then you rinse your hands with water. [PID 16, Student, Little Flower School, Female]

Focused areas for handwashing: Also, when asked about the areas they needed to focus on when washing their hands, students highlighted the importance of cleaning areas such as fingernails, the space between the fingers, the wrist and sometime the back of their hands.

I wash my hands in-between my fingernails and my fingernails too. [PID 16, Student, Little Flower School, Female]

Your nails, in between fingers, and in between your fingers and wrist. [PID 5, Student, Pearls Academy, Female]

Students also expressed their understanding of the importance of handwashing, describing it as a practice to clean hands with soap and water to remove dirt and germs. Across schools, they consistently identified the primary reason for handwashing as preventing illness by eliminating germs that could be transferred through touching the face or food. The statements below illustrate their perspectives:

Handwashing means cleaning your hands with soap and water to remove dirt and germs. [PID 14, Student, Kabita Memorial School, Female]

If you don't wash your hands, germs can stay on them, and you can get sick. For example, when you touch your food or your face, the germs can enter your body. [PID 17, Student, Little flower, Female]

Washing your hands is important because if you play and come back, or if you're going to urinate or eat, you're supposed to wash your hands. [PID 10, Student, Kapuya International School, Male]

Students also identified specific situations for handwashing, including before eating, after using the toilet, after playing outside, and when hands are visibly dirty. Some also mentioned washing hands after handling animals or touching dirty objects. These responses reflected a strong understanding of when handwashing is essential to maintain personal hygiene and prevent the spread of germs. The response below illustrates their perspectives:

First of all, when you play football, you can clean the dirt from your hands. By washing under running water with soap and tissue. You should also wash your hands before and after eating, as well as after visiting the toilet [PID 5, Student, Pearls Academy, Female]

After using the bathroom, before you eat, and after you play outside. Oh, and after you touch animals, too. [PID 19, Student, Little Flower, Female]

When you are going to eat you have to wash your hands and after eating to you wash your hands again and also after going to the toilet. [PID 16, Student, Little Flower, Female]

Despite students showing high level of knowledge about handwashing practices, they admitted to common mistakes in handwashing practices. When discussing common mistakes, students frequently admitted to forgetting to wash their hands after playing, often due to excitement or being in a hurry. Other common errors included washing hands without soap or using a basin. However, regular reminders from parents and teachers, as well as visual cues like the presence of soap and sinks, played a key role in reinforcing proper hand hygiene practices. Additionally, some students carried hand sanitizer to use when soap was unavailable. Their responses reflect both challenges and supportive measures:

Most of the time, yes. But sometimes I forget after playing because I'm in a hurry to go back to class or to play more.' [PID 9, Student, Kapuya International School, Female]

My teacher always says, "Don't forget to wash your hands before lunch!" And at home, my mom always reminds me. I also put sanitizer in my bag, so I can use that when there's no soap. [PID 19, Student, Little Flower, Female]

4.3.4 Attitude of Children Towards Handwashing Practices

From Table 4.6, at least 6 in 10 (61.5%) of the children strongly disagreed that handwashing practices were not important while an additional 31.9% disagreed. Almost 7 in 10 (68.9%) of the children strongly agreed that handwashing before meals was important, while an additional 28.1% agreed that. More than half (54.8%) of the children agreed that handwashing was pleasant, while additional 40.7% strongly agreed. One in 3 (34.8%) of the children strongly disagreed that handwashing wastes time, while 54.1% disagreed. The results show that there were no significant gender disparities with the various attitudes towards proper handwashing practices.

The results show that a fifth (20.7%) of the children had a poor attitude towards handwashing practices. While a higher percentage of males (23.6%) had poor attitude towards handwashing compared to females (17.5%) with poor handwashing practices, the difference was not statistically significant ($p=0.379$).

Table 4. 6: Attitude of children towards handwashing practices by gender

Attitudes	Total N=135	Gender of children		P-value
		Male N=72	Female N=63	
Handwashing is not important				0.290
Strongly disagree	83 (61.5)	44 (61.1)	39 (61.9)	
Disagree	43 (31.9)	22 (30.6)	21 (33.3)	
Agree	4 (3.0)	4 (5.6)	0 (0.0)	
Strongly agree	5 (3.7)	2 (2.8)	3 (4.8)	
Handwashing before meals is important				0.730
Strongly disagree	2 (1.5)	1 (1.4)	1 (1.6)	
Disagree	2 (1.5)	2 (2.8)	0 (0.0)	
Agree	38 (28.1)	19 (26.4)	19 (30.2)	
Strongly agree	93 (68.9)	50 (69.4)	43 (68.3)	
Handwashing is pleasant				0.430
Strongly disagree	3 (2.2)	3 (4.2)	0 (0.0)	
Disagree	3 (2.2)	1 (1.4)	2 (3.2)	
Agree	74 (54.8)	38 (52.8)	36 (57.1)	
Strongly agree	55 (40.7)	30 (41.7)	25 (39.7)	
Handwashing wastes time				0.560
Strongly disagree	47 (34.8)	24 (33.3)	23 (36.5)	
Disagree	73 (54.1)	40 (55.6)	33 (52.4)	
Agree	10 (7.4)	4 (5.6)	6 (9.5)	

Strongly agree	5 (3.7)	4 (5.6)	1 (1.6)	
Overall attitudes of children towards handwashing				0.379
Poor attitude	28 (20.7)	17 (23.6)	11 (17.5)	
Good attitude	107 (79.3)	55 (76.4)	52 (82.5)	

All p-values are from the Fisher's exact test

The positive attitudes of students towards handwashing were found to be emanating from not only knowledge of handwashing practices but also from monitoring and encouragement. It was revealed that handwashing and hygiene in schools were promoted through monitoring, encouragement, and incentives, teachers and prefects supervised students during breaks, after restroom visits, and at lunch to ensure handwashing, with spot checks and reminders integrated into the daily routine. To make handwashing engaging, schools incorporated games, songs, and competitions, particularly for younger students. Additionally, the schools motivated students by offering incentives such as soap, hand sanitizers, or certificates through awards like “Cleanest Student of the Week” or “Hygiene Champion.”

Yes, teachers and school prefects actively monitor students during break times and after they use the toilets. We pay special attention to the younger children to ensure they are following proper hygiene practices. [PID 18, Teacher, Little Flower, Female]

Yes, teachers and prefects supervise students during lunch and after recess to ensure that they wash their hands properly. [PID 2, Teacher, Royal School Complex, Female]

We consistently remind the students about handwashing and incorporate it as an enjoyable part of their daily routine.

Occasionally, we organize small competitions to encourage proper handwashing and make the practice more engaging.

[PID 6, Teacher, Kapuya International School, Male]

Yes, we do that. At the end of the semester, we organize a speech and prize-giving ceremony. During this event, I make sure to reward the best and neatest student with items such as soap, sanitizers, tissues, and a small token. This encourages the student and motivates others to follow good hygiene practices.

[PID 15, Teacher, Little Flower, Female]

Schools promoted hand hygiene through incentives, which influences attitudes. Students who consistently practiced good hygiene received awards and small prizes, motivating them to maintain cleanliness. Schools also engaged parents via PTA meetings, newsletters, and hygiene demonstrations, especially during flu season or outbreaks, urging parents to reinforce these habits at home.

Yes, we do. During our PTA meetings, we make it a point for some teachers to demonstrate proper handwashing techniques to the parents. This helps educate them on ensuring their children practice proper hygiene at home and encourages monitoring to ensure the children do the right thing [PID 15, Teacher, Little Flower, Female]

We provide flyers with hand hygiene tips for students to take home and address the topic during parent meetings. We encourage parents to actively reinforce these practices at home

to ensure consistent hygiene habits [PID 6, Teacher, Kapuya International School, Male]

It was also found that role models in schools influenced attitudes of students, as schools promoted handwashing through both active teaching and role modelling. Teachers used demonstrations, songs, and visual aids to teach the steps of proper handwashing. They further reinforced these lessons by washing their hands in front of students, especially after common activities like handling materials, eating, or going outside. By visibly practicing good hygiene themselves, teachers created a consistent, engaging learning environment that encouraged students to adopt and remember these healthy habits.

During lessons, we conduct demonstrations to teach proper handwashing techniques. We also use a fun and engaging song to help students remember the steps: wet, soap, scrub, rinse, and dry. [PID 4, Teacher, Pearls Academy, Female]

Yes, we make sure to demonstrate proper hygiene to the pupils, especially after lessons. We wash our hands and apply sanitizers in their presence, showing them what we encourage them to do. This not only reinforces the importance of hand hygiene but also motivates them by setting an example. [PID 15, Teacher, Little Flower, Female]

I always make it a point to wash my hands in front of the students, particularly after handling chalk or being outside. Occasionally, I use hand sanitizer in class as well, ensuring they see me

practicing the hygiene habits we teach them. This reinforces the importance of hand hygiene and encourages them to follow suit

[PID 18, Teacher, Little Flower, Female]

4.3.5 Handwashing Practice Among Children

The high knowledge and favourable attitudes of students towards handwashing reflected in children's handwashing practices. Among the 135 children, it was found that washing of hands with soap and water was practiced among 99.3% before eating, 98.5% after handling garbage, 98.5% after playing, 98.5% after visiting the toilet, 94.1% after eating. Also, 55.6% wash their hands with soap and water after touching money Table 4.7.

In terms of gender disaggregation, there was no significant differences between male and female children in terms of the timing of handwashing with soap and water. Overall, half (50.4%) of the children had good handwashing practices and the other half (49.6%) have fair proper handwashing practices (Table 4.7).

