

ENSIGN GLOBAL UNIVERSITY, KPONG
EASTERN REGION, GHANA

FACULTY OF PUBLIC HEALTH
DEPARTMENT OF COMMUNITY HEALTH

HANDWASHING KNOWLEDGE, PRACTICES, AND ASSOCIATED FACTORS AMONG
SELECTED BASIC SCHOOL CHILDREN AT THE LOWER MANYA KROBO
MUNICIPALITY IN THE EASTERN REGION OF GHANA

BY

EMMANUEL KWASI KPONYO

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MAY, 2026

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A THESIS SUBMITTED TO THE DEPARTMENT OF COMMUNITY HEALTH, FACULTY
OF PUBLIC HEALTH, ENSIGN GLOBAL UNIVERSITY IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE
MASTER OF PUBLIC HEALTH DEGREE

MAY, 2026

DECLARATION

I, Emmanuel Kwasi Kponyo, hereby certify that, except for references to other people's work, which I have duly cited, this project submitted to the Department of Community Health, Ensign Global University, Kpong is the result of my own investigation, and has not been presented for any other degree elsewhere.

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(STUDENT)

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Signature

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Date

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(Supervisor)

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Signature

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Date

(Certified by)

PROF. STEPHEN MANORTEY

(Head of Academic Program)

.....

Sign

DEDICATION

This work is dedicated to God Almighty for His guidance, strength, and grace throughout this academic journey.

I also dedicate this study to my late wife, who encouraged me to take up the MPH programme but died one month after a successful interview leading to my admission into the Ensonian fraternity, February 2025 COHORT, even though she knew I do not have a background in health, and also my family for their unwavering support, encouragement, and sacrifices, which have made this achievement possible.

Finally, this work is dedicated to all school children, whose health and well-being inspired this study, with the hope that the findings will contribute to improving hygiene practices and promoting better health outcomes.

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My heartfelt thanks also go to the management and staff of the selected schools within the district for granting the team the permission and also the support during data collection. I am especially grateful to all the pupils who willingly participated in this study.

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LIST OF ABBREVIATIONS

Abbreviation	Full Meaning
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
UNICEF	United Nations Children's Fund
JMP	Joint Monitoring Programme
GES	Ghana Education Service
SHEP	School Health Education Programme
LMICs	Low- and Middle-Income Countries
SDGs	Sustainable Development Goals
SEM	Social Ecological Model
DHS	Demographic and Health Surveys
MICS	Multiple Indicator Cluster Surveys
GSHS	Global School-based Student Health Survey
CHPS	Community-based Health Planning and Services
IRB	Institutional Review Board
STATA	Statistical Software for Data Analysis
JHS	Junior High School

ABSTRACT

Background: Hand hygiene is a fundamental public health intervention for preventing communicable diseases, particularly among school-aged children. This study aimed to evaluate the knowledge, practices, and enabling conditions related to handwashing among basic school children at the Lower Manya Krobo Municipality in the Eastern Region of Ghana.

Methods: A quantitative cross-sectional study design was employed among 390 pupils selected from three basic schools using a multistage sampling technique. Data was collected using a structured questionnaire administered through KoboCollect. Descriptive statistics were used to summarize variables, while chi-square tests and logistic regression analyses were conducted to assess associations and predictors of handwashing practices at a 5% level of significance.

Results: The study found that 90.3% of respondents had good knowledge of handwashing, while 57.8% demonstrated good handwashing practices, showing a substantial knowledge-behaviour gap. A majority of pupils reported washing their hands at critical moments such as before eating and after toilet use; however consistent use of soap was lower.

Majority of respondents reported access to handwashing stations, however, availability of soap and water was not always consistent. Class level, availability of soap and water, and the presence of hygiene posters were significantly associated with handwashing practices ($p < 0.05$), while on the other hand; sex, school location, and knowledge level were not. Behavioral factors including forgetfulness, were also identified as barriers to proper hand hygiene.

Conclusion: In conclusion, although basic school children in the Lower Manya Krobo Municipality demonstrate high levels of handwashing knowledge, this does not consistently

translate into proper handwashing practices, highlighting a significant Knowledge-behaviour gap. The study establishes that enabling conditions, particularly consistent availability of water and soap, along with hygiene promotion tools such as posters, play a more critical role in influencing handwashing behaviour than knowledge alone. Addressing both behavioral and infrastructural barriers through strengthened school-based WASH interventions, improves child health outcomes in the municipality.

TABLE OF CONTENTS

DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF ABBREVIATIONS.....	v
ABSTRACT	vi
LIST OF TABLES	xi
LIST OF FIGURES	xii
CHAPTER ONE	1
1.0 INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Rationale	5
1.4 Conceptual Framework.....	6
1.5 Research Questions.....	8
1.6 General Objective.....	9
1.7 Specific Objectives	9
1.8 Profile of the Study Area: Lower Manya Krobo Municipality	9
1.9 Scope of the study.....	10
1.10 Organization of the Study	11
CHAPTER TWO	13
2.0 LITERATURE REVIEW	13
2.1 Introduction	13
2.2 Handwashing Knowledge Among Basic School Children	13
2.3 Handwashing Practices Among Basic School Children	16
2.4 Availability and Accessibility of Handwashing Facilities in Basic Schools	18
2.5 Interrelationship Between Handwashing Knowledge, Practices, and Enabling Conditions	21
2.6 Summary of the Literature Review	24
CHAPTER THREE	26
3.0 METHODOLOGY	26
3.1 Introduction	26

3.2 Study Design.....	26
3.3 Study Site	27
3.4 Study Population	27
3.5 Inclusion Criteria	27
3.6 Exclusion Criteria.....	28
3.7 Sample Size	28
3.8 Sampling Procedure	29
3.9 Data Collection Methods and Instruments	30
3.10 Pre-testing	31
3.11 Data Handling.....	31
3.12 Statistical Analysis	31
3.13 Ethical Considerations.....	32
CHAPTER FOUR	34
4.0 RESULTS	34
4.1 Introduction	34
4.2 Socio-Demographic Characteristics of Participants	34
4.3 Level of Knowledge About Proper Handwashing Techniques and Its Health Benefits	36
4.4 Overall Knowledge	39
4.5 Handwashing Practices Among Basic School Children	39
4.6 Factors, including enabling conditions, associated with handwashing practices	43
4.6.1 Bivariate Associations Between Study Variables and Handwashing Practice.....	43
4.7 Logistic Regression Assumption Checks.....	46
4.7.1 Multicollinearity Assessment.....	46
4.7.2 Additional Assumption Checks	48
4.8 Hierarchical Binary Logistic Regression: Predictors of Good Handwashing Practice.....	48
4.9 Null Model.....	49
4.10 Summary of Hierarchical Regression Findings	51
4.11 Chapter Summary	55
CHAPTER FIVE	56

5.0 DISCUSSION.....	56
5.1 Introduction	56
5.2 Handwashing Knowledge.....	56
5.3 Handwashing Practices and the Knowledge-Behaviour Gap.....	57
5.4 Enabling Conditions: Infrastructure, Posters, and Teacher Guidance	58
5.5 Hierarchical Regression: Theoretical and Practical Implications.....	60
5.6 Comparison with Existing Literature	61
5.7 Limitations.....	62
5.8 Practical Implications	62
5.9 Chapter Summary	63
CHAPTER SIX.....	64
6.0 CONCLUSION	64
6.1 Introduction	64
6.2 Restatement of Study Purpose	64
6.3 Summary of Key Finding	64
6.4 Conclusions	66
6.5 Recommendations	67
6.6 Directions for Future Research	68
REFERENCES	70
APPENDICES	74
Appendix 1: Assent and Questionnaire.....	74
Appendix 2: Approval form Ghana Education Service	82
Appendix 3: Ethical clearance	83
Appendix 4: Turnitin and Plagiarism Result	84

LIST OF TABLES

Table 4.1 Socio-Demographic Characteristics of Participants (N = 390).....	35
Table 4.2 Level of Knowledge About Proper Handwashing Techniques and Its Health Benefits	38
Table 4.3 Handwashing Practices Among Basic School Children	41
Table 4.4 Handwashing Knowledge and Practice Level Classifications	42
Table 4.5 Chi-Square Tests of Association Between Study Variables and Handwashing Practice Level	45
Table 4.6 Collinearity Diagnostics for Logistic Regression Predictor Variables.....	47
Table 4.7 Hierarchical Binary Logistic Regression: Predictors of Good Handwashing Practice (N = 351).....	52

LIST OF FIGURES

Figure 4.1 Distribution of handwashing knowledge levels among pupils.....	42
Figure 4.2 Distribution of handwashing practice levels among pupils.....	43

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Hand hygiene, particularly handwashing with soap, is universally recognized as one of the most cost-effective public health interventions for preventing communicable diseases, especially among children. According to the World Health Organization, regular handwashing with soap can reduce the incidence of diarrheal diseases by up to 30% and respiratory infections by up to 20% (WHO, 2021a). Despite this well-established benefit, hand hygiene remains a neglected practice in many parts of the world, particularly in low- and middle-income countries (LMICs), where children are usually affected by poor hygiene-related outcomes due to limited water, sanitation, and hygiene (WASH) infrastructure (White *et al.*, 2020).

Globally, hygiene-related illnesses are among the leading causes of morbidity and mortality among children under the age of 15. Diarrhea and respiratory infections remain among the top ten causes of death in this age group. School-aged children are especially vulnerable due to their frequent contact with one another and shared resources in school environments. Inadequate handwashing can increase the transmission of enteric and respiratory pathogens, contributing to high rates of school absenteeism, impaired cognitive development, and reduced academic performance (Rabie and Curtis, 2016). This makes promoting hand hygiene in schools an important health imperative.

Evidence from Sub-Saharan Africa highlights a significant gap between knowledge and practice of proper hand hygiene among school children. In Nigeria, a study conducted among public primary school pupils in Imo State found that while the majority of students demonstrated awareness of handwashing benefits, only a minority practiced it consistently with soap at critical

times, such as after toilet use and before eating, primarily due to inadequate facilities and lack of hygiene resources (Nwajiuba *et al.*, 2019). Similarly, in Ethiopia, a cross-sectional study among schoolchildren in Yirgalem Town revealed that although 89% of students knew that handwashing with soap is essential, only 39.1% engaged in appropriate handwashing practices during key moments like after defecation and before meals (Eshetu, Kifle and Hirigo, 2020). This reveals the influence of contextual factors such as access to water, soap availability, and supportive school policies.

In Ghana, the government has initiated several interventions through the School Health Education Programme (SHEP), which integrates WASH education into school curricula to instill hygiene-promoting behaviors in pupils (GES, 2025). Nonetheless, consistent challenges persist. A study conducted in Ejusu-Juaben municipality in Ghanaian, found that only 16 % of schools had a functional handwashing station, despite 68 % having soap present and merely 16 % having a reliable water point on site (Appiah-Brempong *et al.*, 2018). Another investigation in Wa Municipality revealed that just 43.5 % of basic schools used Veronica buckets with both water and soap, and only 25.5 % utilized Tippy taps, suggesting that a significant number of schools still lacked complete hand hygiene setups (Ismaila *et al.*, 2023).

Handwashing practices are influenced by social, behavioral, and environmental factors. Studies show that children are more likely to engage in regular handwashing if they see peers or teachers doing so, if facilities are conveniently located, and if there are visual reminders such as posters (Lewis *et al.*, 2018). Behavior change communication strategies, such as interactive demonstrations and school-based competitions, have been shown to enhance both knowledge and compliance among pupils (Seimetz *et al.*, 2017). However, the effectiveness of such strategies

depends heavily on the availability of necessary infrastructure and sustained stakeholder commitment.

The Lower Manya Krobo District, located in the Eastern Region of Ghana, faces challenges common to many LMICs, limited WASH infrastructure, intermittent water supply, and insufficient sanitation facilities in schools. The district records seasonal outbreaks of waterborne diseases such as cholera and typhoid, particularly among school-age populations. Anecdotal reports from district health officers and teachers also suggest a low level of compliance with handwashing practices among basic school pupils. Yet, there is a lack of empirical data on the extent of these challenges, particularly in relation to knowledge levels, behavioral patterns, and infrastructural limitations. While hand hygiene remains a simple yet powerful tool for preventing disease, its practice among children, particularly in resource-constrained settings like the Lower Manya Krobo District, is influenced by a complex interplay of knowledge, behavior, and infrastructure. By exploring these dimensions, this study seeks to provide evidence that can drive improvements in child health, educational outcomes, and public health policy.

1.2 Problem Statement

Globally, school-aged children continue to suffer preventable illnesses due to poor hand hygiene, reflecting both behavioral and infrastructural deficits. According to a global review by UNICEF, (2020), only 57% of schools had access to basic handwashing facilities with soap and water in 2020, leaving approximately 818 million children at heightened risk of infectious disease transmission.

Ghana is no exception to these challenges. In the Greater Accra Region, a study by Fianko and Gawu, (2020) reported that 75% of schools had handwashing stands, but only 60% were

functional. About 72% of pupils understood the importance of hand hygiene, and 68.2% acknowledged they should wash after defecation; yet only 17.5% actually did so, and 51% washed hands before meals. In the Ashanti Region, Richard, Paul and Ebenezer, (2023) found that while 76.8% of students washed with soap and water after toilet use, 42.1% cited inadequate handwashing materials and 37.1% mentioned forgetfulness as barriers. These studies illustrate a clear gap between hand hygiene knowledge and actual practices.

In the Lower Manya Krobo Municipality specifically, no known empirical study has comprehensively assessed the handwashing knowledge and practices of basic school pupils, despite recurring outbreaks of hygiene-related illnesses such as typhoid and skin infections reported by the municipal health directorate. According to the municipal health directorate, 5,876 cases of typhoid fever were recorded between January and December 2025 (GNA, 2026). Circumstantial reports suggest that many schools lack consistent access to clean water and soap, and that hygiene education is inconsistently implemented. Given this context, a systematic examination of the current state of hand hygiene knowledge, practice, and enabling environments in basic schools is urgently needed.

Despite existing evidence on handwashing and practices in Ghana, there is limited district and or municipal level data examining the interactions between knowledge, behaviour, and enabling conditions among basic school children in the Lower Manya Krobo Municipality.

This study aims to fill that gap, generating localized data that will inform interventions that aligned with Ghana's WASH in Schools strategy and the Sustainable Development Goals (SDG 6). Without such evidence, efforts to promote child health and school attendance in the Municipality risk remaining fragmented and ineffective.

