ASSESSMENT OF COMMUNITY ACQUIRED INFECTIONS AMONG UNDERGRADUATE STUDENTS ACROSS HALLS OF RESIDENCE, IN THE UNIVERSITY OF BENIN.

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BENIN CITY, EDO STATE

MAY, 2026.

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BEING A ONE YEAR PROJECT PRESENTED TO THE DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, COLLEGE OF MEDICAL SCIENCES, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF MEDICINE AND BACHELOR OF SURGERY (MBBS) DEGREE IN THE UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA.

MAY, 2026

DECLARATION

I hereby declare that this research project titled "**ASSESSMENT OF COMMUNITY ACQUIRED INFECTIONS AMONG UNDERGRADUATE STUDENTS ACROSS HALLS OF RESIDENCE, IN THE UNIVERSITY OF BENIN.**" was carried out by **ENWEZOR OBIORA MACLEAN** with matriculation number **MED1807395** under the supervision of Professor A. I. Obi and has not been submitted anywhere else in part or full for the award of a degree or certificate.

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ENWEZOR OBIORA MACLEAN
MED1807395

CERTIFICATION

This is to certify that this research study titled "**ASSESSMENT OF COMMUNITY ACQUIRED INFECTIONS AMONG UNDERGRADUATE STUDENTS ACROSS HALLS OF RESIDENCE, IN THE UNIVERSITY OF BENIN."** was conducted by **ENWEZOR OBIORA MACLEAN** with matriculation number **MED1807395** under the supervision of **PROFESSOR A.I. OBI** in the Department of Public Health and Community Medicine, College of Medical Sciences, University of Benin as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) degree.

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DEDICATION

This project is dedicated to God Almighty, the supreme protector under who's grace I have made it this far and also my mother Late (Mrs). Harriet Enwezor and father, Mr. Joseph Enwezor for the unconditional love, guidance and protection they have shown me over the years. I also dedicate this work to my siblings, Nelly, Pearl and Brenda for their unwavering belief in me.

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Above all, I bow in profound reverence to The Lord God, our Father who art in heaven. Every step of this journey has been guided by Your invisible hand, Your grace sustained me when my strength faltered, and to You, I return all the glory for carrying me through to the end.

I owe a deep debt of gratitude to the Department of Public Health and Community Medicine. The culture and discipline to achieve academic excellence was a cornerstone to the success of this work. To my extraordinary project supervisor, Prof. A. I. Obi, simply saying "thank you" feels inadequate. You nurtured my potential. Your meticulous attention to detail, your challenging yet encouraging words, and the generosity with which you shared your profound wisdom pushed me to a standard of excellence I didn't know I could reach.

To my sweet, irreplaceable mother, Late (Mrs.) Harriet Enwezor—my heart still aches for your physical presence, but your beautiful spirit remains my guiding light. Every word on these pages carries the echo and warmth of your love. I know you are watching from heaven with a proud smile. This is for you, Mummy; I will spend the rest of my life striving to make you proud.

To my first hero and strongest pillar, my father, Mr. Joseph Enwezor (Sir Enwezor the 1st). Papa, your sacrifices are the very bricks that paved my path to this moment. Your unshakeable belief in my dreams, your silent strength, and your endless provision have been the wind beneath my wings. Thank you for being my rock.

To my beautiful siblings—Nelly, Pearl, and Brenda—you are the heartbeat of my life. Thank you for the endless encouragement and the unconditional love that made my heavy days so much lighter.

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You have been my sanctuary away from home. Thank you for holding me up when I was exhausted, for the therapeutic laughter, and the victories we celebrated together.

I also extend my sincere appreciation to the Principal Officers and Distinguished Senators of the 39th Assembly, University of Benin. The leadership, solidarity, and profound sense of community we fostered together enriched my university experience beyond measure.

Finally, I take a moment to acknowledge myself. Through the intense exhaustion, the moments of self-doubt, and the overwhelming demands of this degree, I kept showing up. I am deeply thankful for my resilience, my grit, and my flat refusal to quit.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
CAI	Community-Acquired Infection
CAP	Community-Acquired Pneumonia
CI	Confidence Interval
ESBL	Extended-Spectrum Beta-Lactamase
GI	Gastrointestinal
HBM	Health Belief Model
IBM SPSS	International Business Machines Statistical Package for Social Sciences
IHR	International Health Regulations
IPC	Infection Prevention and Control
JMP	Joint Monitoring Programme
KAP	Knowledge, Attitude, and Practice
LMIC	Low- and Middle-Income Countries
MBBS	Bachelor of Medicine, Bachelor of Surgery
NPC	National Population Commission
NUC	National Universities Commission
OR	Odds Ratio
RTI	Respiratory Tract Infection
SD	Standard Deviation
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNIBEN	University of Benin
UTI	Urinary Tract Infection
WASH	Water, Sanitation, and Hygiene

WHO	World Health Organization
WHO/UNICEF JMP	World Health Organization/United Nations Children's Fund Joint Monitoring Programme

DEFINITION OF TERMS

Community-Acquired Infection (CAI): Any infection contracted outside of a healthcare facility, specifically in community settings such as homes, schools, workplaces, and residential institutions including university hostels. Community-acquired infections are distinguished from healthcare-associated infections, which develop within clinical settings during the course of medical care.

Conceptual Framework: A structured representation of the relationships between the variables in a research study, mapping the pathways through which determinants of health outcomes operate. In this study, the conceptual framework identifies individual cognitive and attitudinal determinants, structural and environmental determinants, and sociodemographic moderating variables as the three categories of factors that together determine infection outcomes in the university hostel setting.

Environmental Health: The branch of public health concerned with all aspects of the natural and built environment that may affect human health, including water quality, sanitation, housing conditions, waste management, and air quality within residential settings such as university halls of residence.

Good Hygiene Practices: A composite classification assigned to respondents who scored 70% or above on the 11-item hygiene practice scale adapted from the WHO/UNICEF Joint Monitoring Programme Core Questions on Water, Sanitation and Hygiene, indicating consistent performance of evidence-based hygiene behaviours relevant to infection prevention in communal settings.

Good Knowledge: A composite classification assigned to respondents who scored 70% or above on the 40-item knowledge assessment instrument covering the definition, causative agents, examples, routes of transmission, hostel risk factors, and prevention methods of community-acquired infections, consistent with the application of Bloom's criterion in KAP studies in Nigerian university settings.

Health Belief Model (HBM): A theoretical framework for explaining and predicting preventive health behaviour, originally developed by Rosenstock (1966) and elaborated by Becker (1974), that proposes that an individual's likelihood of adopting a health-protective behaviour is determined by perceived susceptibility to the health threat, perceived severity of its consequences, perceived benefits and barriers to the preventive action, cues to action, and self-efficacy.

Halls of Residence: University-owned or university-affiliated residential buildings that provide accommodation to enrolled undergraduate students, including the official halls of residence on the University of Benin Ugbowo Campus (Mary Slessor, Eghosa, Moremi, Eta Obi, Kuti, and Sarbah Halls) and the affiliated hostels in the surrounding hostel district.

Hygiene Practice: The regular performance of behaviours that reduce the risk of infection transmission, including handwashing at critical moments, consistent use of toilet facilities, avoidance of open defecation, non-sharing of personal items, food hygiene, environmental cleaning, and waste disposal. In this study, hygiene practice was operationalised through an 11-item scale adapted from the WHO/UNICEF JMP Core Questions on WASH.

Infection Prevalence: The proportion of respondents who reported experiencing at least one self-reported community-acquired infection from any of six categories (respiratory tract,

gastrointestinal, skin and soft tissue, urinary tract, eye, and malaria) in the six months preceding the survey date.

Knowledge, Attitude, and Practice (KAP) Survey: A quantitative research methodology employing validated instruments to assess cognitive knowledge of a health topic, attitudinal orientation towards preventive measures, and the actual adoption of those preventive behaviours. The KAP framework, endorsed by the World Health Organization, enables simultaneous identification of the cognitive, attitudinal, and behavioural gaps that public health interventions should target.

Positive Attitude: A composite classification assigned to respondents who scored 70% or above on the 12-item attitude instrument using binary appropriateness coding, indicating that the respondent's attitudinal orientation towards community-acquired infections and their prevention is favourable to the adoption of preventive behaviours.

Predictor Variable: An independent variable that is identified through multivariate logistic regression analysis as having a statistically significant independent association with an outcome variable after adjustment for all other variables in the model. In this study, predictors were identified for four outcomes: good knowledge, positive attitude, good hygiene practices, and presence of self-reported infection.

Self-Reported Infection: An infection reported by the respondent as having been experienced in the six months preceding the survey, based on self-identification of symptoms consistent with one or more of the six infection categories assessed in the study questionnaire. Self-reported infection is distinguished from microbiologically confirmed infection, which was not assessed in this study.

WASH: An acronym standing for Water, Sanitation, and Hygiene, encompassing the combined access to safe drinking water, adequate sanitation facilities, and hygienic practices required to prevent the transmission of infectious diseases in community and institutional settings.

ABSTRACT

Background:

Community-acquired infections (CAIs) are infections contracted outside healthcare facilities and constitute a significant source of morbidity among university students globally, particularly in environments characterized by overcrowding, shared sanitation facilities, poor ventilation, and inadequate hygiene infrastructure. In Nigeria, university halls of residence are defined by high population density and constrained living conditions, creating environments highly conducive to respiratory, gastrointestinal, skin, and vector-borne infection transmission. Despite this burden, comprehensive data on the knowledge, attitudes, hygiene practices, prevalence, treatment-seeking behaviour, and environmental determinants of community-acquired infections among hostel-resident undergraduate students in South-South Nigeria remain scarce.

Objective:

This study aimed to assess the knowledge and preventive measures of students regarding community-acquired infections, ascertain their attitudes towards infections and preventive measures, determine the prevalence and types of infections experienced, and identify risk factors influencing recurrence among undergraduate students residing in the halls of residence at the University of Benin, Benin City, Edo State, Nigeria.

Methods:

A descriptive cross-sectional study was conducted among undergraduate students residing in the official halls of residence and affiliated hostels at the University of Benin, Ugbowo Campus, Benin City, Edo State, Nigeria. A multistage sampling technique was employed. The minimum sample size of 436 was calculated using the Cochran formula with a design effect of 2.0, based on an estimated infection prevalence of 85% and a precision of 0.05. A

total of 487 respondents were enrolled, yielding a 100% response rate. Data were collected using a structured, self-administered questionnaire adapted from the WHO KAP Framework (Cronbach's α = 0.908 and 0.767 for knowledge and attitude respectively), the WHO/UNICEF JMP WASH indicators (α = 0.743 for hygiene practices), and a validated symptom-based infection history checklist for the six-month recall period. Data were entered and analysed using IBM SPSS version 27. Descriptive statistics were summarised as frequencies and percentages, while inferential analysis was conducted using chi-square tests, Fisher's exact test, and binary logistic regression to identify predictors of infection. Statistical significance was set at $p < 0.05$.

Results:

A total of 487 undergraduate students participated, with a mean age of 21.16 ± 2.68 years; 295 (60.6%) were female and 462 (94.9%) were Christian. Almost four in five respondents (378; 77.6%) were aware of community-acquired infections. Among aware respondents, more than four-fifths (326; 86.2%) had good knowledge, with a mean composite score of 33.18 out of 40. Islamic religion (OR = 0.101; 95% CI: 0.025–0.407; p = 0.001), 100 Level (OR = 0.203; p = 0.014), 200 Level (OR = 0.244; p = 0.007), and non-medical faculty membership (OR = 0.405; p = 0.023) were significant independent negative predictors of good knowledge. Nearly nineteen in twenty respondents (461; 94.7%) held positive attitudes; Islamic religion was the only significant independent predictor (OR = 0.098; 95% CI: 0.034–0.286; p < 0.001). About two-thirds (329; 67.6%) had good hygiene practices; Islamic religion (OR = 0.101; p < 0.001), 600 Level seniority (OR = 16.43; p = 0.009), and higher monthly allowance (OR = 1.554; p = 0.035) were significant independent predictors. The overall six-month infection prevalence was very high, with 418 (85.8%) reporting at least one infection. Respiratory tract infections were the most prevalent (87.1% of infected

respondents), followed by malaria (56.2%), gastrointestinal infections (48.6%), skin and soft tissue infections (32.5%), urinary tract infections (12.7%), and eye infections (6.9%). Male sex was the strongest independent predictor of lower infection odds (OR = 0.376; 95% CI: 0.207–0.681; p = 0.001), while frequent common area cleaning was the strongest independent environmental predictor (OR = 0.195; 95% CI: 0.057–0.666; p = 0.009). Among infected respondents, 368 (88.0%) sought treatment; purchasing drugs from a pharmacy was the most common action (53.3%). Good hygiene practices was the strongest independent predictor of early treatment-seeking (OR = 3.052; p = 0.009). Critical environmental deficits were documented: 80.1% reported no soap in hostel toilets, 90.1% had no access to hand sanitizer, and 72.5% described room ventilation as poor or very poor.

Conclusion:

The burden of community-acquired infections among undergraduate students in the University of Benin halls of residence is very high, with respiratory tract infections, malaria, and gastrointestinal infections predominating. Although awareness and positive attitudes toward prevention were near-universal, knowledge deficits among junior and non-medical students and structural deficiencies including absent soap, poor ventilation, and infrequent common area cleaning remained the dominant determinants of infection risk. Consistent with the Health Belief Model, high perceived barriers in the form of structurally deficient hostel infrastructure negated the protective potential of adequate knowledge and positive attitudes. Frequent common area cleaning was the strongest modifiable predictor of freedom from infection. University management, the Estates Department, Student Affairs Directorate, and Health Centre should implement coordinated interventions encompassing urgent hostel infrastructure upgrades, mandatory infection prevention curricula for non-medical faculties,

religion-sensitive health communication, and proactive student health outreach to substantially reduce the infection burden in the residential setting.

Keywords: Community-Acquired Infections, Undergraduate Students, Halls of Residence, University of Benin, Benin City, Knowledge, Attitude, Hygiene Practices, Prevalence, Health Belief Model.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Community-acquired infections (CAIs) are infections contracted in community settings outside of healthcare facilities. They rank among the leading causes of preventable morbidity and mortality worldwide, caused by bacteria, viruses, fungi, and parasites, and range from mild upper respiratory tract infections to life-threatening conditions such as pneumonia, sepsis, meningitis, and enteric fever. Globally, infectious diseases account for an estimated 15% of all deaths annually, with the burden falling disproportionately on low- and middle-income countries where access to clean water, sanitation, and healthcare remains inadequate.[1] Antimicrobial resistance has further complicated the picture, prolonging illnesses, raising healthcare costs, and causing treatment failures across multiple infection categories.[3] Population growth, increased urbanisation, and the emergence of novel pathogens continue to reshape the epidemiology of CAIs in ways that strain health systems ill-equipped to respond.[2]

In Africa, the burden is substantially higher than the global average. High population densities, poor access to safe water and sanitation, substandard housing, inadequate solid waste management, and a high prevalence of immunocompromising conditions such as HIV/AIDS and malnutrition amplify both the risk of infection and the severity of outcomes.[2] Respiratory tract infections, diarrhoeal diseases, and malaria remain the leading infectious causes of mortality across the continent, with young adults bearing a disproportionate share.[4,5] A prospective cohort study in South Africa from 2016 to 2018 found that roughly 37% of community-dwelling individuals contracted influenza or respiratory syncytial virus at least once per year in settings marked by household crowding and poor ventilation, confirming that communal living environments drive respiratory infection risk at the population level.[4]

Nigeria carries a particularly heavy burden. Respiratory tract infections are among the most frequent causes of outpatient consultation across all age groups.[5,6] A retrospective study at a tertiary hospital in Abuja identified community-acquired pneumonia as a leading cause of emergency admission, with higher case-fatality rates among patients who presented late or carried comorbidities.[6] A five-year retrospective study in rural South-Western Nigeria reported pneumonia case-fatality rates of up to 8.9%, driven by delayed presentation and absence of intensive care support.[5] Gastrointestinal infections, skin infections, urinary tract infections, and vector-borne diseases compound this burden further.[7] Diphtheria re-emerged in multiple Nigerian states between 2022 and 2023, with 798 confirmed cases across eight states by June 2023, illustrating how structural underinvestment in preventive infrastructure allows vaccine-preventable diseases to take hold.[8]

University students in halls of residence are a particularly vulnerable group. Nigerian university hostels are characterised by severe overcrowding, unreliable water supply, substandard toilet and bathroom facilities, poor ventilation, and inadequate sanitation services.[9,10] A study among 7,129 students at the University of Nigeria, Nsukka, found that overcrowding, water scarcity, and indiscriminate refuse disposal were the dominant drivers of poor hygiene practices.[9] At the University of Benin, a study of 7,360 students documented that 68% did not wash their hands regularly with soap and water, 52.5% did not use hostel toilet facilities consistently, and 98% reported urinating indiscriminately within or around hostel premises.[10] Both structural and behavioural determinants operate together in these settings. Knowledge, attitude, and practice (KAP) studies provide a validated framework for identifying the modifiable cognitive and behavioural targets that public health intervention can address.[1,11] Evidence from multiple contexts confirms that students may possess general awareness of infectious diseases while failing to translate that awareness into consistent preventive behaviour, constrained by attitudinal, social, and structural barriers.[12,13,2]

At the policy level, the prevention of community-acquired infections in Nigeria sits within a multi-level framework. The National Action Plan for Health Security 2022–2026, developed by the Federal Ministry of Health in alignment with the International Health Regulations, designates prevention and control of communicable diseases as a priority area and mandates strengthened surveillance systems.[39] The National Malaria Strategic Plan sets specific targets for reducing morbidity in high-burden zones including the South-South geopolitical zone where Benin City is located.[40] The WHO Global Guidelines on Infection Prevention and Control establish international minimum standards for hand hygiene, environmental cleaning, and waste management directly applicable to communal residential settings.[41] Nigerian federal universities are mandated under the Universities (Miscellaneous Provisions) Act to provide adequate and healthy accommodation for resident students. The documented deficits in soap availability, water supply, ventilation, and sanitation maintenance in UNIBEN hostels[9,10] represent a measurable gap between that statutory obligation and the lived experience of residential students, a gap this study seeks to quantify and address.

1.2 STATEMENT OF THE PROBLEM

Community-acquired infections among undergraduate students in Nigerian university hostels constitute a significant and inadequately characterised public health problem. Globally, infectious diseases contracted in community settings account for a major proportion of disability-adjusted life years lost among persons aged 15 to 34 years, the demographic group that makes up the bulk of Nigerian university populations.[2] Systematic surveillance data on the specific infection types, prevalence, and risk determinants in the university hostel setting are limited globally and are virtually absent for Nigerian federal universities outside the capital territory.[14,15]

Across Africa, and in Nigeria specifically, the pattern of community-acquired infections reflects both biological susceptibility and the structural conditions of the living environment. Overcrowding in university hostels forces students into sustained close physical contact that facilitates respiratory droplet transmission. Absent soap, poor toilet maintenance, and unreliable water supply undermine hand hygiene compliance regardless of individual knowledge or motivation.[9,10] Inadequate waste management and poor ventilation compound the risk of gastrointestinal and respiratory infections.[17] Neither the Nsukka study nor the UNIBEN sanitation study quantified the resulting infection burden or identified independent environmental predictors of infection using multivariate methods.[9,10]

At the individual level, knowledge and attitude gaps compound the structural risk. Research among clinical students in Nigerian teaching hospitals has found persistent deficits in actionable prevention knowledge even among those who score well on composite knowledge assessments.[14,15] Attitude studies have documented a widespread optimism bias in personal risk perception that reduces motivation to adopt preventive behaviours in daily hostel life.[18,16] When students with incomplete prevention knowledge and attitudinal gaps live in structurally

deficient hostel environments, the cumulative effect is a high infection prevalence that is both predictable and preventable.

No study at UNIBEN has simultaneously assessed knowledge of community-acquired infections and their prevention, attitudes towards preventive measures, the prevalence and types of infections experienced in the preceding six months, and the environmental and behavioural risk factors independently predicting infection recurrence. This study was undertaken to fill that gap, providing the evidence base for targeted institutional interventions.

1.3 JUSTIFICATION FOR THE STUDY

Comprehensive data on the burden, patterns, and determinants of community-acquired infections among hostel-resident undergraduate students in South-South Nigeria are scarce.[14,15] Existing Nigerian studies on student health have focused on single infection categories, single campuses, or specific knowledge domains, without examining the full spectrum of infection types, structural environmental determinants, and treatment-seeking behaviour in the same study.[19,2] The two studies conducted at UNIBEN itself were restricted to sanitation practices and did not measure infection outcomes.[9,10] This study addresses those gaps directly: it is the first at UNIBEN to integrate knowledge, attitude, hygiene practice, infection prevalence, treatment-seeking behaviour, and environmental risk factor data in the same population, using validated instruments and multivariate analysis.

For university administrators and student affairs offices, the findings will provide evidence to support investment in hostel infrastructure, targeted health education, and University Health Centre outreach. For state and federal policymakers, the study contributes to the evidence base for minimum infrastructure standards in university residential facilities as a student health protection measure. For the academic community, it fills a documented gap in the

KAP and infectious disease literature on Nigerian university hostel populations and offers a replicable methodological framework for similar studies elsewhere.

1.4 RESEARCH QUESTIONS

1. What is the level of knowledge of community-acquired infections and their preventive measures among undergraduate students in halls of residence at the University of Benin?
2. What is the attitude of undergraduate students towards community-acquired infections and preventive measures?
3. What is the prevalence and what are the types of community-acquired infections experienced by undergraduate students in the past six months?
4. What are the risk factors influencing the recurrence of community-acquired infections in the halls of residence?

1.5 STUDY OBJECTIVES

General Objective

To assess the knowledge, attitude, preventive measures, prevalence, risk factors, and student awareness of community-acquired infections among undergraduate students across halls of residence at the University of Benin, Benin City, Edo State, in order to provide empirical data for developing targeted public health interventions and improving student health outcomes.

Specific Objectives

1. To assess the knowledge and preventive measures of students regarding community-acquired infections within halls of residence.
2. To ascertain the attitudes of students towards community-acquired infections and their prevention.
3. To determine the prevalence and types of community-acquired infections within the study area.
4. To identify risk factors influencing the recurrence of community-acquired infections within the halls of residence.

CHAPTER TWO

LITERATURE REVIEW

2.1 BACKGROUND TO THE LITERATURE REVIEW

This chapter reviews literature relevant to community-acquired infections among undergraduate students in halls of residence, with particular emphasis on Nigerian and African settings. The review is organised to address each of the four specific study objectives: knowledge of community-acquired infections and their prevention, attitudes towards preventive measures, prevalence and types of community-acquired infections, and risk factors influencing recurrence. The chapter also presents the concept of community-acquired infection and its major categories, the policy framework governing infection prevention and control at global, regional, national, and institutional levels, the evaluation of instruments used for data collection, and the theoretical and conceptual frameworks underpinning the study.