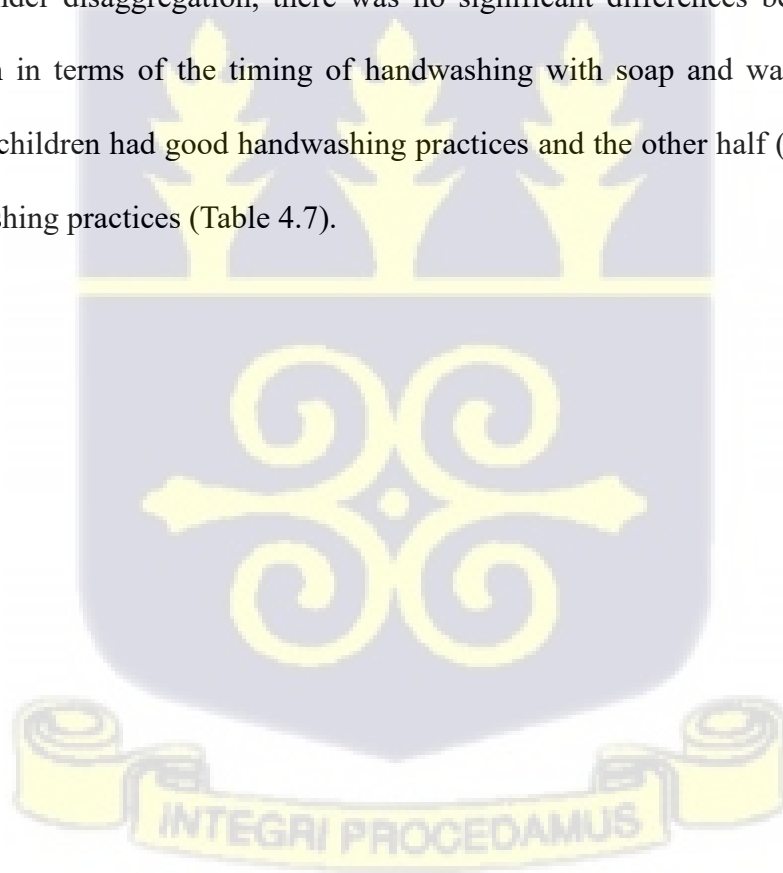


Table 4. 7: Handwashing practice among children by gender

Handwashing practices	Total N=135	Gender of children		P-value
		Male N=72	Female N=63	
Wash your hands with water and soap ...				
... after a toilet visit	133 (98.5)	71 (98.6)	62 (98.4)	1.000
... before eating	134 (99.3)	71 (98.6)	63 (100.0)	1.000
... after eating	127 (94.1)	68 (94.4)	59 (93.7)	1.000
... after touching money	75 (55.6)	37 (51.4)	38 (60.3)	0.390
... after playing	133 (98.5)	71 (98.6)	62 (98.4)	1.000
... after handling garbage	133 (98.5)	72 (100.0)	61 (96.8)	0.220
Practice score (%), Median (IQR)	100 (84-100)	84 (84-100)	100 (84-100)	0.600 ^W
Practice score (%)				0.830
66.7%	8 (5.9)	5 (6.9)	3 (4.8)	
83.3%	59 (43.7)	32 (44.4)	27 (42.9)	
100.0%	68 (50.4)	35 (48.6)	33 (52.4)	
Level of handwashing practice				0.660
Fair practice (66.7% & 83.3%)	67 (49.6)	37 (51.4)	30 (47.6)	
Good practice (100.0%)	68 (50.4)	35 (48.6)	33 (52.4)	

W: P-values from the Wilcoxon rank sum test of equality of medians.

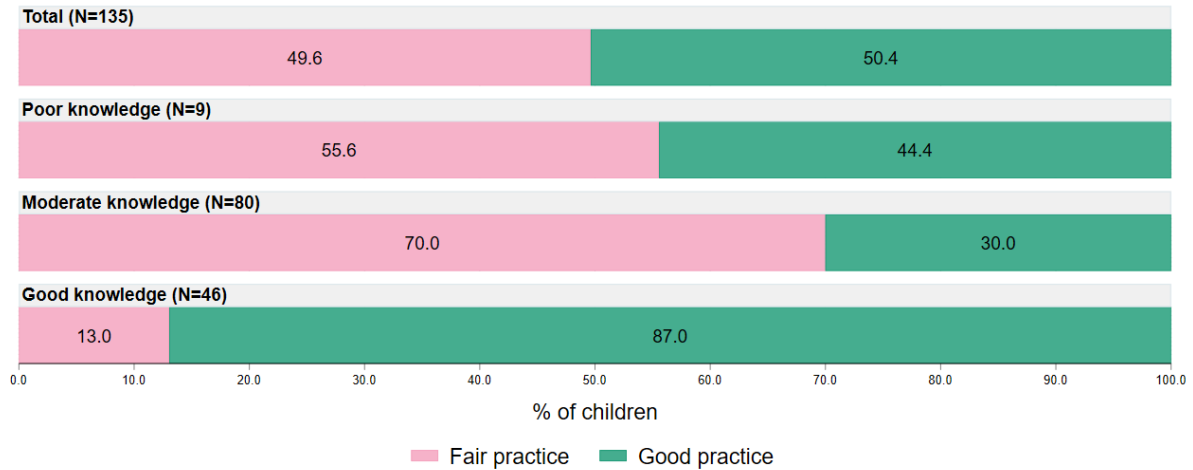
All other p-values are from the Fisher's exact test

4.3.5.1 Bivariate Association Between Knowledge on Handwashing and Level of Handwashing Practices

The bivariate association between level of handwashing practices and the knowledge of children towards handwashing practices was assessed. The percentage of children with good handwashing practices was higher among the children with good knowledge (87.0%) compared to children with poor knowledge (44.4%) and moderate knowledge (30.0%) (Figure 4.1).



Figure 4. 1: Level of proper handwashing practice by knowledge level of children



The percentage of children with good handwashing practices was higher among children who indicated that soap must be applied before wetting hands compared to children who thought otherwise (54.5% vs. 30.4%, $p=0.041$) (Table 4.8). The percentage of children with good handwashing practices was lower among children who indicated that washing hands in a basin is a good practice compared to children who thought otherwise (29.0% vs. 68.5%, $p<0.001$).

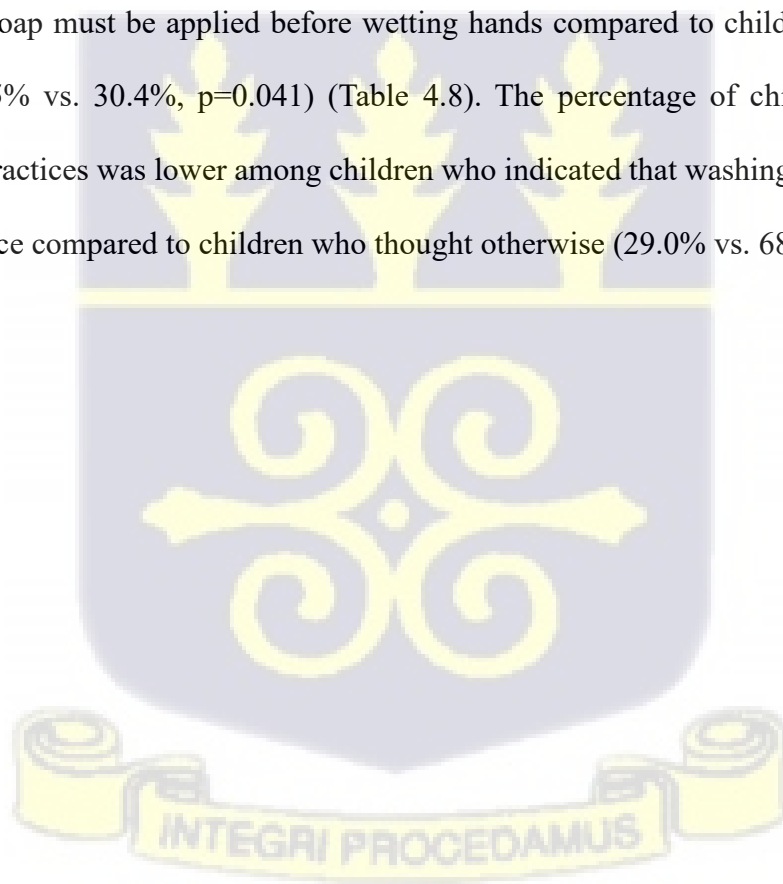


Table 4. 8: Bivariate association between knowledge of children on handwashing and level of handwashing practices among children

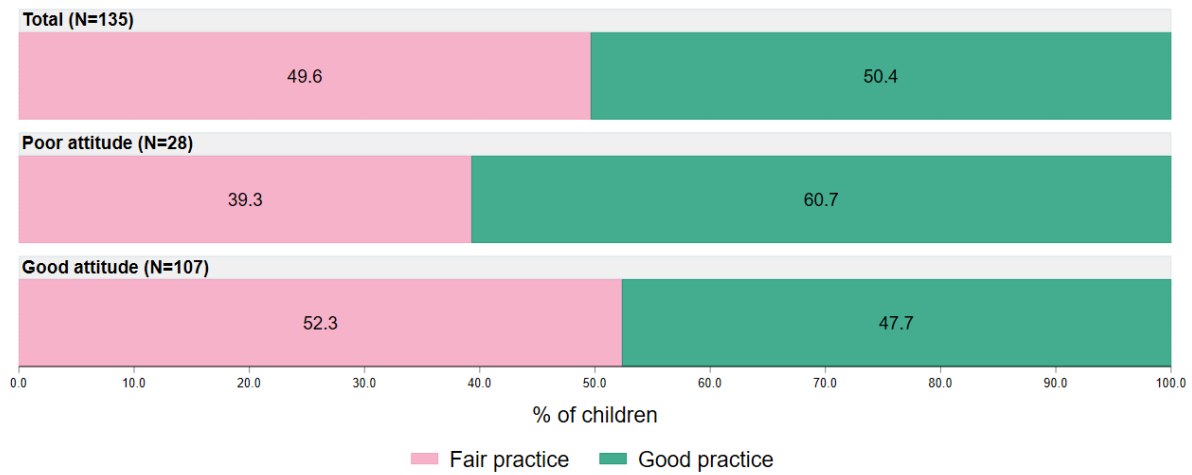
	Total N=135	Level of handwashing practices		P-value
		Fair practice N=67	Good practice N=68	
Soap must be applied before wetting hands				0.041
No	23	16 (69.6)	7 (30.4)	
Yes	112	51 (45.5)	61 (54.5)	
Washing of upper wrist region is important				1.000
No	2	1 (50.0)	1 (50.0)	
Yes	133	66 (49.6)	67 (50.4)	
Washing in between the fingers is not important				0.280
No	87	40 (46.0)	47 (54.0)	
Yes	48	27 (56.2)	21 (43.8)	
Handwashing must last at least 5 min				0.120
No	16	11 (68.8)	5 (31.2)	
Yes	119	56 (47.1)	63 (52.9)	
Washing hands in a basin is a good practice				<0.001
No	73	23 (31.5)	50 (68.5)	
Yes	62	44 (71.0)	18 (29.0)	

All p-values are from the Fisher's exact test

4.3.5.2 Bivariate association between attitude towards handwashing and level of handwashing practices

The bivariate association between level of handwashing practices and the attitude of children towards handwashing practices was assessed. The percentage of children with good handwashing practices was higher among the children with poor attitude (60.7%) compared to children with good attitude (50.4%) but not statistically significant ($p=0.219$) (Figure 4.2).

Figure 4. 2: Level of proper handwashing practice by attitude towards handwashing among children



P-value=0.219

At the individual item level, the attitudes of the children towards handwashing practices were not significantly associated with the practice of proper handwashing practices (Table 4.9).