1.3 Rationale

Hand hygiene is a cornerstone of infectious disease prevention, particularly in school-aged populations who are highly vulnerable to communicable illnesses such as diarrheal and respiratory infections (WHO, 2021). While global efforts have been made to integrate hygiene education into schools, significant gaps persist in the practice and promotion of handwashing in low- and middle-income countries (LMICs), including Ghana. According to Wichaidit *et al.*, (2019) despite decades of advocacy, many children continue to fall ill due to preventable hygiene-related conditions, compromising their health, school attendance, and overall development.

In the Ghanaian context, numerous studies have reported substantial discrepancies between children's awareness of handwashing benefits and their actual practice of the behavior (Richard, Paul and Ebenezer, 2023; Duah, 2024). While government programs such as the School Health Education Programme (SHEP) have sought to incorporate WASH principles into the educational curriculum, challenges such as infrastructural inadequacy, irregular supply of water and soap, and behavioral neglect continue to hinder progress (Wichaidit *et al.*, 2019).

While district-level reports have acknowledged frequent hygiene-related illnesses among schoolchildren, there is a lack of rigorous empirical data on the scope and determinants of handwashing behavior in basic schools. This study responds to this call by investigating not only handwashing knowledge and practices but also the environmental and behavioral factors that mediate them in the Lower Manya Krobo Municipality.

This research will contribute to existing literature by providing district-level data that can inform local policy implementation. The findings can support national WASH and SHEP frameworks, guide resource allocation, and potentially serve as a model for similar Municipalities facing

hygiene-related challenges. In addition, the study aligns with national and global development goals, including Sustainable Development Goal 6, which emphasizes access to adequate water and sanitation for all, and Goal 3, which seeks to ensure healthy lives and promote well-being for all ages (UN, 2025).

1.4 Conceptual Framework

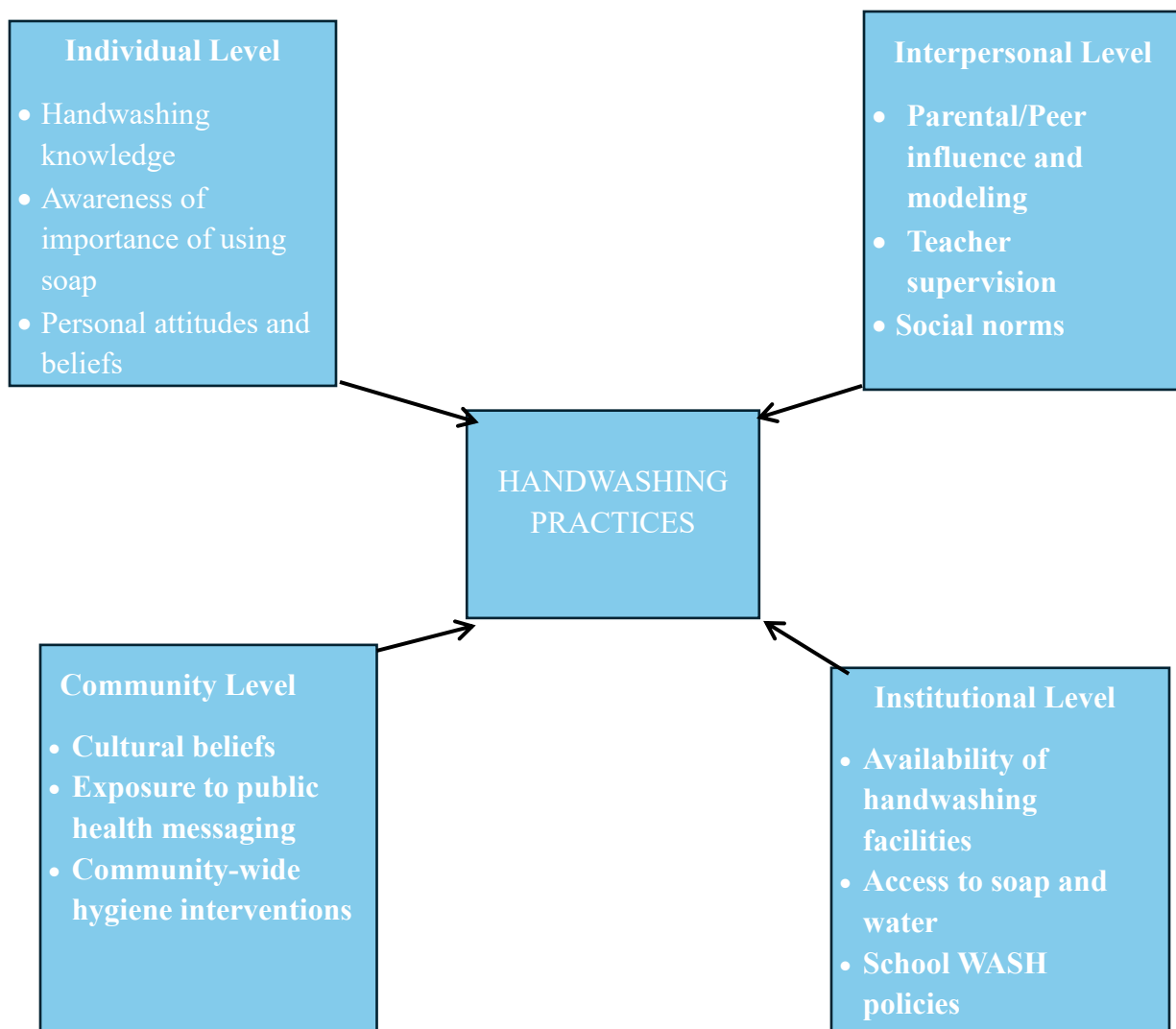


Figure 1 Conceptual Framework

Source: Author's Construct

This study is anchored in the Social Ecological Model (SEM), a comprehensive public health framework that conceptualizes behavior as being influenced by multiple layers of interacting factors: individual, interpersonal, institutional, community, and policy levels. The SEM is particularly suited for analyzing complex behaviors like handwashing, as it moves beyond individual-level determinants to consider how environmental and social systems influence personal health practices. Among school-aged children, this model allows for analysis of how knowledge, social relationships, and school infrastructure collectively shape hand hygiene behavior.

At the individual level, the SEM recognizes the role of personal knowledge, beliefs, and attitudes in shaping health behaviors. In this study, handwashing knowledge constitutes the core individual factor and refers to the pupil's understanding of when and why handwashing is necessary, the importance of using soap, and awareness of disease transmission. Research indicates that while knowledge alone may not always result in consistent handwashing behavior, it forms the foundational step toward behavioral adoption (Zhang *et al.*, 2021).

The interpersonal level of the SEM emphasizes the influence of social networks, including peers, teachers, and family members, on health behavior. In school environments, hand hygiene behavior is often shaped by social modeling, peer norms, and adult supervision.

At the institutional level, schools serve as a pivotal setting for promoting or hindering hand hygiene behavior. Factors such as the presence of functional handwashing facilities, availability of soap and water, hygiene promotion programs, and WASH-friendly policies significantly impact practice. The WHO/UNICEF (2021) reported that in sub-Saharan Africa, nearly 50% of schools lack access to basic handwashing facilities. These structural limitations often prevent even knowledgeable and motivated pupils from practicing regular handwashing.

The community level of the SEM recognizes broader cultural and environmental factors that influence handwashing practices. In many communities, hygiene behaviors are shaped by collective norms, traditional beliefs, and community-wide interventions. In Ghana, Aryeetey *et al* (2019) found that children in urban areas with frequent exposure to public health messaging and social marketing campaigns had significantly better handwashing practices compared to those in peri-urban or rural areas. This suggests that school-based hygiene behavior is not isolated from community influences, and broader social norms must be considered in program design.

This conceptual framework underscores that handwashing behavior is the result of an interplay between individual knowledge, interpersonal support, institutional provisions, and community norms. Each layer of the model aligns with a specific study objective: the individual level focuses on personal knowledge, attitudes, skills regarding handwashing (Objective 1) which seeks to evaluate pupils' knowledge. The interpersonal levels deal with peer, and teacher relationships and the influence on actual handwashing behavior. This relates to (Objective 2) which assesses how interactions among these groups affects how frequent pupils practice handwashing. For institutional level, infrastructure that supports hygiene practices is critical and this relates to (objective 3) which identifies the availability and accessibility of hand handwashing facilities.

1.5 Research Questions

1. What do basic school children know about proper handwashing techniques and its associated health benefits?
2. How frequently do basic school children wash their hands, and under what circumstances?
3. What is the availability and accessibility of handwashing facilities and supplies at selected public basic schools across the municipality?

1.6 General Objective

To evaluate the knowledge, practices, and enabling conditions related to handwashing among basic school children in the Lower Manya Krobo District Municipality.

1.7 Specific Objectives

1. To evaluate the level of knowledge among basic school children regarding proper handwashing techniques and their health benefits.
2. To assess the frequency and conditions under which basic school children practice handwashing.
3. To identify factors, including enabling conditions, associated with handwashing practices among basic school children.

1.8 Profile of the Study Area: Lower Manya Krobo Municipality

The Lower Manya Krobo Municipality is one of the thirty-three (33) Municipalities and Districts in the Eastern Region of Ghana. It lies between latitude 6.05°S and 6.30°N and longitude 0.08°E and 0.20°W, covering an area of approximately 316 square kilometers, which constitutes about 8.1% of the total land area of the Eastern Region (18,310 km²). The administrative capital of the municipality is Odumase, which incorporates towns such as Atua, Agormanya, and Nuaso. Other significant towns include Akuse and Kpong GSS 2021.

According to the 2021 Population and Housing Census conducted by the Ghana Statistical Service, the Lower Manya Krobo Municipality has a total population of 121,478, comprising 56,662 males and 64,816 females. The age distribution indicates that 36,807 individuals are within the 0–14

years age group, representing approximately 30.3% of the total population, which underscores a significant proportion of school-aged children.

The municipality exhibits a predominantly urban character, with 91,503 individuals (approximately 75.3%) residing in urban areas, while 29,975 individuals (24.7%) live in rural settings. With a literacy rate of approximately 79.9%, the ethnic composition of the municipality is diverse, with the Ga-Dangme ethnic group being the majority, numbering 87,608 individuals. Other significant ethnic groups include the Ewe (21,092), Akan (7,378), and smaller populations of Guan, Gurma, Mole-Dagbani, Grusi, Mandé, and other ethnicities.

The municipality's health infrastructure comprises 45 health facilities, including 16 primary health facilities such as hospitals, health centers, clinics, and Community-Based Health Planning and Services (CHPS) compounds (Berete *et al.*, 2024). While specific statistics on educational institutions within the municipality are limited in the provided sources, the significant proportion of the population within the school-going age bracket (0–14 years) suggests the presence of numerous basic schools.

The Lower Manya Krobo Municipality is ideal setting for studying handwashing knowledge and practices among basic school children due to its substantial population of school-aged children, diverse ethnic composition, and varying levels of access to health and educational facilities.

1.9 Scope of the study

The study was conducted in the Lower Manya Krobo Municipality in the Eastern of Ghana, a municipality dominated by a high proportion of school-going children and varying access to health and educational facilities most of which are public institutions. According to Ghana Statistical Service (2021), 2021 Population and Housing Census: General Report (Volume 3B), Lower Manya

Krobo Municipality has 36,807 (30.3%) of the population aged 0-14 years reflecting a high school going age population. The scope of the study captures this group and addresses three main areas: the level of knowledge of pupils regarding proper handwashing practices; the frequency and conditions under which pupils practice handwashing; and the availability and accessibility of handwashing facilities and suppliers. The research was conducted among three selected basic public schools in the municipality. As a result, findings may not be generalized to all children in the municipality

1.10 Organization of the Study

The study is structured systematically and presented in six chapters.

Chapter one: Introduction- this chapter presents the background of the study, highlighting the importance of hand hygiene particularly doing so with soap as a way of preventing diseases and promoting good health through practical hygiene practices. It also highlights the problem statement, rationale of the study, conceptual framework that underpinned the study, research questions set out to help inform findings, objectives, and profile of the study area.

Chapter two: literature review- this chapter provides relevant evidence of literatures important to help guide the study. It provides theoretical, and empirical evidence available to support the basis for continuous study into knowledge, practice and availability of hand hygiene facilities within the Lower Manya Krobo Municipality.

Chapter three: methodology- this chapter describes the adopted methodology, the process by which data was collected as well the scientific evaluation of data for structure and reliable outcomes. It describes the multistate sampling approaches used, data collection instruments and methods of analyses.

Chapter four: Results- This chapter describes the outcome of the study based on data collected. It includes analysis in terms of various demographic characteristics. It also presents the level of knowledge about proper handwashing techniques and practices.

Chapter five: Discussion- This chapter presents and discusses the findings of the study in terms of knowledge, practice, availability. It also presents literature review of existing literature necessary to draw conclusion.

Chapter six: Conclusion- This chapter summarizes the study's findings. It provides a number of recommendations for various institutions such the Ghana Education Service, Ghana Health Service through the municipal Directorate as well as recommendation for future research.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter presents a critical review of existing literature relevant to handwashing knowledge, practices, and enabling conditions among basic school children. The purpose of the literature review is to situate the present study within the broader body of empirical evidence, identify what is already known, and highlight gaps that justify the current investigation in the Lower Manya Krobo Municipality. Consistent with the study objectives, the review is organized thematically around handwashing knowledge, handwashing practices, and the availability and accessibility of handwashing facilities in school settings.

2.2 Handwashing Knowledge Among Basic School Children

Handwashing knowledge among basic school children refers to pupils' understanding of the importance of hand hygiene, the appropriate times at which hands should be washed, the role of soap in effective cleansing, and the health benefits associated with proper handwashing. Knowledge is widely regarded as a foundational determinant of hygiene behaviour because it shapes risk perception and awareness of disease transmission pathways, even though it does not on its own guarantee sustained behavioural practice (White *et al.*, 2020). In school settings, handwashing knowledge is commonly acquired through formal classroom instruction, school health programmes, teacher demonstrations, peer learning, and broader public health messaging.