Community-acquired infections constitute one of the most significant public health burdens in sub-Saharan Africa, where structural deficits in sanitation and water infrastructure, high population density, and limited access to healthcare continuously reproduce infection risk in community settings.[2,9,10] The university hostel represents a specific and high-risk community setting in this context, combining residential overcrowding, shared sanitation facilities, high interpersonal contact, and the behavioural patterns of late adolescence and early adulthood in ways that structurally amplify respiratory, gastrointestinal, skin, and vector-borne infection risk. Understanding community-acquired infections in this setting requires a framework that integrates individual-level cognitive determinants, which are knowledge, attitudes, and hygiene practices, with structural and environmental determinants including facility quality,

water availability, and sanitation maintenance. This dual-level approach is reflected in the study's theoretical and conceptual frameworks, instrument design, and analytical strategy.[1,21]

2.2 CONCEPT OF COMMUNITY-ACQUIRED INFECTION

A community-acquired infection is defined as any infection contracted outside of a healthcare facility, specifically in community settings such as homes, schools, workplaces, and residential institutions including university hostels.[1,2] The term distinguishes infections acquired in the community from healthcare-associated infections, which develop within clinical settings during the course of medical care. Community-acquired infections are caused by bacteria, viruses, fungi, and parasites, and are transmitted through respiratory droplets, contaminated food and water, direct skin-to-skin contact, sharing of personal items, vector bites, and contact with contaminated environmental surfaces.[1,3] The clinical spectrum is wide, ranging from mild presentations such as the common cold, conjunctivitis, and localised skin infections to severe and potentially life-threatening conditions including pneumonia, sepsis, meningitis, and enteric fever.[1,6] In communal living environments such as university hostels, the conditions of overcrowding and shared facilities create a setting where pathogen transmission is frequent and difficult to interrupt through individual behaviour alone.[9,10]

2.2.1 TYPES AND CATEGORIES OF COMMUNITY-ACQUIRED INFECTIONS

The major categories of community-acquired infections relevant to the university hostel setting are respiratory tract infections, gastrointestinal infections, skin and soft tissue infections, urinary tract infections, eye infections, and vector-borne infections, particularly malaria. Respiratory tract infections are the most prevalent category globally and in nigeria, encompassing upper respiratory tract infections such as the common cold, pharyngitis, and sinusitis, as well as lower respiratory tract infections including bronchitis and pneumonia.

Transmission occurs primarily through respiratory droplets, making poorly ventilated and overcrowded environments highly conducive to spread.[4,5,6]

Gastrointestinal infections include diarrhoeal diseases, cholera, typhoid fever, and food poisoning caused by pathogens such as salmonella typhi, escherichia coli, vibrio cholerae, and rotavirus. Transmission occurs through contaminated food and water, poor hand hygiene, and inadequate refuse disposal.[1,9] skin and soft tissue infections include fungal infections such as tinea corporis and tinea capitis and bacterial infections including impetigo, cellulitis, and scabies, transmitted through direct skin-to-skin contact and sharing of personal items such as towels, combs, and razors.[1,10] urinary tract infections are more common in female students and are associated with poor toilet hygiene, with causative organisms including escherichia coli, klebsiella pneumoniae, and extended-spectrum beta-lactamase-producing strains documented in community settings in nigeria.[3] eye infections, including bacterial and viral conjunctivitis, are transmitted through contact with contaminated surfaces and sharing of personal items.[1] malaria, caused by plasmodium falciparum, is transmitted by the anopheles mosquito and remains hyperendemic in benin city and the south-south geopolitical zone, where year-round high transmission intensity is sustained by the tropical climate and inadequate environmental vector control. The who estimated 68 million malaria cases and 194,000 deaths in nigeria in 2021, confirming the country as the highest malaria-burden nation globally.[7]

2.3 POLICY FRAMEWORK ON INFECTION PREVENTION AND CONTROL

The prevention and control of community-acquired infections is governed by policy frameworks operating at global, regional, national, and institutional levels that collectively define the standards for hand hygiene, environmental sanitation, water and waste management, vector control, and health education applicable to communal residential environments.[39,40,41]

At the global level, the World Health Organization occupies the central role in establishing policy standards for infection prevention and control. The WHO Global Guidelines on Infection Prevention and Control specify minimum standards for hand hygiene, environmental cleaning, waste management, and ventilation that are designed for adaptation to resource-limited settings.[41] The WHO also developed and validated the Knowledge, Attitude, and Practice (KAP) Survey Framework, which has been applied extensively across sub-Saharan Africa in communicable disease research and provides the methodological foundation for knowledge and attitude assessment in population-based studies.[1,11] The WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene provides the global reference standard for assessing hygiene behaviours in community settings through core questions on handwashing, toilet use, refuse disposal, and environmental cleaning that have been validated across sub-Saharan African community settings.[23]

At the regional level, the Africa Centres for Disease Control and Prevention and the African Union promote integrated approaches to communicable disease surveillance and infection prevention. Regional frameworks emphasise addressing the structural determinants of infection risk, including inadequate water and sanitation infrastructure, substandard housing, and vector control deficits, which are particularly pronounced in densely populated communal institutional settings.[2] The Africa CDC Integrated Disease Surveillance and Response framework provides guidance on detecting and responding to community-acquired infection clusters originating in institutional settings such as university hostels.

In Nigeria, the federal policy framework for infection prevention is anchored in the National Action Plan for Health Security 2022 to 2026, developed by the Federal Ministry of Health in alignment with International Health Regulations. This plan designates prevention and control of communicable diseases, including respiratory, gastrointestinal, and vector-borne

infections, as priority areas and mandates strengthened community surveillance systems and health workforce capacity for infectious disease detection and response.[39] The National Malaria Strategic Plan provides specific targets for reducing morbidity and mortality in high-burden zones, including the South-South geopolitical zone where Benin City is located.[40] Nigeria's recurrent diphtheria outbreaks, with 798 confirmed cases across eight states by June 2023, illustrate the public health consequence of sustained underinvestment in preventive infrastructure at the community level.[8]

At the institutional level, Nigerian federal universities are mandated under the Universities (Miscellaneous Provisions) Act to provide adequate and healthy accommodation for resident students, creating a statutory obligation to maintain hostel environmental health standards including functional sanitation facilities, reliable water supply, and adequate ventilation. Studies at UNIBEN have documented that 68% of hostel-resident students do not wash their hands regularly with soap and water and 98% report urinating indiscriminately within hostel premises, reflecting a persistent gap between statutory obligation and lived reality.[10]

2.4 EVALUATION OF INSTRUMENTS IN USE IN THE LITERATURE

Several validated instruments have been developed and applied across African and Nigerian settings to assess knowledge, attitudes, and practices related to community-acquired infections in student and community populations. The three instruments most relevant to this study are the WHO KAP Survey Framework, the WHO/UNICEF JMP Core Questions on Water, Sanitation and Hygiene, and symptom-based community-acquired infection surveillance checklists. These tools collectively address the cognitive, behavioural, and epidemiological dimensions of the four study objectives.[1,11,23]

The KAP Survey Framework, developed and championed by the World Health Organization, is the foundational methodological template for assessing the cognitive and attitudinal

determinants of health behaviour in population-based studies and has been applied extensively in sub-Saharan Africa across communicable disease contexts.[1,11] The framework uses binary scoring, where each correct or appropriate response is scored 1 and each incorrect or inappropriate response is scored 0, with Bloom's 70% criterion applied as the established threshold for classifying respondents as having good knowledge or a positive attitude.[22,11] The strengths of the KAP framework are its theoretical grounding in cognitive-behavioural models of health, its validation across Nigerian student populations, and the availability of precedent studies in comparable African university settings against which findings can be benchmarked.[14,15,16] Its primary limitation is that self-report knowledge and attitude data may be subject to social desirability bias, as respondents may answer in ways they perceive to be expected rather than accurately reporting their beliefs and behaviours.

The WHO/UNICEF JMP Core Questions on Water, Sanitation and Hygiene for Household Surveys provide a validated item pool covering eleven critical hygiene indicators including handwashing frequency and timing, toilet use, open defecation avoidance, refuse disposal, sharing of personal items, washing of fruits and vegetables, and environmental cleaning, all of which have been validated for use in community settings across sub-Saharan Africa.[23] The strength of the JMP instrument is its standardised, evidence-based operationalisation of hygiene behaviours, enabling comparison with WHO benchmark data. Its limitation is that it was originally designed for household settings and requires adaptation to the communal hostel context, which may affect the comparability of some item scores with household normative data.[23]

Symptom-based community-acquired infection surveillance tools validated for use in community and household studies in African populations cover major infection categories over a six-month recall period.[4,6,2] The six-month recall period is a validated approach for cross-sectional self-report of infection history in sub-Saharan African community populations

and has been applied in prospective household cohort studies in South Africa[4] and in retrospective community-acquired pneumonia studies in Nigeria.[5,6] The primary limitation of this approach is the absence of microbiological or clinical confirmation, which introduces the possibility of misclassification due to recall bias or incomplete symptom recognition, an inherent constraint of cross-sectional community prevalence studies conducted without laboratory confirmation facilities.[2,4,6]

2.5 THEORETICAL FRAMEWORK: THE HEALTH BELIEF MODEL

The theoretical framework for this study is the Health Belief Model (HBM), originally developed by Rosenstock in 1966 and subsequently elaborated by Becker and colleagues to explain and predict preventive health behaviour in response to perceived health threats.[42,35] The HBM proposes that the likelihood of adopting a preventive health behaviour is determined by six constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy.[21,42]

Perceived susceptibility refers to an individual's assessment of their personal risk of contracting the health threat. Perceived severity refers to beliefs about the seriousness of the consequences of the threat, including illness duration, complications, and social impact. Perceived benefits refer to the individual's belief that the recommended preventive action will reduce the risk or severity of the threat. Perceived barriers are the individual's assessment of the obstacles, whether structural, social, or psychological, that stand in the way of adopting the preventive behaviour.[21,42] Cues to action are stimuli, both internal such as symptoms and external such as health education campaigns, that trigger the individual to act on their health beliefs. Self-efficacy, added to the model by Bandura, refers to the individual's confidence in their capacity to successfully perform the preventive behaviour.[21,42]

The HBM has been applied extensively in communicable disease research in sub-Saharan Africa and has demonstrated consistent explanatory power in settings where structural barriers to preventive behaviour are pronounced.[2,19] In the context of university hostel populations, the model predicts that high perceived barriers, such as the absence of soap, unreliable water supply, and poorly maintained toilets, will reduce preventive behaviour even among students who possess adequate knowledge and positive attitudes. This prediction is supported by the broader literature on infection prevention in Nigerian communal settings, where structural deficits consistently override individual cognitive determinants as predictors of hygiene behaviour and infection outcomes.[9,10,14]

2.6 CONCEPTUAL FRAMEWORK

The conceptual framework for this study maps the pathways through which the determinants of community-acquired infections operate in the university hostel setting, grounded in the Health Belief Model.[21,42] The framework identifies three categories of determinants that converge to produce the study outcomes. The first is individual cognitive and attitudinal determinants, encompassing knowledge of community-acquired infections, attitudes towards preventive measures, and personal hygiene practices, which collectively establish whether a student knows what to do, is motivated to do it, and actually does it.[1,11,22] The second is structural and environmental determinants, encompassing toilet and bathroom cleanliness, water availability, ventilation quality, frequency of common area cleaning, waste bin adequacy, and availability of soap and hand sanitiser, which either enable or structurally constrain the preventive behaviours that knowledge and attitude would otherwise motivate.[9,10,23] The third is sociodemographic determinants, encompassing age, sex, religion, faculty, level of study, monthly allowance, duration of hostel stay, and hall of residence,

which function as moderating variables shaping both individual cognitive factors and structural exposure.[18,19]

The three categories converge to determine four outcomes: good or poor knowledge, positive or negative attitude, good or poor hygiene practices, and infection presence or absence in the preceding six months. The framework emphasises that structural enablement is the necessary condition for individual behaviour change to reduce infection risk, and that knowledge and positive attitudes alone are insufficient in the absence of a supportive physical environment.[9,10]

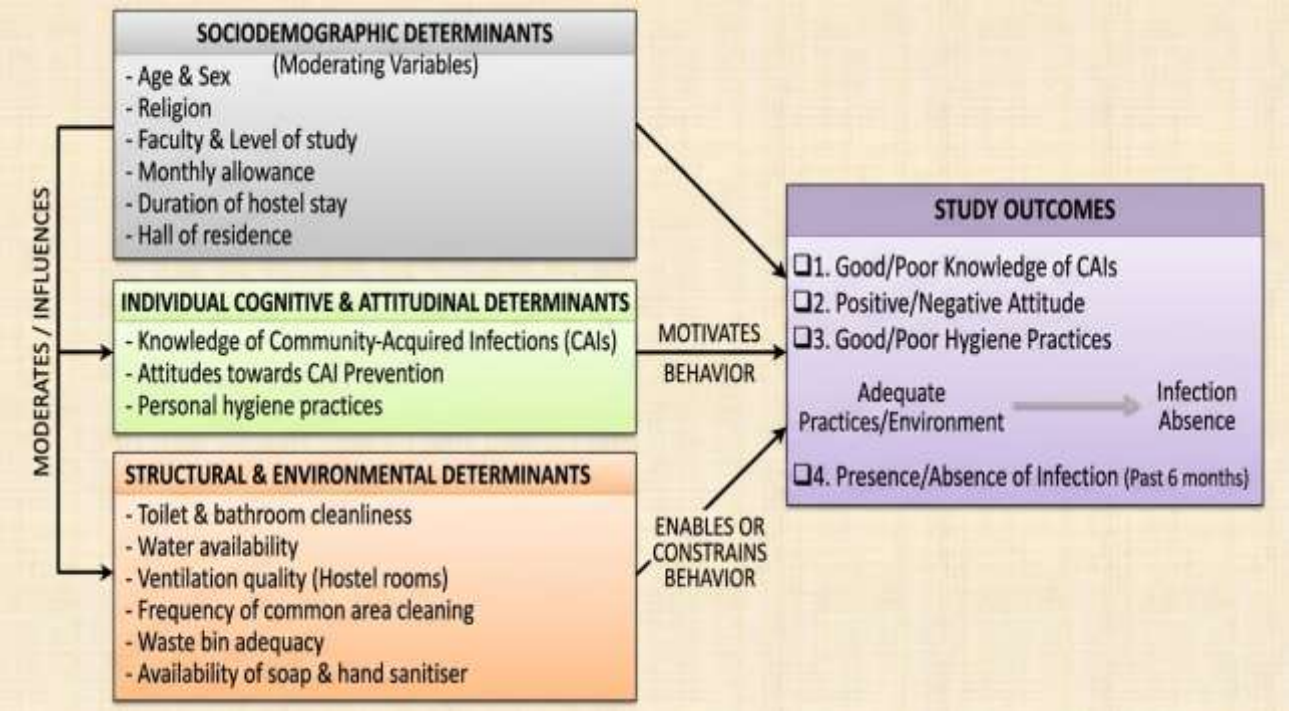

FIG 1. CONCEPTUAL FRAMEWORK FOR COMMUNITY ACQUIRED INFECTIONS

2.7 KNOWLEDGE OF COMMUNITY-ACQUIRED INFECTIONS AMONG UNIVERSITY STUDENTS

Knowledge of community-acquired infections and their prevention is widely documented as a prerequisite for adopting appropriate preventive behaviours, and the literature consistently finds that students possess varying degrees of general awareness of infectious diseases while the translation of that knowledge into consistent preventive practice remains limited by attitudinal, social, and structural barriers.[2,14,15,16]

Internationally, a randomised controlled study conducted in Gansu Province, China, among 2,002 primary, junior, and senior high school students, with data collected using structured questionnaires before and after an educational intervention, found that the intervention group achieved a knowledge accuracy rate of 72.23% compared to the control group, confirming that structured health education interventions produce measurable improvements in knowledge outcomes.[12]

In Africa, a cross-sectional study conducted at the University of Namibia among 162 health science students, with data collected using a structured self-administered questionnaire, found that medical students achieved a mean knowledge score of 73% compared to 66% for nursing students and 61% for radiography students, demonstrating significant disciplinary disparities in infection prevention knowledge.[13] Critically, only 24.1% of respondents correctly identified the environment as a major source of infection, confirming that item-level deficits in environmental transmission knowledge persist even in formally trained health science students.[13]

A sub-Saharan African scoping review conducted across fifteen countries, with data synthesised from studies assessing knowledge, attitude, perception, and preventive practices towards COVID-19 in community populations, found that composite knowledge scores were

generally adequate across settings but that actionable prevention knowledge and environmental transmission knowledge were consistently weaker subdomains across all contexts reviewed.[2]

In Nigeria, a study conducted among 219 clinical-year medical students at a teaching hospital in Jos, Plateau State, with data collected using a structured questionnaire, found that while 68.5% of respondents had overall good preventive practices, only 57.4% reported washing hands before invasive procedures and 45.7% never cleaned their stethoscopes, with over half citing unavailability of personal protective equipment as the primary barrier to compliance.[14]

A study conducted at a teaching hospital in Abakaliki among 221 medical students, with data collected through a self-administered questionnaire, found that while 96.4% had adequate overall knowledge of infections, only 68.3% had adequate knowledge of specific control measures, and 40% relied on senior colleagues rather than formal instruction as their primary knowledge source.[15]

A study conducted at the University of Ibadan among 239 clinical nursing and medical students, with data collected using a structured self-administered questionnaire, found that 91.6% had adequate infection control knowledge but 42.7% reported low compliance with preventive measures. Unavailability of gloves was cited by 87.4%, burden of handwashing by 74.9%, and time constraints by 74.1% of respondents as the dominant structural barriers constraining practice despite adequate knowledge.[16]

A study conducted among secondary school students in Maiduguri, Nigeria, with data collected through a cross-sectional survey, found that 85% demonstrated high susceptibility to community-acquired infections in communal settings, with knowledge gaps concentrated around specific transmission routes and individual prevention methods rather than general awareness of infection risk.[20]

In summary, the literature confirms that knowledge of community-acquired infections is generally adequate at the composite level in student populations but that actionable prevention knowledge and environmental transmission knowledge are consistently weaker, and that structural resource shortfalls override knowledge and attitudinal motivation in determining actual preventive behaviour.[14,15,2]

2.8 ATTITUDES TOWARDS COMMUNITY-ACQUIRED INFECTIONS AND PREVENTIVE MEASURES

Positive attitudes toward infection prevention are widely reported in student populations across Nigeria and sub-Saharan Africa, but an attitude-practice gap in which positive endorsement does not translate into consistent preventive behaviour is a well-documented and persistent feature of the literature.[2,14,15]

Internationally, a cross-sectional study conducted among 1,959 undergraduate and postgraduate students in the Kurdistan region of Iraq, with data collected through an online structured questionnaire, found that while 86.7% of respondents expressed confidence in outbreak control, only 57.3% reported wearing masks when leaving home, demonstrating a clear decoupling between population-level attitudinal endorsement and personal protective behaviour.[18]

In Africa, a cross-sectional study conducted in Cameroon among 1,006 participants, with data collected through structured interviewer-administered questionnaires during the exponential rise of the COVID-19 outbreak, found a positive health-seeking attitude in 69.0% of respondents but a lower practice score of 60.8%, with a significant proportion relying on traditional remedies and self-medication rather than formal healthcare.[24]

In Nigeria, a cross-sectional survey conducted among 1,268 students at a university in Ogun State, with data collected using a structured self-administered questionnaire, found that

88.2% believed the COVID-19 outbreak would be controlled but over half, at 52.1%, had visited crowded places despite widespread endorsement of protective measures, confirming the attitude-behaviour gap in Nigerian student populations across infection contexts.[25]

A KAP study conducted in Northern Nigeria among 400 respondents, with data collected through structured interviewer-administered questionnaires, found a mean positive attitude score of 71.4% and identified religious affiliation and education level as the most significant predictors of attitudinal outcomes, with Islamic religious affiliation associated with lower positive attitude scores.[19]

In summary, the literature confirms that positive attitudes toward infection prevention are near-universal in student populations but that specific attitudinal gaps around personal risk perception and acceptance of high-risk communal behaviours such as sharing of personal items are the dominant targets for intervention, and that religious affiliation and education level are the strongest independent predictors of attitudinal variation in the Nigerian context.[18,25,19]

2.9 PREVALENCE AND TYPES OF COMMUNITY-ACQUIRED INFECTIONS AMONG UNIVERSITY STUDENTS

Community-acquired infections impose a substantial and well-documented burden on youth and student populations globally, with respiratory infections consistently the most prevalent category across diverse settings.[4,6]

Internationally, a prospective household cohort study conducted in South Africa from 2016 to 2018, with data collected through active weekly household surveillance and laboratory confirmation among community-dwelling individuals, found that approximately 37% of individuals were infected with influenza or respiratory syncytial virus at least once annually

and that significant asymptomatic transmission occurred in settings characterised by household crowding and poor ventilation.[4]

A prospective cohort study conducted in South Africa from 2020 to 2021, with data collected through weekly active household surveillance over 13 months among households in rural and urban settings, found a SARS-CoV-2 household attack rate of 62.4% and identified household crowding as a key predictor of transmission, with 85.3% of infections occurring asymptomatically.[27]

In Nigeria, a retrospective study conducted at a tertiary care hospital in Abuja, with data collected from hospital records, identified community-acquired pneumonia as a leading cause of emergency admission with a case fatality rate of 8% and found that late presentation and the presence of comorbidities were the key predictors of mortality.[6]

A five-year retrospective observational study conducted in rural South-Western Nigeria, with data collected from patient records across the study period, reported a community-acquired pneumonia case fatality rate of 9.1% and identified delayed presentation and absence of intensive care support as the dominant predictors of death.[5]

A retrospective epidemiological study conducted at a university health centre in Nigeria, with data collected from medical records over a five-year period, found that upper respiratory tract infections were the most prevalent respiratory condition and identified female students as having significantly higher odds of respiratory illness consultation compared to males (aOR = 0.752, 95% CI: 0.648 to 0.855, p = 0.001).[26]

A laboratory study conducted in Abakaliki among healthy school children, with data collected through urine culture and sensitivity testing, found ESBL-producing Klebsiella pneumoniae urinary carriage in 16% of children with 17.7% demonstrating antimicrobial

resistance, confirming the presence of drug-resistant community-circulating organisms in Nigerian educational settings.[3]

In summary, respiratory tract infections are the most prevalent category of community-acquired infections in student and community populations, with malaria constituting a substantial additional burden in the South-South Nigerian context, and female sex and communal overcrowding consistently emerging as significant determinants of higher infection prevalence.[4,5,6,7,26]

2.10 RISK FACTORS INFLUENCING THE RECURRENCE OF COMMUNITY-ACQUIRED INFECTIONS IN HOSTEL SETTINGS

The evidence base on risk factors for community-acquired infections in communal student settings consistently identifies sanitation infrastructure, water availability, ventilation quality, and overcrowding as the dominant modifiable determinants of infection risk.[9,10,17]

Internationally, a study conducted among student dormitory residents in China, with data collected through structured student questionnaires and physical inspection of dormitory ventilation conditions, found that students in poorly ventilated rooms reported significantly higher incidence and longer duration of respiratory infections compared to those in well-ventilated rooms, and that ventilation rate was a significant independent predictor of infection risk.[17]

In Africa, a prospective household cohort study conducted in South Africa from 2016 to 2018, with data collected through active weekly household surveillance, found that approximately 37% of community-dwelling individuals were infected with influenza or respiratory syncytial virus at least once annually in settings characterised by household crowding and poor ventilation, confirming the role of communal living environments in amplifying respiratory infection risk at the population level.[4]

In Nigeria, a study conducted at the University of Nigeria, Nsukka, among 7,129 undergraduate students, with data collected through a structured questionnaire across halls of residence, identified overcrowding, water scarcity, and indiscriminate refuse disposal as the dominant structural drivers of poor hygiene practices in student halls of residence.[9]

A study conducted at the University of Benin among 7,360 undergraduate students, with data collected through a cross-sectional survey across halls of residence, found that 68% did not wash their hands regularly with soap and water, 52.5% did not use hostel toilet facilities consistently, and 98% reported urinating indiscriminately within or around hostel premises, establishing the structural and behavioural dimensions of infection risk in the UNIBEN hostel setting.[10]

In summary, the evidence reviewed in this chapter establishes that community-acquired infections in communal student settings are driven primarily by structural deficits in sanitation, water, and ventilation infrastructure, amplified by individual knowledge-practice gaps, and compounded by sociodemographic factors including religion, level of study, faculty, and socioeconomic status.[9,10,2]

CHAPTER THREE
METHODOLOGY

3.1 STUDY AREA

The study was conducted among undergraduate students residing in the halls of residence at the University of Benin (UNIBEN), Ugbowo Campus, Benin City, Edo State, Nigeria. Edo State is located in the South-South geopolitical zone, sharing boundaries with Kogi State to the north, Anambra State to the east, Delta State to the south, and Ondo State to the west, covering approximately 17,802 square kilometres with a population exceeding 4 million.[28]

Benin City, the state capital, lies between latitudes 6°06'N and 6°30'N and longitudes 5°30'E and 5°45'E, covering approximately 1,204 square kilometres with an estimated population of over 1.5 million across three local government areas: Oredo, Egor, and Ikpoba-Okha.[29]

The University of Benin (UNIBEN) is a federal university established by Decree No. 11 of 1970, formally inaugurated on 23 November 1970, and granted full university status by the National Universities Commission on 1 July 1971. Originally established as the Institute of Technology, the institution evolved into a fully comprehensive university and is today one of the foremost federal universities in Nigeria. With 15 faculties, 1 college, and 3 institutes spanning disciplines in Medicine, Law, Engineering, Sciences, Arts, and the Social Sciences, it hosts over 40,000 students across its Ugbowo and Ekehuan campuses.[30]

The official halls of residence at the Ugbowo Campus are Hall 1 (Queen Idia Hall), Hall 2 (Tinubu hall), Hall 3(Aminu Kano), Hall 4, Hall 5, and Hall 6. Halls 1, 2, 3, and 6 are designated female halls of residence, while Halls 4 and 5 accommodate male students. Four affiliated hostel facilities — NDDC Hostel, Keystone Hostel, Daisy Danjuma Hostel, and TETFUND Hostels (Blocks A, B, C, and D) were subsequently included to supplement enrolment. Among the affiliated hostels, Daisy Danjuma Hostel and TETFUND Hostels A,

B, and C accommodate female students, while NDDC Hostel, Keystone Hostel, and TETFUND Hostel D accommodate male students. These facilities are characterised by shared bathrooms, toilets, kitchens, and common areas. The high population density and communal living arrangements create an environment conducive to the transmission of community-acquired infections, making this an ideal study setting.