Table 4. 9: Bivariate association between attitude of children towards handwashing and level handwashing practices among children

	Total N=135	Level of handwashing practices		P-value
		Fair practice N=67	Good practice N=68	
Handwashing is not important				1.000
Disagree	126	63 (50.0)	63 (50.0)	
Agree	9	4 (44.4)	5 (55.6)	
Handwashing before meals is important				0.620
Disagree	4	1 (25.0)	3 (75.0)	
Agree	131	66 (50.4)	65 (49.6)	
Handwashing is pleasant				1.000
Disagree	6	3 (50.0)	3 (50.0)	
Agree	129	64 (49.6)	65 (50.4)	
Handwashing wastes time				0.270
Disagree	120	62 (51.7)	58 (48.3)	
Agree	15	5 (33.3)	10 (66.7)	

All p-values are from the Fisher's exact test

4.4 Factors Influencing Handwashing Practices Among Primary School Children

This section addresses research objective 3 of the study. The multiple binary logistic regression model was used to assess the predictors or factors associated with handwashing practices (the outcome variable was binary). the Hosmer–Lemeshow model goodness of test p-value of

0.4210 suggests that model is reasonably well calibrated and there is no strong evidence of poor fit. Additionally, the mean variance inflation factor of 3.35 suggests acceptable level of multicollinearity.

Using a multiple binary logistic regression model, the results showed that the odds of good handwashing practices was over 8 times higher among children in class 6 compared to children in class 5 (aOR: 8.01, 95% CI: 2.35, 27.25, $p=0.001$). The adjusted odds of good handwashing practices were over 24 times higher among children with good knowledge of handwashing practices compared to children with poor or moderate knowledge of handwashing practices (aOR: 24.46, 95% CI: 4.23, 141.51, $p<0.001$). On the other hand, children with good attitude towards handwashing practices had less odds of good practices of proper handwashing practices (aOR: 0.13, 95% CI: 0.03, 0.60, $p=0.009$). The adjusted odds of good handwashing practices were over 6 times high among children reported of constant availability of tissues or handwashing dryers at the washing point (aOR: 6.19, 95% CI: 1.88, 20.45, $p=0.003$) (Table 4.10).

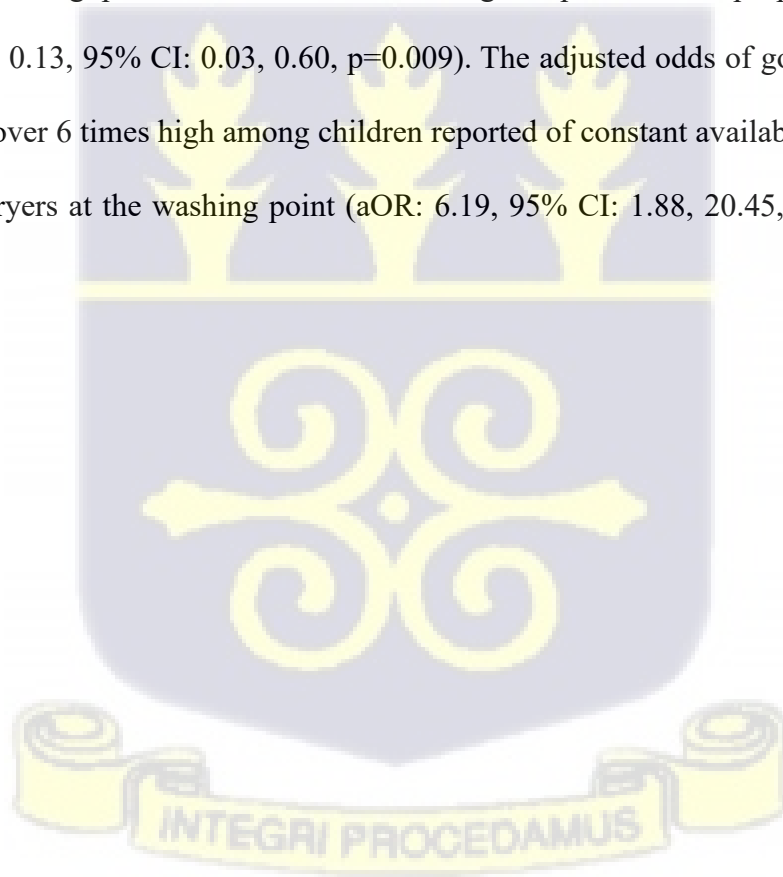


Table 4. 10: Logistic regression model of factors associated with good handwashing practice among children

Characteristics	Unadjusted model		Adjusted model	
	COR [95% CI]	P-value	OR [95% CI]	P-value
Age group of children				
9 years	1.00 [reference]		1.00 [reference]	
10 years	0.86 [0.31, 2.35]	0.764	0.35 [0.09, 1.28]	0.112
11 years	1.19 [0.39, 3.58]	0.760	0.29 [0.07, 1.20]	0.087
12+ years	1.50 [0.39, 5.84]	0.559	0.11 [0.02, 0.75]	0.024
Sex of child				
Male	1.00 [reference]		1.00 [reference]	
Female	1.16 [0.59, 2.29]	0.663	0.99 [0.31, 3.19]	0.990
Class of child				
Class 5	1.00 [reference]		1.00 [reference]	
Class 6	4.80 [2.24, 10.27]	<0.001	8.01 [2.35, 27.25]	0.001
Household size				
2-5 members	1.00 [reference]		1.00 [reference]	
6+ members	2.54 [1.19, 5.39]	0.016	3.20 [1.08, 9.50]	0.036
Knowledge level of child				
Poor/moderate knowledge	1.00 [reference]		1.00 [reference]	
Good knowledge	14.52 [5.50, 38.36]	<0.001	24.46 [4.23, 141.51]	<0.001
Attitude of child towards handwashing				
Poor attitude	1.00 [reference]		1.00 [reference]	
Good attitude	0.59 [0.25, 1.38]	0.223	0.13 [0.03, 0.60]	0.009
Tissues/hand dryer always available at washing point				
No	1.00 [reference]		1.00 [reference]	
Yes	7.13 [3.32, 15.32]	<0.001	6.19 [1.88, 20.45]	0.003
Mother's education				
None/primary/secondary	1.00 [reference]		1.00 [reference]	
Tertiary	0.42 [0.14, 1.30]	0.133	3.54 [0.72, 17.46]	0.121
Don't know	0.39 [0.08, 1.79]	0.226	0.18 [0.02, 1.60]	0.124
Father's education				
None/primary/secondary	1.00 [reference]		1.00 [reference]	
Tertiary	1.56 [0.59, 4.14]	0.373	2.54 [0.53, 12.15]	0.242
Don't know	2.63 [0.57, 12.07]	0.215	24.38 [2.18, 272.39]	0.009
Goodness of fit test (Hosmer–Lemeshow) p-value			0.4210	
Mean VIF (range)			3.35 (1.77 – 6.95)	

COR: crude odds ratio. AOR: adjusted odds ratio. CI: confidence interval

Difference between home and school: Students highlighted noticeable differences in handwashing practices between school and home, emphasizing that maintaining hygiene is easier at home. At home, soap is consistently available, and family members, especially

parents, actively remind and encourage children to wash their hands, particularly before meals and after playing. In contrast, schools often face resource limitations, such as inconsistent access to soap and water, which make regular handwashing more difficult. Despite these challenges, students demonstrated awareness of hygiene practices. Their responses include:

At home, we always have soap, and my mom makes sure we wash our hands before eating and after playing.' [PID 19, Student, Little Flower, Female]

At home, it's easy because we always have soap, and my parents remind me.' [PID 7, Student, Kapuya International School, Female]

4.5 Facilitators and Barriers to Handwashing Practices Among Primary School Children

4.5.1 Factors Associated with Good Handwashing Practices Among School Children

All the 135 children indicated that they had pipe-borne water in the school for handwashing. Most (85.2%) of the children reported availability of veronica bucket in the school, 29.6% reported availability of tippy tap, 15.6% reported availability of sink and 1.5% reported availability of “Kuffour gallon”. Most (94.1%) of the children reported that the number of handwashing points in the school was enough. Also, most (94.1%) of the children reported of washing point within proximity to their classrooms. In the case of non-availability of handwashing points, most of the children will walk to the nearest washing point even if it is too far (72.6%) (Table 4.11).

Less than half (46.7%) of the children indicated consistent availability of tissues to dry hands at the handwashing points. Nine in 10 (90.4%) of the children reported consistent availability of soap at the handwashing points. In the case of non-availability of soap at the handwashing points, more than half (54.8%) of the children will use hand sanitizers, 23.0% will find soap somewhere else and 20.0% will use only water to wash their hands. Most of the children spend 6-8 hours in school (Table 4.11).

Table 4.11 further describe the enabling factors for proper handwashing among children in schools by the gender of the children. Aside more males (98.6%) compared to females (88.9%) indicating that the handwashing points in their schools were enough ($p=0.017$), there were non-significant disparities in the reported enabling factors by gender of the children (Table 4.11).



Table 4. 11: Enabling factors of good handwashing practices among children by gender

	Total N=135	Gender of children		P-value
		Male N=72	Female N=63	
Do you have pipe-borne running water in the school for handwashing?				-
No	0 (0.0)	0 (0.0)	0 (0.0)	
Yes	135 (100.0)	72 (100.0)	63 (100.0)	
Source of water for handwashing in school				
<i>Veronica bucket</i>	115 (85.2)	62 (86.1)	53 (84.1)	0.810
<i>Sink</i>	21 (15.6)	8 (11.1)	13 (20.6)	0.160
<i>Kuffour gallon</i>	2 (1.5)	2 (2.8)	0 (0.0)	0.500
<i>Tippy tap</i>	40 (29.6)	24 (33.3)	16 (25.4)	0.350
Do you think the number of hands washing points in your school is enough?				0.017
No	8 (5.9)	1 (1.4)	7 (11.1)	
Yes	127 (94.1)	71 (98.6)	56 (88.9)	
Is there a washing point closer to your classroom?				0.470
No	8 (5.9)	3 (4.2)	5 (7.9)	
Yes	127 (94.1)	69 (95.8)	58 (92.1)	
Action taking when there is no handwashing point closer				
<i>Walk to the nearest washing point, even if it's far</i>	98 (72.6)	52 (72.2)	46 (73.0)	1.000
<i>Wait until later to wash your hands</i>	13 (9.6)	8 (11.1)	5 (7.9)	0.570
<i>Use hand wash sanitizer if available</i>	43 (31.9)	28 (38.9)	15 (23.8)	0.067
<i>Sometimes skip washing hands</i>	2 (1.5)	1 (1.4)	1 (1.6)	1.000
Is there always a tissue at the handwashing point to dry hands after washing hands				0.390
No	72 (53.3)	41 (56.9)	31 (49.2)	
Yes	63 (46.7)	31 (43.1)	32 (50.8)	
Action taking when there are no tissues to dry hand after handwashing				
<i>Shake your hands to dry them</i>	32 (23.7)	20 (27.8)	12 (19.0)	0.310
<i>Use your clothes to dry your hands</i>	13 (9.6)	5 (6.9)	8 (12.7)	0.380
<i>Leave your hands wet</i>	6 (4.4)	3 (4.2)	3 (4.8)	1.000
<i>Bring your tissue or towel</i>	86 (63.7)	44 (61.1)	42 (66.7)	0.590
Do you always have soap at the handwashing point?				0.570
No	13 (9.6)	8 (11.1)	5 (7.9)	
Yes	122 (90.4)	64 (88.9)	58 (92.1)	
Action taking when there is no soap to wash hand				
<i>I use only water to wash my hands</i>	27 (20.0)	13 (18.1)	14 (22.2)	0.670
<i>I try to find soap somewhere else</i>	31 (23.0)	16 (22.2)	15 (23.8)	0.840
<i>I skip washing my hands</i>	4 (3.0)	2 (2.8)	2 (3.2)	1.000
<i>I use hand sanitizer instead</i>	74 (54.8)	41 (56.9)	33 (52.4)	0.610
How long do you spend in school on average?				0.510
4-6 hours	2 (1.5)	1 (1.4)	1 (1.6)	

	Total N=135	Gender of children		P-value
		Male N=72	Female N=63	
6-8 hours	124 (91.9)	68 (94.4)	56 (88.9)	
More than 8 hours	9 (6.7)	3 (4.2)	6 (9.5)	

All p-values are from the Fisher's exact test

In Table 4.12, the enabling factors are described by the level of handwashing practices among the children. There were some selected enabling factors that significantly vary by the level of proper handwashing practices of the children (Table 4.12). For instance, the availability of sinks and tippy taps.