At the global level, evidence suggests that awareness of handwashing as a preventive health measure is relatively widespread among school-aged children. Analyses drawing on Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) across multiple low-

and middle-income countries indicate that a large proportion of children are aware that hands should be washed after toilet use and before eating (Kumar *et al*, 2017). Similarly, data from the Global School-based Student Health Survey (GSHS) show that adolescents in many countries report knowing that handwashing before eating and after using the toilet is important for maintaining health (Jatrana *et al.*, 2021). However, these global assessments also highlight that awareness tends to be general rather than detailed, with important gaps in knowledge about correct handwashing technique and consistent use of soap.

Further synthesis of international evidence demonstrates that while children may recognize the importance of handwashing in principle, fewer possess comprehensive knowledge of effective handwashing practices. Systematic reviews of hand hygiene behaviour have shown that knowledge related to the mechanics of handwashing, such as the need for soap and adequate rubbing time, is often weaker than knowledge of handwashing at critical moments (White *et al.*, 2020). This distinction is important, as incomplete or superficial knowledge may limit the effectiveness of hygiene promotion efforts, particularly in environments where children must independently decide whether and how to wash their hands.

In sub-Saharan Africa, studies consistently report a similar pattern of moderate to high awareness accompanied by gaps in depth and accuracy of knowledge. Research conducted among primary school children in Ethiopia found that although most pupils knew that handwashing could prevent disease, fewer demonstrated accurate knowledge of proper handwashing procedures or identified multiple critical moments beyond toilet use (Eshetu, Kifle and Hirigo, 2020). Comparable findings have been reported in Nigeria, where school-based studies show that pupils often understand the general health benefits of handwashing but are less certain about the necessity of soap or the consistency with which it should be used (Nwajiuba *et al.*, 2019). These findings suggest that

hygiene education in many African school contexts may prioritize awareness messages without sufficiently reinforcing procedural knowledge.

Evidence from intervention and observational studies in the region further indicates that school context plays a significant role in shaping knowledge acquisition. Schools that are exposed to structured hygiene promotion activities, including teacher-led demonstrations and repeated messaging, tend to report higher levels of accurate handwashing knowledge than schools without such exposure (Seimetz *et al.*, 2017). Nevertheless, even in these settings, knowledge gaps persist, particularly where educational activities are irregular or not reinforced by a supportive physical environment.

In Ghana, empirical studies on handwashing knowledge among basic school pupils reflect many of these broader regional trends. Research conducted in public basic schools in the Greater Accra Region found that a majority of pupils were aware that handwashing helps prevent illness and could correctly identify key moments such as after defecation (Fianko and Gawu, 2020). However, the same study reported notable gaps in knowledge related to consistent soap use and comprehensive handwashing technique. Similarly, an assessment of school hygiene conditions and practices in Ghana indicated that while pupils are frequently exposed to hand hygiene messages through the School Health Education Programme (SHEP), this exposure does not always translate into thorough or practically applicable knowledge (Appiah-Brempong *et al.*, 2018).

Additional evidence from Ghanaian school settings supports the observation that knowledge is often uneven across schools and regions. Studies conducted in the Kintampo area reported that although pupils demonstrated general awareness of handwashing as a health-promoting behaviour, detailed knowledge of correct technique and the importance of soap use remained limited, particularly in schools with inadequate WASH facilities (Dajaan *et al.*, 2018). This suggests that

the school environment may influence not only practice but also the depth of knowledge that pupils acquire and retain.

The literature indicates that handwashing knowledge among basic school children is generally moderate, with relatively high awareness of the importance of hand hygiene but persistent gaps in detailed and actionable understanding. Global and regional studies show that knowing when to wash hands does not necessarily equate to knowing how to wash hands effectively, especially with soap. Addressing this gap is essential for informing context-specific hygiene education interventions that strengthen not only awareness but also practical understanding of effective handwashing.

2.3 Handwashing Practices Among Basic School Children

Handwashing practice refers to the actual performance of hand hygiene behaviours by individuals, including the frequency of handwashing, the situations in which hands are washed, and the use of soap and water during the process. Among school children, handwashing practice is influenced not only by individual awareness but also by habit formation, supervision, social norms, and the availability of supportive facilities. While knowledge provides a foundation, empirical evidence consistently shows that practice is shaped by a broader interaction of behavioural and environmental factors, making it a critical focus of public health research in school settings (White *et al.*, 2020).

Globally, studies indicate that reported handwashing practices among school-aged children are often lower than recommended standards, particularly in low- and middle-income countries. Multi-country analyses using DHS and MICS data suggest that although many children report washing their hands at key times, consistent handwashing with soap is far less common, especially in

settings with limited access to basic WASH infrastructure (Kumar *et al.*, 2017). Evidence from the Global School-based Student Health Survey similarly shows substantial variation in self-reported handwashing practices among adolescents, with lower compliance observed in regions facing infrastructural and resource constraints (Jatrana *et al.*, 2021). These findings highlight a persistent gap between awareness and actual behaviour at the global level.

In sub-Saharan Africa, handwashing practices among school children are frequently reported as suboptimal, even where awareness is relatively high. Studies conducted in Ethiopia have shown that although many pupils report washing their hands after toilet use, fewer do so consistently before eating or after other critical exposures, and soap use remains irregular (Eshetu, Kifle and Hirigo, 2020). Similar patterns have been documented in Nigeria, where observational and self-reported data reveal that handwashing is often performed with water alone, particularly in schools where soap is unavailable or rationed (Nwajiuba *et al.*, 2019). These findings suggest that structural and contextual barriers play a significant role in shaping practice.

Empirical evidence also points to the influence of social and institutional factors on handwashing behaviour in African school settings. Research examining behavioural determinants has shown that teacher supervision, peer influence, and routine enforcement of hygiene rules significantly affect whether children wash their hands at recommended times (Seimetz *et al.*, 2017). In schools where handwashing is actively monitored and reinforced, pupils are more likely to develop habitual practices, whereas in the absence of supervision, handwashing tends to be inconsistent and easily neglected.

In Ghana, several studies have documented similar discrepancies between knowledge and practice among basic school pupils. Research conducted in public schools in the Greater Accra Region found that while a majority of pupils reported washing their hands after toilet use, consistent

handwashing before meals and regular use of soap were considerably lower (Fianko and Gawu, 2020). Observational components of the study further revealed that self-reported practices often overestimated actual behaviour, underscoring the importance of contextual and environmental influences.

District-level studies in Ghana reinforce these findings. In the Kintampo area, Dajaan *et al.* (2018) reported that although pupils demonstrated moderate knowledge of hand hygiene, actual handwashing practices were constrained by limited access to soap and functional handwashing stations. Pupils in schools with better WASH facilities were more likely to practice handwashing consistently, suggesting a close interaction between behaviour and the school environment. Appiah-Brempong *et al.*, (2018) similarly observed that inadequate maintenance of handwashing facilities in Ghanaian basic schools undermined regular practice, even where pupils had been exposed to hygiene education through the School Health Education Programme.

Handwashing practices among basic school children are shaped by a complex interaction of knowledge, supervision, social norms, and environmental conditions. Across global, regional, and national contexts, evidence consistently points to a gap between what children know and what they do in practice. In Ghana, little is known about the specific patterns of handwashing practice among pupils in peri-urban settings. Addressing this gap is essential for informing targeted school-based interventions that promote sustained and effective hand hygiene behaviour.

2.4 Availability and Accessibility of Handwashing Facilities in Basic Schools

The availability and accessibility of handwashing facilities constitute a critical enabling condition for effective hand hygiene among school children. In school settings, availability refers to the presence of functional handwashing infrastructure, including a designated handwashing station

with water and soap, while accessibility relates to the ease with which pupils can use these facilities at appropriate times without physical, social, or institutional barriers. Empirical evidence consistently demonstrates that even when children possess adequate knowledge of hand hygiene, the absence or poor functionality of facilities substantially constrains their ability to translate knowledge into consistent practice (White *et al.*, 2020).

Globally, access to basic handwashing facilities in schools remains uneven, particularly in low- and middle-income countries. According to the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP), a basic handwashing facility in schools is defined as a facility with water and soap available at the time of survey. The 2022 JMP global progress report indicates that while access to drinking water in schools has improved over time, access to handwashing facilities with soap lags significantly behind, with large proportions of schools worldwide lacking soap even where water is present (WHO/UNICEF JMP, 2022). This global evidence underscores that infrastructure gaps persist as a major barrier to school-based hygiene promotion.

Analyses drawing on DHS and MICS data further highlight disparities in the enabling environment for handwashing. Kumar *et al.*, (2017) showed that the presence of a handwashing location with both water and soap is far from universal across countries, and that soap availability is the most frequently missing component. Although these datasets rely on proxy indicators rather than direct observation of behaviour, they provide strong evidence that many children attend schools where the physical conditions necessary for effective handwashing are absent or inconsistent.

In sub-Saharan Africa, the challenge of inadequate handwashing facilities in schools is particularly pronounced. Regional JMP estimates indicate that a substantial proportion of schools in the region lack basic handwashing facilities, with deficits more severe in rural and peri-urban areas

(WHO/UNICEF JMP, 2022). Empirical studies from African countries consistently report that handwashing stations, where present, are often non-functional due to broken infrastructure, lack of water supply, or absence of soap. For example, school-based studies in Ethiopia have documented situations where handwashing points exist but are rarely stocked with soap, limiting their practical utility for pupils (Eshetu, Kifle and Hirigo, 2020). Similarly, Nwajiuba *et al.*, (2019) reported findings in Nigeria, where the availability of soap is frequently dependent on irregular contributions from teachers or pupils rather than systematic provision by school authorities

Beyond physical presence, accessibility also emerges as a key concern in the African context. Studies indicate that handwashing facilities are often located far from classrooms or latrines, reducing the likelihood of use at critical moments such as after toilet use or before eating (Seimetz *et al.*, 2017). In some cases, access is further constrained by overcrowding, limited supervision, or informal restrictions placed on facility use to conserve water or soap. These contextual barriers highlight that the mere existence of infrastructure does not guarantee effective access or utilization.

In Ghana, evidence suggests that while handwashing facilities are present in many basic schools, their availability and functionality vary widely across regions and districts. National assessments and school-level studies indicate that common handwashing facilities include Veronica buckets, tippy taps, and, less frequently, piped sinks. However, several studies have documented that these facilities are often inadequately maintained or inconsistently supplied with soap and water. Research conducted in public basic schools in the Greater Accra Region found that although most schools had some form of handwashing station, soap was frequently unavailable, and water supply was unreliable, particularly during dry seasons (Fianko and Gawu, 2020).

District-level studies reinforce these findings. In the Kintampo area, Dajaan *et al.*, (2018) reported that the absence of soap and limited functionality of handwashing stations significantly

undermined pupils' ability to practice proper hand hygiene, even when facilities were nominally present. Appiah-Brempong *et al.*, (2018) similarly observed that inadequate maintenance and weak institutional responsibility for school WASH facilities in Ghana reduced their effectiveness as enabling environments for hygiene behaviour. These studies suggest that infrastructural provision alone is insufficient without sustained maintenance, clear management roles, and consistent supply of consumables.

Institutional and management factors also play a critical role in shaping the availability and accessibility of handwashing facilities in Ghanaian schools. Evidence indicates that responsibility for maintaining facilities often falls between multiple actors, including school management committees, district education offices, and parent–teacher associations, leading to gaps in accountability (Appiah-Brempong *et al.*, 2018). In many schools, the provision of soap depends on ad hoc arrangements rather than formal budgetary allocations, resulting in frequent shortages that limit consistent use by pupils.

Understanding these contextual conditions is essential for interpreting pupils' handwashing practices and for informing targeted interventions that address not only knowledge and behaviour but also the enabling school environment.

2.5 Interrelationship Between Handwashing Knowledge, Practices, and Enabling Conditions

The existing literature consistently demonstrates that handwashing knowledge, actual hygiene practices, and the availability and accessibility of facilities are closely interrelated rather than independent components of behaviour. Across diverse contexts, studies show that knowledge alone is insufficient to produce sustained handwashing practice when enabling conditions are weak, while the presence of facilities without adequate knowledge or behavioural reinforcement similarly

limits effective use. This interrelationship underscores the need to examine handwashing behaviour as a product of interacting individual and environmental factors rather than as a simple outcome of awareness.

At the global level, synthesis studies indicate that although children may understand the importance of handwashing, their ability to act on this knowledge is strongly conditioned by the physical and social environment in which they operate. White *et al.*, (2020) emphasize that handwashing behaviour is shaped by a combination of cognitive factors, such as knowledge and perceived risk, and contextual factors, including access to soap and water and routine reinforcement. Large-scale analyses using DHS and MICS proxy indicators further suggest that children living or schooling in environments lacking basic handwashing facilities are less likely to translate knowledge into practice, regardless of awareness levels (Kumar *et al.*, 2017). These findings highlight that knowledge becomes actionable only when supported by an enabling environment.

Evidence from sub-Saharan Africa reinforces this interaction. Studies from Ethiopia and Nigeria demonstrate that even where pupils are aware of the health benefits of handwashing, inconsistent availability of soap and functional facilities substantially reduces regular practice (Eshetu, Kifle and Hirigo, 2020; Nwajiuba *et al.*, 2019). In these contexts, pupils often resort to washing hands with water alone or skipping handwashing altogether, not due to lack of knowledge but because of environmental constraints. Research also shows that social and institutional factors, such as teacher supervision and school hygiene norms, mediate the relationship between knowledge and practice by reinforcing or weakening habitual behaviour (Seimetz *et al.*, 2017).

In the Ghanaian context, empirical studies similarly point to a strong interaction between pupils' knowledge, their handwashing practices, and school-level enabling conditions. Fianko and Gawu

(2020) found that although many pupils demonstrated awareness of appropriate handwashing moments, consistent practice was undermined by irregular access to soap and unreliable water supply. District-level evidence from Kintampo further illustrates that pupils in schools with functional handwashing facilities and regular soap provision were more likely to practice handwashing at critical times than those in poorly resourced schools, even when knowledge levels were comparable (Dajaan *et al.*, 2018). These findings suggest that the school environment plays a pivotal role in determining whether knowledge is translated into action.

Institutional and management factors further influence this relationship in Ghanaian schools. Appiah-Brempong *et al.*, (2018) highlight that unclear responsibility for facility maintenance and consumable supply weakens the sustainability of handwashing infrastructure, thereby disrupting the link between hygiene education and daily practice. Where facilities deteriorate or soap is unavailable, pupils' motivation to practice handwashing declines over time, reinforcing the gap between what they know and what they do.