3.2 STUDY DESIGN

This study employed an analytical cross-sectional research design. This design was chosen because it allows for the simultaneous assessment of knowledge, attitudes, hygiene practices, and infection prevalence among undergraduate students at a defined point in time. Cross-sectional studies are particularly suitable for estimating the prevalence of health conditions and identifying associations between variables in a defined population.[31] This design has been successfully utilised in similar studies examining infectious disease burden and hygiene practices among student populations in Nigeria.[9,10]

3.3 STUDY DURATION

The study was conducted from December 2024 to May 2025.

3.4 STUDY POPULATION

The study population comprised all undergraduate students currently residing in the official halls of residence and affiliated hostels at the University of Benin, Ugbowo Campus. The target population included students across all nine faculties represented in the study (Medicine, Basic Medical Sciences, Pharmacy, Sciences, Engineering, Arts, Social Sciences, Education, and Law), all levels of study (100 to 600 Level), and both male and female accommodation facilities.

3.5 SELECTION CRITERIA

Inclusion Criteria

1. Registered full-time undergraduate students of the University of Benin.
2. Students currently residing in the official university halls of residence or affiliated hostels for at least one semester.
3. Students who provided written informed consent to participate in the study.

Exclusion Criteria

1. Students who were unwilling to participate or unable to provide informed consent.
2. Students who were acutely ill at the time of data collection.
3. Part-time and postgraduate students.
4. Students unavailable as at the time of the study

3.6 SAMPLE SIZE DETERMINATION

The minimum sample size was calculated using the Cochran formula for descriptive cross-sectional studies:[32]

$$n = Z^2pq / d^2$$

Where:

n = minimum sample size

Z = standard normal deviate at 95% confidence interval = 1.96

p = estimated prevalence of community-acquired infections

q = 1 − p

d = degree of precision = 0.05

The prevalence (p) was set at 0.85 based on findings from Musa and Dogo, who reported that 85% of secondary school students in Maiduguri demonstrated high susceptibility to community-acquired infections in communal living environments.[20]

p = 0.85, q = 0.15, d = 0.05, Z = 1.96

$$n = (1.96)2 \times 0.85 \times 0.15 / (0.05)2 = 195.9 \approx 196$$

Adjusting for a 10% non-response rate:

$$nf = 196 / (1 - 0.10) = 217.8 \approx 218$$

Applying a design effect of 2.0 to account for the multistage cluster sampling technique:

$$Adjusted\ sample\ size = 218 \times 2 = 436$$

The calculated sample size was 436 respondents. A total of 487 respondents were enrolled, exceeding the minimum requirement, with a 100% response rate.

3.7 SAMPLING TECHNIQUE

A multistage sampling technique was employed to ensure adequate representation across all residential facilities.

Stage 1: Selection of Campus

The University of Benin operates two campuses: the Ugbowo Campus and the Ekehuan Campus. This study was conducted exclusively at the Ugbowo Campus for three principal reasons. First, the Ugbowo Campus houses the overwhelming majority of the university's official halls of residence including six official halls and four affiliated hostel facilities making it the primary hub of student residential accommodation. The Ekehuan Campus operates only two formal university halls of residence for male and female, and students there largely reside off-campus or in privately managed accommodation, which falls outside the

scope of this study's interest in communal, institutionally managed living environments. Second, the Ugbowo Campus hosts the majority of the university's student population, including all medical, health sciences, engineering, sciences, arts, and social sciences faculties, ensuring a diverse and representative sampling frame. Third, the high population density and shared sanitation infrastructure at Ugbowo Campus are the very conditions hypothesised to facilitate community-acquired infection transmission, making it the more relevant and scientifically appropriate setting for this study.

Stage 2: Selection of Halls of Residence

All six official halls of residence at the Ugbowo Campus were included: Hall 1 (Ekenwan Hall), Hall 2 (Benson Okere Hall), Hall 3, Hall 4, Hall 5 (Queens Hall), and Hall 6. Four affiliated hostel facilities : NDDC Hostel, Keystone Hostel, Daisy Danjuma Hostel, and TETFUND Hostels (A/B/C/D) were subsequently included to achieve the required sample size, bringing the total number of residential facilities covered to ten. Female accommodation comprised Halls 1, 2, 3, and 6, Daisy Danjuma Hostel, and TETFUND Hostels A, B, and C. Male accommodation comprised Halls 4 and 5, NDDC Hostel, Keystone Hostel, and TETFUND Hostel D. Female halls comprise Hall 1, Hall 2, Hall 3, Hall 6, Daisy Danjuma Hostel, and TETFUND Hostels A, B, and C. Male halls comprise Hall 4, Hall 5 (Queens Hall), TETFUND Hostel D, NDDC Hostel, and Keystone Hostel.

Stage 3: Selection of Blocks/Wings

Within each hall of residence, blocks or wings were selected using simple random sampling by balloting, with the number selected proportionate to the size of the hall.

Stage 4: Selection of Rooms

Within each selected block, rooms were selected using systematic random sampling from a list of all occupied rooms, at regular intervals after a random start.

Stage 5: Selection of Respondents

The sample was distributed across halls using proportionate allocation based on estimated bed capacity. Within each selected room, all consenting eligible occupants were enrolled until the allocated sample for each hall was achieved. Where multiple eligible occupants were present, simple random sampling by balloting was used to select one respondent per room to avoid clustering effects.

3.8 DATA MANAGEMENT

3.8.1 Tools for Data Collection

Data were collected using a structured, self-administered questionnaire developed and adapted from validated instruments. The knowledge and attitude sections were adapted from the Knowledge, Attitudes, and Practices (KAP) framework widely used in infectious disease research.[1,11] The hygiene practices section was adapted from the WHO/UNICEF Joint Monitoring Programme (JMP) Core Questions on Water, Sanitation and Hygiene for Household Surveys.[23] The infection history section utilised a symptom-based checklist adapted from community-acquired infection surveillance tools.[4,6]

3.8.2 Sections of the Questionnaire

The questionnaire comprised six sections structured to address all study objectives:

Section A: Socio-demographic Characteristics

This section collected data on age, sex, religion, ethnicity, level of study, faculty, primary caregiver and their educational level, hall of residence, number of roommates, duration of stay in hostel, and monthly allowance.

Section B: Knowledge of Community-Acquired Infections

This section assessed understanding of community-acquired infections covering definitions, causative agents, examples, modes of transmission, hostel risk factors, prevention methods, and statement-based knowledge verification items. Items were presented as multiple-response questions and statement-verification items yielding a composite score out of 40.

Section C: Attitudes Towards the Prevention of Community-Acquired Infections

This section assessed beliefs and acceptance of preventive practices using 12 binary Agree/Disagree items covering hand hygiene, sanitation, health-seeking behaviour, and personal responsibility in infection prevention. One item regarding the acceptability of sharing personal items was reverse-scored, consistent with the binary scoring approach described in studies examining attitude assessment in Nigerian student populations[33] for attitude assessment in Nigerian student populations.

Section D: Prevalence Assessment of Community-Acquired Infections

Hygiene Practices: Eleven items assessed personal and environmental hygiene behaviours including handwashing frequency, critical handwashing moments, toilet use, open defecation, refuse disposal, sharing of personal items, washing of fruits and vegetables, room cleaning

frequency, bed sheet washing, and water storage. Items were adapted from the WHO/UNICEF JMP WASH behavioural indicators[23] and coded as Present (1) or Absent (0).

Infection History (Prevalence Outcome): Self-reported history of infections in the past six months was assessed across six categories: respiratory tract infections, gastrointestinal infections, skin and soft tissue infections, urinary tract infections, eye infections, and malaria, consistent with symptom-based community-acquired infection surveillance approaches.[4,6] The use of a six-month recall period for self-reported infection is well-supported in cross-sectional survey methodology and has been used in comparable population-based studies in Africa.[2] Respondents reporting at least one infection in any category were classified as Infection Present; those with no reported infections were classified as Infection Absent. This binary classification served as the primary prevalence outcome and the dependent variable in all bivariate and logistic regression analyses.

Section E: Types of Community-Acquired Infections Experienced

This section documented specific infection types experienced in the past six months, frequency of occurrence, symptoms, treatment-seeking behaviour, and treatment completion status.

Section F: Factors Influencing Recurrence of Community-Acquired Infections

This section explored environmental and behavioural factors within the hostel contributing to infection recurrence, including toilet and bathroom cleanliness, water availability, ventilation, frequency of common area cleaning, adequacy of waste disposal bins, and availability of soap and hand sanitizer. Responses were recorded as binary variables.

3.8.3 Method of Data Collection

Data collection was conducted over four weeks. Questionnaires were administered within the halls of residence in settings ensuring privacy and confidentiality. Trained research assistants

were deployed at each facility to distribute questionnaires, provide clarification, and collect completed forms. Average completion time was approximately 15 to 20 minutes.

3.8.4 Pretesting

A pretest was conducted among approximately 44 respondents (10% of the minimum sample) at Ambrose Alli University, Ekpoma, Edo State, to assess the clarity, flow, cultural appropriateness, and comprehensibility of the questionnaire items. Feedback was used to refine the instrument before the main data collection.

3.8.5 VALIDITY OF INSTRUMENT

Face and content validity of the questionnaire were assessed by two faculty members specialising in Public Health and Epidemiology at the Department of Public Health and Community Medicine, University of Benin. The reviewers evaluated each item for clarity, cultural appropriateness, relevance to the study objectives, and adequacy of coverage across all constructs of interest. Suggested modifications were incorporated before the instrument was finalised for pretesting.[1,11]

Content validity of the knowledge section was assessed by examining whether items adequately represented all six knowledge domains: definition of community-acquired infections, causative agents, examples, modes of transmission, hostel risk factors, and prevention methods. All six domains were confirmed to be proportionately represented in the composite 40-item score.

Construct validity was supported by the use of established, theoretically grounded source instruments: the KAP framework for the knowledge and attitude sections,[1,11] the WHO/UNICEF JMP WASH indicators for the hygiene practices section,[23] and validated symptom-based surveillance tools for the infection history section.[4,6] Each source instrument

has demonstrated construct validity across African settings, providing a strong foundation of construct validity for the adapted questionnaire.

Criterion-related validity was supported by the use of Bloom's 70% criterion as the established threshold for knowledge classification, which has been validated and applied consistently across KAP studies in Nigerian student populations, enabling meaningful comparison of findings with existing benchmarks.[22,11]

3.8.6 RELIABILITY OF INSTRUMENT

The reliability of each scoreable scale was assessed using Cronbach's alpha coefficient, a widely used measure of internal consistency. A minimum acceptable threshold of Cronbach's $\alpha \geq 0.70$ was applied, consistent with the standard used in KAP studies among Nigerian student populations.[33,22]

The knowledge scale, comprising 40 items across six knowledge domains, demonstrated excellent internal consistency (Cronbach's $\alpha = 0.908$), confirming that the items coherently measured a single underlying construct of community-acquired infection knowledge and that summing items to produce a composite score is methodologically justified.

The attitude scale, comprising 12 binary items, demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.767$), confirming that the items reliably measured a single attitudinal construct. The hygiene practices scale, comprising 11 items adapted from the WHO/UNICEF JMP WASH indicators, demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.743$), consistent with the acceptable alpha values reported in comparable hygiene practice studies in Nigerian university settings.[23,9]

These alpha values confirm that each scale functions reliably as an internally consistent instrument and that the composite scores derived from summing individual items are valid representations of each construct for the purpose of bivariate and multivariate analysis.

3.9 SCORING SYSTEM

Knowledge Assessment

Knowledge was assessed using a 40-item composite score derived from six item groups: definition awareness (1 item), causative agents (4 items), examples of CAI (9 items), transmission routes (5 items), hostel risk factors (8 items), prevention methods (7 items), and statement-based knowledge verification items (6 items). Each correctly selected option was scored 1 point and each incorrect or "don't know" response scored 0, yielding a maximum of 40 points. The instrument demonstrated good internal consistency (Cronbach's $\alpha = 0.908$). Only respondents who were aware of community-acquired infections (n = 378) were eligible for scoring. Scores were converted to percentages and respondents scoring ≥70% (≥28/40) were categorised as having Good Knowledge, and those scoring <70% (<28/40) as Poor Knowledge. The 70% threshold was applied in accordance with the widely used Bloom's cut-off criterion for classifying knowledge levels in KAP studies,[19] consistent with its application in similar KAP studies conducted in Nigeria.[1,11]

Attitude Assessment

Attitudes towards the prevention of community-acquired infections were assessed using 12 binary Agree/Disagree items. Each appropriate response was scored 1 point (Agree for positive items; Disagree for the reverse-scored item on sharing personal items), yielding a maximum of 12 points. The instrument demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.767$). The binary scoring approach was adopted following methods described in studies examining KAP outcomes in Nigerian student populations in which respondents answering appropriately on ≥75% of attitude items were classified as having a positive attitude. Applying this threshold to our 12-item scale yields a cut-off of ≥9/12 (75%).

Respondents scoring ≥9/12 were classified as having a Positive Attitude; those scoring <9/12 as Negative Attitude.

Hygiene Practices Assessment

Hygiene practices were assessed using 11 items adapted from the WHO/UNICEF JMP WASH behavioural indicators,[23] covering handwashing frequency, critical handwashing moments, toilet use, open defecation, refuse disposal, sharing of personal items, washing of fruits and vegetables, room cleaning, room cleaning frequency, bed sheet washing, and water storage. Each item was coded as Present (1) or Absent (0), yielding a maximum of 11 points. Respondents scoring ≥8/11 were classified as having Good Hygiene Practices; those scoring <8/11 as Poor, applying the ≥70% threshold consistent with Bloom's cut-off criteria.[19]

Infection History (Prevalence Outcome)

Self-reported infection history in the past six months was assessed across six categories: respiratory, gastrointestinal, skin and soft tissue, urinary tract, eye infections, and malaria, consistent with symptom-based definitions used in community-acquired infection surveillance.[4,6] The six-month recall period is a standard and validated approach in cross-sectional studies assessing self-reported illness in community and student populations in sub-Saharan Africa.[2] Respondents reporting at least one infection in any category were classified as Infection Present (n = 418, 85.8%); those with no reported infections as Infection Absent (n = 69, 14.2%). This binary classification constituted the primary prevalence outcome and dependent variable in all bivariate and logistic regression analyses.

Fig 2: Summary of scoring systems for all outcome variables

Variable	Scoring Method	Good / Present / Positive	Poor / Absent / Negative
Knowledge	Binary (0/1); % score	≥70% (≥28/40)	<70% (<28/40)
Attitude towards prevention of CAI	Binary Agree/Disagree	≥9/12 (Positive)	<9/12 (Negative)
Hygiene Practices	Binary (0/1); sum score	≥8/11 (Good)	<8/11 (Poor)
Infection History (Prevalence Outcome)	Categorical (yes/no per category)	≥1 infection in past 6 months (Present)	No infections reported (Absent)

3.10 DATA ANALYSIS

Data were analysed using IBM Statistical Package for the Social Sciences (SPSS) version 27. The following approaches were employed:

Descriptive Statistics

Frequencies, percentages, means, and standard deviations were used to summarise socio-demographic characteristics, knowledge scores, attitude scores, hygiene practice scores, infection prevalence, and Section F environmental variables.

Bivariate Analysis

Chi-square ($\chi 2$) tests were used to assess associations between categorical variables and each outcome. Fisher's Exact Test was applied where expected cell frequencies were less than 5. Statistical significance was set at $p < 0.05$.

Multivariate Analysis

Binary logistic regression was conducted to identify independent predictors of each outcome. All socio-demographic variables, hall of residence, duration of stay, faculty (Medical vs. Non-Medical faculties), and relevant Section F environmental variables were entered simultaneously into each model. Effect sizes were expressed as odds ratios (OR) with 95% confidence intervals (CI). Model fit was assessed using the Nagelkerke R2 statistic. Complete separation was handled by excluding the offending variable from the relevant model with appropriate footnoting. Statistical significance was set at $p < 0.050$ at 95% confidence interval.

3.11 DATA PRESENTATION

Results are presented using frequency distribution tables, contingency tables, pie charts, and narrative prose. Tables display socio-demographic characteristics, knowledge and attitude responses, hygiene practice items, infection types, bivariate associations, and logistic regression outputs. Pie charts provide visual representation of the distribution of knowledge, attitude, and hygiene practice categories, and infection prevalence.

3.12 ETHICAL CONSIDERATION

Institutional permission and ethical clearance were obtained from the Health Research Ethics Committee of the University of Benin Teaching Hospital (UBTH) **Ethical Clearance Number: ADM/E 22/A/VOL. VII/14865491272117**. Permission was also obtained from the Dean of Students Affairs and the Hall Wardens of each hall of residence and affiliated hostel.

Informed Consent

Informed consent was obtained from all participants after explaining the purpose, procedures, benefits, and voluntary nature of the study.

Confidentiality

All information provided by respondents was kept strictly confidential. Questionnaires were anonymous with no personal identifying information collected. Data were stored securely and accessible only to the research team.

Voluntary Participation

Participation was entirely voluntary, and respondents were free to withdraw at any time without penalty or prejudice to their accommodation status.

Beneficence and Non-maleficence

The study posed minimal risk to participants. Information on infection prevention and available health services at the university health centre was provided to all participants upon questionnaire completion.

3.13 STUDY LIMITATIONS

The following potential limitations were identified:

1. The study relied on self-reported data, which may introduce recall bias and social desirability bias. Respondents may have under-reported poor hygiene practices or over-reported infections. These biases were mitigated by assuring respondents of confidentiality and anonymity and by phrasing questions in a non-judgmental manner.
2. The cross-sectional design limits the ability to establish causal relationships between hygiene practices, environmental factors, and infection occurrence. All findings are interpreted as associations rather than causal effects.
3. Self-reported infection history without microbiological or clinical confirmation may lead to misclassification. The use of a symptom-based checklist across multiple

infection categories with a validated six-month recall period,[2] consistent with community-acquired infection surveillance methods,[4,6] was employed to improve the validity of prevalence estimates.

CHAPTER FOUR

RESULTS

A total of 487 respondents participated in this study, giving a 100% response rate. The results are presented in the following sections in line with the specific objectives of the study.

SECTION A: Socio-demographic characteristics of respondents

SECTION B: Knowledge of community-acquired infections

SECTION C: Attitude towards community-acquired infections and preventive measures

SECTION D: Prevalence of community-acquired infections

SECTION E: Types of community-acquired infections experienced

SECTION F: Risk factors influencing recurrence of community-acquired infections

SECTION A: Socio-demographic characteristics of respondents

Table 1: Socio-demographic characteristics of students in halls of residence (n = 487)

Variables	Frequency (n = 487)	Percent
Age group (years)		
<18 years	26	5.3
18–24 years	410	84.2
>25 years	51	10.5
Mean age (±SD)		21.16 ± 2.68 years
Sex		
Male	191	39.2
Female	296	60.8
Religion		
Christianity	462	94.9
Islam	16	3.3
Atheist/No Religion	7	1.4
African Traditional Religion	1	0.2
Ethnicity		
Bini/Edo	177	36.3
Esan	97	19.9
Igbo	87	17.9
Urhobo	46	9.4
Yoruba	39	8.0
Etsako	10	2.1
Cross River/	7	1.4
Afemai	6	1.2
Akoko-Edo	5	1.0
Ijaw	5	1.0
North	4	0.8
Owan	4	0.8
Level of study		
100 Level	42	8.6
200 Level	85	17.5
300 Level	154	31.6
400 Level	130	26.7
500 Level	45	9.2
600 Level	31	6.4
Primary caregiver		
Both parents	341	70.0
Father	57	11.7
Mother	57	11.7
Self-sponsored	17	3.5
Extended relatives	15	3.1
Education level of primary caregiver		
Tertiary	408	83.8
Secondary	59	12.1
Primary	9	1.8
Uneducated	3	0.6
Monthly allowance (Naira)		
≤₦50,000	261	53.6
>₦50,000	226	46.4
Hall of residence		
Hall 1 (Ekenwan Hall)	43	8.8
Hall 2 (Benson Okere Hall)	88	18.1
Hall 3	63	12.9
Hall 4	80	16.4
Hall 5 (Queens Hall)	46	9.4
Hall 6	65	13.3
NDDC Hostel	67	13.8
Keystone Hostel	19	3.9
Daisy Danjuma Hostel	10	2.1
TETFUND Hostels (A/B/C/D)	6	1.2
Number of roommates		
≤6 roommates	281	59.3
>6 roommates	195	41.1
Not reported	11	2.3
Duration of stay in hostel		
≤1 year	235	48.3
>1 year	252	51.7
Faculty		
Medicine	129	26.5
Arts	71	14.6
Basic Medical Sciences	68	14.0
Sciences	61	12.5
Pharmacy	44	9.0
Engineering	37	7.6
Social Sciences	32	6.6
Education	25	5.1
Law	20	4.1

The ages of respondents ranged from 16 to 37 years, with a mean age of 21.16 ± 2.68 years.