Table 4. 12: Enabling factors of good handwashing practices among children by level of handwashing practices

	Total N=135	Level of handwashing practices		P-value
		Fair practice N=67	Good practice N=68	
Do you have pipe-borne running water in the school for handwashing?				0.500
No	1 (0.7)	1 (1.5)	0 (0.0)	
Yes	134 (99.3)	66 (98.5)	68 (100.0)	
Source of water for handwashing in school				
<i>Veronica bucket</i>	115 (85.2)	53 (79.1)	62 (91.2)	0.056
<i>Sink</i>	21 (15.6)	3 (4.5)	18 (26.5)	<0.001
<i>Kuffour gallon</i>	2 (1.5)	1 (1.5)	1 (1.5)	1.000
<i>Tippy tap</i>	40 (29.6)	14 (20.9)	26 (38.2)	0.038
Do you think the number of hands washing points in your school is enough?				0.980
No	8 (5.9)	4 (6.0)	4 (5.9)	
Yes	127 (94.1)	63 (94.0)	64 (94.1)	
Is there a washing point closer to your classroom?				1.000
No	8 (5.9)	4 (6.0)	4 (5.9)	
Yes	127 (94.1)	63 (94.0)	64 (94.1)	
Action taking when there is no handwashing point closer				
<i>Walk to the nearest washing point, even if it's far</i>	98 (72.6)	38 (56.7)	60 (88.2)	<0.001
<i>Wait until later to wash your hands</i>	13 (9.6)	11 (16.4)	2 (2.9)	0.009
<i>Use hand wash sanitizer if available</i>	43 (31.9)	20 (29.9)	23 (33.8)	0.710
<i>Sometimes skip washing hands</i>	2 (1.5)	0 (0.0)	2 (2.9)	0.500
Is there always a tissue at the handwashing point to dry hands after washing ha				<0.001
No	72 (53.3)	51 (76.1)	21 (30.9)	
Yes	63 (46.7)	16 (23.9)	47 (69.1)	
Action taking when there are no tissues to dry hand after handwashing				
<i>Shake your hands to dry them</i>	32 (23.7)	26 (38.8)	6 (8.8)	<0.001
<i>Use your clothes to dry your hands</i>	13 (9.6)	10 (14.9)	3 (4.4)	0.045
<i>Leave your hands wet</i>	6 (4.4)	5 (7.5)	1 (1.5)	0.120
<i>Bring your tissue or towel</i>	86 (63.7)	26 (38.8)	60 (88.2)	<0.001
Do you always have soap at the handwashing point?				0.560
No	13 (9.6)	5 (7.5)	8 (11.8)	
Yes	122 (90.4)	62 (92.5)	60 (88.2)	
Action taking when there is no soap to wash hand				
<i>I use only water to wash my hands</i>	27 (20.0)	22 (32.8)	5 (7.4)	<0.001

	Total N=135	Level of handwashing practices		P-value
		Fair practice N=67	Good practice N=68	
<i>I try to find soap somewhere else</i>	31 (23.0)	22 (32.8)	9 (13.2)	0.008
<i>I skip washing my hands</i>	4 (3.0)	1 (1.5)	3 (4.4)	0.620
<i>I use hand sanitizer instead</i>	74 (54.8)	23 (34.3)	51 (75.0)	<0.001
How long do you spend in school on average?				1.000
4-6 hours	2 (1.5)	1 (1.5)	1 (1.5)	
6-8 hours	124 (91.9)	62 (92.5)	62 (91.2)	
More than 8 hours	9 (6.7)	4 (6.0)	5 (7.4)	

All p-values are from the Fisher's exact test

The qualitative study also found that availability of water and soap was critical to adopting appropriate handwashing practices. Access to soap and water in schools play a critical role in promoting hand hygiene, yet students often face challenges in maintaining this practice. They described frequent shortages of soap, particularly during busy times like breaks, and highlighted issues with water availability, such as low pressure or complete outages. These inconsistencies create frustration among students, who understand the importance of hygiene but cannot always wash their hands properly. Despite these obstacles, students demonstrated a clear awareness of soap's role in health, emphasizing its ability to remove visible dirt and kill germs, which reduces the risk of illness. Many students also carry hand sanitizer as an alternative when soap is unavailable. The following comments from students illustrate both their awareness and the challenges they encounter:

You use soap to wash your hands because if you're going to play, maybe germs will be there. If you don't wash your hands with soap and just use your hands to eat, you'll get germs. [PID 10, Student, Kapuya International School, Male]

Sometimes there's soap, but other times it's finished, and then we just rinse with water. The water also runs out sometimes, and we have to wait for it to come back. [PID 19, Student, Little Flower, Female]

In the qualitative data it was also found various enablers of handwashing. Schools generally provided soap, water, and Veronica buckets as primary handwashing resources, with hand sanitizers available as supplementary hygiene options in some areas, like classrooms and entrances. Maintenance staff monitor supplies, but delays in restocking soap and inconsistent water access often disrupt routines. Facilities such as sinks and Veronica buckets are often insufficient for the large number of students, causing long queues during peak times, which sometimes led students to skip handwashing. Teachers emphasized the need for more comprehensive and accessible hygiene infrastructure to ensure that students can regularly and easily practice hand hygiene.

We have several handwashing stations equipped with Veronica buckets and soap. However, these facilities are insufficient for the number of students we have. During break times, long queues form, and some students lose patience waiting their turn, which results in some of them skipping handwashing. [PID 18, Teacher, Little Flower, Female]

We have a few sinks along with some Veronica buckets. The sinks are positioned outside the classrooms, while the buckets serve as backup facilities." [PID 2, Teacher, Royal School Complex, Female]

We primarily use soap and water for handwashing, but hand sanitizers are also provided at specific stations, particularly near the school's entrance." [PID 4, Teacher, Pearls Academy, Female]

We provide soap and water at the handwashing stations, with hand sanitizers available as an alternative, particularly during water shortages. While sanitizers are useful, we prioritize using soap and water whenever feasible. [PID 18, Teacher, Little Flower, Female]

4.5.2 Barriers to Good Handwashing Practices

In terms barriers to proper handwashing practices, 31.9% agreed while 12.6% strongly agreed that lack of accessibility to sinks or alcohol-based hand rub were barriers. Also, 11.1% agreed, while 7.4% strongly agreed that forgetfulness was a major barrier to proper handwashing practices. The perception of handwashing being harmful to the skin leading to irritation was agreed by 1.5% and strongly agreed by 6.7% of the children as a barrier to proper handwashing practices. Also, 2.2% agreed while 6.7% strongly agreed that lack of time to perform handwashing was a barrier to proper handwashing practices. Locating handwashing facilities at inconvenient places was a barrier that was agreed to by 15.6% and strongly agreed to by 5.9% of the children. Only 1.5% of the children strongly agreed that handwashing was not important. Lack of clean water was a barrier to proper handwashing practices that was agreed by 10.4% and strongly agreed by 20.7% of the children (Table 4.13).

Table 4.13 also shows the disparities in the barriers to handwashing practices by the gender of children. None of the barriers varied significantly by the gender of children.

Table 4. 13: Barriers of good handwashing practices among children by gender

Barriers	Gender of child			P-value
	Total N=135	Male N=72	Female N=63	
Lack of accessibility to sinks or alcohol-based hand rub				0.910
Strongly disagree	36 (26.7)	20 (27.8)	16 (25.4)	
Disagree	39 (28.9)	22 (30.6)	17 (27.0)	
Agree	43 (31.9)	21 (29.2)	22 (34.9)	
Strongly agree	17 (12.6)	9 (12.5)	8 (12.7)	
I forgot about washing my hands				0.350
Strongly disagree	47 (34.8)	28 (38.9)	19 (30.2)	
Disagree	63 (46.7)	32 (44.4)	31 (49.2)	
Agree	15 (11.1)	9 (12.5)	6 (9.5)	
Strongly agree	10 (7.4)	3 (4.2)	7 (11.1)	
Handwashing harms the skin and leads to irritation				0.910
Strongly disagree	66 (48.9)	37 (51.4)	29 (46.0)	
Disagree	58 (43.0)	29 (40.3)	29 (46.0)	
Agree	2 (1.5)	1 (1.4)	1 (1.6)	
Strongly agree	9 (6.7)	5 (6.9)	4 (6.3)	
I do not have time to perform washing				0.730
Strongly disagree	61 (45.2)	35 (48.6)	26 (41.3)	
Disagree	62 (45.9)	32 (44.4)	30 (47.6)	
Agree	3 (2.2)	1 (1.4)	2 (3.2)	
Strongly agree	9 (6.7)	4 (5.6)	5 (7.9)	
Facilities are not in a convenient location				0.310
Strongly disagree	40 (29.6)	26 (36.1)	14 (22.2)	
Disagree	66 (48.9)	32 (44.4)	34 (54.0)	
Agree	21 (15.6)	11 (15.3)	10 (15.9)	
Strongly agree	8 (5.9)	3 (4.2)	5 (7.9)	
Handwashing is not important				1.000
Strongly disagree	83 (61.5)	44 (61.1)	39 (61.9)	
Disagree	50 (37.0)	27 (37.5)	23 (36.5)	
Strongly agree	2 (1.5)	1 (1.4)	1 (1.6)	
Lack of clean water				0.810
Strongly disagree	56 (41.5)	29 (40.3)	27 (42.9)	
Disagree	37 (27.4)	21 (29.2)	16 (25.4)	
Agree	14 (10.4)	6 (8.3)	8 (12.7)	
Strongly agree	28 (20.7)	16 (22.2)	12 (19.0)	

All p-values are from the Fisher's exact test

Table 4.14 shows the barriers to proper handwashing practices, by the level of handwashing practices. There were significant differences between the barriers to handwashing practices and the level of proper handwashing practices among the children ($p < 0.001$).