According to literature reviewed, hand washing behaviour among basic school children emerges from the interaction of knowledge, behavioural reinforcement, and enabling conditions within the school environment. Studies consistently show that improvements in any single component are unlikely to yield sustained behavioural change in isolation. Addressing this gap is essential for generating context-specific evidence that can inform comprehensive school-based hygiene interventions.

2.6 Summary of the Literature Review

This chapter reviewed relevant literature on handwashing knowledge, practices, and enabling conditions among basic school children, guided strictly by the study objectives. Using a funnel approach, the review examined global, sub-Saharan African, and Ghanaian evidence to situate the present study within existing empirical work and to identify gaps warranting further investigation.

The literature indicates that handwashing knowledge among school children is generally moderate, with widespread awareness of the importance of hand hygiene and recognition of key moments such as after toilet use and before eating. However, evidence consistently shows that this knowledge is often superficial, with persistent gaps in understanding proper handwashing techniques and the consistent use of soap. Studies from global and African contexts, as well as Ghana, demonstrate that awareness alone is insufficient to ensure effective hygiene behaviour.

Findings on handwashing practices reveal a substantial gap between knowledge and actual behaviour. Across settings, school children are less likely to wash their hands consistently at critical times, particularly when soap is unavailable or when supervision is weak. Ghanaian studies similarly show that reported handwashing practices often overestimate actual behaviour and that environmental and institutional constraints significantly undermine consistent practice in school settings.

The review further highlights the critical role of enabling conditions, particularly the availability and accessibility of functional handwashing facilities with soap and water. Global and regional evidence indicates that many schools lack basic handwashing facilities, and where facilities exist, they are frequently poorly maintained or inconsistently supplied. In Ghana, studies document wide variation in facility functionality and management, with weak institutional responsibility

contributing to frequent shortages of soap and water. However, these studies largely focus on awareness levels without adequately examining the role enabling school environment. The reviewed literature underscores the need for context-specific, integrated research that simultaneously examines handwashing knowledge, practices, and enabling conditions within school environments.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Introduction

This chapter presents the methodology employed in conducting the study. It outlines the research design adopted and provides a description of the study site and target population. The chapter further explains the inclusion and exclusion criteria used in selecting participants, as well as the sample size determination and sampling procedures.

In addition, the chapter describes the data collection methods and instruments used to gather relevant information for the study, including procedures for pre-testing to ensure validity and reliability. It also details how data were handled and analyzed, highlighting the statistical techniques applied.

Finally, the chapter discusses the dissemination of results and the ethical considerations observed throughout the research process to ensure the protection of participants and the integrity of the study.

3.2 Study Design

This study employed a quantitative, analytical cross-sectional design to assess knowledge, practices, and enabling conditions related to handwashing among basic school children in the Lower Manya Krobo Municipality. This design enabled the collection of data from a large number of participants at a single point in time, allowing for the identification of patterns and associations.

3.3 Study Site

The study was conducted in selected basic schools within the Lower Manya Krobo Municipality in the Eastern Region of Ghana. The municipality comprises a mix of public and private basic schools serving children from diverse socio-economic and geographical backgrounds.

To ensure geographic representation within the municipality, schools from different communities were considered for inclusion in the study. However, due to challenges such as hesitancy from some schools to participate, as well as logistical and time constraints during the data collection period, only three schools were ultimately selected. Despite these limitations, the selected schools were considered reasonably representative of the municipality's school environment.

The study was therefore conducted in EP Basic School, Kpong; R/C Basic School, Kpong; and Kpongunor Presbyterian Basic School, Odumase. These schools serve a substantial population of pupils within the municipality and provided an appropriate setting for assessing handwashing knowledge, practices, and enabling conditions among basic school children.

3.4 Study Population

The study population consisted of pupils in upper primary (Basic 4–6) and junior high (JHS 1–3) levels enrolled in the selected public basic schools within the Municipality. This group was targeted because they are old enough to understand and articulate their knowledge and practices relative to hand hygiene.

3.5 Inclusion Criteria

- Pupils enrolled in Basic 4 to JHS 3 within selected schools.
- Pupils present during the time of data collection.

- Pupils who assent and have parental/guardian consent.

3.6 Exclusion Criteria

- Pupils who are absent during data collection.
- Pupils with physical or cognitive impairments that prevent them from participating in a questionnaire-based study.
- Pupils whose parents or guardians decline consent.

3.7 Sample Size

The sample size was calculated using the Cochran's formula:

$$n = \frac{Z^2 \times pq}{e^2}$$

Where;

n = sample size (Cochran, 1977)

Z = the z-score that corresponds with 95% confidence interval which is 1.96

p = Proportion of basic school students with good handwashing practices =37.7%
(Irehovbude and Okoye, 2020)

$q = 1 - p = 0.623$ (proportion who do not)

e = Margin of error set at 5% (0.05)

Therefore;

$$n = \frac{(1.96)^2 \times (0.377 \times 0.623)}{(0.05)^2} \cong 361$$

Considering possible non-responses, a non-response rate of 10 % was added to the sample size, which resulted in a total of 397 participants. However, a sample of 390 participants were recruited for the study.

3.8 Sampling Procedure

A multistage sampling technique was employed to select respondents for the study.

In the first stage, convenience sampling was used to select three basic schools within the Lower Manya Krobo Municipality were selected: EP Basic School, Kpong; Presbyterian Basic School, Kpongunor, Odumase; and Kpong R/C Basic School. These schools were selected based on accessibility, willingness of school authorities to participate in the study, time constraints, funding difficulties, and the presence of pupils within the target classes (Basic 4 to JHS 3). The three selected schools have varying student populations: 788 pupils in EP Basic School, Kpong, 395 pupils in Kpongunor Presbyterian Basic School, Odumase; and 197 pupils in R/C Basic School, Kpong. The total population for the three selected school equals 1,380. These figures indicate that EP Basic School has the largest population, followed by Presbyterian Basic School, while R/C Basic School has the smallest population. The distribution of pupils across the schools approximates a ratio of 4:2:1. Using the sample size of 397 and the ratio of 4:2:1, this resulted in 227 respondents selected from EP, 113 respondents from Presby, and 57 from R/C. This proportional distribution ensured that schools with larger pupil populations contributed more respondents to the study, thereby enhancing the representativeness of the sample. Although

convenience sampling was used to select schools, efforts were made to ensure representativeness through proportional allocations and systematic sampling within schools.

In the second stage, systematic sampling was used to select pupils within the selected schools. Lists of eligible pupils in Basic 4 to JHS 3 were obtained from the school registers with the assistance of class teachers. The total number of eligible pupils in each school was first determined. Based on this number and the required sample size for each school, a sampling interval (k) was calculated by dividing the total number of eligible pupils by the number of pupils required from that school.

A random starting point was selected from the first k pupils on the register, after which every k th pupil on the list was selected until the required number of respondents was obtained. In cases where a selected pupil was absent or declined participation, the next eligible pupil on the register was selected.

3.9 Data Collection Methods and Instruments

Data for this study were collected using a structured, self-administered questionnaire specifically developed to assess handwashing knowledge, practices, and enabling conditions among basic school children. The questionnaire was designed based on existing literature and WHO guidelines on hygiene. Data was collected using KoboCollect.

3.10 Pre-testing

The instrument was pre-tested among 40 students in Golden Crown school and Good Shepherd school outside the study area. Feedback on clarity, language, and flow guided modifications before the main data collection.

3.11 Data Handling

Completed questionnaires were securely stored on an online server. Data was exported to SPSS Statistics Version 26 for data analysis. Anonymity and confidentiality were maintained by removing any identifiable information.

3.12 Statistical Analysis

Data were analyzed using IBM SPSS Statistics Version 26. Descriptive statistics, including frequencies, percentages, and means, were used to summarize socio-demographic characteristics, as well as levels of handwashing knowledge, practices, and enabling conditions among pupils.

Handwashing knowledge was assessed using a set of questionnaire items measuring pupils' understanding of proper handwashing techniques, critical times for handwashing, and the health benefits of hand hygiene. Each correct response was scored as **1**, while incorrect or “don't know” responses were scored as **0**. A composite knowledge score was computed by summing the responses. The total score was converted into percentages, and respondents who scored **70% and above** were classified as having good knowledge, while those who scored **below 70%** were classified as having poor knowledge. The 70% cut-off was adopted in line with precedent in comparable Ghanaian and sub-Saharan African school-based WASH studies (Eshetu et al., 2020;

Fianko & Gawu, 2020), where the same threshold has been applied to differentiate adequate from inadequate hygiene knowledge and practice, thereby facilitating meaningful cross-study comparisons.

Similarly, handwashing practice was measured using multiple items capturing the frequency and conditions under which pupils practiced handwashing, including handwashing before eating, after toilet use, and use of soap. Responses were scored and summed to generate a composite practice score. The scores were converted into percentages, with respondents scoring 70% and above classified as having good practice, and those scoring below 70% classified as having poor practice.

Bivariate analysis was conducted using Pearson chi-square tests of independence to examine associations between socio-demographic and environmental factors and handwashing practice. Effect sizes were reported using Phi (ϕ) for 2×2 tables and Cramér's V for variables with more than two categories. Fisher's Exact Test was applied where expected cell counts were less than five.

To identify independent predictors of handwashing practice, hierarchical binary logistic regression analysis was performed. Variables were entered in blocks based on the Social Ecological Model, including socio-demographic factors, enabling infrastructure conditions, and hygiene promotion variables. Model assumptions were assessed, including multicollinearity using Variance Inflation Factor (VIF) and tolerance values, and goodness-of-fit using the Hosmer–Lemeshow test.

Statistical significance was set at a p-value of less than 0.05. Results were presented using tables and figures to enhance clarity and interpretation.

3.13 Ethical Considerations

Ethical clearance was obtained from the Institutional Review Board (IRB) of Ensign Global University. Written informed consent was obtained from parents/guardians, and assent from pupils. Participation was voluntary, and confidentiality was maintained throughout the research process. There were no direct benefits, but results contributed to better interventions towards improving hygiene among basic school students in the Municipality.

CHAPTER FOUR

4.0 RESULTS

4.1 Introduction

This chapter presents the results of the study, which investigated handwashing knowledge, practices, and enabling conditions among selected basic school children in the Lower Manya Krobo Municipality, Ghana. Data were collected from 390 pupils across three selected public basic schools using a structured, self-administered questionnaire administered via KoboCollect and analyzed using IBM SPSS Statistics Version 26. Findings are presented in accordance with the three specific objectives of the study. The chapter is organized as follows: socio-demographic characteristics; handwashing knowledge and practice levels; chi-square tests of association; collinearity diagnostics; and hierarchical binary logistic regression analysis identifying independent predictors of good handwashing practice.

4.2 Socio-Demographic Characteristics of Participants

Table 1 presents the socio-demographic profile of the 390 participants. The gender distribution was approximately equal among the 368 pupils who provided valid responses, with 185 males (50.3%) and 183 females (49.7%); 22 respondents (5.6%) did not provide a gender response. The age distribution showed that the majority of pupils were in the 11–13 years cohort (n=198; 50.8%), followed by the 8–10 years group (n=103; 26.4%), the 14–16 years group (n=85; 21.8%), and those aged 17 years and above (n=4; 1.0%). No missing data were recorded for age. Of 389 valid class-level responses, Class 4 comprised 57 pupils (14.7%), Class 5 comprised 63 (16.2%), and Class 6 comprised 81 (20.8%), yielding an Upper Primary (UP) subtotal of 201 pupils (51.7%). At the Junior High School (JHS) level, JHS 1 comprised 70 pupils (18.0%), JHS 2 comprised 75

(19.3%), and JHS 3 comprised 43 (11.1%), yielding a JHS subtotal of 188 pupils (48.3%). With respect to school location, 274 pupils (71.4%) attended urban schools and 110 (28.6%) attended rural schools, based on 384 valid responses.

Table 4.1 Socio-Demographic Characteristics of Participants (N = 390)

Characteristic	N	Valid %
Gender (valid n=368; missing=22)		
Male	185	50.3
Female	183	49.7
Age group (N=390)		
11–13 years	198	50.8
8–10 years	103	26.4
14–16 years	85	21.8
17 years and above	4	1.0
Class level (valid n=389; missing=1)		
Class 4	57	14.7
Class 5	63	16.2
Class 6	81	20.8
Upper Primary subtotal (Classes 4–6)	201	51.7
JHS 1	70	18.0
JHS 2	75	19.3
JHS 3	43	11.1
JHS subtotal (JHS 1–3)	188	48.3
School location (valid n=384; missing=6)		

Characteristic	N	Valid %
Urban	274	71.4
Rural	110	28.6

Note. Valid percentages are reported for gender (valid n=368), class level (valid n=389), and school location (valid n=384). Percentages may not sum to 100.0 due to rounding. Age data were complete with no missing values (N=390). Missing values were due to non-response.

4.3 Level of Knowledge About Proper Handwashing Techniques and Its Health Benefits

The table presents respondents' knowledge and practices regarding handwashing and disease prevention.

The results indicate that a large majority of respondents were aware that handwashing with soap and water can prevent diseases, with 90.51% answering "Yes." However, 8.46% reported that handwashing cannot prevent diseases, while 1.03% indicated that they did not know.

Regarding specific handwashing practices, most respondents reported washing their hands before eating food, with 81.79% indicating "Yes," while 18.21% reported that they do not wash their hands before eating. Similarly, a high proportion of respondents reported washing their hands after using the toilet, accounting for 86.92%, whereas 13.08% indicated that they do not.

In terms of washing hands after playing outside, 72.31% of the respondents reported doing so, while 27.69% did not. Additionally, 64.36% of the respondents reported washing their hands before cooking or helping with food, whereas 35.64% reported that they do not. For handwashing after coughing or sneezing, 60.00% indicated that they wash their hands, while 40.00% reported that they do not.

With respect to materials used for handwashing, the majority of respondents indicated that they use soap and water (96.92%). A small proportion reported using water only (2.31%), while 0.77% reported using hand sanitizer only.

In terms of knowledge of the recommended duration for proper handwashing, 48.46% indicated about 20 seconds or more, while 38.72% reported one minute or more. However, 10.26% believed that less than 10 seconds was sufficient, and 2.56% indicated that they did not know the recommended duration.