The largest proportion were within the 18–24 years age group, accounting for 410 (84.2%) of

respondents, followed by those aged above 25 years, 51 (10.5%), while the least proportion were aged below 18 years, 26 (5.3%).

There was a higher proportion of female respondents, 296 (60.8%), compared to males, 191 (39.2%). In terms of religion, the overwhelming majority identified as Christians, 462 (94.9%), while those of Islamic faith accounted for 16 (3.3%), Atheist/No religion for 7 (1.4%), and African Traditional Religion for 1 (0.2%).

Regarding ethnicity, Edo indigenes were the majority, 298 (61.2%), comprising Bini/Edo 175 (35.9%), Esan 97 (19.9%), Etsako 10 (2.1%), Akoko-Edo 4 (0.8%), Owan 3 (0.6%), and other Edo groups 9 (1.8%). The Igbo group, including Ika, Agbor, Igala, Igbanke, and Ikwerre, accounted for 87 (17.9%). Yoruba respondents constituted 39 (8.0%), while Urhobo/Delta respondents accounted for 46 (9.4%). For bivariate and multivariate analyses, ethnicity was dichotomised into Edo indigenes (n = 298, 61.2%) and Non-Edo indigenes (n = 189, 38.8%).

By level of study, the highest proportion were at 300 Level, 154 (31.6%), followed by 400 Level, 130 (26.7%), and 200 Level, 85 (17.5%). Those at 500 Level accounted for 45 (9.2%), 100 Level 42 (8.6%), and 600 Level 31 (6.4%). Concerning primary caregiver, both parents jointly served for 341 (70.0%). The majority of primary caregivers had attained tertiary education, 408 (83.8%). With regard to monthly allowance, 261 (53.6%) received ≤₦50,000 monthly, while 226 (46.4%) received above ₦50,000.

Regarding hall of residence, Hall 2 (Benson Okere Hall) had the highest representation, 88 (18.1%), followed by Hall 4, 80 (16.4%), and NDDC Hostel, 67 (13.8%). Concerning number of roommates, 281 (59.3%) had ≤6 roommates while 195 (41.1%) had more than 6 roommates. Regarding duration of hostel stay, 235 (48.3%) had resided for ≤1 year, while 252 (51.7%) had stayed for more than 1 year.

SECTION B: Knowledge of community-acquired infections

Table 2: Awareness and sources of information of CAIs of students in halls of residence (n = 487)

Variables	Frequency (n = 487)	Percent
Awareness of community-acquired infections		
Yes	378	77.6
No	109	22.4
Source of information (n = 378) *		
School/University lectures	261	69.0
Health talks/seminars	191	50.5
Social media	166	43.9
Healthcare workers	128	33.9
Friends/peers	94	24.9
Television/Radio	87	23.0
Family members	82	21.7

**Multiple responses; percentages exceed 100%*

Of the 487 respondents, 378 (77.6%) were aware of community-acquired infections, while 109 (22.4%) had not previously heard of the term. Among those who were aware, the most common source of information was school or university lectures, 261 (69.0%), followed by health talks or seminars, 191 (50.5%), social media, 166 (43.9%), and healthcare workers, 128 (33.9%). Friends or peers were cited by 94 (24.9%), television or radio by 87 (23.0%), and family members by 82 (21.7%).

Table 3: Knowledge responses of community-acquired infections amongst students in halls of residence (n = 378)

Knowledge Item / Response	Frequency (n = 378)	Percent (%)
Health education and training*		
Received health training on preventing community-acquired infections	154	40.7
Received health education on infection prevention in hostel	143	37.8
Definition of community-acquired infections		
Infections contracted outside healthcare settings like homes, schools, and hostels	447	118.3
Infections that only affect elderly people	18	4.8
Infections gotten only from hospitals	9	2.4
Infections that cannot be prevented	4	1.1
Causative agents of CAI*		
Bacteria	120	31.7
Viruses	78	20.6
Fungi	78	20.6
Parasites	65	17.2
All of the above	302	79.9
Examples of CAI *		
Skin infections (e.g. ringworm, scabies)	287	75.9
Common cold/flu	266	70.4
Cholera	246	65.1
Tuberculosis	238	63.0
Urinary tract infections	227	60.1
Diarrhea	212	56.1
Conjunctivitis (pink eye)	203	53.7
Typhoid fever	200	52.9
Malaria	147	38.9
Transmission routes of CAI*		
Contaminated hands	149	39.4
Droplets from coughing or sneezing	145	38.4
Contaminated food and water	143	37.8
Direct skin-to-skin contact	124	32.8
Sharing personal items (towels, combs, razors)	121	32.0
All of the above	297	78.6
Hostel risk factors for infection*		
Poor sanitation	353	93.4
Overcrowding	324	85.7
Indiscriminate waste disposal	321	84.9
Irregular cleaning	312	82.5
Sharing toilets and bathrooms	301	79.6
Poor ventilation	294	77.8
Inadequate water supply	292	77.2
Sharing eating utensils	245	64.8
Effective prevention methods*		
Regular handwashing	140	37.0
Using clean toilets	136	36.0
Avoiding sharing of personal items	123	32.5
Proper waste disposal	120	31.7
Drinking clean water	119	31.5
Seeking early medical treatment when sick	110	29.1
Eating properly cooked food	104	27.5
All of the above	319	84.4
Knowledge verification statements		
Handwashing with soap and water can prevent the spread of infections	362	95.8
Proper toilet hygiene can reduce the risk of getting infections	363	96.0
Sharing personal items like towels and combs can spread infections	349	92.3
Keeping your room and surroundings clean can help prevent infections	366	96.8
Covering your mouth and nose when coughing or sneezing can prevent spread of respiratory infections	370	97.9
Early treatment of infections can prevent complications and spread to others	371	98.1

**Multiple response question; each option is an independent response. $\alpha = 0.908$*

Of the 378 aware respondents, 143 (37.8%) had received health education on infection prevention in the hostel, and 155 (41.0%) had received specific health training on preventing

community-acquired infections. When asked to identify the correct definition, the majority correctly identified community-acquired infections as those contracted outside healthcare settings. Regarding causative agents, 302 (79.9%) selected all of the above, while bacteria were individually identified by 120 (31.7%), viruses and fungi by 78 (20.6%) each, and parasites by 65 (17.2%). Skin infections were the most frequently identified example, 287 (75.9%), followed by common cold/flu 266 (70.4%), cholera 246 (65.1%), and tuberculosis 238 (63.0%).

Regarding transmission routes, contaminated hands were identified by 149 (39.4%), droplets by 145 (38.4%), and contaminated food and water by 143 (37.8%), while 369 (97.6%) selected all of the above. Hostel risk factors were well recognised, with poor sanitation most frequently identified, 353 (93.4%), followed by overcrowding 324 (85.7%) and indiscriminate waste disposal 321 (84.9%). Prevention methods showed lower correct identification rates, ranging from 27.5% to 37.0%. True/false item correct response rates were uniformly high, ranging from 92.3% to 98.1%. The internal consistency of the 30-item knowledge scale was excellent (Cronbach's $\alpha = 0.908$).

Table 4: Correctness of responses to knowledge assessment items (n = 378)

Variables n = 378	Correctness of knowledge responses	
	Correct n (%)	Incorrect n (%)
Causative agents		
Bacteria	120 (31.7)	258 (68.3)
Viruses	78 (20.6)	300 (79.4)
Fungi	78 (20.6)	300 (79.4)
Parasites	65 (17.2)	313 (82.8)
Transmission routes		
Contaminated hands	149 (39.4)	229 (60.6)
Droplets from coughing or sneezing	145 (38.4)	233 (61.6)
Contaminated food and water	143 (37.8)	235 (62.2)
Direct skin-to-skin contact	124 (32.8)	254 (67.2)
Sharing personal items	121 (32.0)	257 (68.0)
Hostel risk factors		
Poor sanitation	353 (93.4)	25 (6.6)
Overcrowding	324 (85.7)	54 (14.3)
Indiscriminate waste disposal	321 (84.9)	57 (15.1)
Irregular cleaning	312 (82.5)	66 (17.5)
Sharing toilets/bathrooms	301 (79.6)	77 (20.4)
Poor ventilation	294 (77.8)	84 (22.2)
Inadequate water supply	292 (77.2)	86 (22.8)
Sharing eating utensils	245 (64.8)	133 (35.2)
Prevention methods		
Regular handwashing	140 (37.0)	238 (63.0)
Using clean toilets	136 (36.0)	242 (64.0)
Avoiding sharing personal items	123 (32.5)	255 (67.5)
Proper waste disposal	120 (31.7)	258 (68.3)
Drinking clean water	119 (31.5)	259 (68.5)
Seeking early medical treatment	110 (29.1)	268 (70.9)
Eating properly cooked food	104 (27.5)	274 (72.5)
Knowledge verification statements		
Handwashing with soap prevents spread	362 (95.8)	16 (4.2)
Proper toilet hygiene reduces risk	363 (96.0)	15 (4.0)
Sharing personal items spreads infections	349 (92.3)	29 (7.7)
Keeping room clean prevents infections	366 (96.8)	12 (3.2)
Covering mouth prevents respiratory spread	370 (97.9)	8 (2.1)
Early treatment prevents complications	371 (98.1)	7 (1.9)

**Multiple responses shown separately. $\alpha = 0.908$*

The highest correct response rates were recorded for the knowledge verification statements, with early treatment preventing complications at 371 (98.1%), covering the mouth preventing respiratory spread at 370 (97.9%), and keeping the room clean at 366 (96.8%). Among hostel risk factors, poor sanitation was the most correctly identified, 353 (93.4%). The lowest correct response rates were observed for causative agents — particularly parasites 65 (17.2%), fungi and viruses 78 (20.6%) each — and for eating properly cooked food 104 (27.5%) and seeking early medical treatment 110 (29.1%).

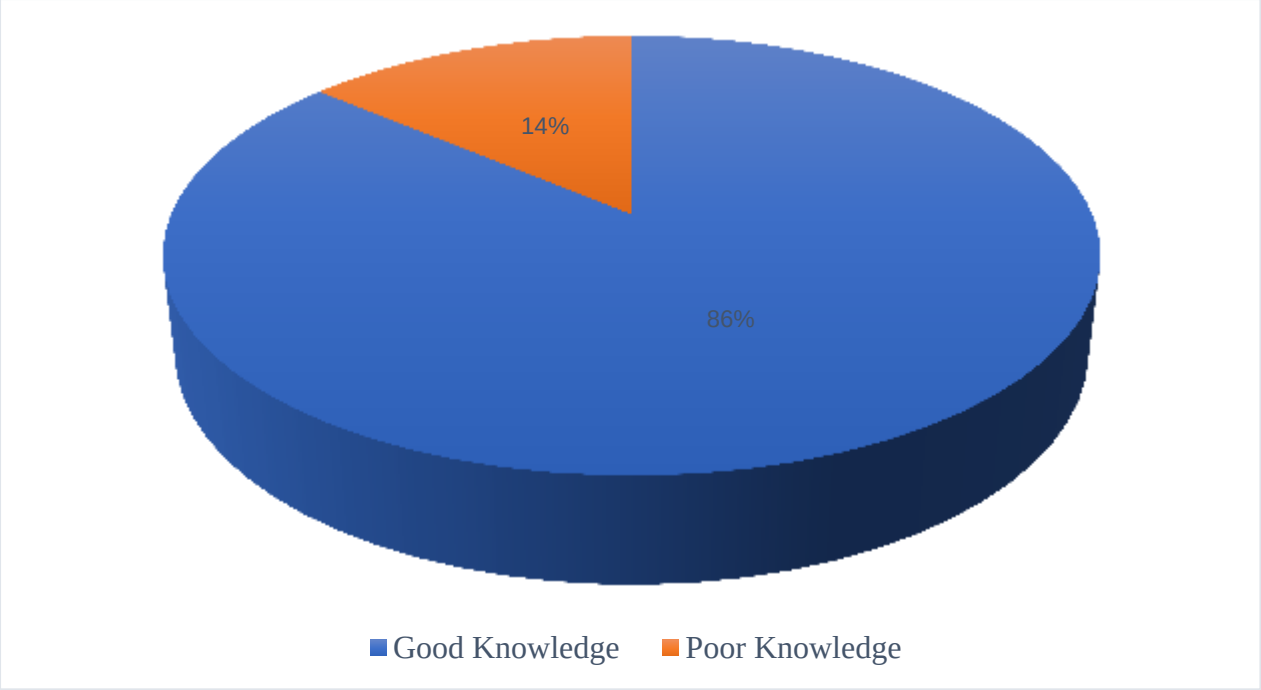

FIG 3: KNOWLEDGE OF COMMUNITY ACQUIRED INFECTIONS AMONG RESPONDENTS IN HALLS OF RESIDENCE

Among the 378 aware respondents, 326 (86.2%) demonstrated good knowledge, while 52 (13.8%) were classified as having poor knowledge, based on a composite score of ≥70% across all knowledge items. The mean composite knowledge score was 33.18 ± 6.49 out of a maximum possible score of 40 (Cronbach's $\alpha = 0.908$).

Table 5: Factors associated with sociodemographic characteristics and knowledge of community-acquired infections (n = 378)

Variables	Knowledge of CAI		Test Statistic	p-value
	Good (n = 326) (%)	Poor (n = 52) (%)	(χ2)	
Age group (years)				
<18 years	7 (50.0)	7 (50.0)	16.201	**<0.001**
18–24 years	282 (87.9)	39 (12.1)		
>25 years	37 (86.0)	6 (14.0)		
Sex				
Male	137 (87.8)	19 (12.2)	0.557	0.456
Female	189 (85.1)	33 (14.9)		
Religion				
Christianity	310 (87.1)	46 (12.9)	12.957*	**0.005**
Islam	7 (53.8)	6 (46.2)		
Others	8 (100.0)	0 (0.0)		
Ethnicity				
Edo indigenes	183 (84.7)	33 (15.3)	0.983	0.321
Non-Edo indigenes	143 (88.3)	19 (11.7)		
Level of study				
100 Level	25 (78.1)	7 (21.9)	15.664	**0.008**
200 Level	44 (74.6)	15 (25.4)		
300 Level	103 (91.2)	10 (8.8)		
400 Level	84 (84.0)	16 (16.0)		
500 Level	41 (95.3)	2 (4.7)		
600 Level	29 (93.5)	2 (6.5)		
Monthly allowance (Naira)				
≤₦50,000	164 (85.9)	27 (14.1)	0.047	0.829
>₦50,000	162 (86.6)	25 (13.4)		
Hall of residence				
Official Halls (1–6)	248 (84.9)	44 (15.1)	1.862	0.172
New/Affiliated Hostels	78 (90.7)	8 (9.3)		
Number of roommates				
≤6 roommates	196 (87.9)	27 (12.1)	1.909	0.167
>6 roommates	120 (82.8)	25 (17.2)		
Duration of stay in hostel				
≤1 year	149 (83.7)	29 (16.3)	1.823	0.177
>1 year	177 (88.5)	23 (11.5)		
Faculty				
Medical faculties	186 (90.7)	19 (9.3)	7.606	**0.006**
Non-Medical faculties	140 (80.9)	33 (19.1)		

*Bold = p < 0.05. *Fisher's Exact Test*

With respect to age group, good knowledge was present across all age categories; however, those aged below 18 years had the lowest proportion, 7 (50.0%), compared to 18–24 years, 282 (87.9%), and above 25 years, 37 (86.0%). The association was statistically significant (χ2 = 16.201, p < 0.001).

In terms of sex, good knowledge was slightly higher among males, 137 (87.8%), compared to females, 189 (85.1%); this was not statistically significant ($\chi2 = 0.557$, $p = 0.456$). Regarding religion, Christians had the highest proportion with good knowledge, 310 (87.1%), while Islamic respondents had the lowest, 7 (53.8%), and this association was statistically significant ($\chi2 = 12.957$, $p = 0.005$, Fisher's Exact Test). It is important to note, however, that the Islamic subsample was small (n = 13 among aware respondents), and caution should be exercised in interpreting this association, as the finding may be driven by small cell counts rather than a true effect of religion on knowledge. This association should therefore be interpreted descriptively and not generalised beyond this sample. Regarding ethnicity, good knowledge was slightly higher among Non-Edo indigenes, 143 (88.3%), compared to Edo indigenes, 183 (84.7%); this was not statistically significant ($\chi2 = 0.983$, $p = 0.321$).

Level of study was significantly associated with knowledge ($\chi2 = 15.664$, $p = 0.008$). Respondents at 500 Level had the highest proportion with good knowledge, 41 (95.3%), followed by 600 Level, 29 (93.5%), and 300 Level, 103 (91.2%), while the lowest proportions were at 200 Level, 44 (74.6%), and 100 Level, 25 (78.1%). Monthly allowance ($\chi2 = 0.047$, $p = 0.829$), hall of residence ($\chi2 = 1.862$, $p = 0.172$), number of roommates ($\chi2 = 1.909$, $p = 0.167$), and duration of stay ($\chi2 = 1.823$, $p = 0.177$) were not significantly associated.

Table 6: Predictors of good knowledge of community-acquired infections amongst students in halls of residence

Predictors	β	Odds ratio	95% CI		p-value
			Lower	Upper	
Age (years)	0.112	1.119	0.967	1.295	0.130
Sex					
*Female**		1			
Male	0.096	1.101	0.538	2.254	0.790
Religion					
*Christianity**		1			
Islam	-2.293	0.101	0.025	0.407	**0.001**
Ethnicity					
*Edo indigenes**		1			
Non-Edo indigenes	0.522	1.686	0.83	3.424	0.149
Level of study					
*300 Level**		1			
100 Level	-1.597	0.203	0.052	0.785	**0.014**
200 Level	-1.41	0.244	0.084	0.707	**0.007**
400 Level	-0.676	0.509	0.205	1.263	0.145
500 Level	0.403	1.496	0.295	7.583	0.632
Monthly allowance					
*≤₦50,000**		1			
>₦50,000	-0.362	0.696	0.348	1.393	0.294
Duration of stay in hostel					
*≤1 year**		1			
>1 year	-0.18	0.835	0.37	1.887	0.648
Hall of residence					
*Official halls 1–6**		1			
New/Affiliated hostel	0.289	1.335	0.51	3.498	0.551
Faculty					
*Medical faculties**		1			
Non-Medical faculties	-0.903	0.405	0.185	0.887	**0.023**

*CI = Confidence interval; OR = Odds ratio; *Reference category Nagelkerke R2 = 0.169 - 0.248*

Islamic religion was a significant negative predictor of good knowledge compared to Christianity (OR = 0.158, 95% CI = 0.042–0.594, p = 0.006), indicating substantially lower odds of good knowledge among Muslim respondents after adjustment. Compared with respondents at 300 Level, those at 200 Level (OR = 0.235, 95% CI = 0.092–0.600, p = 0.002) and 400 Level (OR = 0.411, 95% CI = 0.169–0.999, p = 0.050) had significantly lower odds of good knowledge. Age, sex, ethnicity, allowance, and 100 and 500 Level were not significant independent predictors.

SECTION C: Attitude towards community-acquired infections and preventive measures

Table 7: Attitudinal responses towards the prevention of community-acquired infections amongst students in halls of residence. (n = 487)

Variables	Agree n (%)	Neutral n (%)	Disagree n (%)
I am willing to practice good hygiene to prevent infections	468 (96.1)	16 (3.3)	3 (0.6)
The university should provide adequate sanitation facilities to prevent infections	467 (95.9)	12 (2.5)	8 (1.6)
I believe that infections can be prevented through proper hygiene practices	467 (95.9)	15 (3.1)	5 (1.0)
Handwashing with soap and water is important in preventing infections	459 (94.3)	24 (4.9)	4 (0.8)
Health education programs on infection prevention should be organised regularly in hostels	459 (94.3)	27 (5.5)	1 (0.2)
Overcrowding in hostels increases my risk of getting infections	455 (93.4)	24 (4.9)	8 (1.6)
It is my responsibility to keep my environment clean to prevent infections	446 (91.6)	36 (7.4)	5 (1.0)
I would seek medical attention early if I develop symptoms of an infection	442 (90.8)	39 (8.0)	6 (1.2)
Community-acquired infections are a serious health problem in university hostels	437 (89.7)	50 (10.3)	0 (0.0)
I would encourage my roommates to practice good hygiene	435 (89.3)	28 (5.7)	24 (4.9)
I think I am at risk of contracting infections while living in the hostel	353 (72.5)	85 (17.5)	49 (10.1)
Sharing personal items like towels and combs is acceptable among roommates (REVERSED)	126 (25.9)	56 (11.5)	305 (62.6)

Cronbach's $\alpha = 0.767$

The highest level of agreement was observed for willingness to practice good hygiene, 468 (96.1%), followed by support for university-provided sanitation, 467 (95.9%), and belief that infections can be prevented through hygiene, 467 (95.9%). Handwashing importance and health education programs were each endorsed by 459 (94.3%), while overcrowding as a risk was recognised by 455 (93.4%). For the reversed item on sharing personal items, 305 (62.6%) appropriately disagreed, while personal risk perception was endorsed by 353 (72.5%).

Table 8: Appropriateness of attitudinal statements of students in halls of residence(n = 487)

Variable	Appropriateness of attitudinal responses	
	Appropriate n (%)	Inappropriate n (%)
I am willing to practice good hygiene to prevent infections	468 (96.1)	19 (3.9)
The university should provide adequate sanitation facilities	467 (95.9)	20 (4.1)
I believe infections can be prevented through proper hygiene	467 (95.9)	20 (4.1)
Handwashing with soap and water is important in preventing infections	459 (94.3)	28 (5.7)
Health education programs should be organised regularly in hostels	459 (94.3)	28 (5.7)
Overcrowding increases my risk of getting infections	455 (93.4)	32 (6.6)
It is my responsibility to keep my environment clean	446 (91.6)	41 (8.4)
I would seek medical attention early if I develop symptoms	442 (90.8)	45 (9.2)
Community-acquired infections are a serious health problem in university hostels	437 (89.7)	50 (10.3)
I would encourage my roommates to practice good hygiene	435 (89.3)	52 (10.7)
I think I am at risk of contracting infections in the hostel	353 (72.5)	134 (27.5)
Sharing personal items is acceptable among roommates	305 (62.6)	182 (37.4)

The highest proportions of appropriate responses were for willingness to practice good hygiene, 468 (96.1%), support for university-provided sanitation, 467 (95.9%), and belief that infections can be prevented through hygiene, 467 (95.9%). The lowest appropriate response rate was for the reversed item on sharing personal items, 305 (62.6%), followed by personal risk perception, 353 (72.5%). The mean appropriate response rate across all 12 items was 88.3%.