Table 4. 14: Barriers of good handwashing practices among children by Level of handwashing practices

Barriers	Total N=135	Level of handwashing practices		P-value
		Fair practice N=67	Good practice N=68	
Lack of accessibility to sinks or alcohol-based hand rub				<0.001
Strongly disagree	36 (26.7)	25 (37.3)	11 (16.2)	
Disagree	39 (28.9)	7 (10.4)	32 (47.1)	
Agree	43 (31.9)	27 (40.3)	16 (23.5)	
Strongly agree	17 (12.6)	8 (11.9)	9 (13.2)	
I forgot about washing my hands				<0.001
Strongly disagree	47 (34.8)	30 (44.8)	17 (25.0)	
Disagree	63 (46.7)	14 (20.9)	49 (72.1)	
Agree	15 (11.1)	13 (19.4)	2 (2.9)	
Strongly agree	10 (7.4)	10 (14.9)	0 (0.0)	
Handwashing harms the skin and leads to irritation				<0.001
Strongly disagree	66 (48.9)	42 (62.7)	24 (35.3)	
Disagree	58 (43.0)	17 (25.4)	41 (60.3)	
Agree	2 (1.5)	2 (3.0)	0 (0.0)	
Strongly agree	9 (6.7)	6 (9.0)	3 (4.4)	
I do not have time to perform washing				<0.001
Strongly disagree	61 (45.2)	42 (62.7)	19 (27.9)	
Disagree	62 (45.9)	15 (22.4)	47 (69.1)	
Agree	3 (2.2)	2 (3.0)	1 (1.5)	
Strongly agree	9 (6.7)	8 (11.9)	1 (1.5)	
Facilities are not in a convenient location				0.140
Strongly disagree	40 (29.6)	24 (35.8)	16 (23.5)	
Disagree	66 (48.9)	26 (38.8)	40 (58.8)	
Agree	21 (15.6)	12 (17.9)	9 (13.2)	
Strongly agree	8 (5.9)	5 (7.5)	3 (4.4)	
Handwashing is not important				<0.001
Strongly disagree	83 (61.5)	57 (85.1)	26 (38.2)	
Disagree	50 (37.0)	9 (13.4)	41 (60.3)	
Strongly agree	2 (1.5)	1 (1.5)	1 (1.5)	
Lack of clean water				<0.001
Strongly disagree	56 (41.5)	32 (47.8)	24 (35.3)	
Disagree	37 (27.4)	3 (4.5)	34 (50.0)	
Agree	14 (10.4)	10 (14.9)	4 (5.9)	
Strongly agree	28 (20.7)	22 (32.8)	6 (8.8)	

All p-values are from the Fisher's exact test

Barriers related to handwashing was also reflected in the qualitative data, which showed that schools faced challenges in maintaining adequate handwashing facilities due to limited resources like soap, water, and handwashing stations, which led to long wait times for students. Teachers recommended that additional support from government or NGOs could alleviate these issues by providing essential supplies and increasing facilities. They also advocated for public health campaigns to emphasize handwashing's role in disease prevention, helping communities understand and prioritize good hygiene practices.

Yes, we encounter challenges with maintaining consistent supplies for handwashing. At times, tissues are unavailable, and we also face issues with running out of water. When this happens, we need to call our supplier to replenish the water, which can be quite costly. Placing the financial burden on parents isn't ideal, and this remains a significant challenge for our school campus.
[PID 15, Teacher, Little Flower, Female]

At home, I sometimes rely on a bucket system due to a lack of running water. At school, however, the main issue we face is frequent soap shortages, which can disrupt proper hand hygiene practices. [PID 4, Teacher, Pearls Academy, Female]

The government or NGOs should take the initiative to provide schools with essential resources, such as additional soap, water tanks, and handwashing stations. These provisions would significantly improve hygiene practices, ensuring that students

have access to the necessary facilities. Furthermore, public campaigns promoting the importance of handwashing could raise awareness and encourage healthier habits within schools and the broader community. [PID 15, Teacher, Little Flower, Female]

I believe the government or NGOs should provide schools with additional resources, such as soap, water tanks, and more handwashing stations. These facilities would greatly improve hygiene practices in schools. Additionally, running public campaigns about the importance of handwashing could help raise awareness and encourage healthier habits within both schools and the broader community. [PID 4, Teacher, Pearls Academy, Female]

4.6 Challenges and Recommendations from School Children

the most common challenges faced by the children included lack of hand dryers or tissues (6.7%), lack of hand sanitizers (3.7%), and lack of handwashing facilities (2.2%). (Table 4.15)

Table 4. 15: Challenges and recommendations of school children in promoting good handwashing practices

	Total N=135	Gender of child		P-value
		Male N=72	Female N=63	
Challenges:				
<i>Lack of hand dryers/tissues</i>	9 (6.7)	4 (5.6)	5 (7.9)	0.730
<i>Lack of hand sanitizers</i>	5 (3.7)	3 (4.2)	2 (3.2)	1.000
<i>Lack of handwashing facilities</i>	3 (2.2)	2 (2.8)	1 (1.6)	1.000
Recommendations:				
<i>Provision of hand dryers/tissues</i>	5 (3.7)	3 (4.2)	2 (3.2)	1.000
<i>Provision of hand sanitizers</i>	7 (5.2)	6 (8.3)	1 (1.6)	0.120
<i>Provision of handwashing facilities</i>	2 (1.5)	1 (1.4)	1 (1.6)	1.000

All p-values are from the Fisher's exact test

Additionally, in the qualitative data, students across various schools reported challenges in handwashing due to limited access to soap, water, tissue, and an insufficient number of sinks and made suggestions on how these challenges could be solved. These issues often result in long wait times, leading to frustration or worry among students. To address these challenges, students suggested practical improvements, such as increasing the number of sinks in accessible areas like classrooms and playgrounds, ensuring a consistent supply of soap and tissues, and introducing engaging initiatives like competitions or reward systems to make handwashing more enjoyable. Their perspectives highlight both the barriers they face and their proactive ideas for fostering better hygiene practices:

*There's no soap to wash our hands and tissue too. [PID 5,
Student, Pearls Academy, Female]*

*Where we wash our hands are not many. And soap. And tissue.
[PID 1, Student, Kabita Memorial School, Female]*

*They should provide us more Veronica buckets and enough soap
and tissues. [PID 1, Student, Kabita Memorial School, Female]*

Further, teachers also provided valuable insights into students' handwashing practices and the challenges schools face in maintaining hygiene. Students generally wash their hands two to three times daily, particularly before meals and after using the washroom, although reminders are often needed after playtime. However, consistent handwashing is hindered by frequent soap shortages and unreliable water supply, which disrupt routines. Teachers emphasized that improving access to essential hygiene resources such as soap, water, and washing facilities is

critical for fostering consistent handwashing habits among students. Their observations highlight both the current practices and the need for targeted improvements:

On average, students wash their hands at least two to three times a day. Most of them do it before lunch and after using the bathroom, but we keep reminding them, especially after playtime, to wash their hands. [PID 18, Teacher, Little Flower, Female]

Most students wash their hands at least twice a day. They are required to wash their hands before lunch, but sometimes, we have to remind them after playtime. [PID 4, Teacher, Pearls Academy, Female]

The challenge we encounter is about the washing materials. The soap and tissues are often inadequate, and the Veronica buckets are limited. The number of students adds to the pressure, and having more washing materials and facilities would ease this issue. [PID 15, Teacher, Little Flower, Female]

The biggest challenge is water supply. Sometimes the taps run dry, and we have to resort to using stored water, which isn't always enough. Another challenge is getting students to consistently remember to wash their hands, especially when they're in a rush or excited after break. [PID 18, Teacher, Little Flower, Female]

CHAPTER FIVE

5 DISCUSSION OF FINDINGS

5.1 Introduction

This chapter interprets the findings of the study with respect to the existing literature and theoretical framework, highlighting key patterns and implications. It examines how the results align with or diverge from previous research. This chapter also presents the limitations of the study to ensure balanced conclusions. The findings are discussed in line with the objectives of the study.

5.1.1 Relationship Between Knowledge and Practices of Handwashing Among Primary School Children.

In line with the Social Learning Theory (Bandura, 1977), the study found that children have the potential to learn behaviours, such as handwashing, by observing adults and peers particularly parents, teachers and classmates engage in such practices. When these observations are reinforced through monitoring, praise, and rewards, handwashing behaviours are strengthened. This process reflects the conceptual pathway adopted in this study: Observation → knowledge → attitudes → Behaviour (in this case, appropriate handwashing practices).

The findings revealed that almost all the children learned about handwashing in school, with the most common sources of information being teachers (72.6%), parents (62.2%), and television (40.7%). The qualitative data supported these results, showing that children predominantly learned about handwashing through structured lessons and school policies. Generally children usually believe their teachers, which helps explain why teachers emerged as the primary source of information. One child noted, “Our teacher always washes her hands before eating, so we do the same,” illustrating how role-modelling translates into habit formation. This aligns with findings from similar contexts where children typically acquire

handwashing knowledge from both educational institutions and their homes (Setyautami et al., 2012). More recent studies confirm this trend. In India it was found that most primary school students cited school as their main source of hygiene education (Chaudhari et al., 2025). In Japan, it was demonstrated that structured, school-based interventions, combined with immediate visual feedback on cleanliness, significantly improved children's handwashing practices (Nakayama et al., 2024).

The integration of hygiene education into the school curriculum, enforcement of policies, and consistent monitoring likely account for the high knowledge levels observed in this study. Children spend most of their day with teachers and parents, both of whom act as role models. This influence was reflected in attitudes, with 79.3% of children demonstrating a positive attitude toward handwashing (Alula et al., 2018; Blanton et al., 2010; Scott et al., 2007). This is also consistent with findings from Romania, where it was found that curriculum-integrated hygiene programs resulted in measurable improvements in children's hygiene-related attitudes and behaviours (Sălceanu et al., 2023)

Children in this study also demonstrated awareness of the critical times for handwashing, such as before meals and after toilet use. This knowledge provides a strong foundation for behaviour adoption, a relationship similarly observed by Scott et al. (2007) and in more recent studies in Kazakhstan, which found high knowledge levels among students even in contexts where infrastructure was inadequate (Sadu et al., 2024) Such infrastructural challenges were also mentioned by participants in this study. One child explained, "I like washing my hands, but sometimes there is no soap, so I don't," highlighting how external constraints can inhibit practice despite positive attitudes and knowledge.

Interestingly, the findings revealed that children with good attitudes toward handwashing had lower odds of actually practicing it. This counterintuitive result reflects the well-documented

knowledge–attitude–practice (KAP) gap reported in the literature (Chaudhari et al., 2025). Several explanations are possible. First, social desirability bias may have influenced self-reported attitudes, as children might have provided responses they believed were expected. Second, complacency or overconfidence could lead children with positive attitudes to assume they already practice good hygiene, resulting in lapses. Third, infrastructure limitations that can hinder consistent behaviour even when attitudes are strong (Sadu et al., 2024). Finally, absence of real-time feedback may reduce compliance as children’s handwashing behaviours improved when they received immediate, visual cleanliness feedback, suggesting that without such cues, even motivated children may not always follow through (Nakayama et al., 2024).