The results further show mixed knowledge regarding the role of handwashing in preventing specific diseases. The majority of respondents correctly indicated that handwashing does not prevent malaria, with 91.03% responding “No,” while 8.97% believed that it does. However, only 44.36% correctly reported that handwashing can prevent diarrhoea, while 55.64% indicated otherwise.

Knowledge regarding cholera prevention was relatively high, with 74.36% indicating that handwashing can prevent cholera, while 25.64% reported that it cannot. Similarly, responses regarding COVID-19 prevention were almost evenly distributed, with 50.77% indicating that handwashing can prevent COVID-19, while 49.23% disagreed.

Finally, knowledge that handwashing can help prevent the common cold was relatively low. Only 22.56% answered “Yes,” while the majority, 77.44%, indicated that it does not prevent the common cold.

Table 4.2 Level of Knowledge About Proper Handwashing Techniques and Its Health Benefits

Variable	Category	Frequency (n)	Percentage (%)
Handwashing with soap and water can prevent diseases	Yes	353	90.51
	No	33	8.46
	Don't know	4	1.03
Wash hands before eating food	No	71	18.21
	Yes	319	81.79
Wash hands after using the toilet	No	51	13.08
	Yes	339	86.92
Wash hands after playing outside	No	108	27.69
	Yes	282	72.31
Wash hands before cooking or helping with food	No	139	35.64
	Yes	251	64.36
Wash hands after coughing or sneezing	No	156	40.00
	Yes	234	60.00
Material used to wash hands properly	Soap and water	378	96.92
	Water only	9	2.31
	Hand sanitizer only	3	0.77
Recommended handwashing duration	About 20 seconds or more	189	48.46
	1 minute or more	151	38.72
	Less than 10 seconds	40	10.26
	I don't know	10	2.56
Handwashing prevents malaria	No	355	91.03
	Yes	35	8.97
Handwashing prevents diarrhoea	No	217	55.64
	Yes	173	44.36
Handwashing prevents cholera	No	100	25.64
	Yes	290	74.36

Handwashing prevents COVID-19	No	192	49.23
	Yes	198	50.77
Handwashing prevents common cold	No	302	77.44
	Yes	88	22.56

4.4 Overall Knowledge

Table 3 presents the overall classification of pupils by handwashing knowledge and practice levels. Knowledge level data were available for all 390 participants with no missing values. The large majority of pupils 352 (90.3%) were classified as having good handwashing knowledge, while 38 (9.7%) were classified as having poor knowledge.

Variable / Category	n	Valid %
Handwashing Knowledge Level (N=390; no missing)		
Good knowledge	352	90.3
Poor knowledge	38	9.7

4.5 Handwashing Practices Among Basic School Children

The findings show that the majority of respondents reported always washing their hands before eating, accounting for 71.54% of participants. However, 20.77% indicated that they sometimes wash their hands before eating, 6.41% reported doing so often, while a very small proportion (1.28%) reported that they never wash their hands before eating.

Similarly, most respondents indicated that they always wash their hands after using the toilet, representing 72.82%. Meanwhile, 21.03% reported that they sometimes wash their hands after

using the toilet, 5.13% reported doing so often, and 1.03% indicated that they never wash their hands after using the toilet.

With regard to the use of soap when washing hands, 58.21% of respondents reported that they always use soap, while 33.08% indicated that they sometimes use soap. A smaller proportion reported using soap often (7.44%), and 1.28% indicated that they never use soap when washing their hands.

Regarding handwashing after playing outside, 57.95% of respondents reported that they always wash their hands, while 33.08% indicated that they sometimes do so. Additionally, 7.18% reported washing their hands often after playing outside, whereas 1.79% indicated that they never wash their hands after outdoor activities.

In relation to washing hands before helping with cooking or food preparation, 68.97% of respondents reported that they always wash their hands before handling food. Meanwhile, 23.59% indicated that they sometimes wash their hands before cooking or helping with food preparation, 6.92% reported doing so often, and 0.51% reported that they never wash their hands before handling food.

Finally, the results indicate relatively lower consistent use of hand sanitizer when soap and water are unavailable. Only 30.77% of respondents reported that they always use hand sanitizer in such situations, while the majority (51.54%) indicated that they sometimes use it. Additionally, 7.95% reported using sanitizer often, and 9.74% indicated that they never use hand sanitizer when soap and water are unavailable.

Table 4.3 Handwashing Practices Among Basic School Children

Variable	Category	Frequency (n)	Percentage (%)
Wash hands before eating	Never	5	1.28
	Sometimes	81	20.77
	Often	25	6.41
	Always	279	71.54
Wash hands after using the toilet	Never	4	1.03
	Sometimes	82	21.03
	Often	20	5.13
	Always	284	72.82
Use soap when washing hands	Never	5	1.28
	Sometimes	129	33.08
	Often	29	7.44
	Always	227	58.21
Wash hands after playing outside	Never	7	1.79
	Sometimes	129	33.08
	Often	28	7.18
	Always	226	57.95
Wash hands before helping with cooking/food preparation	Never	2	0.51
	Sometimes	92	23.59
	Often	27	6.92
	Always	269	68.97
Use hand sanitizer when soap/water unavailable	Never	38	9.74
	Sometimes	201	51.54
	Often	31	7.95
	Always	120	30.77

With respect to practice level, one participant was excluded owing to a missing composite score, leaving a valid sample of 389. Of these, 225 pupils (57.8%) were classified as demonstrating good handwashing practice and 164 (42.2%) as demonstrating poor practice. The difference between

the good-knowledge rate (90.3%) and the good-practice rate (57.8%) represents a knowledge-behaviour gap of 32.5 percentage points, which is a central empirical finding of this study.

Table 4.4 Handwashing Knowledge and Practice Level Classifications

Handwashing Practice Level (valid n=389; missing=1)

Good practice	225	57.8
Poor practice	164	42.2

Note. Knowledge level and practice level are binary composite classifications derived from Sections B and D of the questionnaire, respectively. One case excluded from practice level classification due to a missing composite score (valid n=389).

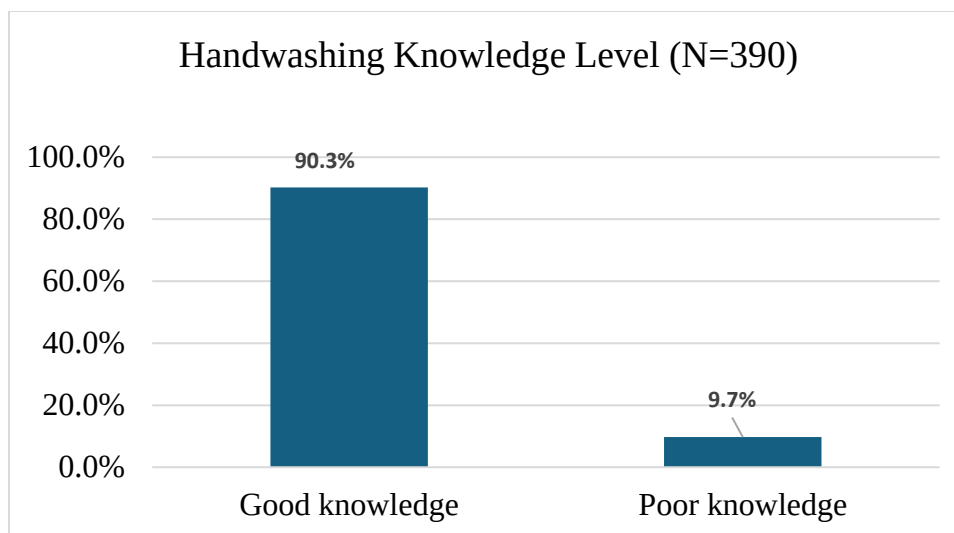


Figure 4.1 Distribution of handwashing knowledge levels among pupils

From the figure 4.2 presents the distribution of pupils according to their level of handwashing knowledge. The result shows that a vast majority (90.3%) of the pupils possessed good knowledge, while only 9.7% demonstrate poor knowledge.

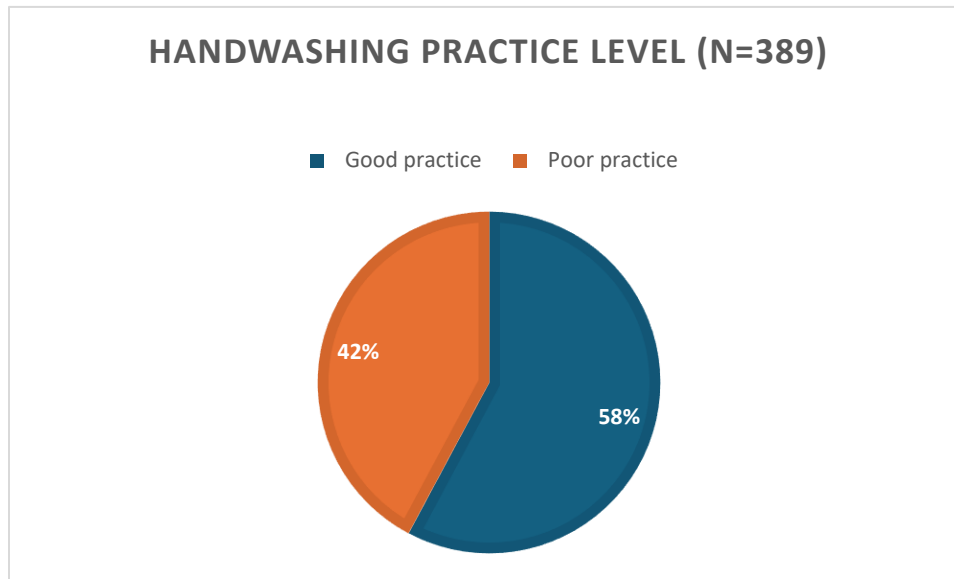


Figure 4.2 Distribution of handwashing practice levels among pupils

Figure 4.2 illustrates the proportion of pupils classified as having good and poor handwashing practices. 57.8% of the respondents representing more than half of the respondents demonstrate good handwashing practices while 42.2% exhibit poor practices.

4.6 Factors, including enabling conditions, associated with handwashing practices

4.6.1 Bivariate Associations Between Study Variables and Handwashing Practice

To examine associations between key study variables and the binary practice outcome (good vs. poor practice), Pearson chi-square tests of independence were conducted. Phi (ϕ) was computed as the effect size measure for 2×2 tables, and Cramér's V for tables with more than two categories;

for 2×2 tables these are equivalent. Statistical significance was set at $\alpha=.05$. Fisher's Exact Test was consulted where expected cell counts fell below 5.0. Results are presented in Table 3.

Among socio-demographic variables, knowledge level was not significantly associated with practice level ($\chi^2(1)=1.06$, $p=.303$, $\phi=.052$). Pupils with good knowledge demonstrated a 58.7% good-practice rate, compared to 50.0% for those with poor knowledge, a 8.7 percentage point difference that did not reach statistical significance. Gender was not significantly associated with practice ($\chi^2(1)=2.98$, $p=.084$, $\phi=.090$), though male pupils demonstrated a numerically higher good-practice rate (64.3%) than female pupils (55.5%). School location was also not significant ($\chi^2(1)=3.32$, $p=.069$, $\phi=.093$), with rural pupils demonstrating 65.5% good practice compared to 55.3% for urban pupils.

Class group was significantly associated with practice level ($\chi^2(1)=7.14$, $p=.008$, $\phi=.136$). JHS pupils demonstrated a good-practice rate of 64.9%, compared to 51.5% among Upper Primary pupils a statistically significant difference of 13.4 percentage points, with a small-to-medium effect size.

Among enabling condition variables, soap availability was significantly associated with practice ($\chi^2(2)=8.58$, $p=.014$, $\phi=.149$). The highest good-practice rate was observed among pupils with consistent soap access (61.4%), compared to 41.5% where soap was only sometimes available, and 57.7% where soap was reported as unavailable a pattern suggesting that intermittent soap supply may be more disadvantageous than complete absence, possibly because inconsistency disrupts habit formation. Water availability yielded the strongest bivariate association in the analysis ($\chi^2(2)=15.43$, $p<.001$, $\phi=.200$). A clear dose-response pattern was evident: 61.0% of pupils with consistent water access were good practitioners, compared to 29.4% with intermittent access and 0.0% with no access. Two cells had expected counts below 5.0 (minimum expected

count=0.84), reflecting the very small number of pupils (n=2) reporting no water; this result should therefore be interpreted with appropriate caution, and the direction of the association is consistent with the linear-by-linear association statistic ($\chi^2=13.74$, $p<.001$). Hygiene posters were significantly associated with practice ($\chi^2(1)=9.31$, $p=.002$, $\phi=.157$): 62.1% of pupils in schools with posters were good practitioners, compared to 43.2% in schools without.

Table 4.5 Chi-Square Tests of Association Between Study Variables and Handwashing Practice Level

Variable			Poor Practice (%)	n	Good Practice (%)	n	df	χ^2	p	ϕ / V
Socio-Demographic Variables										
Knowledge (n=389)	level	Poor	19(50.0%)		19(50.0%)		1	1.06	.303	.052
		Good	145(41.3%)		206(58.7%)					
Gender (n=367)		Female	81(44.5%)		101(55.5%)		1	2.98	.084	.090
		Male	66(35.7%)		119(64.3%)					
School (n=383)	location	Rural								
		Urban	38(34.5%)		72(65.5%)		1	3.32	.069	.093
			122(44.7%)		151(55.3%)					
Class group (n=388)		Upper Primary	97(48.5%)		103(51.5%)		1	7.14	.008	.136
		JHS	66(35.1%)		122(64.9%)					
Enabling Condition Variables										
Soap (n=386)	availability	Yes	114(38.6%)		181(61.4%)					
		Sometimes	38(58.5%)		27(41.5%)		2	8.58	.014	.149
		No	11(42.3%)		15(57.7%)					

Variable			Poor Practice (%)	n	Good Practice (%)	n	df	χ^2	p	ϕ / V
Water availability (n=387)	Yes	Yes	137(39.0%)		214(61.0%)					
		Sometimes	24(70.6%)		10(29.4%)		2	15.43	<.001	.200
		No	2(100%)		0(0%)					
Hygiene posters present (n=379)	No	No	46(56.8%)		35(43.2%)		1	9.31	.002	.157
		Yes	113(37.9%)		185(62.1%)					

Note. Phi (ϕ) is reported as the effect size measure; for 2×2 tables, ϕ and Cramér's V are equivalent.