Almost all respondents, 461 (94.7%), were classified as having a positive attitude towards community-acquired infections and preventive measures, while only 26 (5.3%) were classified as having a negative attitude. The mean attitude score was 10.66 ± 1.90 out of a maximum of 12

Table 9: Factors associated with attitude towards prevention of community-acquired infections

Variables	Attitude towards CAIs		Test Statistic	p-value
	Positive attitude n (%)	Negative attitude n (%)	($\chi 2$)	
Age group (years)				
<18 years	25 (96.2)	1 (3.8)	2.299*	0.317
18–24 years	390 (95.1)	20 (4.9)		
>25 years	46 (90.2)	5 (9.8)		
Sex				
Male	182 (95.3)	9 (4.7)	0.244	0.621
Female	279 (94.3)	17 (5.7)		
Religion				
Christianity	441 (95.5)	21 (4.5)	22.239*	**<0.001**
Islam	11 (68.8)	5 (31.3)		
Others	9 (100.0)	0 (0.0)		
Ethnicity				
Edo indigenes	278 (93.3)	20 (6.7)	2.863	0.091
Non-Edo indigenes	183 (96.8)	6 (3.2)		
Level of study				
100 Level	38 (90.5)	4 (9.5)	5.199*	0.392
200 Level	81 (95.3)	4 (4.7)		
300 Level	148 (96.1)	6 (3.9)		
400 Level	122 (93.8)	8 (6.2)		
500 Level	41 (91.1)	4 (8.9)		
600 Level	31 (100.0)	0 (0.0)		
Monthly allowance (Naira)				
≤₦50,000	251 (96.2)	10 (3.8)	2.529	0.112
>₦50,000	210 (92.9)	16 (7.1)		
Hall of residence				
Official Halls (1–6)	364 (94.5)	21 (5.5)	0.049	0.825
New/Affiliated Hostels	97 (95.1)	5 (4.9)		
Number of roommates				
≤6 roommates	264 (94.0)	17 (6.0)	0.459	0.498
>6 roommates	186 (95.4)	9 (4.6)		
Duration of stay in hostel				
≤1 year	221 (94.0)	14 (6.0)	0.344	0.558
>1 year	240 (95.2)	12 (4.8)		
Knowledge category				
Poor knowledge	43 (82.7)	9 (17.3)		**0.001**
Good knowledge	313 (96.0)	13 (4.0)		
Faculty				
Medical faculties	222 (92.1)	19 (7.9)	6.115	**0.013**
Non-Medical faculties	239 (97.2)	7 (2.8)		

*Bold = p < 0.05. *Fisher's Exact Test.*

With respect to age group, sex, ethnicity, level of study, monthly allowance, hall of residence, number of roommates, and duration of stay, none were statistically significantly associated with attitude. Regarding religion, Christians had the highest proportion of positive attitude,

441 (95.5%), compared to Islamic respondents, 11 (68.8%), and this association was statistically significant ($\chi 2 = 22.239$, $p < 0.001$, Fisher's Exact Test). Knowledge category was also significantly associated with attitude ($p = 0.001$, Fisher's Exact Test). Respondents with good knowledge had a higher proportion of positive attitude, 313 (96.0%), compared to those with poor knowledge, 43 (82.7%), confirming that greater knowledge is associated with more favourable attitudinal outcomes.

Table 10: Predictors of positive attitude towards prevention of community-acquired infections amongst students in halls of residence

Predictors	β	Odds ratio	95% CI		p-value
			Lower	Upper	
Age (years)	-0.103	0.902	0.757	1.074	0.244
Sex					
*Female**		1			
Male	0.414	1.513	0.574	3.988	0.398
Religion					
*Christianity**		1			
Islam	-2.318	0.098	0.034	0.286	<0.001
Ethnicity					
*Edo indigenes**		1			
Non-Edo indigenes	0.677	1.967	0.706	5.48	0.201
Monthly allowance					
*≤₦50,000**		1			
>₦50,000	-0.787	0.455	0.189	1.098	0.080
Duration of stay in hostel					
*≤1 year**		1			
>1 year	0.308	1.362	0.541	3.43	0.493
Hall of residence					
*Official halls 1–6**		1			
New/Affiliated hostel	0.57	1.768	0.576	5.421	0.326
Knowledge of CAI					
*Poor knowledge**		1			
Good knowledge	0.804	2.236	0.884	5.659	0.089
Faculty					
*Medical faculties**		1			
Non-Medical faculties	0.521	1.685	0.602	4.715	0.316

*CI = Confidence interval; OR = Odds ratio; *Reference category. Nagelkerke R2 = 0.146 – 0.240*

Islamic religion was a strong and significant negative predictor of positive attitude compared to Christianity (OR = 0.077, 95% CI = 0.021–0.276, $p < 0.001$). Good knowledge showed a positive but non-significant association with positive attitude (OR = 1.848, 95% CI = 0.793–4.306, $p = 0.155$). Age, sex, ethnicity, and allowance were not significant independent predictors.

SECTION D: Prevalence of community-acquired infections

Hygiene Practices

Table 11: Assessment of hygiene practice items amongst students in halls of residence (n = 487).

Hygiene practice items (n = 487)	Present n (%)	Absent n (%)
Cleans room	463 (95.1)	24 (4.9)
Washes fruits and vegetables before eating	457 (93.8)	30 (6.2)
Disposes refuse in waste bins provided	420 (86.2)	67 (13.8)
Washes bed sheets weekly/biweekly	413 (84.8)	74 (15.2)
Cleans room frequently (Daily/2–3 times per week)	368 (75.6)	119 (24.4)
Safe water storage method (Covered/Safe)	351 (72.1)	136 (27.9)
Washes hands at critical times (before eating, after using toilet)	344 (70.6)	143 (29.4)
Handwashing frequency (Always/Often)	339 (69.6)	148 (30.4)
No open defecation/urination	325 (66.7)	162 (33.3)
Does not share personal items with roommates	259 (53.2)	228 (46.8)
Uses hostel toilet facilities regularly (Always/Often)	249 (51.1)	238 (48.9)

Cronbach's $\alpha = 0.743$

Cleaning of the room was the highest-scoring item, 463 (95.1%), followed by washing fruits and vegetables before eating, 457 (93.8%). Washing of bed sheets was practiced by 413 (84.8%), and proper waste bin disposal by 420 (86.2%). Non-sharing of personal items was reported by 259 (53.2%), while regular hostel toilet use was the lowest-scoring item at 249 (51.1%).

Among the 487 respondents, 329 (67.6%) were classified as having good hygiene practices, while 158 (32.4%) had poor hygiene practices.

Table 12: Factors associated with hygiene practices of students in halls of residence

Variables	Hygiene Practices		Test Statistic	p-value
	Good hygiene n = 329 (%)	Poor hygiene n = 158 (%)	($\chi 2$)	
Age group (years)				
<18 years	17 (65.4)	9 (34.6)	3.845	0.146
18–24 years	275 (67.1)	135 (32.9)		
>25 years	37 (72.5)	14 (27.5)		
Sex				
Male	133 (69.6)	58 (30.4)	0.619	0.432
Female	196 (66.2)	100 (33.8)		
Religion				
Christianity	321 (69.5)	141 (30.5)	16.462*	**0.001**
Islam	4 (25.0)	12 (75.0)		
Others	4 (50.0)	4 (50.0)		
Ethnicity				
Edo indigenes	199 (66.8)	99 (33.2)	0.434	0.510
Non-Edo indigenes	130 (68.8)	59 (31.2)		
Level of study				
100 Level	23 (54.8)	19 (45.2)	16.025	**0.007**
200 Level	57 (67.1)	28 (32.9)		
300 Level	103 (66.9)	51 (33.1)		
400 Level	84 (64.6)	46 (35.4)		
500 Level	32 (71.1)	13 (28.9)		
600 Level	30 (96.8)	1 (3.2)		
Monthly allowance (Naira)				
≤₦50,000	163 (62.5)	98 (37.5)	6.686	**0.010**
>₦50,000	166 (73.5)	60 (26.5)		
Hall of residence				
Official Halls (1–6)	252 (65.5)	133 (34.5)	3.705	0.054
New/Affiliated Hostels	77 (75.5)	25 (24.5)		
Number of roommates				
≤6 roommates	199 (70.8)	82 (29.2)	3.899	**0.048**
>6 roommates	123 (63.1)	72 (36.9)		
Duration of stay in hostel				
≤1 year	153 (65.1)	82 (34.9)	2.878	0.090
>1 year	176 (69.8)	76 (30.2)		
Faculty				
Medical faculties	174 (72.2)	67 (27.8)	**4.692**	**0.030**
Non-Medical faculties	155 (63.0)	91 (37.0)		

*Bold = $p < 0.05$. *Fisher's Exact Test.*

Age group, sex, ethnicity, hall of residence, and duration of stay were not significantly associated with hygiene practices. Regarding religion, Christians had the highest proportion with good hygiene, 321 (69.5%), while Islamic respondents had the lowest, 4 (25.0%), and this was statistically significant ($\chi 2 = 16.462$, $p = 0.001$, Fisher's Exact Test). By level of

study, respondents at 600 Level had the highest proportion with good hygiene, 30 (96.8%), while the lowest was at 100 Level, 23 (54.8%), and this was statistically significant ($\chi2$ = 16.025, p = 0.007). Respondents receiving >₦50,000 had a higher proportion with good hygiene, 166 (73.5%), compared to ≤₦50,000, 163 (62.5%), and this was statistically significant ($\chi2$ = 6.686, p = 0.010). Regarding number of roommates, those with ≤6 had a higher proportion with good hygiene, 199 (70.8%), compared to those with >6, 123 (63.1%), and this was statistically significant ($\chi2$ = 3.899, p = 0.048).

Table 13: Predictors of good hygiene practices amongst students in halls of residence

Predictors	β	Odds ratio	95% CI		p-value
			Lower	Upper	
Age (years)	-0.083	0.92	0.842	1.007	0.070
Sex					
*Female**		1			
Male	0.29	1.336	0.864	2.063	0.192
Religion					
*Christianity**		1			
Islam	-2.292	0.101	0.029	0.356	**<0.001**
Ethnicity					
*Edo indigenes**		1			
Non-Edo indigenes	0.041	1.042	0.679	1.6	0.849
Level of study					
*300 Level**		1			
100 Level	-0.543	0.581	0.27	1.252	0.166
200 Level	-0.031	0.969	0.518	1.812	0.922
400 Level	0.125	1.133	0.659	1.949	0.652
500 Level	0.321	1.379	0.624	3.048	0.428
600 Level	2.799	16.43	1.987	135.876	**0.009**
Monthly allowance					
*≤₦50,000**		1			
>₦50,000	0.407	1.502	0.993	2.272	0.054
Duration of stay in hostel					
*≤1 year**		1			
>1 year	0.175	1.191	0.763	1.86	0.442
Hall of residence					
*Official halls 1–6**		1			
New/Affiliated hostel	0.054	1.056	0.597	1.87	0.850
Faculty					
*Medical faculties**		1			
Non-Medical faculties	-0.334	0.716	0.464	1.106	0.132

*CI = Confidence interval; OR = Odds ratio; *Reference category Nagelkerke R2 = 0.127..*

Increasing age was a significant negative predictor of good hygiene (OR = 0.914, 95% CI = 0.837–0.999, p = 0.048). Islamic religion was a strong negative predictor compared to Christianity (OR = 0.113, 95% CI = 0.032–0.392, p < 0.001). Respondents at 600 Level had significantly higher odds of good hygiene compared to 300 Level (OR = 20.288, 95% CI = 2.519–163.437, p = 0.005). Higher monthly allowance was also a significant positive predictor (OR = 1.554, 95% CI = 1.032–2.339, p = 0.035). Sex, ethnicity, and other levels of study were not significant independent predictors.

Infection History

Table 14: Prevalence of self-reported infection history in the past 6 months amongst students in halls of residence

Variables	Frequency	Percent (%)
Infection history in the past 6 months (n = 487)		
At least one infection present	418	85.8
No infection	69	14.2
Infection type (among infected, n = 418)		
Respiratory tract infection	364	87.1
Malaria	235	56.2
Gastrointestinal infections	203	48.6
Skin and soft tissue infections	136	32.5
Urinary tract infections	53	12.7
Eye infections	29	6.9
Infection frequency (among infected, n = 418)		
Once	252	60.3
Twice	104	24.9
Three times	37	8.9
More than three times	25	6.0

$\alpha = 0.743$

The overall prevalence of at least one infection in the past 6 months (infection history) was 418 (85.8%), while 69 (14.2%) reported no infections. Among those with infections, 252 (60.3%) experienced them once, 104 (24.9%) twice, and 62 (14.8%) three or more times. Hostel-related community-acquired infection, defined as the co-occurrence of poor hygiene and at least one infection, was present in 138 (28.3%) of all respondents.

Respiratory tract infections were the most prevalent, with 364 respondents (74.7%) reporting at least one respiratory infection in the past six months. Malaria followed closely, affecting 235 respondents (48.3%). Gastrointestinal infections were reported by 203 respondents (41.7%), while skin and soft tissue infections were present in 136 respondents (27.9%). Urinary tract infections were less common, reported by 53 respondents (10.9%), and eye infections were the least frequently reported, affecting 29 respondents (6.0%).

Among respiratory infections, cough was the most commonly reported, 252 (51.7%), followed by common cold, 237 (48.7%), and sore throat, 192 (39.4%). For gastrointestinal infections, diarrhea was most prevalent, 126 (25.9%), followed by food poisoning, 66 (13.6%). Skin rashes were the most common skin/soft tissue infection, 104 (21.4%). Malaria was highly prevalent, affecting 235 (48.3%) of respondents.

Table 15: Factors associated with presence of self-reported community-acquired infection amongst students in halls of residence

Variables	Self-reported CAI		Test Statistic	p-value
	Infection Present n (%)	Infection Absent n (%)	($\chi 2$)	
Age group (years)				
<18 years	24 (92.3)	2 (7.7)	6.608	**0.037**
18–24 years	356 (86.8)	54 (13.2)		
>25 years	38 (74.5)	13 (25.5)		
Sex				
Male	153 (80.1)	38 (19.9)	8.475	**0.004**
Female	265 (89.5)	31 (10.5)		
Religion				
Christianity	393 (85.1)	69 (14.9)	4.178*	0.243
Islam	16 (100.0)	0 (0.0)		
Others	9 (100.0)	0 (0.0)		
Ethnicity				
Edo indigenes	253 (84.9)	45 (15.1)	0.549	0.459
Non-Edo indigenes	165 (87.3)	24 (12.7)		
Level of study				
100 Level	31 (73.8)	11 (26.2)	10.747	0.057
200 Level	69 (81.2)	16 (18.8)		
300 Level	141 (91.6)	13 (8.4)		
400 Level	111 (85.4)	19 (14.6)		
500 Level	39 (86.7)	6 (13.3)		
600 Level	27 (87.1)	4 (12.9)		
Monthly allowance (Naira)				
≤₦50,000	225 (86.2)	36 (13.8)	0.065	0.799
>₦50,000	193 (85.4)	33 (14.6)		
Hall of residence				
Official Halls (1–6)	334 (86.8)	51 (13.2)	1.284	0.257
New/Affiliated Hostels	84 (82.4)	18 (17.6)		
Number of roommates				
≤6 roommates	243 (86.5)	38 (13.5)	0.173	0.677
>6 roommates	166 (85.1)	29 (14.9)		
Duration of stay in hostel				
≤1 year	193 (82.1)	42 (17.9)	5.123	**0.024**
>1 year	225 (89.3)	27 (10.7)		
Faculty				
Medical faculties	204 (84.6)	37 (15.4)	0.550	0.458
Non-Medical faculties	214 (87.0)	32 (13.0)		
Condition of toilet/bathroom facilities				
Dirty	165 (92.2)	14 (7.8)	9.376	**0.002**
Clean	253 (82.1)	55 (17.9)		
Water availability				
Not reliably available	248 (89.5)	29 (10.5)	7.228	**0.007**
Available	170 (81.0)	40 (19.0)		
Ventilation in room				
Poor	313 (88.7)	40 (11.3)	8.490	**0.004**
Good	105 (78.4)	29 (21.6)		
Frequency of common area cleaning				
Infrequent	70 (95.9)	3 (4.1)	7.145	**0.008**
Frequent	348 (84.1)	66 (15.9)		
Adequate waste disposal bins				
No	119 (85.6)	20 (14.4)	0.008	0.930
Yes	299 (85.9)	49 (14.1)		
Ever avoided hostel toilet				
No	48 (80.0)	12 (20.0)	1.914	0.167
Yes	370 (86.7)	57 (13.3)		
Soap availability				
Not available	336 (86.2)	54 (13.8)	0.167	0.683
Available	82 (84.5)	15 (15.5)		
Access to hand sanitizer				
No	377 (85.9)	62 (14.1)	0.008	0.931
Yes	41 (85.4)	7 (14.6)		
Knowledge category				
Poor knowledge	46 (88.5)	6 (11.5)	0.372	0.542
Good knowledge	278 (85.3)	48 (14.7)		
Attitude category				
Negative attitude	21 (80.8)	5 (19.2)		0.395
Positive attitude	397 (86.1)	64 (13.9)		

*Bold = $p < 0.05$. *Fisher's Exact Test.*

Age group, sex, ethnicity, hall of residence, number of roommates, duration of stay, knowledge category, and attitude category were not significantly associated with hostel-related CAI. Regarding religion, Islamic respondents had a substantially higher proportion, 12 (75.0%), compared to Christians, 121 (26.2%), and this was statistically significant ($\chi2$ = 21.523, $p < 0.001$, Fisher's Exact Test). By level of study, those at 100 Level had the highest proportion, 16 (38.1%), while 600 Level had the lowest, 1 (3.2%), and this was statistically significant ($\chi2$ = 11.986, $p = 0.035$). Monthly allowance was significantly associated, with ≤₦50,000 showing a higher proportion, 86 (33.0%), compared to >₦50,000, 52 (23.0%), and this was statistically significant ($\chi2$ = 5.895, $p = 0.015$).

Table 16: Predictors of presence of self-reported community-acquired infection amongst students in halls of residence

Predictors	B	Odds ratio	95% CI		p-value
			Lower	Upper	
Age (years)	-0.099	0.906	0.813	1.009	0.088
Sex					
*Female**		1			
Male	-0.979	0.376	0.207	0.681	**0.001**
Ethnicity					
*Edo indigenes**		1			
Non-Edo indigenes	0.134	1.143	0.623	2.095	0.664
Level of study					
*300 Level**		1			
100 Level	-1.545	0.213	0.075	0.607	**0.004**
200 Level	-0.806	0.447	0.178	1.12	0.079
400 Level	-0.389	0.678	0.285	1.613	0.368
500 Level	-0.219	0.803	0.238	2.714	0.703
600 Level	0.549	1.73	0.395	7.575	0.451
Monthly allowance					
*≤₦50,000**		1			
>₦50,000	-0.093	0.911	0.499	1.664	0.757
Duration of stay in hostel					
*≤1 year**		1			
>1 year	0.343	1.409	0.76	2.614	0.276
Hall of residence					
*Official halls 1–6**		1			
New/Affiliated hostel	-0.207	0.813	0.398	1.661	0.581
Faculty					
*Medical faculties**		1			
Non-Medical faculties	0.284	1.329	0.706	2.503	0.385
Knowledge of CAI					
*Poor knowledge**		1			
Good knowledge	0.103	1.108	0.58	2.119	0.757
Attitude towards prevention of CAI					
*Negative attitude**		1			
Positive attitude	-0.068	0.934	0.274	3.185	0.911
Condition of toilet/bathroom facilities					
*Dirty**		1			
Clean	-0.696	0.499	0.247	1.008	0.053
Water availability					
*Not reliably available**		1			
Available	-0.419	0.658	0.363	1.193	0.177
Ventilation in room					
*Poor ventilation**		1			
Good ventilation	-0.379	0.685	0.353	1.327	0.250
Frequency of common area cleaning					
*Infrequent**		1			
Frequent	-1.635	0.195	0.057	0.666	**0.009**

*CI = Confidence interval; OR = Odds ratio; *Reference category, Nagelkerke R2 =0.190 – 0.285*

Every one-year increase in age was associated with lower odds of reporting infection, though this did not reach statistical significance after adjustment (OR = 0.908, 95% CI = 0.786–0.993, p = 0.096). Male sex was a significant protective factor, with male respondents having approximately 64% lower odds of reporting infection in the past six months compared to females (OR = 0.364, 95% CI = 0.196–0.676, p < 0.001). Ethnicity, monthly allowance, and duration of stay in the hostel were not significant independent predictors after adjustment.

Regarding level of study, respondents at 100 Level had significantly lower odds of infection compared to those at 300 Level (OR = 0.218, 95% CI = 0.071–0.667, p = 0.004), likely reflecting shorter cumulative hostel exposure among newer students rather than a true protective biological effect. Respondents at 200, 400, 500, and 600 Levels did not differ significantly from 300 Level after adjustment. Faculty of study, whether Medical or Non-Medical, was not a significant independent predictor of infection history (OR = 1.323, p = 0.388).

Good knowledge of CAI and positive attitude towards preventive measures were not significant independent predictors after adjustment (OR = 1.093, p = 0.803 and OR = 0.922, p = 0.896 respectively), indicating that awareness and attitude alone do not sufficiently reduce infection risk in the absence of a supportive physical environment.

Among the environmental variables from Section F, students in hostels with clean toilet and bathroom facilities had approximately 52% lower odds of infection compared to those with dirty facilities (OR = 0.485, 95% CI = 0.239–0.983, p = 0.040). Frequent cleaning of common areas was the strongest independent environmental predictor, with students in frequently cleaned hostels having approximately 80% lower odds of infection compared to those in infrequently cleaned hostels (OR = 0.203, 95% CI = 0.054–0.757, p = 0.011). Water availability, ventilation, and overcrowding perception were not significant independent

predictors after adjustment. Islam was excluded from the regression model due to complete separation, as all 16 Muslim respondents reported infection present.

SECTION E: Types of community-acquired infections experienced

Table 17: Symptoms experienced, treatment-seeking behaviour, and treatment completion amongst students in halls of residence

Variables	Frequency	Percent (%)
Symptoms experienced in the past 6 months (n = 418) *		
Headache	316	75.6
Fever	234	56.0
Loss of appetite	170	40.7
Nausea	144	34.4
Chills	138	33.0
Vomiting	77	18.4
Itchy eyes	71	17.0
Genital itch	59	14.1
Sought treatment (n = 418)		
Yes	368	88.0
No	50	12.0
Action taken when symptoms occurred (n = 368) *		
Bought drugs from pharmacy	196	53.3
Went to university health centre	97	26.4
Went to hospital/clinic outside university	71	19.3
Self-medicated at home	39	10.6
Used herbal/traditional remedies	9	2.4
Time to seek treatment (n = 368)		
Early (same day)	86	24.2
Late (after same day)	282	75.8
Completed prescribed treatment (n = 368)		
Yes	298	81.0
No	70	19.0

**Multiple response question; percentages exceed 100%*

Headache was the most commonly reported symptom among infected respondents, 316 (75.6%), followed by fever, 234 (56.0%), loss of appetite, 170 (40.7%), nausea, 144 (34.4%), chills, 138 (33.0%), vomiting, 77 (18.4%), itchy eyes, 71 (17.0%), and genital itch, 59 (14.1%). Among the 418 infected respondents, 368 (88.0%) sought treatment and 50 (12.0%) did not seek any treatment. Among those who sought treatment, purchasing drugs from a pharmacy was the most common action, 196 (53.3%), followed by visiting the university health centre, 97 (26.4%), attending an outside hospital or clinic, 71 (19.3%), self-medicating, 39 (10.6%), and using herbal remedies, 9 (2.4%). Of the 368 who sought treatment, 86 (23.4%) sought same-day treatment (early), while 282 (76.6%) sought

treatment later. Of those who sought treatment, 298 (81.0%) completed their prescribed treatment course, while 70 (19.0%) did not.