Overall, the study underscores that children’s handwashing practices are shaped by multiple overlapping factors, educational institutions, parents, and media operating within an environment of reinforcement. Recent evidence shows that sustained behavioural improvement requires consistent reinforcement at both school and home, coupled with adequate facilities and practical demonstrations (Chaudhari et al., 2025; Nakayama et al., 2024; Sălceanu et al., 2023). Positive reinforcement mechanisms, such as monitoring, praise and incentives not only encourage habit formation but also help bridge the gap between knowledge, attitude and actual practice. The heightened self-efficacy developed through repeated modelling and encouragement appears to be a decisive factor in sustaining appropriate handwashing behaviours.

5.1.2 Gender and Handwashing Practices Among Primary School Children.

The present study found no statistically significant gender disparities in sources of information on proper handwashing practices, knowledge of proper handwashing practices, attitudes towards handwashing, or actual handwashing behaviours among primary school children. This

suggests that both boys and girls had comparable exposure to hygiene education and demonstrated similar levels of knowledge and practice. A plausible explanation for this parity is that parents and teachers generally adopt equitable and non-discriminatory approaches when teaching children about hygiene, ensuring that handwashing messages are uniformly conveyed regardless of gender.

This finding is consistent with research conducted in Yirgalem Town, Southern Ethiopia, which also reported no significant gender differences in handwashing knowledge, attitudes, or practices among primary school children (Eshetu et al., 2020). Similarly, a study in India found that gender was not a significant predictor of handwashing with soap after defecation among school-aged children, indicating that health education interventions can successfully bridge gender gaps when implemented inclusively (Sayantani Chatterjee et al., 2022). Furthermore, a study in Indonesia found that both male and female individuals significantly increased their hand hygiene practices during the COVID-19 pandemic, particularly when adequate facilities, perceived risk, and supportive social norms were present (Dwipayanti et al., 2021).

However, the present results contrast with earlier research, such as Tadesse (2005), which identified notable gender differences in hygiene behaviours, often linked to cultural norms that assign greater domestic responsibilities to girls, thereby increasing their exposure to hygiene practices (G. Tadesse, 2005). More recent studies emphasize that gender disparities in hygiene behaviours persist in contexts where access to sanitation facilities is unequal and where sociocultural norms influence expectations differently for boys and girls. For instance, inadequate WASH infrastructure and prevailing gender roles often place a disproportionate burden on girls, affecting their health, safety, and educational outcomes (Madison Weaver, 2024).

Taken together, the results of this study align more closely with contemporary evidence showing that when hygiene promotion is systematic, equitable, and reinforced both at home and in school, gender differences in handwashing knowledge and practices are minimised. This underscores the importance of maintaining inclusive hygiene education strategies that reach all children equally, ensuring sustained improvements in public health outcomes.

5.1.3 Factors Influencing Handwashing Practices Among Primary School Children.

In the study, factors such as class level, knowledge, attitudes, and the availability of tissue at handwashing points were found to statistically significantly related to handwashing practices. The study also found factors such as children in class 6 were more likely to practice good handwashing practices compared to children in class 5. This could be explained by the fact that children in class 6 are mature than children in class 5. Those who had good knowledge and good attitudes also had higher odds of good handwashing practice compared to those with poor/moderate knowledge and poor attitudes respectively, which has been shown in other studies (Alula et al., 2018; Hoque, 2003). It is expected that having knowledge and positive attitudes towards handwashing would lead to good handwashing practice. Availability of materials such as tissue or hand drying materials was also critical to good handwashing practices.

Some students held misconceptions or negative attitudes toward handwashing, such as perceiving it as unnecessary after certain activities, which is contrary to other studies (Omari et al., 2022). These beliefs undermined handwashing efforts despite the awareness of health benefits. Additionally, limited time between classes or other school activities was a hinderance, especially if handwashing points were not immediately accessible. Students often skipped handwashing if facilities were far from their routine pathways. Further, without consistent reminders or structured times for handwashing, students sometimes forgot or deprioritized the

practice, particularly during non-meal times. The qualitative data found noticeable difference differences in handwashing practices between home and school as handwashing facilities are consistently available at home compared to school, as well as parents and other family members actively encouraging them to wash their hands before and after critical events such as before eating.

5.1.4 Facilitators and Barriers to Handwashing Among Primary School Children.

Consistent in both the quantitative and qualitative data, the study found that, generally schools had the necessary facilities for handwashing such pipe born water, veronica buckets, and sinks. Availability of running water, soap and sanitizers was a critical facilitator to handwashing. Consistent access to soap, along with hand sanitizers when soap was unavailable, helped adherence to handwashing practices. This is consistent with other studies (Rabie & Curtis, 2006).

The study identified a number of facilitators that influence handwashing practices. Availability and proximity of basic handwashing infrastructure such as handwashing points. Social support and influence including support from teachers and parents played significant roles as primary sources of information and encouragement, promoting the importance of handwashing. Teachers, in particular, influenced students by demonstrating proper techniques and reinforcing the habit. This finding is line with findings from similar context which found the availability and proximity of basic handwashing infrastructure was critical to handwashing (Tetteh et al., 2021).

The qualitative findings revealed that inconsistent availability of resources was a barrier to handwashing as the occasional shortages of soap, water, and tissues created practical barriers to regular handwashing. The lack of soap or hand-drying materials at certain times limited children's ability to wash hands effectively. This qualitative finding was consistent with the

quantitative findings. Barriers such as inconsistent resource availability, inadequate handwashing points, and lack of reminders hinder adherence to hygiene practices. Although some schools had basic facilities, the number and placement of handwashing points were sometimes inadequate to meet student needs, especially during peak times. This led to delays and discouraged consistent use, which is consistent with other studies (Morgan et al., 2017).

Enablers of handwashing practices include the availability of soap, sanitizers, tissues, and proximity of facilities. Social support from parents and teachers plays a significant role in fostering good handwashing practices.

5.1.5 Implications of the findings

This section outlines the implications of the study findings for policy and further research.

Implications for Policy

Institutionalising hygiene education in schools: The strong influence of teacher-led instruction and modelling supports the formal integration of hygiene education into primary school curricula. Collaboration between the Ministries of Education and Health is important to develop standardised hygiene modules and comprehensive teacher training programs.

Reinforcement-based behaviour change strategies: The effectiveness of praise, monitoring, and incentives suggests that behavioural reinforcement should be embedded in school hygiene protocols. National WASH policies should promote reward systems and peer-led hygiene clubs to sustain engagement.

Infrastructure Investment and Maintenance: Inadequate access to soap, water, and drying materials remains a barrier despite high knowledge levels. Policymakers must prioritize budget allocations for WASH infrastructure in schools, with mechanisms for regular maintenance and supply chain reliability.

Age-Sensitive Programming: Older pupils demonstrated better hygiene autonomy, implying that interventions should be tailored by age group. Policy frameworks should differentiate hygiene promotion strategies for lower and upper primary levels.

Gender-Inclusive Hygiene Policies: The absence of gender disparities in handwashing behaviour supports the design of inclusive hygiene programs. However, policies must remain vigilant to ensure that infrastructural and cultural factors do not disadvantage girls, especially regarding menstrual hygiene.

Alignment with Sustainable Development Goals (SDGs): The findings contribute directly to SDG 3 (Health), SDG 4 (Education), and SDG 6 (Sanitation). Policymakers should leverage school-based hygiene interventions as cross-sectoral tools for achieving national development targets.

Implications for future research

Exploring the knowledge–attitude–practice disconnect: The unexpected finding that positive attitudes did not always translate into practice warrants deeper investigation. Future studies should examine psychological, contextual, and environmental mediators that influence this gap.

Evaluating longitudinal behaviour change: This study provides a snapshot of handwashing behaviour; longitudinal research is needed to assess sustainability over time. Tracking cohorts across academic years could reveal patterns of habit formation and decay.

Testing behavioural nudges and cues: The potential role of visual reminders, peer modelling, and habit-tracking tools should be empirically tested. Experimental designs could assess the effectiveness of different nudge strategies in promoting consistent hygiene behaviour.

5.1.6 Limitations of the Study

The results of the present study need to be interpreted with caution, taking into consideration the fact that, the study was conducted in only five private schools in Tamale, Northern region, Ghana. Hence, the findings cannot be generalised to the entire region or the country. These limitations notwithstanding, the findings and conclusions of this study gives very good insights into knowledge and handwashing practices among private primary school children.



CHAPTER SIX

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The study set out to assess the knowledge and handwashing practices among private primary school children in Tamale, Northern region, Ghana. Specifically, the study sought to:

- i. Assess the relationship between knowledge and practices of handwashing among primary school children.
- ii. Assess gender and handwashing practices among primary school children.
- iii. Examine the factors influencing handwashing practices among primary school children.
- iv. Explore facilitators and barriers to handwashing among primary school children.

The study employed a convergent mixed-method approach, utilising primary quantitative and qualitative data collected from five private primary schools in the Tamale Metropolis, northern region, Ghana. Conclusions and recommendations are outlined below.

This section summarises the findings in line with the four set of objectives of the study.

The study demonstrated that children acquire handwashing behaviours primarily through observational learning, as outlined in Social Learning Theory (Bandura, 1977).. Teachers, parents, and peers serve as key role models, influencing children's practices through their actions. Positive reinforcement, such as praise, monitoring, and rewards, was found to encourage and sustain good handwashing habits. Schools played a central role as the primary source of knowledge, complemented by parental guidance and media like television. The study further emphasized the link between knowledge, positive attitudes, and effective handwashing practices, with 79.3% of children displaying favourable attitudes. Awareness of critical times

for handwashing, such as before meals and after toilet use, provided a foundation for better hygiene behaviours. Overall, the findings highlight the importance of knowledge, reinforcement, and role models in promoting consistent handwashing practices among children.

The study found no evidence of gender disparities in sources of information, knowledge, attitudes, or practices related to handwashing among children. This suggests that hygiene education and behaviour reinforcement were equally accessible to both boys and girls, reflecting non-discriminatory efforts by parents, teachers, and other influencers in promoting handwashing practices.

The study identified several significant predictors of handwashing practices among children, including class level, knowledge, attitudes, and the availability of tissue at handwashing points. Children in class 6 were more likely to practice proper handwashing compared to those in class 5, likely due to their increased maturity. Greater knowledge and positive attitudes were strongly linked to better handwashing practices, while the availability of essential materials, such as tissue and hand-drying tools, further facilitated hygiene adherence. However, misconceptions and negative attitudes, such as perceiving handwashing as unnecessary after certain activities, undermined proper practices. Practical barriers, such as limited time, inaccessible facilities, and the absence of structured routines, also hindered adherence. Peer influence and group norms emerged as critical motivators, with children encouraged by observing their peers practicing hand hygiene. Overall, the study highlights how factors such as maturity, knowledge, attitudes, social norms, and access to resources collectively shape handwashing behaviours among children.