Effect size conventions: $\phi < .10$ = negligible, $.10-.30$ = small-to-medium, $>.30$ = large (Cohen, 1988). Highlighted rows indicate statistically significant associations ($p < .05$). Significance codes: $p < .001$, $p < .01$, $p < .05$, ns = not significant. For water availability, 2 cells (33.3%) had expected counts below 5.0 (minimum=0.84); the linear-by-linear association statistic ($\chi^2=13.74$, $p < .001$) provides additional support for the association. Teacher guidance and facility presence were not included in the final regression model due to multicollinearity concerns and near-complete data separation respectively.

4.7 Logistic Regression Assumption Checks

4.7.1 Multicollinearity Assessment

Prior to conducting the hierarchical logistic regression, multicollinearity among the seven predictor variables was assessed by running an ordinary least squares (OLS) regression with the continuous practice score as the dependent variable and requesting Tolerance and Variance Inflation Factor (VIF) statistics. As presented in Table 4, all Tolerance values ranged from 0.907 to 0.980 and all VIF values ranged from 1.020 to 1.102, all well within acceptable limits

(Tolerance>0.10; VIF <5.0; Field, 2018). The maximum condition index was 21.250, which falls within the range considered acceptable for regression analysis (Belsley et al., 1980). These results confirm the absence of problematic multicollinearity among the predictor variables.

Note that the variable facility present was excluded from the logistic regression because 99.0% of pupils reported a station present (n=381 of 385 valid), leaving only four observations in the no-facility category. This near-zero variance and the resulting quasi-complete separation of the outcome would produce unstable coefficient estimates and inflated standard errors, rendering the variable analytically uninformative. Similarly, the water: No and teacher guidance: Not sure_ categories contained only two and three observations, respectively; these produced unstable estimates in the hierarchical model (large standard errors exceeding 28,000) indicative of quasi-complete separation and are excluded from substantive interpretation. All reported coefficients for these categories are marked accordingly in Table 5.

Table 4.6 Collinearity Diagnostics for Logistic Regression Predictor Variables

Predictor Variable	Reference Category	Tolerance	VIF
Gender (female)	Male	0.980	1.020
School location (urban)	Rural	0.943	1.060
Class level (JHS)	Upper Primary	0.955	1.047
Knowledge level (good)	Poor	0.980	1.020
Soap availability	No soap	0.919	1.089
Water availability	Sometimes	0.907	1.102
Hygiene posters present	No	0.913	1.096

Note. Tolerance = $1 - R^2$ of each predictor when regressed on all other predictors. VIF = $1/\text{Tolerance}$. The conventional threshold for concern is Tolerance < 0.10 and VIF > 5.0; serious multicollinearity is indicated by VIF > 10.0. All predictors in this model fall well within acceptable limits. The OLS regression from which these statistics were derived used practice score as the dependent variable ($R^2=.061$, $F(7,342)=3.153$, $p=.003$, $N=350$). JHS = Junior High School.

4.7.2 Additional Assumption Checks

The dependent variable practice level was binary (0=poor practice; 1=good practice), satisfying the fundamental distributional requirement. Independence of observations was addressed by the study design, with each pupil independently completing the questionnaire. The events-per-variable (EPV) ratio in the final block, with 210 good-practice cases and 10 predictor parameters, was 21.0:1, exceeding the recommended minimum of 10:1 (Peduzzi et al., 1996). Hosmer-Lemeshow goodness-of-fit tests were conducted for each block of the hierarchical model and all yielded non-significant results (Block 1: $\chi^2(5)=5.858$, $p=.320$; Block 2: $\chi^2(8)=7.733$, $p=.460$; Block 3: $\chi^2(8)=7.711$, $p=.462$), confirming adequate model fit at all stages of the analysis.

4.8 Hierarchical Binary Logistic Regression: Predictors of Good Handwashing Practice

A hierarchical binary logistic regression was conducted to identify the independent predictors of good handwashing practice (outcome: practice level_; poor=0, good=1) and to examine the incremental explanatory contribution of each conceptual block of predictors, consistent with the theoretical architecture of the Social Ecological Model (SEM; McLeroy et al., 1988). Predictors were entered in three theory-driven blocks: Block 1 comprised socio-demographic and individual-level variables (gender, class group, and knowledge level); Block 2 added primary infrastructure enabling conditions (soap availability and water availability); and Block 3 added hygiene

promotion environment variables (hygiene poster presence and teacher guidance). The outcome was coded poor=0, good=1, and the reference categories for each predictor were: gender (male), class group (JHS), knowledge level (good), soap availability (no soap), water availability (sometimes), hygiene posters (yes), and teacher guidance (no). The analysis was conducted on a common sample of 351 complete cases after listwise deletion of 39 cases (10.0%) with missing data on one or more predictors. Full hierarchical results are presented in Table 5.

4.9 Null Model

The null model (intercept only) correctly classified 59.8% of cases by predicting all outcomes as good practice (the majority category). The corresponding -2 log likelihood was 472.936, providing the baseline against which model improvement was assessed.

Block 1: Socio-Demographic and Individual-Level Predictors

The entry of gender, class group, and knowledge level in Block 1 produced a statistically significant improvement over the null model (Omnibus $\chi^2(3)=16.870$, $p<.001$). The $-2LL$ decreased to 456.066, and Nagelkerke R^2 was .063, indicating that these three predictors explained approximately 6.3% of the variance in the log-odds of good practice. The Hosmer-Lemeshow test confirmed adequate model fit ($\chi^2(5)=5.858$, $p=.320$). Overall classification accuracy was 60.4%.

Gender was a significant predictor ($B=-0.582$, $SE=0.226$, $Wald=6.64$, $p=.010$, $OR=0.559$, 95% CI [0.359, 0.870]). Female pupils had 44.1% lower odds of good practice compared to male pupils ($OR=0.559$), equivalent to a 1.79-fold advantage for males. Class group was also significant ($B=-0.714$, $SE=0.226$, $Wald=9.96$, $p=.002$, $OR=0.489$, 95% CI [0.314, 0.763]). Relative to JHS pupils (the reference category), Upper Primary pupils had 51.1% lower odds of good practice ($OR=0.489$); equivalently, JHS pupils had approximately twice the odds of good practice

compared to their Upper Primary counterparts ($1/0.489=2.04$). Knowledge level was not a significant predictor in Block 1 ($B=-0.457$, $Wald=1.52$, $p=.217$, $OR=0.633$), with pupils classified as having poor knowledge showing non-significantly lower odds of good practice than those with good knowledge.

Block 2: Primary Infrastructure Enabling Conditions

The addition of soap availability and water availability in Block 2 produced a significant incremental improvement in model fit (Block $\Delta\chi^2(4)=17.569$, $p=.001$), with the overall model chi-square increasing to $\chi^2(7)=34.439$ ($p<.001$). The $-2LL$ decreased to 438.498, and Nagelkerke R^2 increased to .126, representing an increment of $\Delta R^2=.063$ over Block 1 a meaningful increase attributable to the enabling infrastructure variables. Accuracy improved to 63.8%.

Gender ($B=-0.574$, $p=.013$, $OR=0.563$, 95% CI [0.357, 0.888]) and class group ($B=-0.823$, $p<.001$, $OR=0.439$, 95% CI [0.277, 0.696]) remained statistically significant and, notably, their effect sizes strengthened relative to Block 1, suggesting that the infrastructure variables do not account for the gender and class-level practice differentials. The odds ratio for Upper Primary relative to JHS increased in magnitude from $OR=0.489$ (Block 1) to $OR=0.439$ (Block 2), indicating that JHS pupils had 2.28 times the odds of good practice compared to Upper Primary pupils after controlling for enabling conditions.

Water availability emerged as a statistically significant predictor ($B=0.991$, $SE=0.457$, $Wald=4.70$, $p=.030$, $OR=2.694$, 95% CI [1.099, 6.601]). Pupils in schools with consistent water availability had 2.69 times the odds of good practice relative to those with only intermittent water access, after

controlling for all other predictors in the model. This is the largest statistically significant odds ratio in the entire analysis. The water: No category (n=2) produced quasi-complete separation and is excluded from interpretation. Soap availability was not a statistically significant predictor; neither consistent soap (OR=1.018, p=.969) nor intermittent soap (OR=0.667, p=.458) differed significantly from the no-soap reference category, after controlling for other variables.

Block 3: Hygiene Promotion Environment Variables

The addition of hygiene poster presence and teacher guidance in Block 3 did not produce a statistically significant incremental improvement in model fit (Block $\Delta\chi^2(3)=7.069$, p=.070). The overall model remained significant ($\chi^2(10)=41.508$, p<.001), and Nagelkerke R^2 increased marginally to .151 ($\Delta R^2=.025$ over Block 2), with overall classification accuracy reaching 67.8%. The Hosmer-Lemeshow test confirmed adequate fit ($\chi^2(8)=7.711$, p=.462).

In Block 3, gender (B=-0.590, p=.012, OR=0.554, 95% CI [0.349, 0.879]) and class group (B=-0.726, p=.003, OR=0.484, 95% CI [0.299, 0.784]) remained statistically significant, confirming their robustness across all three blocks. Water availability (consistent vs. sometimes) remained significant (B=0.969, p=.045, OR=2.636, 95% CI [1.023, 6.792]), though with a slightly attenuated effect, suggesting a modest shared variance with the Block 3 variables. Knowledge level was not significant in any block (Block 3: B=-0.600, p=.117, OR=0.549). Hygiene posters (OR=0.673, p=.218) and teacher guidance (OR=1.215, p=.679) were not significant independent predictors. The teacher guidance: Not sure category (n=3) produced quasi-complete separation and is excluded from substantive interpretation.

4.10 Summary of Hierarchical Regression Findings

Across all three blocks, three predictors demonstrated consistent statistical significance: female gender, Upper Primary class level, and from Block 2 onwards consistent water availability. Female pupils had approximately 44–45% lower odds of good practice than male pupils, Upper Primary pupils had approximately 51–52% lower odds than JHS pupils, and pupils with consistent water access had approximately 2.6–2.7 times the odds of good practice compared to those with intermittent access. The incremental R^2 decomposition indicates that socio-demographic and individual factors (Block 1) accounted for 6.3% of variance (Nagelkerke R^2), infrastructure enabling conditions (Block 2) contributed an additional 6.3%, and hygiene promotion environment variables (Block 3) contributed a further non-significant 2.5%, for a final model Nagelkerke R^2 of .151.

Table 4.7 Hierarchical Binary Logistic Regression: Predictors of Good Handwashing Practice (N = 351)

Predictor	B	SE	Wald	OR	95% LL	CI	95% UL	CI	p
Block 1: Socio-Demographic and Knowledge Predictors (n=351)									
Omnibus $\chi^2(3)=16.870$, $p<.001$ $-2LL=456.066$ Cox&Snell $R^2=.047$ Nagelkerke $R^2=.063$ H-L $\chi^2(5)=5.858$, $p=.320$ Accuracy=60.4%									
Female (ref: Male)	-0.582	0.226	6.64	0.559	0.359		.870		.010
Upper Primary (ref: JHS)	-0.714	0.226	9.96	0.489	0.314		.763		.002
Poor knowledge (ref: Good)	-0.457	0.371	1.52	0.633	0.306		1.309		.217
Block 2: + Primary Infrastructure Variables (n=362)									

Predictor	B	SE	Wald	OR	95% LL	CI UL	95% CI UL	p
Block $\Delta\chi^2(4)=17.569$, $p=.001$ Model $\chi^2(7)=34.439$, $p<.001$ $-2LL=438.498$ Cox&Snell $R^2=.093$ Nagelkerke $R^2=.126$ $\Delta R^2=.063$ H-L $\chi^2(8)=7.733$, $p=.460$ Accuracy=63.8%								
Female (ref: Male)	-0.574	0.222	6.67	0.563	0.357	.888		.013
Upper Primary (ref: JHS)	-0.823	0.229	12.90	0.439	0.277	.696		<.001
Poor knowledge (ref: Good)	-0.523	0.365	1.83	0.593	0.283	1.239		.165
Soap: Yes (ref: No)	0.018	0.470	0.00	1.018	0.403	2.576		.969
Soap: Sometimes (ref: No)	-0.405	0.545	0.55	0.667	0.229	1.941		.458
Water: Yes (ref: Sometimes)	0.991	0.457	4.70	2.694	1.099	6.601		.030
Water: No (ref: Sometimes)	—	—	—	—	—	—		—

Block 3: + Hygiene Promotion Environment Variables (n=351)

Block $\Delta\chi^2(3)=7.069$, $p=.070$ (ns) | Model $\chi^2(10)=41.508$, $p<.001$ | $-2LL=431.428$ | Cox&Snell $R^2=.112$ | Nagelkerke $R^2=.151$ | $\Delta R^2=.025$ | H-L $\chi^2(8)=7.711$, $p=.462$ | Accuracy=67.8%

Female (ref: Male)	-0.590	0.235	6.28	0.554	0.349	.879		.012
Upper Primary (ref: JHS)	-0.726	0.246	8.69	0.484	0.299	.784		.003
Poor knowledge (ref: Good)	-0.600	0.383	2.46	0.549	0.259	1.162		.117
Soap: Yes (ref: No)	-0.034	0.480	0.01	0.966	0.377	2.475		.943
Soap: Sometimes (ref: No)	-0.578	0.562	1.06	0.561	0.186	1.688		.304

Predictor	B	SE	Wald	OR	95% LL	CI	95% UL	CI	p
Water: Yes (ref: Sometimes)	0.969	0.483	4.03	2.636	1.023		6.792		.045
Water: No (ref: Sometimes)	—	—	—	—	—		—		—
Posters: No (ref: Yes)	−0.397	0.322	1.52	0.673	0.358		1.264		.218
Teacher guidance: Yes (ref: No)	0.195	0.471	0.17	1.215	0.483		3.055		.679
Teacher guidance: Not sure (ref: No)	—	—	—	—	—		—		—

Note. Outcome variable: practice level (poor practice=0; good practice=1). Reference categories: Gender=Male; Class group=JHS; Knowledge level=Good; Soap availability=No soap; Water availability=Sometimes; Hygiene posters=Yes (i.e., absent coded as 1, present as reference); Teacher guidance=No. OR = odds ratio ($\text{Exp}[B]$); CI LL = 95% confidence interval lower limit; CI UL = upper limit. Highlighted rows denote statistically significant predictors ($p < .05$). Significance codes: $p < .001$, $p < .01$, $p < .05$, ns = not significant. Rows marked (—) indicate quasi-complete separation due to near-zero cell frequencies (Water: No, $n=2$; Teacher guidance: Not sure, $n=3$); coefficient estimates are unstable and not interpretable. Block R^2 values are Nagelkerke pseudo- R^2 . ΔR^2 refers to the increment in Nagelkerke R^2 between consecutive blocks. H-L = Hosmer-Lemeshow goodness-of-fit test. Block 3 $\Delta\chi^2$ did not reach statistical significance ($p=.070$).