Having described the types, frequency, symptoms, treatment-seeking behaviour, and treatment completion status of infected respondents, bivariate and multivariate logistic regression analyses were undertaken to identify independent predictors of two key health-seeking outcomes: (1) Early treatment-seeking, defined as seeking treatment on the same day as symptom onset; and (2) treatment completion. Tables 18 and 19 present the bivariate associations, while Tables 20 and 21 present the independent predictors from the multivariate models.

Table 18: Factors associated with early treatment-seeking amongst students in halls of residence with self-reported infections (n = 368)

Variables	Treatment-seeking behaviour		Test statistic	p-value
	Early treatment n (%)	Late / no treatment n (%)	($\chi 2$)	
Age group (years)			9.751	**0.008***
<18 years	1 (5.6)	17 (94.4)		
18–24 years	83 (26.1)	235 (73.9)		
≥25 years	2 (6.2)	30 (93.8)		
Sex			3.454	0.063
Male	24 (17.6)	112 (82.4)		
Female	62 (26.7)	170 (73.3)		
Religion			2.993	**0.055***
Christianity	85 (24.5)	262 (75.5)		
Others	1 (5.0)	19 (95.0)		
Level of study			5.657	0.341
100 Level	4 (14.8)	23 (85.2)		
200 Level	19 (33.3)	38 (66.7)		
300 Level	28 (22.2)	98 (77.8)		
400 Level	21 (21.0)	79 (79.0)		
500 Level	10 (28.6)	25 (71.4)		
600 Level	4 (17.4)	19 (82.6)		
Monthly allowance			0.449	0.503
≤₦50,000	44 (21.8)	158 (78.2)		
>₦50,000	42 (25.3)	124 (74.7)		
Hall of residence			1.488	0.223
Official halls (1–6)	65 (21.9)	232 (78.1)		
Affiliated hostels	21 (29.6)	50 (70.4)		
Number of roommates			0.000	0.987
≤6 roommates	36 (24.3)	112 (75.7)		
>6 roommates	49 (23.7)	158 (76.3)		
Duration of stay			1.390	0.238
≤1 year	45 (26.5)	125 (73.5)		
>1 year	41 (20.7)	157 (79.3)		
Faculty			0.816	0.366
Medical faculties	42 (25.9)	120 (74.1)		
Non-Medical faculties	44 (21.4)	162 (78.6)		
Knowledge category			3.633	0.057
Good knowledge	65 (24.9)	196 (75.1)		
Poor knowledge	1 (4.5)	21 (95.5)		
Hygiene practices			17.607	**<0.001***
Good hygiene	76 (29.7)	180 (70.3)		
Poor hygiene	10 (8.9)	102 (91.1)		
Attitude category			0.000	**0.723***
Positive attitude	83 (23.2)	274 (76.8)		
Negative attitude	3 (27.3)	8 (72.7)		

*Bold = $p < 0.050$. *Fisher's Exact Test.*

Age group was significantly associated with early treatment-seeking ($\chi^2 = 8.691$, $p = 0.013$): those aged 20–22 years had the highest early treatment rate, 45 (28.0%), followed by those ≤19 years, 29 (26.1%), while those aged ≥23 years had the lowest, 12 (12.5%). Hygiene practices was the most strongly associated variable ($\chi^2 = 17.607$, $p < 0.001$), with 76 (29.7%) of those with good hygiene seeking early treatment compared to 10 (8.9%) with poor hygiene. Knowledge category was also significantly associated (Fisher's Exact, $p = 0.033$): 65 (24.9%) with good knowledge sought early treatment versus 1 (4.5%) with poor knowledge. Sex, religion, level of study, monthly allowance, hall of residence, number of roommates, duration of stay, faculty, and attitude were not significantly associated.

Table 19: Factors associated with treatment completion amongst students who sought treatment (n = 368)

Variables	Treatment		Test statistic	p-value
	Complete n (%)	Incomplete n (%)	(χ2)	
Age group (years)			5.154	0.076
<18 years	86 (77.5)	25 (22.5)		
18–24 years	131 (78.9)	35 (21.1)		
>25 years	81 (89.0)	10 (11.0)		
Sex			0.957	0.328
Male	115 (83.9)	22 (16.1)		
Female	183 (79.2)	48 (20.8)		
Level of study			18.296	**0.003**
100 Level	18 (64.3)	10 (35.7)		
200 Level	44 (72.1)	17 (27.9)		
300 Level	97 (80.2)	24 (19.8)		
400 Level	83 (83.0)	17 (17.0)		
500 Level	35 (100.0)	0 (0.0)		
600 Level	21 (91.3)	2 (8.7)		
Monthly allowance			0.850	0.357
≤₦50,000	158 (79.0)	42 (21.0)		
>₦50,000	140 (83.3)	28 (16.7)		
Hall of residence			4.086	0.043
Official halls (1–6)	234 (78.8)	63 (21.2)		
Affiliated hostels	64 (90.1)	7 (9.9)		
Number of roommates			0.597	0.440
≤6 roommates	161 (78.9)	43 (21.1)		
>6 roommates	125 (82.8)	26 (17.2)		
Duration of stay			7.615	**0.006**
≤1 year	126 (74.6)	43 (25.4)		
>1 year	172 (86.4)	27 (13.6)		
Faculty			0.429	0.512
Medical faculties	139 (82.7)	29 (17.3)		
Non-Medical faculties	159 (79.5)	41 (20.5)		
Knowledge category			N/A	**>0.999***
Good knowledge	211 (81.5)	48 (18.5)		
Poor knowledge	20 (80.0)	5 (20.0)		
Hygiene practices			10.286	**0.001**
Good hygiene	215 (85.7)	36 (14.3)		
Poor hygiene	83 (70.9)	34 (29.1)		

*Bold = p < 0.050. *Fisher's Exact Test.*

Level of study was the only variable significantly associated with treatment completion at the bivariate level ($\chi^2 = 18.296$, $p = 0.003$). Treatment completion increased consistently with advancing level of study, from 64.3% at 100 Level to 100.0% at 500 Level. Hall of residence was also significantly associated ($\chi^2 = 4.086$, $p = 0.043$), with respondents in affiliated hostels

having higher completion rates, 64 (90.1%), compared to those in official halls, 234 (78.8%). Duration of hostel stay was significantly associated ($\chi^2 = 7.615$, $p = 0.006$): respondents residing for more than one year had higher completion, 172 (86.4%), compared to those staying for one year or less, 126 (74.6%). Hygiene practices was significantly associated ($\chi^2 = 10.286$, $p = 0.001$), with good hygiene respondents completing treatment more often, 215 (85.7%), than those with poor hygiene, 83 (70.9%). Age, sex, allowance, faculty, number of roommates, knowledge, and attitude were not significantly associated.

Table 20: Predictors of early treatment-seeking amongst students in halls of residence

Predictors	β	Odds ratio	95% CI		p-value
			Lower	Upper	
Age group *					
<18 years		1			
18–24 years	-0.111	0.895	0.540	1.483	0.665
>25 years	-0.368	0.692	0.393	1.217	0.200
Sex (*)					
Female		1			
Male	-0.240	0.787	0.448	1.381	0.404
Religion (Others*)		1			
Christianity	1.223	3.399	1.186	9.744	***0.023**
Level of study (300 Level*)		1			
100 Level	-0.310	0.733	0.295	1.822	0.497
200 Level	-0.087	0.917	0.436	1.926	0.818
400 Level	0.221	1.247	0.625	2.490	0.530
500 Level	0.280	1.323	0.510	3.434	0.567
600 Level	-0.163	0.849	0.311	2.318	0.748
Monthly allowance (*)					
<#50,000		1			
>₦50,000	0.437	1.547	0.906	2.642	0.110
Duration of stay (*)					
<1 year		1			
>1 year	-0.757	0.469	0.259	0.850	***0.013**
Hall of residence (*)					
Official halls		1			
Affiliated hostels	0.152	1.164	0.598	2.265	0.655
Faculty (*)					
Medical faculties		1			
Non-Medical faculties	-0.732	0.481	0.266	0.871	***0.016**
Knowledge (*)					
Poor knowledge		1			
Good knowledge	-0.720	0.487	0.158	1.499	0.210
Hygiene practices (*)					
Poor hygiene		1			
Good hygiene	1.250	3.489	1.992	6.111	***<0.001**
Attitude (*)					
Negative attitude		1			
Positive attitude	0.474	1.606	0.385	6.707	0.516

*CI = Confidence interval; OR = Odds ratio; *Reference category. Nagelkerke R^2 = 0.185-0.289. †Religion excluded from Table 21 due to complete separation in non-Christian group.*

Good hygiene practices was the strongest independent predictor of early treatment-seeking (OR = 3.489, 95% CI = 1.992–6.111, p < 0.001), indicating that respondents with good hygiene practices had approximately 3.5 times higher odds of seeking early treatment compared to those with poor hygiene after adjustment. Christian religion was a significant

positive predictor compared to non-Christian respondents (OR = 3.399, 95% CI = 1.186–9.744, p = 0.023). Longer duration of hostel stay (more than one year) was a significant negative predictor (OR = 0.469, 95% CI = 0.259–0.850, p = 0.013), suggesting that longer-staying residents were less likely to seek early treatment. Belonging to Non-Medical faculties was also a significant negative predictor (OR = 0.481, 95% CI = 0.266–0.871, p = 0.016), indicating lower odds of early treatment-seeking compared to medical faculty students. Age, sex, level of study, allowance, hall of residence, knowledge, and attitude were not significant independent predictors after adjustment.

Table 21: Predictors of treatment completion amongst students who sought treatment

Predictors	β	Odds ratio	95% CI		p-value
			Lower	Upper	
Age group (*)					
<18 years		1			
18 - 24 years	0.046	1.047	0.555	1.975	0.889
>25 years	-0.170	0.844	0.371	1.919	0.684
Sex (*)					
Female		1			
Male	-0.695	0.499	0.240	1.038	0.063
Level of study (300 Level*)		1			
100 Level	-0.784	0.457	0.163	1.277	0.135
200 Level	-0.504	0.604	0.261	1.398	0.238
400 Level	0.200	1.222	0.531	2.810	0.638
500 Level	20.5	—	—	—	<0.001†
600 Level	1.138	3.120	0.604	16.103	0.172
Monthly allowance (*)					
<#50,000		1			
>₦50,000	-0.009	0.991	0.515	1.908	0.979
Hall of residence (*)					
Official halls		1			
Affiliated hostels	-0.704	0.495	0.180	1.361	0.173
Duration of stay (*)					
<1 year		1			
>1 year	0.268	1.308	0.635	2.691	0.466
Faculty (*)					
Medical faculties		1			
Non-Medical faculties	0.129	1.138	0.565	2.292	0.718
Knowledge (*)					
Poor knowledge		1			
Good knowledge	-0.584	0.558	0.160	1.937	0.358
Hygiene practices (*)					
Poor hygiene		1			
Good hygiene	0.966	2.627	1.304	5.291	***0.007**
Attitude (*)					
Negative attitude		1			
Positive attitude	-0.180	0.835	0.142	4.897	0.842
Treatment timing (*)					
Late/No treatment		1			
Early treatment-seeking	-0.310	0.733	0.319	1.687	0.466

*CI = Confidence interval; OR = Odds ratio; *Reference category. Nagelkerke R^2 = 0.170 – 0.268 †Religion excluded due to complete separation (all 19 non-Christian respondents who sought treatment completed it). ‡500 Level: complete separation (all 35 who sought treatment completed); effect size not estimable.*

Level of study was a significant independent predictor of treatment completion (OR = 1.509 per level increase, 95% CI = 1.101–2.069, p = 0.010), consistent with higher completion rates at more advanced levels of study. Good hygiene practices was also a significant positive predictor (OR = 2.627, 95% CI = 1.304–5.291, p = 0.007), indicating that respondents with good hygiene had approximately 2.6 times higher odds of completing treatment compared to those with poor hygiene after adjustment. Age, sex, allowance, duration of stay, hall of residence, faculty, knowledge, attitude, and treatment timing were not significant independent predictors after adjustment.

SECTION F: Risk factors influencing recurrence of community-acquired infections

Table 22: Environmental and behavioural risk factors influencing community-acquired infections in halls of residence

Variables	Frequency (n = 487)	Percent
Condition of toilet/bathroom facilities		
Clean (very clean, clean, or fairly clean)	308	63.2
Dirty (dirty or very dirty)	179	36.8
Water availability in hostel		
Available (always or most of the time)	210	43.1
Not reliably available (sometimes, rarely, or never)	277	56.9
Ventilation in room		
Good (excellent or good)	134	27.5
Poor (fair, poor, or very poor)	353	72.5
Frequency of common area cleaning		
Frequent (daily or 2–3 times per week)	414	85.0
Infrequent (once per week, rarely, or never)	73	15.0
Adequate waste disposal bins available		
Yes	348	71.5
No	139	28.5
Ever avoided hostel toilet due to its condition		
Yes	427	87.7
No	60	12.3
Soap available in hostel toilets/bathrooms		
Available (always or sometimes)	97	19.9
Not available (rarely or never)	390	80.1
Access to hand sanitizer in hostel		
Yes	48	9.9
No	439	90.1
Barriers to practising good hygiene in the hostel*		
Dirty facilities	275	56.5
Lack of water	252	51.7
Lack of soap	200	41.1
Overcrowding	172	35.3
Too busy/no time	64	13.1
Don't see it as important	24	4.9
Hostel conditions contributing to infections (among infected, n = 418)*		
Dirty toilets/bathrooms	173	41.4
Dirty environment	167	40.0
Overcrowding	159	38.0
Poor ventilation	148	35.4
Poor waste disposal	130	31.1
Inadequate water supply	117	28.0
Sharing facilities with many people	112	26.8

**Multiple response question; percentages exceed 100%*

Regarding toilet and bathroom conditions, 308 (63.2%) described facilities as clean while 179 (36.8%) described them as dirty or very dirty. Water was not reliably available for 277 (56.9%), and ventilation was poor for 353 (72.5%). Soap was not available in hostel toilets for 390 (80.1%), and hand sanitizer was inaccessible to 439 (90.1%). The most cited barriers to good hygiene were dirty facilities 275 (56.5%), lack of water 252 (51.7%), and lack of soap 200 (41.1%). Among infected respondents, dirty toilets/bathrooms 173 (41.4%), dirty environment 167 (40.0%), and overcrowding 159 (38.0%) were the most frequently cited contributing hostel conditions.

Table 22 above described the distribution of environmental and behavioural risk factors present within the halls of residence, documenting the prevalence of conditions such as dirty sanitation facilities, unreliable water supply, poor ventilation, and limited access to hygiene resources. These variables were not merely descriptive endpoints; they were identified a priori as potential contributors to infection recurrence based on the study's conceptual framework and the existing literature on community-acquired infections in communal settings. Having established the frequency of these risk factors, it was therefore appropriate to proceed to examine whether each factor was statistically associated with the primary infection outcome (infection present vs. infection absent in the past six months) as measured in Section D. Table 23 below presents the results of this bivariate analysis, testing the association between each environmental and behavioural risk factor and the likelihood of reporting at least one infection in the past six months, using the chi-square test. This analytical pathway from describing exposure variables (Table 22) to testing their association with the outcome (Table 23) is consistent with standard cross-sectional epidemiological methodology, and the significant environmental predictors identified here were subsequently entered into the multivariate logistic regression model reported in Table 21 to determine independent predictors after adjustment for sociodemographic confounders.

Table 23: Association between environmental and behavioural risk factors and presence of self-reported infection (n = 487) in students in halls of residence

Variables	Infection self-reported		Test Statistic	p-value
	Infection Present n (%)	Infection Absent n (%)	($\chi 2$)	
Age group (years)				
<18 years	24 (92.3)	2 (7.7)	6.608	**0.037**
18–24 years	356 (86.8)	54 (13.2)		
>25 years	38 (74.5)	13 (25.5)		
Sex				
Male	153 (80.1)	38 (19.9)	8.475	**0.004**
Female	265 (89.5)	31 (10.5)		
Religion				
Christianity	393 (85.1)	69 (14.9)	4.178*	0.243
Islam	16 (100.0)	0 (0.0)		
Others	9 (100.0)	0 (0.0)		
Ethnicity				
Edo indigenes	253 (84.9)	45 (15.1)	0.549	0.459
Non-Edo indigenes	165 (87.3)	24 (12.7)		
Level of study				
100 Level	31 (73.8)	11 (26.2)	10.747	0.057
200 Level	69 (81.2)	16 (18.8)		
300 Level	141 (91.6)	13 (8.4)		
400 Level	111 (85.4)	19 (14.6)		
500 Level	39 (86.7)	6 (13.3)		
600 Level	27 (87.1)	4 (12.9)		
Monthly allowance (Naira)				
≤₦50,000	225 (86.2)	36 (13.8)	0.065	0.799
>₦50,000	193 (85.4)	33 (14.6)		
Hall of residence				
Official Halls (1–6)	334 (86.8)	51 (13.2)	1.284	0.257
New/Affiliated Hostels	84 (82.4)	18 (17.6)		
Number of roommates				
≤6 roommates	243 (86.5)	38 (13.5)	0.173	0.677
>6 roommates	166 (85.1)	29 (14.9)		
Duration of stay in hostel				
≤1 year	193 (82.1)	42 (17.9)	5.123	**0.024**
>1 year	225 (89.3)	27 (10.7)		
Faculty				
Medical faculties	204 (84.6)	37 (15.4)	0.550	0.458
Non-Medical faculties	214 (87.0)	32 (13.0)		
Condition of toilet/bathroom facilities				
Dirty	165 (92.2)	14 (7.8)	9.376	**0.002**
Clean	253 (82.1)	55 (17.9)		
Water availability				
Not reliably available	248 (89.5)	29 (10.5)	7.228	**0.007**
Available	170 (81.0)	40 (19.0)		
Ventilation in room				
Poor	313 (88.7)	40 (11.3)	8.490	**0.004**
Good	105 (78.4)	29 (21.6)		
Frequency of common area cleaning				
Infrequent	70 (95.9)	3 (4.1)	7.145	**0.008**
Frequent	348 (84.1)	66 (15.9)		
Adequate waste disposal bins				
No	119 (85.6)	20 (14.4)	0.008	0.930
Yes	299 (85.9)	49 (14.1)		
Ever avoided hostel toilet				
No	48 (80.0)	12 (20.0)	1.914	0.167
Yes	370 (86.7)	57 (13.3)		
Soap availability				
Not available	336 (86.2)	54 (13.8)	0.167	0.683
Available	82 (84.5)	15 (15.5)		
Access to hand sanitizer				
No	377 (85.9)	62 (14.1)	0.008	0.931
Yes	41 (85.4)	7 (14.6)		
Knowledge category				
Poor knowledge	46 (88.5)	6 (11.5)	0.372	0.542
Good knowledge	278 (85.3)	48 (14.7)		
Attitude category				
Negative attitude	21 (80.8)	5 (19.2)		0.395
Positive attitude	397 (86.1)	64 (13.9)		

*Bold = $p < 0.05$. *Fisher's Exact Test.*

With respect to sociodemographic characteristics, age group was significantly associated with infection presence ($\chi^2 = 6.608$, $p = 0.037$), with those aged below 18 years having the highest infection proportion, 24 (92.3%), compared to 38 (74.5%) among those aged above 25 years.

Male sex was significantly protective: male respondents had a substantially lower proportion of infection, 153 (80.1%), compared to females, 265 (89.5%), and this association was statistically significant ($\chi^2 = 8.475$, $p = 0.004$). Duration of hostel stay was significantly associated, with those residing for more than one year having a higher infection proportion, 225 (89.3%), compared to 193 (82.1%) among those who had stayed for one year or less ($\chi^2 = 5.123$, $p = 0.024$). Religion, ethnicity, level of study, monthly allowance, hall of residence, number of roommates, faculty, knowledge category, and attitude category were not statistically significantly associated with infection presence.

Regarding environmental and behavioural risk factors, dirty toilet and bathroom conditions were significantly associated with infection: 165 (92.2%) of those in hostels with dirty facilities reported infection compared to 253 (82.1%) in clean-facilitated hostels ($\chi^2 = 9.376$, $p = 0.002$). Unreliable water availability was significantly associated ($\chi^2 = 7.228$, $p = 0.007$), with 248 (89.5%) of those without reliable water reporting infection compared to 170 (81.0%) among those with reliable supply. Poor room ventilation was significantly associated ($\chi^2 = 8.490$, $p = 0.004$), with 313 (88.7%) in poorly ventilated rooms reporting infection compared to 105 (78.4%) in well-ventilated rooms. Infrequent common area cleaning was significantly associated ($\chi^2 = 7.145$, $p = 0.008$): 70 (95.9%) in infrequently cleaned hostels reported infection compared to 348 (84.1%) in frequently cleaned hostels. Adequate waste disposal bins, toilet avoidance behaviour, soap availability, and access to hand sanitizer were not significantly associated. Knowledge and attitude category were also not significantly associated with infection presence.

Table 24: Predictors of presence of self-reported infection amongst students in halls of residence (n = 487)

Predictors	β	Odds ratio	95% CI		p-value
			Lower	Upper	
Age (years)	-0.099	0.906	0.813	1.009	0.088
Sex					
*Female**		1			
Male	-0.979	0.376	0.207	0.681	0.001
Ethnicity					
*Edo indigenes**		1			
Non-Edo indigenes	0.134	1.143	0.623	2.095	0.664
Level of study					
*300 Level**		1			
100 Level	-1.545	0.213	0.075	0.607	0.004
200 Level	-0.806	0.447	0.178	1.12	0.079
400 Level	-0.389	0.678	0.285	1.613	0.368
500 Level	-0.219	0.803	0.238	2.714	0.703
600 Level	0.549	1.73	0.395	7.575	0.451
Monthly allowance					
*≤₦50,000**		1			
>₦50,000	-0.093	0.911	0.499	1.664	0.757
Duration of stay in hostel					
*≤1 year**		1			
>1 year	0.343	1.409	0.76	2.614	0.276
Hall of residence					
*Official halls 1–6**		1			
New/Affiliated hostel	-0.207	0.813	0.398	1.661	0.581
Faculty					
*Medical faculties**		1			
Non-Medical faculties	0.284	1.329	0.706	2.503	0.385
Knowledge of CAI					
*Poor knowledge**		1			
Good knowledge	0.103	1.108	0.58	2.119	0.757
Attitude towards prevention of CAI					
*Negative attitude**		1			
Positive attitude	-0.068	0.934	0.274	3.185	0.911
Condition of toilet/bathroom facilities					
*Dirty**		1			
Clean	-0.696	0.499	0.247	1.008	0.053
Water availability					
*Not reliably available**		1			
Available	-0.419	0.658	0.363	1.193	0.177
Ventilation in room					
*Poor ventilation**		1			
Good ventilation	-0.379	0.685	0.353	1.327	0.250
Frequency of common area cleaning					
*Infrequent**		1			
Frequent	-1.635	0.195	0.057	0.666	0.009

*CI = Confidence interval; OR = Odds ratio; *Reference category. Bold = p < 0.05. Nagelkerke R^2 = 0.190–0.288*

In the multivariate logistic regression model, male sex was the strongest independent predictor of lower infection odds, with male respondents having approximately 62% lower odds of infection compared to females (OR = 0.376; 95% CI: 0.207–0.681; p = 0.001). Compared with respondents at 300 Level, those at 100 Level had significantly lower odds of infection (OR = 0.213; 95% CI: 0.075–0.607; p = 0.004), likely reflecting shorter cumulative hostel exposure rather than a protective biological effect, as newer students spend less time in the communal hostel environment. Age, ethnicity, monthly allowance, duration of stay, hall of residence, faculty, knowledge, and attitude were not significant independent predictors after adjustment.