The availability of soap, sanitizers, tissues, and accessible handwashing facilities were identified as crucial facilitators of effective hygiene practices among students. Social support

from teachers and parents further strengthened these behaviours by providing guidance, encouragement, and demonstrations of proper techniques. However, barriers such as inconsistent access to resources, including soap, water, and tissues, along with the inadequate placement and insufficient number of handwashing stations, hindered adherence to proper handwashing practices. These challenges were especially pronounced during peak times, leading to delays and reduced consistency. Overall, while facilitators play an essential role in promoting hygiene, resource shortages and accessibility constraints remain significant obstacles to maintaining effective handwashing practices.

6.2 Recommendations

Based on the findings of this study, the following recommendations are made:

- Schools should prioritize increasing the number and accessibility of handwashing facilities, ensuring that water and soap are available consistently. Additionally, alternative handwashing options, like hand sanitizers, could be strategically placed around school premises to accommodate the times when water or soap is unavailable.
- Schools should integrate structured hygiene programs into their curriculum, emphasizing the importance of handwashing and appropriate techniques. These programs can be supported by health professionals and should involve interactive sessions to engage students actively.
- Parents and community leaders should be engaged in hygiene education initiatives to foster a culture of hand hygiene both at home and in school. Encouraging parents to model proper handwashing at home can reinforce these behaviours in children.
- Local education authorities, together with school administrators, should develop policies mandating regular hygiene checks and providing necessary resources.

- Guidelines should be established for maintaining functional handwashing stations, and school staff should be trained to reinforce these practices consistently.
- Schools should implement regular monitoring systems to assess handwashing facilities' functionality and the availability of hygiene materials. Feedback from students can be gathered periodically to identify any emerging issues or improvements needed to promote hand hygiene practices continuously.



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LIST OF APPENDIXES

Study instruments

Quantitative

UNIVERSITY OF GHANA – LEGON

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH

COLLEGE OF HUMANITIES

PARTICIPANT CONSENT FORM

Dear participants, I am conducting a research project titled “Assessing Knowledge and Handwashing Practices Among Primary School Children in Tamale, Northern Region, Ghana.”

Your cooperation in responding to the following questions would be greatly appreciated. Please be assured that this research is solely for academic purposes, and your responses will be kept confidential and anonymous. There is no need to provide your name on the questionnaire.

SECTION A: SOCIODEMOGRAPHIC DATA OF RESPONDENTS

Name of school:

Location of school:.....

Date:

1. Ownership of school

a) Private []

2. Gender

a) Male []

b) Female []

3. Age of respondent (age at last birthday)

4. Class of respondent

a) Class 5 []

b) Class 6 []

5. Ethnicity

- a) Mole Dagomba []
- b) Akan []
- c) Ga-Adangbe []
- d) Ewe []
- e) Other, specify.....

6. Religious Affiliation

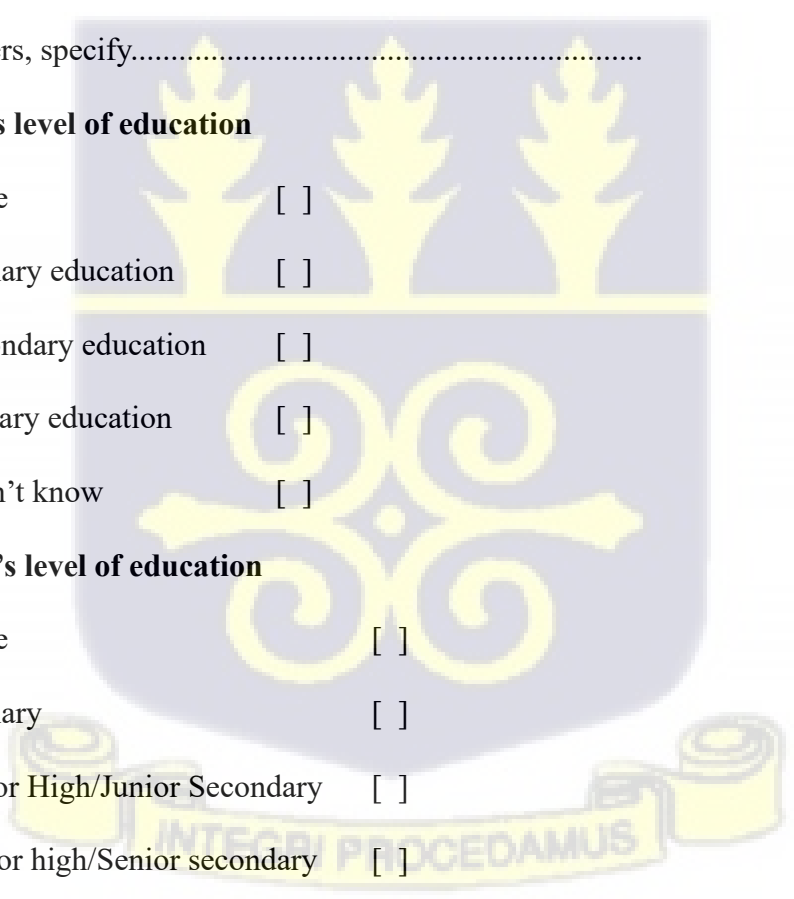
- a) Christian []
- b) Muslim []
- c) Traditionalist []
- d) Others, specify.....

7. Father's level of education

- a) None []
- b) Primary education []
- c) Secondary education []
- d) Tertiary education []
- e) I don't know []

8. Mother's level of education

- a) None []
- b) Primary []
- c) Junior High/Junior Secondary []
- d) Senior high/Senior secondary []
- e) Tertiary []
- f) I don't know []



9. What is your family size?.....

10. Occupation of parents

a) Father..... 99=I don't know / not applicable

b) Mother..... 99=I don't know / not applicable

SECTION B: AWARENESS OF PROPOER HANDWASHING PRACTICES

1. Briefly tell me what you know about handwashing.....

2. Do you learn about handwashing in school?

a) Yes []

b) No []

3. Have you ever had information about proper handwashing steps?

a) Yes []

b) No []

4. If yes, where did you hear the information? (select all that apply)

a) Parents []

b) Siblings []

c) Teachers []

d) Peers/friends []

e) TV []

f) Books []

g) Other.....

5. If not, why do you think you haven't received information about proper handwashing steps?

a) No one has talked to me about it. []

b) I didn't know it was important. []

- c) I haven't had the opportunity to learn about it. []
- d) "I don't remember hearing about it. []
- e) It hasn't been discussed at school. []
- f) Other.....

SECTION C: KNOWLEDGE OF HANDWASHING PRACTICES

This section assesses knowledge of handwashing. Kindly check the correct answer.

1. Soap must be applied before wetting hands

- a) True []
- b) False []

2. Washing of upper wrist region is important

- a) True []
- b) False []

3. Washing in between the fingers is not important

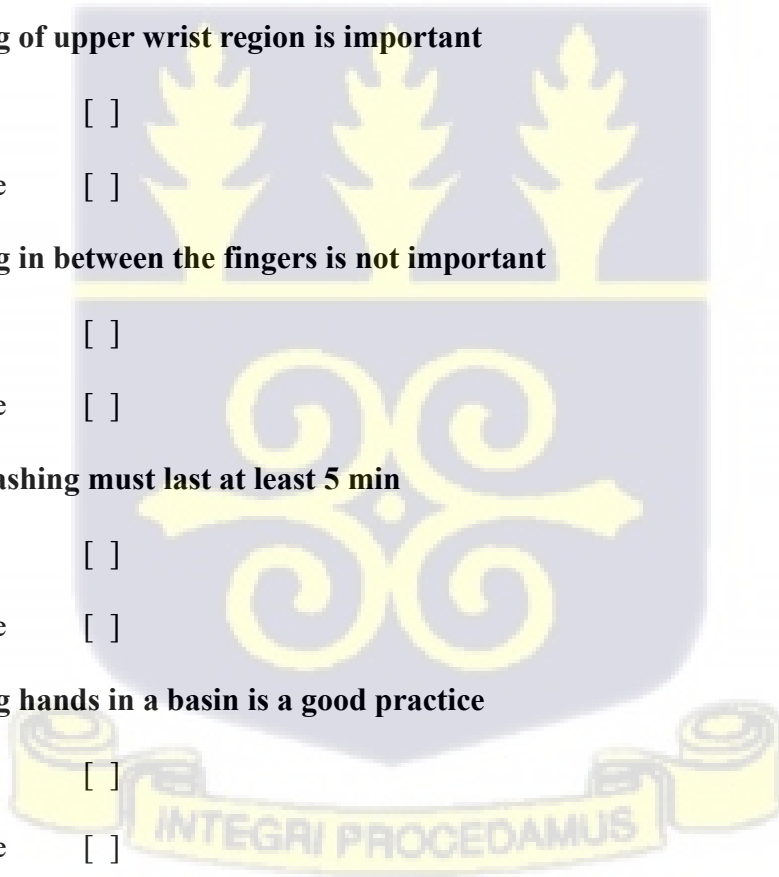
- a) True []
- b) False []

4. Handwashing must last at least 5 min

- a) True []
- b) False []

5. Washing hands in a basin is a good practice

- a) True []
- b) False []



SECTION D: ATTITUDES TOWARDS HANDWASHING

This section assesses the attitudes of participants towards handwashing. On a scale of 1-4, with 1 being the least and 4 being the highest, kindly indicate your level of agreement by ticking.