4.11 Chapter Summary

This chapter has presented the empirical findings of the study in relation to its three specific objectives. The sample (N=390) was approximately equally divided by gender and class level, with a predominantly urban distribution. Good handwashing knowledge was evidenced by 90.3% of pupils; however, only 57.8% demonstrated good practice, yielding a 32.5 percentage point knowledge-behaviour gap. Bivariate analyses identified class group, soap availability, water availability, and hygiene poster presence as significantly associated with practice. Hierarchical logistic regression demonstrated that female gender (OR=0.554, $p=.012$), Upper Primary class level (OR=0.484, $p=.003$), and consistent water availability (OR=2.636, $p=.045$) were the only statistically significant independent predictors of good practice in the final model. Knowledge, soap availability, poster presence, and teacher guidance were not significant independent predictors. The incremental R^2 analysis confirmed that enabling infrastructure variables (Block 2, $\Delta R^2=.063$) contributed as much to explained variance as the socio-demographic block, while hygiene promotion environment variables (Block 3, $\Delta R^2=.025$) did not produce a statistically significant incremental improvement. These findings are discussed in Chapter Five.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Introduction

This chapter discusses the findings presented in Chapter Four in relation to the existing literature reviewed in Chapter Two and the theoretical framework underpinning the study. The discussion is anchored in the Social Ecological Model (SEM; McLeroy et al., 1988), which conceptualizes health behaviour as shaped by the interplay of individual, interpersonal, institutional, and community-level factors. Findings are examined thematically in accordance with the three specific objectives, followed by a discussion of the hierarchical regression results, study limitations, and practical implications. Findings should therefore be interpreted within the context of selected schools.

5.2 Handwashing Knowledge

The finding that 90.3% of pupils were classified as having good handwashing knowledge exceeds comparable rates reported in the Ghanaian literature. Fianko and Gawu (2020) documented adequate general awareness in approximately 72% of pupils in the Greater Accra Region, and Eshetu et al. (2020) reported 82% disease-prevention awareness among Ethiopian schoolchildren. The comparatively elevated levels observed in the present study likely reflect the sustained influence of the School Health Education Programme (SHEP), which was active across all three sampled schools, with 91.5% of pupils confirming teacher guidance on handwashing. This near-universal teacher engagement is itself a positive finding, suggesting that the institutional infrastructure for hygiene education is largely in place.

However, the data reveal a significant and actionable gap in procedural knowledge. Whilst 97.2% of pupils correctly identified soap and water as the appropriate handwashing materials, only 48.8% correctly identified the recommended duration of approximately 20 seconds or more. This finding replicates the pattern documented by White et al. (2020) in a systematic review across LMICs, in which knowledge of handwashing mechanics was substantially weaker than knowledge of timing and materials. Given that washing for fewer than 20 seconds significantly reduces microbial decontamination efficacy (Bloomfield et al., 2017), this procedural knowledge gap represents a specific and addressable content deficit in current SHEP implementation.

Awareness of critical handwashing moments declined with decreasing emphasis in hygiene education messaging from 86.9% for after toilet use to 60.0% for after coughing or sneezing. Disease prevention knowledge showed a counterintuitive pattern: cholera was most widely identified (74.5%), while diarrhoea the disease most directly linked to faecal-oral transmission was identified by only 44.3%. This divergence suggests that hygiene education in the municipality foregrounds cholera at the expense of diarrhoea as the primary disease rationale, an observation with implications for curriculum content review.

5.3 Handwashing Practices and the Knowledge-Behaviour Gap

The 32.5 percentage point gap between good-knowledge prevalence (90.3%) and good-practice prevalence (57.8%) is one of the most consequential findings of this study. Contrary to expectations from literature, knowledge was not a significant predictor of handwashing practice in the study. Critically, knowledge level was not significantly associated with practice in either the bivariate analysis ($\chi^2(1)=1.06$, $p=.303$) or in any block of the hierarchical regression (Block 3: OR=0.549, $p=.117$). This multivariate null finding that knowledge does not independently predict practice once structural and developmental factors are controlled provides empirical support for

the SEM's central proposition: that individual knowledge is a necessary but insufficient condition for behaviour change, and that its effect is contingent on the availability of enabling environmental resources (White et al., 2020).

The theoretical explanation for this pattern is grounded in dual-process models of health behaviour (Strack & Deutsch, 2004; Verplanken & Wood, 2006), which distinguish between reflective (knowledge-driven) and automatic (habit-driven) processing. Habitual handwashing at critical moments requires the formation of stimulus-response associations triggered by environmental cues, rather than conscious deliberation. The primacy of forgetfulness as a self-reported barrier in the facility data (52.5%) exceeding both water absence (49.6%) and soap absence (44.2%) is consistent with this theoretical account: the primary obstacle to practice is not motivational resistance or information deficit but the absence of habitual automaticity and environmental cueing.

The near-universal absence of consistent soap use with 33.0% of pupils reporting never using soap and 58.7% using it only sometimes constitutes the most public-health-significant finding within the practice domain. The WHO (2021) has noted that handwashing without soap reduces microbial decontamination efficacy by approximately 50% relative to washing with soap. At the population level, the absence of consistent soap use effectively vitiates the disease-prevention benefit of whatever handwashing behaviour is being performed, regardless of frequency.

5.4 Enabling Conditions: Infrastructure, Posters, and Teacher Guidance

The facility findings show that there is a lot of nominal coverage but there are also significant problems with quality and placement. Handwashing Station presence was reported by 99.% of pupils, a marked improvement on earlier Ghanaian estimates of 16% to 43.5% (Appiah-Brempong

et al., 2018; Ismaila et al., 2023) reflecting real progress in physical infrastructure provision. However, soap was consistently unavailable for approximately 23.5% of pupils, and the critical finding that only 28.4% of stations were positioned near the toilet or latrine represents a structural misalignment between infrastructure placement and the most epidemiologically consequential use moment. Given that post-defecation handwashing requires immediate proximity to a station, this placement pattern is a plausible structural explanation for the low post-toilet handwashing frequencies observed.

Water availability yielded the strongest bivariate association with practice ($\chi^2(2)=15.43$, $p<.001$, $\phi=.200$) and was the only enabling infrastructure variable to achieve statistical significance in the hierarchical regression. In Block 2, pupils with consistent water access had 2.69 times the odds of good practice compared to those with intermittent access ($OR=2.694$, $p=.030$), and this association was sustained in Block 3 ($OR=2.636$, $p=.045$). The dose-response gradient in the bivariate data from 0.0% good practice with no water, to 29.4% with intermittent access, to 61.0% with consistent access provides compelling evidence for a causal structural pathway, consistent with Kumar et al. (2017) and the WHO/UNICEF JMP (2022) framework. This finding has a direct, unambiguous policy implication: reliable water supply is the foundational enabling condition for school-based handwashing practice in this context.

Hygiene posters were significantly associated with practice in the bivariate analysis ($\chi^2(1)=9.31$, $p=.002$, $\phi=.157$) but were not an independent predictor in the hierarchical regression (Block 3: $OR=0.673$, $p=.218$). The attenuation of the poster effect in the multivariate model suggests that its bivariate association is partially confounded by school-level enabling conditions that co-vary with poster presence. Teacher guidance was similarly non-significant in the multivariate analysis ($OR=1.215$, $p=.679$), a null finding that may partly reflect the near-universal prevalence of

reported teacher guidance (91.5%), which produces insufficient variation to detect an independent effect.

5.5 Hierarchical Regression: Theoretical and Practical Implications

The hierarchical regression design enables a theoretically principled decomposition of explained variance across the three SEM levels incorporated in the analysis. Block 1 (individual and socio-demographic predictors) accounted for 6.3% of variance in practice (Nagelkerke $R^2=.063$). The incremental contribution of Block 2 (infrastructure enabling conditions; $\Delta R^2=.063$) equaled the entire variance explained by Block 1, confirming that institutional enabling conditions are as powerful a predictor of practice as individual and demographic factors combined. Block 3 (hygiene promotion environment; $\Delta R^2=.025$) did not produce a statistically significant increment, suggesting that teacher guidance and poster presence while associated with practice at the bivariate level do not explain independent variance in practice once demographic and infrastructure factors are controlled.

Gender was a consistent and significant predictor across all three blocks. Female pupils had approximately 44–45% lower odds of good practice than male pupils, a finding that diverges from most Ghanaian school-based studies, which do not report a significant gender differential (Appiah-Brempong et al., 2018; Fianko & Gawu, 2020). The persistence of this gender effect across blocks including after controlling for infrastructure, posters, and teacher guidance suggests it reflects a genuine behavioural differential rather than confounding by enabling conditions. The mechanism warrants investigation in future research; possible explanations include differential socialization of hygiene responsibilities, differential access to or use of sanitation facilities, or social desirability effects in self-reporting that operate differently across gender groups.

Class group was the strongest demographic predictor, with Upper Primary pupils having 51–52% lower odds of good practice than JHS pupils across all three blocks. This developmental gradient is theoretically coherent: JHS pupils have accumulated greater cumulative SHEP exposure, more developed executive function and self-regulatory capacity, and stronger peer norm socialization (Bandura, 1986). Critically, the odds ratio for class group strengthened in Block 2 (from OR=0.489 in Block 1 to OR=0.439), indicating that the JHS advantage is not explained by better infrastructure access among JHS schools; rather, it reflects intrinsic developmental and socialization differences between the two educational stages.

5.6 Comparison with Existing Literature

The overall good-knowledge rate (90.3%) exceeds comparable figures from Ghana (Fianko & Gawu, 2020; 72%) and Ethiopia (Eshetu et al., 2020; 82%), consistent with the trajectory of improving hygiene knowledge across sub-Saharan Africa following sustained school-based education investment. The overall good-practice rate (57.8%) is higher than Eshetu et al.'s (2020) 39.1% but is accompanied by critically low individual practice frequencies particularly for post-toilet handwashing and consistent soap use that suggest composite scores overestimate behavioural adequacy when individual items are examined.

The barrier profile differs from the broader African literature in an instructive way. In contexts with lower infrastructure coverage, such as those studied by Nwajiuba et al. (2019) in Nigeria and Eshetu et al. (2020) in Ethiopia, infrastructure barriers (water and soap absence) typically dominate. In the present study, forgetfulness (52.5%) leads water absence (49.6%) as the primary barrier a shift that may reflect the relatively high nominal infrastructure coverage documented here and the consequent transition of the primary constraint from supply-side to habitual and behavioural factors. This has important implications: as infrastructure investments succeed in

closing the coverage gap, the dominant intervention target shifts from physical provision to habit formation and behavioural cueing.

5.7 Limitations

Several limitations must be acknowledged. First, all practice data were collected via self-administered questionnaire, making them susceptible to social desirability bias. The internal inconsistency in practice responses with very low frequencies for post-toilet and pre-meal handwashing but high frequencies for before-cooking and after-play contexts is consistent with differential social desirability effects across behavioural domains, and future research should supplement self-report with direct behavioural observation. Second, since data was collected one time, causality cannot be established; the associations identified are consistent with the theoretical models proposed but cannot establish directionality. Third, convenience sampling at the school level limits external generalizability to the wider municipality. Fourth, school-level clustering was not formally modelled; multilevel approaches would more precisely partition individual and school-level contributions to practice variance. Fifth, the logistic regression model explained only 15.1% of practice variance (Nagelkerke $R^2=.151$), confirming that important unmeasured determinants including household hygiene conditions, peer group norms, and detailed programme implementation quality were not captured.

5.8 Practical Implications

The findings generate six evidence-based recommendations. First, reliable water supply should be prioritized as the foundational infrastructure investment, given its status as the only enabling condition variable achieving independent significance in the hierarchical regression ($OR \approx 2.6$ – 2.7 across Blocks 2 and 3). Second, handwashing stations should be repositioned adjacent to latrines

to address the structural misalignment between station placement (only 28.4% near latrines) and the most hygienically consequential use moment. Third, SHEP implementation should be redesigned to prioritize habit formation over knowledge transmission, using structured daily routines, implementation intention prompts, and visual cues at point of use. Fourth, curriculum content should address the 20-second duration gap (only 48.8% correct) and the diarrhoea-handwashing association (only 44.3% correct). Fifth, intensive behaviour-focused interventions should target Upper Primary pupils (Classes 4–6), who demonstrated 51–52% lower odds of good practice than JHS pupils across all regression blocks, identifying them as the highest-leverage developmental target group.

5.9 Chapter Summary

This chapter has critically examined the empirical findings of this study in relation to existing literature and the Social Ecological Model. The dominant findings are: (1) a 32.5 percentage point knowledge-behaviour gap in which knowledge is not an independent predictor of practice; (2) consistent water availability as the strongest independent structural predictor ($OR \approx 2.6$ – 2.7), confirmed across both Blocks 2 and 3 of the hierarchical model; (3) class level as the strongest demographic predictor (JHS pupils having approximately twice the odds of good practice as Upper Primary pupils); and (4) the incremental R^2 decomposition demonstrating that infrastructure enabling conditions ($\Delta R^2 = .063$) contribute as much explained variance as all socio-demographic and individual-level factors combined. Forgetfulness as the leading barrier signals that the primary challenge is now behavioural and habitual rather than purely infrastructural in this setting. The conclusions and recommendations of the study are presented in Chapter Six.

CHAPTER SIX

6.0 CONCLUSION

6.1 Introduction

This chapter presents the conclusions of the study. It restates the study's purpose and objectives, articulates the key principal conclusions drawn from the empirical evidence, identifies directions for future research, offers evidence-based policy practical recommendations,

6.2 Restatement of Study Purpose

The general objective of this study was to evaluate the knowledge, practices, and enabling conditions related to handwashing among basic school children in the Lower Manya Krobo Municipality. The study was motivated by the absence of prior empirical investigation at the district level, despite documented recurring burdens of hygiene-related illness in the area. A quantitative cross-sectional design was employed, with data collected from 390 pupils across three public basic schools using a structured questionnaire administered via KoboCollect and analyzed in IBM SPSS. The study was theoretically grounded in the Social Ecological Model.