Among the environmental predictors, frequent common area cleaning was the strongest independent environmental predictor of lower infection odds (OR = 0.195; 95% CI: 0.057–0.666; p = 0.009), with respondents in frequently cleaned common areas having approximately 80% lower odds of reporting infection compared to those in infrequently cleaned areas after adjustment for all sociodemographic variables. Clean toilet and bathroom facilities were also a borderline significant independent predictor (OR = 0.499; 95% CI: 0.247–1.008; p = 0.053), with respondents in clean-facilitated hostels having approximately 50% lower odds of infection. Water availability (OR = 0.658; p = 0.177) and room ventilation (OR = 0.685; p = 0.250) lost statistical significance after adjustment, suggesting that their bivariate associations were confounded by sociodemographic factors. These findings establish frequent cleaning of common areas and maintenance of clean toilet and bathroom facilities as the two most critical and actionable environmental determinants of infection risk in UNIBEN halls of residence.

CHAPTER FIVE

DISCUSSION, RECOMMENDATION & CONCLUSION

5.1 DISCUSSION

This study assessed community-acquired infections among undergraduate students across halls of residence at the University of Benin, Benin City, Edo State, Nigeria, involving 487 respondents drawn from all official halls of residence and affiliated hostels at the Ugbowo Campus. The findings are discussed below in line with the specific objectives of the study.

The age distribution of respondents showed that the majority fell within the 18 to 24 years age group, with a mean age of 21.16 ± 2.68 years. This is consistent with the typical undergraduate age profile at Nigerian universities, where the bulk of the student population enters in their late teens and progresses through their programme within this bracket. The concentration of young adults in a communal residential setting is epidemiologically significant because late adolescence and early adulthood are characterised by high-contact social behaviour, shared use of sanitation facilities, and less established personal health-seeking habits, all of which structurally amplify the risk of community-acquired infection transmission. This demographic pattern is consistent with a study carried out at the University of Nigeria, Nsukka, among resident students, where a similarly youthful age distribution was documented in the undergraduate hostel population.[9]

There was a higher proportion of female respondents, consistent with the gender composition of the residential population at the Ugbowo Campus, where female halls of residence accommodate a larger proportion of on-campus students. The overwhelming majority identified as Christians, reflecting the religious demography of Edo State and the South-South geopolitical zone. Edo indigenes constituted the largest ethnic group, reflecting the

local catchment of the institution. By level of study, the highest representation was at 300 and 400 Level, reflecting the intermediate years of study during which students are most likely to have consolidated their hostel residency. The majority of respondents had caregivers with tertiary education, suggesting a relatively privileged socioeconomic background compared to the general Nigerian student population, which is relevant for interpreting the knowledge and hygiene practice findings.

Almost four in five respondents were aware of community-acquired infections prior to the study, with school and university lectures being by far the most commonly cited source of awareness, followed by health talks or seminars and social media. The dominant role of formal academic instruction in generating awareness is consistent with the finding that this sample is heavily weighted toward medical and health science students, for whom infectious disease epidemiology is an integral component of their curriculum. This pattern is consistent with a cross-sectional study conducted among 2,002 primary, junior, and senior high school students in Gansu Province, China, which demonstrated that structured health education interventions significantly improved knowledge and preventive behaviours toward infectious diseases including tuberculosis, influenza, and mumps among the intervention group compared to controls.[12] A study conducted at the University of Namibia among 162 health science students similarly found that medical students achieved higher knowledge scores than nursing and radiography students, confirming the differential effect of faculty-specific academic exposure on health knowledge.[13] The relatively low uptake of health education specific to hostel infection prevention, with fewer than two-fifths of aware respondents reporting having received such training, is a notable gap, suggesting that while general academic exposure to infectious disease knowledge is substantial, hostel-specific infection prevention education remains underdeveloped. The University of Benin Student Affairs Office and Hall Management Units should introduce a structured hostel infection prevention

orientation programme for all new residents, delivered at the point of check-in and reinforced through regular health talks facilitated by the University Health Centre, ensuring that hostel-specific risk awareness is systematically transmitted to every residential student from entry. The policy implication is that academic knowledge of infection prevention, while valuable, does not automatically translate to hostel-contextual awareness, and institutional policy must therefore mandate hostel-specific health education as a distinct and formally resourced component of residential student welfare. This study contributes to knowledge by documenting the specific gap between general CAI awareness and hostel-specific health education exposure at UNIBEN, providing a baseline against which future residential health education programmes can be evaluated.

Among aware respondents, hostel risk factors for infection were the best-recognised knowledge domain, with poor sanitation correctly identified by almost all respondents, followed by overcrowding and indiscriminate waste disposal. This finding is unsurprising given that these are experiential realities for students living in densely occupied university hostels, and knowledge derived from direct personal experience is more reliably retained than knowledge acquired through formal instruction alone. The weakest knowledge domain was prevention methods, where correct identification rates for individual measures were considerably lower than the near-perfect true or false item response rates. The probable reason for this disparity is that the true or false items tested declarative knowledge of well-known health principles such as handwashing and room cleanliness, which are widely communicated through media and informal channels, whereas the prevention method items required respondents to identify and enumerate specific actionable measures without prompting, a higher cognitive demand. The lowest individual item scores were for causative agents, with parasites, fungi, and viruses each correctly identified by fewer than a quarter of respondents independently, even though about four-fifths correctly selected the composite

option. This pattern suggests that many respondents possess surface-level gestalt knowledge of CAI causation without the granular detail needed to understand differential prevention strategies. A study of clinical medical students at a teaching hospital in Jos, Nigeria, similarly found that despite broadly adequate preventive practices, knowledge gaps persisted in specific procedural areas such as equipment hygiene and use of personal protective equipment, supporting the conclusion that composite knowledge scores may obscure important item-level deficits.[14] A study conducted in Abakaliki among 221 medical students similarly reported that while an impressive proportion had adequate overall knowledge of infections, only about two-thirds had adequate knowledge specifically of control measures, confirming that general awareness consistently outstrips actionable prevention knowledge in Nigerian student populations.[15] The University of Benin Directorate of Student Affairs should partner with the Department of Public Health and Community Medicine to develop and distribute a simplified hostel infection prevention pocket guide targeting the specific knowledge gaps identified in this study, with particular emphasis on practical prevention methods, routes of transmission of individual causative agents, and the rationale for each preventive behaviour. The policy implication is that knowledge curricula in hostel health education must prioritise actionable prevention content over conceptual disease awareness, since awareness alone without corresponding practical knowledge of prevention measures cannot drive behaviour change. This study contributes to knowledge by identifying and quantifying the specific knowledge gaps in CAI causation and prevention methods among UNIBEN hostel residents, demonstrating that high composite knowledge scores can coexist with substantive item-level deficits that have direct practical consequences.

Among the respondents who were aware of community-acquired infections, more than four-fifths were classified as having good knowledge based on a composite score of seventy percent or above, while fewer than one in six had poor knowledge. This generally strong

knowledge level is likely attributable to the high representation of medical, pharmacy, and basic medical science students who together accounted for more than half of the aware subsample, and who are systematically trained in the mechanisms and prevention of infectious diseases. The semi-urban character of Benin City, with its relatively high density of educational institutions, healthcare facilities, and media exposure, also creates a more information-rich environment than would be encountered in rural or more isolated settings.[12] A cross-sectional study conducted among 219 clinical-year medical students in a teaching hospital in Jos, Nigeria, similarly found that the majority had overall good preventive practices, though with the caveat that item-level inconsistencies persisted beneath the broadly positive composite score, a pattern directly analogous to what was observed in this study.[14] This finding is significant because good knowledge of infection prevention is the precondition for adopting appropriate preventive behaviours, and populations with adequate knowledge are better positioned to respond correctly during infection outbreaks and to implement preventive measures within shared living environments.[12] The University of Benin should sustain and reinforce this existing knowledge foundation by integrating periodic knowledge refresher activities into residential student life, ensuring that students who entered with good knowledge do not experience erosion of infection prevention knowledge due to competing academic and social demands. The policy implication is that institutional resources for infection prevention at UNIBEN need not be directed primarily at awareness creation but should instead focus on closing the specific item-level gaps identified, particularly around individual causative agents and discrete prevention methods. This study contributes to knowledge by establishing the first comprehensive composite CAI knowledge score for UNIBEN hostel residents, providing a benchmarking baseline against which future educational interventions can measure their impact.

Age group, religion, level of study, and faculty were significantly associated with knowledge at the bivariate level. Respondents below 18 years had by far the lowest proportion with good knowledge, about half, compared to about nine in ten for those in the 18 to 24 years and above 25 years groups. Christians had the highest proportion of good knowledge while Islamic respondents had the lowest, fewer than six in ten. Students at 500 and 600 Level had the highest proportions and those at 100 and 200 Level had the lowest. Faculty was the most strongly associated variable, with arts and education students having substantially lower proportions of good knowledge compared to medical and pharmacy students. The probable reasons for these associations are multi-layered. The age gradient likely reflects the progressive accumulation of academic and life experience, with younger students having had fewer years of formal health education exposure. The level of study gradient mirrors the disciplinary progression through the academic programme, with more senior students having completed a greater volume of health-related coursework. The faculty gradient reflects the well-documented role of health professional training in building comprehensive infectious disease knowledge. The religion association may reflect differential exposure to formal secular scientific education or cultural orientations toward health and disease that differ across religious communities. A study at the University of Namibia similarly identified significant disciplinary differences in infection prevention knowledge, with medical students consistently outperforming nursing and radiography counterparts, supporting the pattern of faculty-specific knowledge differentials observed in this study.[13] A study conducted at Makerere University College of Health Sciences, Uganda, among 202 health professional students similarly found that being in year three or four of clinical training was independently associated with significantly higher infection prevention knowledge scores, confirming the level of study gradient.[26] These associations identify younger students in non-medical faculties at earlier levels of study as the priority subgroup for targeted knowledge

enhancement. The academic affairs offices of all non-medical faculties at the University of Benin should work with the Student Affairs Directorate to incorporate a mandatory infection prevention module into the first-year orientation of every faculty, ensuring that students who will not acquire this knowledge through their formal curriculum receive it from their first semester in residence. The policy implication is that health knowledge disparities between faculties represent a structural inequity that cannot be addressed by voluntary attendance at health talks alone; mandatory faculty-level academic programming is required to systematically close the knowledge gap between health and non-health students. This study adds to existing knowledge by documenting the independent predictors of CAI knowledge specifically in the UNIBEN hostel resident population, establishing the first locally validated evidence base for the design of targeted knowledge interventions at this institution.

At the multivariate level, three significant independent predictors of good knowledge were identified after adjustment for all other variables. Islamic religion was the strongest predictor, with Muslim respondents having significantly lower odds of good knowledge compared to Christians, indicating approximately ten times lower odds after adjustment. Respondents at 100 Level and 200 Level had significantly lower odds compared to those at 300 Level, and non-medical faculty students had significantly lower odds compared to their medical faculty counterparts. The magnitude of the Islamic religion effect after adjustment for level of study, faculty, age, and socioeconomic variables suggests that religious identity itself carries an independent effect on infection prevention knowledge, possibly through pathways including differential engagement with secular health education curricula, different cultural frameworks for understanding disease causation, or differential access to health information channels. The independent effects of 100 Level and 200 Level membership confirm that the knowledge deficit among junior students is not merely a product of faculty composition but reflects a genuine early-training gap that persists after controlling for confounders. A study conducted

in Jos, Nigeria, among clinical medical students similarly found that knowledge gaps were particularly pronounced in areas not covered by formal structured training, confirming that the absence of formal infection prevention and control curriculum in earlier academic years contributes independently to knowledge deficits.[14] A study conducted in Abakaliki similarly reported that the absence of formal training and institutional rules contributed independently to the gap between knowing a problem and knowing how to solve it, supporting the independent effect of training level on actionable prevention knowledge.[15] These multivariate findings have important policy implications for how infection prevention education is prioritised and resourced at UNIBEN. The independent effect of non-medical faculty after controlling for level of study indicates that faculty curriculum design rather than simply academic seniority must be the primary target of intervention. The University of Benin Senate should formally mandate the inclusion of an infection prevention and control module in the curriculum of all non-medical faculties, with completion required before the end of 100 Level, to ensure that the knowledge gap is addressed at its earliest point. This study contributes to knowledge by providing, for the first time from a UNIBEN setting, multivariate-adjusted evidence that Islamic religious identity, junior academic level, and non-medical faculty membership are independent negative predictors of CAI knowledge, enabling highly targeted and efficient allocation of educational resources.

Almost all respondents, nearly nineteen in twenty, were classified as having a positive attitude towards community-acquired infections and preventive measures, with a high mean attitude score. The highest levels of appropriate response were recorded for willingness to practice good hygiene, support for university-provided sanitation facilities, and belief that infections can be prevented through hygiene, each endorsed by approximately nineteen in twenty respondents, collectively indicating a strong normative acceptance of hygiene as both a student responsibility and a university obligation. The lowest appropriate response rates

were observed for personal risk perception, with about three in ten respondents not recognising their personal vulnerability to hostel infections, and for the reversed item on sharing of personal items, with more than a third giving inappropriate responses indicating acceptance of item sharing among roommates. The probable reasons for this attitudinal profile are layered. The overwhelmingly positive overall attitude likely reflects the health-conscious academic environment of a medical university, the influence of Christian religious values on prosocial health attitudes, and social desirability effects inherent in self-report attitudinal measures in this context. The gap in personal risk perception is consistent with the optimism bias documented in health behaviour literature, where individuals readily acknowledge collective risks while underestimating their own personal vulnerability. The acceptance of personal item sharing likely reflects the pragmatic social norms of communal hostel living, where sharing towels, combs, and eating utensils is normalised by necessity and friendship rather than conscious indifference to infection risk. A cross-sectional study conducted among 1,959 undergraduate and postgraduate students in the Kurdistan region of Iraq similarly found generally positive attitudes toward outbreak control, though compliance with specific protective behaviours lagged behind general attitudinal endorsement, consistent with the attitude-behaviour gap observed in this study.[18] A cross-sectional study conducted among 1,268 students at a university in Ogun State, Nigeria, similarly reported high overall positive attitudinal scores but identified a measurable gap between attitudes and practices, with more than half having visited crowded places despite widespread endorsement of preventive behaviour, confirming that positive attitudes are necessary but not sufficient for behaviour change.[25] The University of Benin Hall Management Offices should introduce a hostel community norm campaign that specifically targets the two lowest-scoring attitudinal items, personal risk perception and sharing of personal items, using peer champion students to deliver contextually grounded messaging that challenges optimism bias and normalises

item non-sharing without threatening social cohesion. The policy implication is that the near-universal positive attitude documented in this study creates an exceptionally favourable foundation for behaviour change interventions, but the specific attitudinal gaps around personal risk and item sharing must be explicitly addressed to prevent these gaps from undermining the otherwise strong attitudinal environment. This study contributes to knowledge by documenting the specific attitudinal profile of UNIBEN hostel residents with respect to CAI prevention, identifying personal risk perception and item-sharing acceptance as the two specific attitudinal targets for intervention.

Religion was the only sociodemographic variable significantly associated with attitude at the bivariate level, with Christian respondents having a substantially higher proportion of positive attitude, nearly nineteen in twenty, compared to Islamic respondents, fewer than seven in ten. Knowledge category was also significantly associated, with good knowledge respondents having a higher proportion of positive attitude compared to those with poor knowledge. The religion-attitude association reflects the established role of religious doctrine in shaping health behaviour norms, where certain interpretations of Islamic faith may emphasise spiritual protection over secular hygiene practices, reducing receptiveness to biomedical preventive messaging. The knowledge-attitude association confirms the expected directionality: students who understand how infections are transmitted and prevented are more likely to hold attitudes that endorse the value and feasibility of preventive action. A study conducted in Cameroon among 1,006 participants similarly found that demographic factors including religious background significantly influenced attitudinal scores, with some groups showing substantially lower propensity for health-seeking behaviour despite comparable knowledge levels, consistent with the pattern observed in this study.[24] A cross-sectional study conducted among 239 clinical nursing and medical students at the University of Ibadan and University College Hospital similarly found a significant knowledge-attitude

association, confirming that adequate knowledge of infection control is a necessary antecedent to favourable attitudes toward preventive compliance.[16] These associations identify Muslim students and those with poor knowledge as priority subgroups for attitudinal reinforcement, and suggest that knowledge enhancement programmes will yield dual benefits by improving both knowledge scores and attitudinal outcomes. The University of Benin Student Affairs Directorate should engage the Muslim Students' Society of Nigeria on campus to co-develop culturally and religiously grounded infection prevention messaging that frames hygiene practices within Islamic principles of cleanliness, making prevention normatively consistent with students' religious values. The policy implication is that one-size-fits-all health communication will systematically underperform with Muslim student subgroups, and institutional policy must therefore support the design of religion-sensitive prevention materials as a component of equitable student health programming. This study contributes to knowledge by demonstrating the significant association between Islamic religious affiliation and lower positive attitudinal scores toward CAI prevention in the UNIBEN hostel context, providing locally grounded justification for religion-specific health communication strategies.

At the multivariate level, Islamic religion was the only statistically significant independent predictor of positive attitude after adjustment for all other variables, with Muslim respondents having significantly lower odds of positive attitude compared to Christians, representing approximately ten times lower odds. The magnitude of this effect, which was robust after adjustment for knowledge, faculty, level of study, socioeconomic status, and hall of residence, indicates that religious identity operates as a powerful independent determinant of health attitudes in this population beyond the effects of academic training and socioeconomic background. The probable reason is that religious frameworks which emphasise divine protection over individual hygiene behaviour, or which view illness as spiritually determined

rather than environmentally transmitted, create a cognitive barrier to endorsing secular preventive measures that operates independently of educational attainment or knowledge level. The non-significant association between good knowledge and positive attitude at the multivariate level despite significance at the bivariate level suggests that the effect of knowledge on attitude is confounded by other variables, particularly faculty and level of study, that also drive both outcomes simultaneously. A study conducted among 1,268 students at a university in Ogun State, Nigeria, showed that good knowledge was a significant predictor of both positive attitudes and preventive behaviours after adjustment.[25] A study conducted among clinical nursing and medical students at the University of Ibadan and UCH similarly found that knowledge independently predicted appropriate infection control attitudes after adjustment for faculty and year of training.[16] These findings have important policy implications: since Islamic religious identity is an independent predictor of negative attitude even after controlling for knowledge level, knowledge enhancement alone will be insufficient to close the attitudinal gap among Muslim students. Targeted faith-based attitudinal intervention, delivered by religiously credible community advocates, is required as a complement to knowledge-based education. The UNIBEN Student Affairs Directorate should formally incorporate the Muslim Students' Society of Nigeria branch on campus into the institutional health promotion framework, providing them with training and resources to conduct student-led religion-sensitive infection prevention advocacy within their community. This study makes an original contribution by providing the first multivariate-adjusted evidence from a UNIBEN hostel context that Islamic religious affiliation is the only independent predictor of CAI prevention attitude after controlling for all available confounders, establishing a locally validated basis for faith-sensitive attitudinal programming.

About two-thirds of respondents were classified as having good hygiene practices, while about one in three had poor hygiene. The highest-scoring hygiene practice items were room cleaning, washing fruits and vegetables before eating, and proper waste bin disposal. The lowest-scoring items were regular use of hostel toilet facilities and not sharing personal items with roommates, each endorsed by barely more than half of respondents. The pattern of high scores on private personal hygiene behaviours and low scores on communal hygiene behaviours is revealing. Room cleaning and fruit washing are behaviours performed in personal or semi-private spaces, where students retain autonomy and where performance is unconstrained by the condition of shared infrastructure. In contrast, regular use of hostel toilet facilities is contingent on the condition of the toilets, and the finding that the overwhelming majority of respondents had at some point avoided using hostel toilets due to their condition confirms that this item measures the intersection of individual hygiene behaviour and infrastructural quality rather than personal hygiene motivation alone. The normalisation of item sharing among roommates similarly reflects the social dynamics of communal living rather than ignorance of transmission risk, since the knowledge data showed that the vast majority correctly identified sharing of personal items as a transmission route. This disconnect between knowledge and practice is precisely consistent with the knowledge-practice gap widely documented in infection prevention literature. A study conducted among 219 clinical-year medical students at a teaching hospital in Jos, Nigeria, demonstrated that despite near-universal claims of handwashing compliance, considerably fewer reported doing so before performing invasive procedures, and fewer than half ever cleaned their stethoscopes, confirming the ubiquity of knowledge-practice gaps even in highly trained populations.[14] A study among students at Kotebe Metropolitan University, Ethiopia, similarly found that despite reasonable knowledge scores, a considerable proportion continued to share drinking cups and engage in hygiene-inconsistent behaviours, and identified that most of the

morbidity at that institution was attributable to respiratory, gastrointestinal, and eye and skin infections in a pattern identical to the findings of this study, confirming the cross-contextual relevance of knowledge-practice gaps in dormitory settings.[7] The University of Benin Hall Management Offices should introduce a student-led hygiene accountability programme in every hall, pairing roommates and corridor groups as hygiene accountability partners who check and remind each other about critical hygiene behaviours including personal item non-sharing and consistent toilet use, creating a peer norm enforcement mechanism that addresses social compliance barriers. The policy implication is that hygiene practice improvement in UNIBEN hostels requires both behavioural nudging to change social norms around item sharing and infrastructural investment to make hostel toilets clean enough that students are not driven to avoidance. This study contributes to knowledge by documenting the specific hygiene practice profile of UNIBEN hostel residents, identifying toilet use and item sharing as the two items with the greatest potential for practice improvement and the clearest infrastructural determinants.