1. Handwashing is not important

- 1. Strongly disagree []
- 2. Disagree []
- 3. Agree []
- 4. Strongly Agree []

2. Handwashing before meals is important

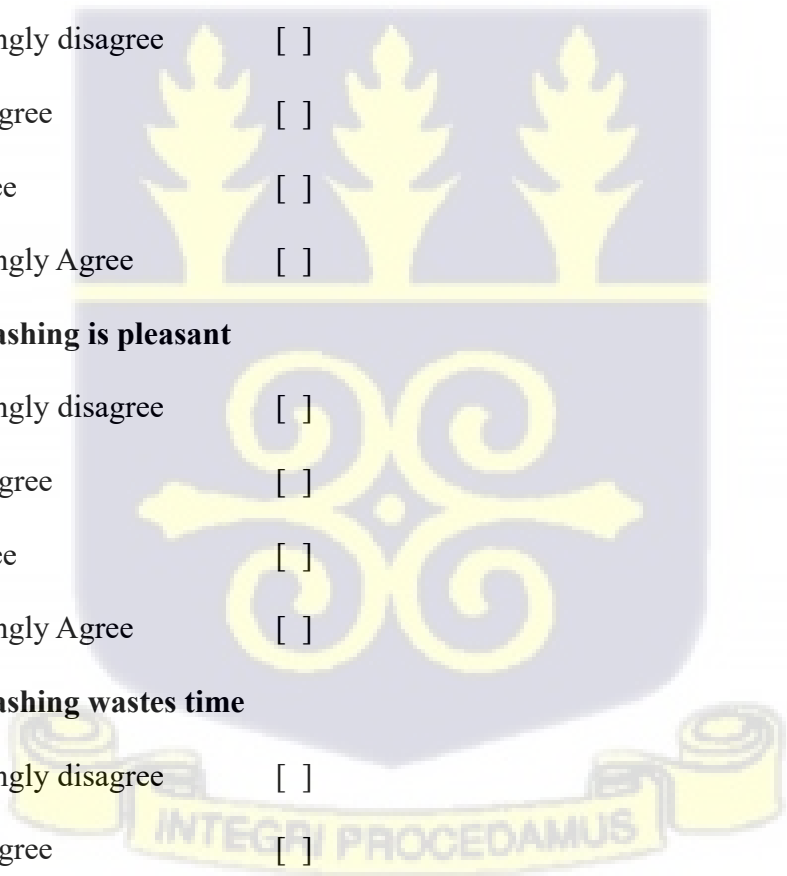
- 1. Strongly disagree []
- 2. Disagree []
- 3. Agree []
- 4. Strongly Agree []

3. Handwashing is pleasant

- 1. Strongly disagree []
- 2. Disagree []
- 3. Agree []
- 4. Strongly Agree []

4. Handwashing wastes time

- 1. Strongly disagree []
- 2. Disagree []
- 3. Agree []
- 4. Strongly Agree []



SECTION E: HANDWASHING PRACTICES

This section assesses handwashing practices. Kindly check the correct answer THAT APPLIES TO YOYOU.

1. Do you wash your hands with water and soap after a toilet visit?

1. No []

2. Yes []

2. Do you wash your hands with water and soap before eating?

1. No []

2. Yes []

3. Do you wash your hands with water and soap after eating?

1. No []

2. Yes []

4. Do you wash your hands with water and soap after touching money?

1. No []

2. Yes []

5. Do you wash your hands with water and soap after playing?

1. No []

2. Yes []

6. Do you wash your hands with water and soap after handling garbage?

1. No []

2. Yes []

SECTION F: HANDWASHING FACILITIES IN THE SCHOOL

1. Do you have pipe-borne running water in the school for handwashing?

1. No []

2. Yes []

2. What kind of handwashing facility do you have in the school?

- 1. None
- 2. Veronica Bucket
- 3. Sink
- 4. Kufour gallon
- 5. Tippy tap
- 6. Other (Specify)_____

3. Do you think the number of handwashing points in your school is enough?

- 1. No
- 2. Yes

4. If not, why do you think there are not enough places to wash your hands?

- 1. There isn't enough room for more places
- 2. The places we have are not cleaned often
- 3. Other, specify.....

5. Is there a washing point closer to your classroom?

- 1. No
- 2. Yes

6. What do you do if you need to wash your hands and there isn't a washing point nearby?

- 1. Walk to the nearest washing point, even if it's far
- 2. Wait until later to wash your hands
- 3. Use hand sanitizer if available
- 4. Sometimes skip washing hands
- 5. Other (Specify)_____

7. Is there always a tissue at the handwashing point to dry hands after washing hands?

- 1. No []
- 2. Yes []

8. What do you do to dry your hands if there is no tissue available?

- 1. Shake your hands to dry them []
- 2. Use your clothes to dry your hands []
- 3. Leave your hands wet []
- 4. Bring your tissue or towel []
- 5. Other specify.....

9. Do you always have soap at the handwashing point?

- 1. No []
- 2. Yes []

10. What do you do if there's no soap available at the handwashing point?

- 1. I use only water to wash my hands. []
- 2. I try to find soap somewhere else. []
- 3. I skip washing my hands. []
- 4. I use hand sanitizer instead. []
- 5. Other specify.....

11. How long do you spend in school on average?

- 1. Less than 4 hours []
- 2. 4-6 hours []
- 3. 6-8 hours []
- 4. More than 8 hours []

SECTION G: FACTORS INFLUENCING HANDWASHING PRACTICES

On a scale of 1-4, kindly indicate your level of agreement or disagreement by ticking in the spaces, Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

	Strongly Agree	Agree	Disagree	Strongly Disagree
Lack of accessibility to sinks or alcohol-based hand rub				
I forgot about washing my hands				
Handwashing harms the skin and leads to irritation				
I do not have time to do handwashing				
Facilities are not in a convenient location to perform handwashing				

Handwashing is not important				
Lack of clean water				

SECTION H: CHALLENGES AND RECOMMENDATIONS

1. Can you please share with me some of the challenges you face in this school?
2. What would you recommend or any suggestion that can be made in the context of these challenges?

Qualitative

Title: Knowledge and Practice of Handwashing Among Primary School Children

In-depth Interview Guide with Peers

IDI Details

01. Interviewer's name: _____

02. Name of school: _____

03. Location of IDI: _____

04. Date of IDI (DD/MM/YYYY): ____ / ____ / ____

05. Start time: _____ End time: _____

06. Notes/Comments:

Demographic Information of IDI Participant

Characteristic	
Class	
Gender	
Age	
Religion	
Legend: <i>Gender:</i> 1=Female, 2=Male; <i>Education:</i> 0= no education; 1= Primary; 2= JHS; 3= SHS; 4= Tertiary; <i>Religion:</i> 0 = No religion; 1= Christianity; 2= Islam; 3= Other religion	

1. What is handwashing, and why is it important?

- Can you tell me what you understand by hand-washing?
- Why do you think it's essential to wash your hands?

2. When should you wash your hands?

- Can you name some situations when you should wash your hands?
- Why is it crucial to wash your hands at these times?

3. Proper handwashing technique:

- How do you wash your hands?
- Can you mention the steps?
- What parts of your hands should you focus on?

4. Common mistakes:

- Do you ever forget to wash your hands?
- What are some of the personal reasons why people might not wash their hands?
- How can we remind ourselves to wash our hands regularly?

5. Role of soap and water:

- Why do we use soap when washing our hands?

- Is it okay to use only water without soap?

6. Encouragement and empowerment:

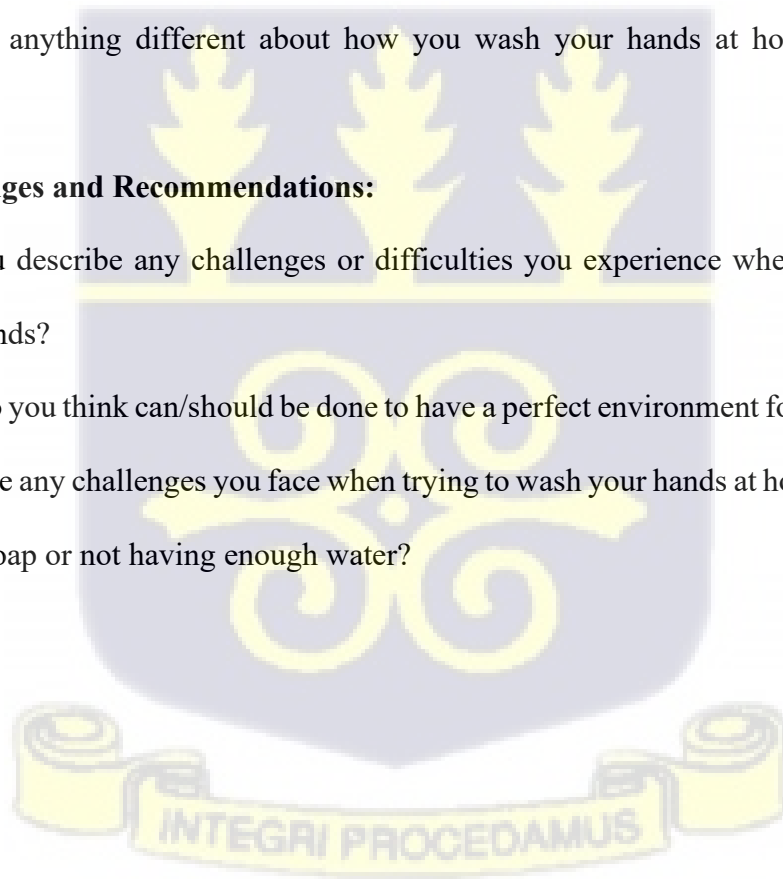
- Why is it essential for you to remind your friends and family to wash their hands?
- How can you encourage others to practice good hand hygiene?

7. Hand-washing practices and challenges at home:

- Can you describe how you usually wash your hands at home?
- How often do you wash your hands at home, especially before eating or after using the toilet?
- Do your family members remind you to wash your hands? If yes how normally does it?
- Is there anything different about how you wash your hands at home compared to school?

8. Challenges and Recommendations:

- Can you describe any challenges or difficulties you experience when trying to wash your hands?
- What do you think can/should be done to have a perfect environment for hand-washing?
- Are there any challenges you face when trying to wash your hands at home, like running out of soap or not having enough water?



Title: Knowledge and Practice of Handwashing Among Primary School Children

In-depth Interview Guide with Teachers

IDI Details

07. Interviewer's name: _____

08. Name of school: _____

09. Location of IDI: _____

10. Date of IDI (DD/MM/YYYY): ____/____/____

11. Start time: _____ End time: _____

12. Notes/Comments:

Demographic Information of IDI Participant

Characteristic	
Gender	
Educational level	
Role of teacher	
Religion	
Legend: <i>Gender:</i> 1=Female, 2=Male; <i>Education:</i> 0= no education; 1= Primary; 2= JHS; 3= SHS; 4= Tertiary; <i>Religion:</i> 0 = No religion; 1= Christianity; 2= Islam; 3= Other religion	

1. School Policies and Education:

- Could you share any school policies or guidelines related to handwashing?

- How do you educate students about the importance of hand hygiene?

2. Observations and Challenges:

- From your observations, how often do students wash their hands during the school day?
- What challenges do you encounter in promoting regular handwashing?

3. Facilities and Supplies:

- Can you describe the handwashing facilities available for students at your school? Are these facilities you described enough for everyone to use?
- Do you provide soap and water or hand sanitizers?
- What steps do you take to make sure these supplies are always available and easy to access?

4. Teaching Techniques:

- How do you teach proper handwashing techniques to students?
- Do you use any creative methods to reinforce this habit?

5. Monitoring and Encouragement:

- Do you monitor students' handwashing behavior?
- How do you encourage students to wash their hands consistently?
- Are there any rewards or incentives for good hand hygiene?

6. Collaboration with Parents:

- How do you involve parents in promoting handwashing at home?
- Do you share information about hand hygiene during parent-teacher meetings?

7. Role Modelling

- As teachers, how do you serve as role models for proper handwashing?

8. Challenges and Recommendation

- Can you describe any challenges or difficulties you experience when trying to wash your hands?
- What do you think can/should be done so as to have a perfect environment for hand-washing?
- Are there any challenges you face when trying to wash your hands at home?