6.3 Summary of Key Finding

This study was guided by three specific objectives: to assess the level of handwashing knowledge among basic school children in the Lower Manya Krobo Municipality; to evaluate their handwashing practices; and to identify the factors, including enabling conditions, associated with those practices. The evidence gathered across these three objectives converges on a single, coherent conclusion.

With respect to the first objective, basic school children in the Municipality demonstrate a high level of general handwashing knowledge (90.3% classified as good), surpassing comparable figures from Ghana and sub-Saharan Africa and reflecting consistent School Health Education Programme (SHEP) engagement. However, this knowledge is procedurally incomplete: fewer than half of pupils (48.8%) correctly identified the recommended 20-second washing duration, only 44.3% recognised diarrhoea as a preventable disease despite its direct faecal-oral transmission route, and awareness declined progressively for less-emphasised critical moments. Hygiene education has achieved breadth of awareness but has not yet secured the procedural depth required for maximally protective practice.

With respect to the second objective, handwashing practice was considerably lower than knowledge, with only 57.8% of pupils classified as having good practice. The resulting 32.5 percentage point knowledge-practice gap is the central public health finding of this study. Knowledge level was not a statistically significant predictor of practice in any block of the hierarchical regression (final block: OR=0.549, $p=.117$), providing multivariate evidence that the gap is structural and habitual in origin rather than motivational. Forgetfulness was the leading self-reported barrier (52.5%), ahead of water absence (49.6%) and soap absence (44.2%), indicating that habit formation and environmental cueing are closer intervention targets than further knowledge education.

With respect to the third objective, consistent water availability emerged as the strongest independent predictor of good handwashing practice across Blocks 2 and 3 of the hierarchical regression (OR=2.636–2.694, $p=.030-.045$), with a clear dose-response gradient: 0.0% good practice where water was absent, rising to 29.4% with intermittent access and 61.0% with consistent access. Although station presence was near-universal (99.0%), high nominal coverage

was not matched by effective enabling access—soap was unreliable for 23.5% of pupils and only 28.4% of stations were positioned near the latrine. At the demographic level, female gender and Upper Primary class level were consistent and significant predictors of poorer practice across all three regression blocks (Block 3: OR=0.554, $p=.012$ and OR=0.484, $p=.003$, respectively). The incremental R^2 decomposition confirmed that infrastructure enabling conditions ($\Delta R^2=.063$) contributed as much explained variance in practice as all individual and socio-demographic factors combined (Block 1 $R^2=.063$), validating the Social Ecological Model's claim that structural enabling conditions are co-equal determinants of health behaviour alongside individual-level factors. Taken together, the evidence demonstrates that bridging the knowledge-practice gap in this setting requires not further knowledge education but targeted structural investment in water reliability and station placement, alongside behavioural interventions specifically designed for Upper Primary pupils and female students.

6.4 Conclusions

This study set out to generate the first systematic, district-level evidence on handwashing knowledge, practices, and enabling conditions among basic school children in the Lower Manya Krobo Municipality a setting with a documented hygiene-related disease burden and an absence of localized empirical data. The findings confirm that pupils possess relatively high levels of general knowledge but are constrained in translating that knowledge into consistent, effective practice by unreliable water supply, poorly positioned infrastructure, the near-universal absence of consistent soap use, and the absence of habitual, automatic handwashing routines.

The study's most consequential finding is that consistent water availability independently predicts good handwashing practice at approximately 2.6 to 2.7 times the odds across the hierarchical model, independently of all other predictors. Equally important is the consistent null finding for

knowledge: once structural enabling conditions are controlled, knowledge does not independently predict practice. Together, these findings make a powerful argument for a fundamental reorientation of school handwashing promotion away from further knowledge education and toward reliable infrastructure, habitual behaviour programming, and the environmental cueing necessary to make consistent handwashing both possible and automatic.

The hierarchical regression framework employed in this study demonstrates that socio-demographic factors, infrastructure enabling conditions, and hygiene promotion environment variables each contribute meaningful and partially independent explanatory power to practice variation, validating the multi-level logic of the Social Ecological Model as both a research and intervention design framework. This study contributes to the limited district/municipal level evidence on the interaction between knowledge, behaviour, and enabling conditions in Ghana. It is hoped that the evidence generated by this study will inform evidence-based policy decisions that contribute to measurable and sustained improvements in handwashing practice, reductions in the burden of hygiene-related disease, and progress toward Sustainable Development Goals 3 and 6 among school-age children in the Lower Manya Krobo Municipality and in comparable settings across Ghana and sub-Saharan Africa.

6.5 Recommendations

Four evidence-based recommendations follow from the study's conclusions.

- First, reliable water supply should be prioritized as the foundational WASH in Schools investment. With an odds ratio of 2.6–2.7, water reliability is the strongest independent predictor of good practice in this study. District authorities should conduct systematic water

supply audits across all basic schools and establish formal monitoring and maintenance mechanisms.

- Second, handwashing stations should be repositioned adjacent to latrine facilities. Only 28.4% of stations were near the latrine; repositioning is a low-cost, high-impact structural intervention directly supported by the evidence.
- Third, schools should establish a monitored supply system or policy with daily and weekly checks by designated staff ensure continuous availability of soap and water. This would address the 23.5% unreliable soap access rate.
- Fourth, intensive behaviour-focused interventions should specifically target Upper Primary pupils (Classes 4–6), who demonstrate 51–52% lower odds of good practice than JHS pupils across all regression blocks, identifying them as the highest-priority developmental target.

6.6 Directions for Future Research

Four priorities for future research are recommended.

1. Direct behavioural observation should supplement self-report measures to address social desirability bias and the internal inconsistencies identified in the practice data.
2. Longitudinal or experimental designs, including pre-post evaluations of water supply improvements and station repositioning interventions, are needed to establish causal effects and confirm the structural pathways identified by this cross-sectional study.
3. Multilevel modelling with larger numbers of schools would formally partition individual and school-level variance and enable more rigorous estimation of school-level determinants.

4. Qualitative research exploring the social, cultural, and peer-normative mechanisms that shape handwashing behaviour in the Ga-Dangme community context would provide the contextual depth needed to design culturally grounded and locally sensitive programmes.

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APPENDICES

Appendix 1: Assent and Questionnaire

ASSENT FORM

Title of Study

Handwashing Knowledge and practices amongst basic school children in the Lower Manya Krobo District municipality

GENERAL INFORMATION ABOUT THE RESEARCH

I am Emmanuel Kwasi Kponyo, a Master of Public Health student at Ensign Global College, Kpong. I am doing a study about handwashing in basic schools. I want to know what children like you know about handwashing, how often you wash your hands, and whether your school has soap, water, and working handwashing places.

If you choose to take part, I will ask you some questions. These questions will help me understand how to make schools healthier. You will answer the questions by choosing the answers that best describe you. It will take about 20 to 25 minutes.

Benefits/Risks of the Study

There are no risks in this study. The only thing is that it may take a bit of your time. You will not be paid, but your answers may help make your school and others cleaner and healthier.

Confidentiality

Your name will not be written on the form. No one will know what you say. What you tell us will be private, and only the researcher and supervisor will see the answers. The information will be kept safe and locked with a password.

Compensation

You will not be given any money or gifts for taking part. This is voluntary. We appreciate your help.

Withdrawal from Study

You do not have to take part. You can stop at any time, and no one will be upset. You can ask questions now or later, and we will be happy to answer them.

PARTICIPANT AGREEMENT

If you are happy to take part in the study, please write your name or make a thumbprint.

I have read this information (or it has been read to me). I understand that I will be asked questions about handwashing. I know I do not have to take part and can stop at any time. I agree to be part of the study.

Name of Participant

Signature or Thumbprint of Participant

Date

I have explained the purpose, benefits, and risks of the study to the participant.

Name of Person Who Obtained Assent

Signature of Person Who Obtained Assent

Date

QUESTIONNAIRE

Section A: Socio-demographic Information

1. What is your age?
 - ☐ 8–10 years
 - ☐ 11–13 years
 - ☐ 14–16 years
2. What is your gender?
 - ☐ Male
 - ☐ Female
3. What class are you currently in?
 - ☐ Class 4
 - ☐ Class 5
 - ☐ Class 6
 - ☐ JHS 1
 - ☐ JHS 2
 - ☐ JHS 3
4. Is your school in a rural or urban area?
 - ☐ Rural
 - ☐ Urban

Section B: Knowledge About Handwashing

5. Do you think washing hands with soap and water can prevent diseases?
 - ☐ Yes
 - ☐ No
 - ☐ I don't know
6. When should you wash your hands? (Tick all that apply)
 - ☐ Before eating food

- After using the toilet
 - After playing outside
 - Before cooking or helping with food
 - After coughing or sneezing
7. Which materials should you use to wash your hands properly?
- Water only
 - Soap and water
 - Hand sanitizer only
 - Cloth or tissue
8. How long should you wash your hands with soap and water to clean them well?
- Less than 10 seconds
 - About 20 seconds or more
 - 1 minute or more
 - I don't know
9. Which of these illnesses can handwashing help prevent? (Tick all that apply)
- Malaria
 - Diarrhea
 - Cholera
 - COVID-19
 - Common cold

Section C: Attitudes Toward Handwashing

10. Do you think washing hands with soap is important for your health?
- Yes
 - No
 - Not sure
11. How do you feel about washing your hands regularly?

- I like it
- It is difficult to remember
- It is boring
- I don't care

12. Do your friends and teachers remind or encourage you to wash your hands?

- Yes, often
- Sometimes
- No

13. Do you think washing your hands regularly helps you stay healthy?

- Yes
- No
- I'm not sure

Section D: Handwashing Practices

For each activity below, how often do you do it?

Please tick one option for each question:

13. How often do you wash your hands before eating?

- Never
- Sometimes
- Often
- Always

14. How often do you wash your hands after using the toilet?

- Never
- Sometimes
- Often
- Always

15. How often do you use soap when washing your hands?

- Never
- Sometimes
- Often
- Always

16. How often do you wash your hands after playing outside or handling dirt?

- Never
- Sometimes
- Often
- Always

17. How often do you wash your hands before helping with cooking or food preparation?

- Never
- Sometimes
- Often
- Always

18. How often do you use hand sanitizer when soap and water are not available?

- Never
- Sometimes
- Often
- Always

Section E: Availability of Handwashing Facilities

19. Does your school have a handwashing station?

- Yes
- No
- I don't know

20. Is soap usually available at the handwashing station?

- Yes

- No
- Sometimes

21. Is water available at the handwashing station?

- Yes
- No
- Sometimes

22. Are there posters or signs at school showing how to wash hands properly?

- Yes
- No
- I don't know

23. Does your teacher teach you how to wash your hands properly?

- Yes
- No
- I don't remember

Appendix 2: Approval form Ghana Education Service

	GHANA EDUCATION SERVICE	P. O. BOX 49 ODUMASE - KROBO Digital Address: EL-0315-9671 In case of reply the number and code of this letter should be quoted Ref. No. GES/ER/LMKM:..... Date: 21st JANUARY, 2025
REPUBLIC OF GHANA	LOWER MANYA KROBO MUNICIPAL	

**EMMANUEL KPONYO KWASI
ESIGN GLOBAL UNIVERSITY
KPONG**

**RE-PERMISSION TO CONDUCT A RESEARCH IN BASIC SCHOOLS
WITHIN THE LOWER MANYA KROBO MUNICIPAL**

You have been granted permission to conduct your research on the topic: **"Handwashing Knowledge and Practices Amongst Basic School Children in the Lower Manya Krobo Municipality, Eastern Region – Ghana."**

Kindly ensure that you follow all standard ethical practices during your research activities in the school.

Should you encounter any challenge with regards to your engagements with the schools, please contact Mr. Evans Tamatey on **0246414166** for assistance.

We look forward to knowing your findings and recommendations.

Thank you.


.....
MR. SAMUEL KWESI TETTEY
MUNICIPAL DIRECTOR OF EDUCATION
LOWER MANYA KROBO
MUNICIPAL DIRECTOR
GHANA EDUCATION SERVICE
LOWER MANYA KROBO
ODUMASE - KROBO

Cc:
• All Heads of Basic Schools, LMKM
• File

Appendix 3: Ethical clearance



OUR REF: ENSIGN/IRB/EL/SN-346/01
YOUR REF:

October 10, 2025.

INSTITUTIONAL REVIEW BOARD SECRETARIAT

Emmanuel Kwasi Kponyo
Ensign Global University
Kpong.

Dear Emmanuel,

ETHICAL CLEARANCE TO UNDERTAKE POSTGRADUATE RESEARCH

At the General Research Proposals Review Meeting of the *INSTITUTIONAL REVIEW BOARD (IRB)* of Ensign Global University held on Wednesday, October 8, 2025, your research proposal entitled "*Handwashing Knowledge and Practices Amongst Basic School Children in the Lower Manya Krobo Municipality*" was considered.

The following recommendation(s) and change(s) are to be effected in order for approval and ethical clearance to collect data for the said research under academic supervision.

- 1) Add the name of the region and country to the title of the study.
- 2) Indicate the title of the study in the questionnaire.
- 3) Provide signed permission letter from the Ghana Education Service and the Primary and Junior High Schools.
- 4) Indicate the title of the study in the questionnaire.
- 5) Provide contact in case of emergency.
- 6) Provide Parent's permission form.
- 7) Indicate where the data will be stored, the security of the location, and the duration the data will be kept as well as the appropriateness of the individuals who will have access to the data

We wish you all the best.

Sincerely

A handwritten signature in blue ink, appearing to read "Patrick Kuma".

Mr. Patrick Kuma

(Registrar/ IRB Administrator)

Appendix 4: Turnitin and Plagiarism Result

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4

Amha Admasie, Alemu Guluma, Fentaw Wassie Feleke. "Handwashing Practices and Its Predictors Among Primary School Children in Damote Woide District, South Ethiopia: A Institution Based Cross-Sectional Study", Environmental Health Insights, 2022

Publication

5

Submitted to Kwame Nkrumah University of Science and Technology

Student Paper

6

Submitted to Robert Kennedy College

Student Paper

7

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