Religion was the most strongly associated sociodemographic variable with hygiene practices at the bivariate level, with Christians having a substantially higher proportion of good hygiene practices, about seven in ten, compared to Islamic respondents, only about one in four. Level of study was significantly associated, with 600 Level students having the highest proportion of good hygiene by far, nearly all, while 100 Level students had the lowest at barely more than half. Monthly allowance was significantly associated, with higher allowance respondents showing better hygiene practices. Number of roommates was also significantly associated, with those having six or fewer roommates having a higher proportion of good hygiene compared to those with more than six. The probable reasons for these associations are multi-layered. The religion-hygiene association likely reflects the intersection of cultural norms, socioeconomic factors, and the differential knowledge levels

already documented. The level of study gradient is consistent with the progressive development of health knowledge, attitudinal maturity, and self-regulatory capacity over the course of a university career, with final-year students having had the greatest exposure to health education and the greatest personal investment in maintaining their health at a critical examination period. The allowance-hygiene association confirms that economic resources enable hygiene by funding the purchase of soap, hand sanitiser, and personal hygiene products that improve practice scores beyond what communal infrastructure provides. The roommate density association confirms the exposure pathway: more roommates means more shared surfaces, more social pressure to compromise on hygiene for social harmony, and less personal space for private hygiene routines. A study conducted among undergraduate students at four southwestern Nigerian universities similarly found that socioeconomic variables were significantly associated with hygiene practice scores, with lower-resource students showing more deficits.[1] A large prospective household cohort study conducted in South Africa similarly found that overcrowded household conditions were associated with significantly higher transmission rates of respiratory pathogens, confirming the biological plausibility of the roommate density-hygiene-infection pathway documented in this study.[4] These associations identify 100 Level students with lower allowances and higher roommate densities, particularly those of Islamic religious background, as the highest-priority subgroups for hygiene practice interventions. The University of Benin Student Affairs Directorate should introduce a targeted hygiene starter pack for all new students at check-in, containing soap, a personal hand sanitiser, and a non-sharing pledge card, reducing the economic barrier to good hygiene from the first day of residency. The policy implication is that hygiene practices at UNIBEN hostels are constrained by a combination of knowledge gaps, social norms around sharing, limited personal economic resources, and overcrowded room conditions, meaning that a policy that addresses only one of these dimensions will leave the

others intact. This study contributes to knowledge by providing the first comprehensive hygiene practice profile and associated factor analysis for UNIBEN hostel residents, establishing an empirical baseline and identifying the specific structural and socioeconomic determinants that policy must address.

At the multivariate level, three variables were significant independent predictors of good hygiene practices. Islamic religion was the strongest independent predictor, with Muslim respondents having significantly lower odds of good hygiene compared to Christians, consistent with the knowledge and attitude findings. Respondents at 600 Level had significantly higher odds of good hygiene compared to those at 300 Level, confirming that the most senior students have by far the best hygiene practices after controlling for confounders, likely through a combination of accumulated health education, developed self-regulatory capacity, and a stronger personal motivation to protect health at a critical academic juncture. Higher monthly allowance was a significant positive predictor of good hygiene, confirming the role of economic resources in enabling hygiene practice independently of knowledge and attitudinal variables. Older age was a significant negative predictor, which may reflect the tendency of older students, who are more likely to have greater social commitments and academic workload, to deprioritise personal hygiene under competing demands. A study of students in a Nigerian university setting similarly found that higher socioeconomic status was independently associated with better hygiene practices, confirming the primacy of economic enabling factors for hygiene behaviour.[9] A study of student dormitory residents in China found that increasing overcrowding was independently associated with higher respiratory infection rates, supporting the pathway from hygiene-compromising conditions to infection outcomes.[17] The independent effect of higher allowance on good hygiene after controlling for religion, faculty, level, and hall indicates that the University of Benin Hall Management Offices should lobby the university administration

to ensure adequate provision of communal soap and hand sanitiser in all hostel facilities, removing the financial barrier to hygiene practice for lower-income students who cannot afford to supplement the inadequate communal supply. The policy implication is that economic inequality in hygiene practice within the UNIBEN hostel population represents a health equity concern that cannot be fully addressed by behaviour change communication alone; it requires material provision. This study makes an original contribution by demonstrating through multivariate analysis that Islamic religious identity, 600 Level seniority, and higher allowance are the independent predictors of good hygiene practice in this population, providing a locally validated evidence base for targeted resource allocation to address hygiene inequities.

The overall prevalence of self-reported infection in the past six months was very high, with about six in seven respondents reporting at least one infection during this period. Respiratory tract infections were by far the most prevalent, followed by malaria at about half, gastrointestinal infections at about two-fifths, skin and soft tissue infections at about three in ten, urinary tract infections at about one in nine, and eye infections at about one in seventeen. The dominance of respiratory tract infections is consistent with the environmental conditions documented in this study, particularly the finding that almost three-quarters of respondents described ventilation in their rooms as poor or very poor, and with the documented role of overcrowded dormitory conditions in facilitating droplet transmission of respiratory pathogens. A retrospective analysis of medical records at the Covenant University Medical Centre in Ogun State, Nigeria, over five years similarly found that upper respiratory tract infections were the most prevalent respiratory condition and identified females as having significantly higher odds of respiratory disease presentation compared to males, consistent with the higher infection prevalence among female respondents documented in the present study.[26] A cross-sectional study of student dormitory residents in China similarly found that

students in crowded rooms with lower ventilation rates reported significantly higher incidence and longer duration of common colds and influenza compared to those in less crowded, better-ventilated rooms, confirming the mechanistic plausibility of the ventilation-respiratory infection pathway in this study.[17] The high malaria prevalence of nearly half of infected respondents is consistent with the hyperendemic malaria context of Benin City, where Nigeria's South-South zone bears a high year-round malaria transmission burden, and is supported by the WHO report on malaria in Nigeria which documented millions of cases and hundreds of thousands of deaths annually, with transmission risk existing throughout the country all year round.[7] The public health significance of the very high infection prevalence is that it documents a substantial and current disease burden among the UNIBEN hostel population that is attributable to preventable environmental conditions, representing a measurable threat to academic performance, student wellbeing, and health system utilisation. The University of Benin Estates Department and Student Affairs Directorate should jointly develop and implement a hostel environmental health improvement plan with specific, time-bound targets for improving room ventilation, including the installation of functional windows and ceiling fans in rooms where these are absent or non-functional. The policy implication is that the documented infection burden in this study constitutes prima facie evidence for institutional policy action on the physical environment of UNIBEN hostels, placing the onus on university administration to treat hostel environmental health as a core institutional responsibility rather than a peripheral concern. This study contributes to knowledge by providing the first comprehensive multi-category infection prevalence survey for UNIBEN hostel residents, establishing the current disease burden across six infection categories and quantifying the relative contribution of each, thereby providing an evidence base for prioritising specific infection-type interventions.

Age group, sex, and duration of hostel stay were significantly associated with infection prevalence at the bivariate level. Those below 18 years had the highest proportion of infection, about nine in ten, compared to about three in four for those above 25 years. Female respondents had a higher proportion of infection, about nine in ten, compared to about four in five for male respondents. Those who had stayed more than one year had a higher proportion of infection compared to those who had stayed one year or less, suggesting a cumulative exposure effect. Among environmental variables, dirty toilet and bathroom conditions, unreliable water availability, poor ventilation, and infrequent common area cleaning were all significantly associated with higher infection prevalence. The probable reasons for the sex differential in infection are multi-layered. Female students may be more likely to accurately report infections due to greater health awareness and lower social desirability bias against acknowledging illness. Additionally, physiological differences including greater susceptibility to urinary tract infections and respiratory diseases may contribute to genuine biological differences in infection rates. The cumulative duration effect suggests that longer hostel residence exposes students to a greater cumulative pathogen burden through shared facilities, consistent with the dynamics of infectious disease transmission in congregate settings. A study conducted in South Africa similarly documented that individuals with longer residence in a shared community setting had higher cumulative attack rates for respiratory infections.[4] A retrospective epidemiological study at Covenant University in Nigeria similarly found a significant association between sex and respiratory disease presentation, with females having significantly higher odds, consistent with the sex differential in CAI prevalence documented in this study.[26] These bivariate findings identify female students, those at the early stages of residency but with high hostel density, and those in hostels with dirty facilities as the highest-priority subgroups for infection surveillance and targeted prevention. The University of Benin Health Centre should establish a simple

infection surveillance register for hostel students, enabling termly mapping of infection patterns by hall, sex, and level of study, to identify clusters early and direct environmental remediation efforts to the highest-burden facilities. The policy implication is that the consistent sex differential in infection rates documented in this study indicates that hostel health programming and environmental remediation must incorporate a gender lens, prioritising investments in sanitation and hygiene infrastructure in female halls where infection burden is highest. This study contributes to knowledge by documenting the sex differential in CAI prevalence among UNIBEN hostel residents, providing locally validated evidence for the need for sex-stratified infection surveillance in this setting.

At the multivariate level, male sex was the strongest independent predictor of infection, with male respondents having substantially lower odds of reporting infection compared to females. Respondents at 100 Level had significantly lower odds compared to those at 300 Level, likely reflecting shorter cumulative hostel exposure among newer students rather than a true protective biological effect. Frequent cleaning of common areas was the strongest independent environmental predictor, with students in frequently cleaned hostels having substantially lower odds of infection compared to those in infrequently cleaned hostels. Clean toilet and bathroom conditions were a borderline significant protective factor. Knowledge, attitude, faculty, hall of residence, and most other sociodemographic variables were not significant independent predictors after adjustment for environmental factors. The non-significance of knowledge and attitude as independent predictors of infection prevalence after adjustment is a critical and policy-relevant finding. It indicates that knowing about infection prevention and having positive attitudes toward it do not sufficiently reduce infection risk in the absence of a supportive physical environment. Students who know that handwashing prevents infections but have no soap available, who know that poor ventilation increases risk but cannot open windows that have been sealed, and who know that dirty toilets facilitate

transmission but have no clean alternative cannot translate their knowledge or attitudes into effective protection. This is consistent with evidence from a cross-sectional study conducted at a teaching hospital in Jos, Nigeria, where more than half of medical students cited unavailability of personal protective equipment as the main barrier to preventive practice, confirming that resource shortages override knowledge and attitudinal motivation in real-world settings.[14] A study conducted in South Africa similarly found a very high infection attack rate over thirteen months in shared community settings, and identified that most infections were transmitted through environmental contact rather than through individual behavioural factors, supporting the primacy of environmental over individual predictors of infection outcomes.[27] The primacy of frequent common area cleaning as the strongest modifiable environmental predictor is the most actionable finding of this entire study. The University of Benin Estates Department should establish a minimum daily cleaning frequency for all hostel common areas, toilets, and bathrooms, supported by a verifiable cleaning log system inspected by Hall Wardens and reported to the Dean of Student Affairs on a weekly basis, with clear consequences for non-compliance by contracted cleaning staff. The policy implication of the non-significance of knowledge and attitude as infection predictors after controlling for environmental variables is that infection prevention policy at UNIBEN must prioritise environmental interventions, specifically cleaning frequency, toilet condition, water supply, and ventilation, over educational campaigns, since the environment determines whether knowledge can be converted into practice. This study makes its most important contribution to knowledge through this environmental primacy finding: it provides the first multivariate evidence from a UNIBEN hostel context that frequent common area cleaning is the strongest independent predictor of freedom from infection, a modifiable and institutionally controllable factor that university management can address through resource allocation and management decisions.

Among respondents who reported infections, headache was the most commonly experienced symptom, reported by nearly three in four, followed by fever at about half, and loss of appetite at about two-fifths. Purchasing drugs from a pharmacy without a prescription was by far the most common response to infection, reported by about half of affected respondents, followed by visiting the university health centre at about one in four, and visiting an outside hospital at about one in six. Nearly one in seven did not seek any treatment, while about one in eight self-medicated at home. Among those who did seek treatment, the majority waited beyond the same day before doing so. Of those who sought treatment, nearly three in ten did not complete their prescribed course. The dominance of pharmacy drug purchase as the first response to infection symptoms is a widespread pattern among Nigerian university students that carries significant public health risks including delayed diagnosis, inadequate treatment, and contribution to antimicrobial resistance. A cross-sectional study conducted among 384 undergraduate students at Afe Babalola University, Ekiti State, Nigeria, found that more than four-fifths practised self-medication, with pharmacy purchases and drug use without prescription being the most common route, consistent with the pattern documented in this study.[34] The public health significance of high pharmacy self-purchase and treatment non-completion is that it creates conditions for partial treatment of infections, development of antibiotic resistance, progression of infections to complications, and continued transmission during the treatment period. The University of Benin Health Centre should implement a proactive student health outreach programme that deploys health workers to hostels during peak illness periods such as the rainy season and examination periods, reducing the travel cost and time barrier to formal care that drives students toward pharmacy self-purchase. The policy implication is that the pattern of pharmacy self-purchase over health centre attendance reflects a structural failure of the current student health service model, which requires voluntary attendance during health centre hours, and that a policy of proactive outreach care

delivery is needed to redirect students from informal to formal care channels. This study contributes to knowledge by documenting the current treatment-seeking behaviour profile of UNIBEN hostel residents, establishing the high proportion relying on pharmacy self-purchase and the substantial proportion failing to complete treatment, and providing a baseline for evaluating the impact of student health service improvement initiatives.

Regarding environmental risk factors for infection, the environmental profile of UNIBEN hostels documented in this study is deeply concerning. More than half of respondents reported unreliable water availability, almost three-quarters reported poor or very poor ventilation, more than four-fifths reported no soap in hostel toilets, and nine in ten reported no access to hand sanitiser. The most cited barriers to good hygiene practice were dirty facilities, lack of water, and lack of soap, in that order. Among infected respondents, dirty toilets and bathrooms, dirty environment, and overcrowding were the top three hostel conditions implicated in their infections. Dirty toilet conditions, unreliable water availability, poor ventilation, and infrequent common area cleaning were all significantly associated with higher infection prevalence at the bivariate level. These findings collectively paint a picture of a hostel environment that is structurally compromised in the most fundamental determinants of infection control: water, sanitation, and ventilation. The probable reasons are rooted in the underfunding and under-maintenance of university residential infrastructure that characterises many Nigerian federal universities, where rapid growth in student enrolment has not been matched by corresponding investment in hostel renovation, utilities, and cleaning services. The absence of soap in the overwhelming majority of hostel toilets is particularly notable because it directly negates the single most evidence-based and cost-effective infection prevention measure, handwashing. A study of the sanitation practices of undergraduate students at the University of Benin previously documented that the majority of students did not wash their hands regularly with soap and water, a finding that this study's

structural data helps to contextualise: non-washing behaviour may in many cases reflect the absence of soap rather than the absence of knowledge or motivation.[10] A prospective household cohort study conducted in South Africa from 2016 to 2018 similarly found that structural living conditions including household crowding and ventilation quality were significant determinants of respiratory infection transmission, confirming the biological plausibility of the structural risk environment documented in this study.[4] The University of Benin Estates Department should immediately undertake a systematic assessment and repair of ventilation systems in all hostel rooms, including the installation of functional windows and ceiling fans, and should establish a contract for the continuous supply of soap to all hostel toilet and bathroom facilities, funded through the hostel fee structure. The UNIBEN Facilities Management Committee should develop a minimum standards of infrastructure checklist for all residential facilities, with annual inspection and public reporting of compliance, creating institutional accountability for the environmental conditions that this study has demonstrated are the primary determinants of infection risk. The policy implication of these findings is that the infection burden documented in this study is fundamentally an infrastructure and facilities management failure, and that no level of student knowledge or attitudinal improvement will meaningfully reduce infection rates unless the physical environment meets minimum standards for water availability, sanitation quality, ventilation, and cleaning frequency. This study makes a critical contribution to knowledge by providing the first systematic quantification of environmental health deficits across UNIBEN's hall of residence system, linking each specific environmental variable to infection outcomes through bivariate and multivariate analysis, and establishing the evidence base for an urgently needed programme of hostel infrastructure investment.

5.2 CONCLUSION

Almost four in five respondents were aware of community-acquired infections, with school and university lectures being the most commonly cited source of awareness. Among aware respondents, more than four-fifths were classified as having good knowledge, with hostel risk factors the best-recognised knowledge domain and prevention methods the weakest. Islamic religious identity, junior academic level, and non-medical faculty membership were significant independent negative predictors of good knowledge.

Almost all respondents held a positive attitude towards community-acquired infections and preventive measures, with willingness to practice good hygiene being the most endorsed item. Personal risk perception and acceptance of item sharing were the two weakest attitudinal items. Islamic religious identity was the only significant independent predictor of attitude, with Muslim respondents having significantly lower odds of positive attitude compared to Christians.

About two-thirds of respondents had good hygiene practices, with room cleaning and fruit washing the highest-scoring items, and regular hostel toilet use and personal item non-sharing the lowest. Islamic religious identity, 600 Level seniority, and higher monthly allowance were significant independent positive predictors of good hygiene, while older age was a negative predictor.

The overall infection prevalence in the past six months was very high, with about six in seven respondents reporting at least one infection. Respiratory tract infections were the most prevalent followed by malaria, gastrointestinal infections, skin and soft tissue infections, urinary tract infections, and eye infections. Male sex and 100 Level academic level were significant independent protective predictors of infection, while frequent common area

cleaning was the strongest independent environmental predictor of freedom from infection. Knowledge and attitude were not significant independent predictors of infection after adjustment for environmental variables.

Pharmacy drug purchase without prescription was the most common response to infection symptoms, followed by attendance at the university health centre. Nearly one in seven infected respondents sought no treatment, and nearly three in ten did not complete their prescribed course. The hostel environmental profile was substantially deficient, with the majority of respondents reporting unreliable water supply, poor ventilation, and absent soap in toilet facilities.

5.3 RECOMMENDATIONS

To the University of Benin Vice-Chancellor and University Management:

1. The University of Benin Vice-Chancellor and University Management should commission an urgent comprehensive assessment of the physical infrastructure of all official halls of residence and affiliated hostels, with a mandate to develop a time-bound remediation plan addressing the specific environmental deficits documented in this study: poor ventilation, absent or inadequate toilet facilities, unreliable water supply, and the absence of soap at handwashing points.

2. The University should establish and fund a dedicated hostel environmental health inspection unit under the Estates Department, tasked with conducting quarterly environmental health audits of all residential facilities, publishing results publicly on the university website, and reporting compliance status to the Vice-Chancellor's Office on a termly basis.

3. The University should review and increase the allocation of hostel maintenance funds within the annual budget to ensure that hostel facilities meet minimum environmental health standards as a non-negotiable condition of student residential accommodation.

To the University of Benin Estates Department:

A. The University of Benin Estates Department should immediately establish a minimum daily cleaning schedule for all hostel common areas, toilets, and bathrooms, supported by signed and time-stamped cleaning logs that are reviewed by Hall Wardens and submitted weekly to the Directorate of Student Affairs, with contractual penalties for cleaning contractors who fail to meet the minimum standard.

B. The Department should install functional ventilation in all hostel rooms that lack adequate airflow, prioritising ceiling fans and serviceable windows, since frequent cleaning and good ventilation are the two environmental factors most strongly associated with reduced infection prevalence in this study.

C. The Department should establish a continuous soap supply contract for all hostel toilet and bathroom facilities, removing the most direct structural barrier to student handwashing compliance.

To the University of Benin Directorate of Student Affairs:

A. The Directorate of Student Affairs should introduce a structured hostel infection prevention orientation programme for all new residents, delivered at the point of residential check-in each academic year, covering hostel-specific infection risks, proper hygiene practices, correct use of hostel facilities, and pathways for seeking treatment at the University Health Centre.

B. The Directorate should distribute a hostel infection prevention starter pack to every new residential student, containing a bar of soap, personal hand sanitiser, and a brief illustrated guide on infection prevention in hostel settings, reducing the economic and informational barriers to good hygiene practice from the first day of residency.

C. The Directorate should mandate non-medical faculty student associations to incorporate a compulsory infection prevention awareness component into their annual faculty orientation activities, ensuring that students in Arts, Education, Law, Social Sciences, and Engineering receive structured infection prevention education equivalent to that received by health science students.

To the University of Benin Health Centre:

1. The University of Benin Health Centre should establish a proactive student health outreach programme that deploys health workers to halls of residence during peak illness periods, including the early rainy season months and the weeks immediately preceding end-of-semester examinations, providing on-site consultation, prescription, and treatment completion counselling to reduce reliance on pharmacy self-purchase and improve treatment completion rates.

2. The Health Centre should establish a simple infection surveillance register for hostel students, enabling termly mapping of infection patterns by hall, sex, and level of study, to identify infection clusters early and direct environmental remediation efforts and outreach activities to the highest-burden facilities.

3. The Health Centre should develop and facilitate regular health talks in hostel common rooms on infection prevention, with special sessions targeting the specific knowledge gaps identified in this study around individual causative agents and discrete prevention methods

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APPENDIX I

QUESTIONNAIRE

ASSESSMENT OF COMMUNITY ACQUIRED INFECTIONS AMONG UNDERGRADUATE STUDENTS ACROSS HALLS OF RESIDENCE IN THE UNIVERSITY OF BENIN

INSTRUCTION: Please tick (✓) the appropriate box or fill in the blank spaces where applicable. Your honest responses are appreciated and will be treated with strict confidentiality.

Serial Number: _____

SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS

1. Age (in completed years): _____
2. Sex: Male ( ) Female ( )
3. Religion: Christianity ( ) Islam ( ) African Traditional Religion ( ) Others (specify): _____
4. Ethnicity: Bini ( ) Esan ( ) Igbo ( ) Yoruba ( ) Hausa ( ) Others (specify): _____
5. Faculty: _____
6. Department: _____
7. Level of Study: 100 Level ( ) 200 Level ( ) 300 Level ( ) 400 Level ( ) 500 Level ( ) 600 Level ( )
8. Who is your Primary Caregiver: Father ( ) Mother ( ) Both Parents ( ) Extended Relatives ( ) Self-Sponsored ( )
9. Level of Education of Primary caregiver: Primary ( ) Secondary ( ) Tertiary ( ) Uneducated ( )
10. Monthly allowance (in Naira): Below 10,000 ( ) 10,000 - 20,000 ( ) 20,001 - 30,000 ( ) 30,001 - 50,000 ( ) Above 50,000 ( )
11. Hall of Residence: Hall 1 ( ) Hall 2 ( ) Hall 3 ( ) Hall 4 ( ) Hall 5/Queens ( ) Hall 6 ( )
12. How many roommates do you have? _____
13. How long have you been living in the hostel? Less than 6 months ( ) 6 months - 1 year ( ) 1-2 years ( ) 2-3 years ( ) More than 3 years ( )

SECTION B: KNOWLEDGE OF COMMUNITY-ACQUIRED INFECTIONS

Part I: Awareness and Sources of Information

14. Have you ever heard of community-acquired infections? Yes ( ) No ( )

15. If yes to question 14, where did you hear about it? (You may select more than one)

School/University lectures ( ) Health talks/seminars ( ) Friends/peers ( ) Television/Radio ( ) Social media ( ) Family members ( ) Healthcare workers ( ) Others (specify): _____

16. Have you received any health education about infection prevention in the hostel? Yes ( ) No ( )
17. Have you received any health training about preventing community acquired infection? Yes ( ) No ( )
18. Which statement BEST defines community-acquired infections? (Choose ONE)
(a) Infections gotten only from hospitals ( ) (b) Infections contracted outside healthcare settings like homes, schools, and hostels ( ) (c) Infections that cannot be prevented ( ) (d) Infections that only affect elderly people ( )
19. Community-acquired infections can be caused by: (Select all that apply)

(a) Bacteria ( ) (b) Viruses ( ) (c) Fungi ( ) (d) Parasites ( ) (e) All of the above ( )

20. Which of the following are examples of community-acquired infections? (Tick all that apply)

Common cold/flu ( ) Diarrhea ( ) Typhoid fever ( ) Skin infections (e.g., ringworm, scabies) ( ) Urinary tract infections ( ) Malaria ( ) Tuberculosis ( ) Cholera ( ) Conjunctivitis (pink eye) ( )

21. Community-acquired infections can be transmitted through: (Select all that apply)

(a) Contaminated hands ( ) (b) Contaminated food and water ( ) (c) Droplets from coughing or sneezing ( ) (d) Direct skin-to-skin contact ( ) (e) Sharing personal items (towels, combs, razors) ( ) (f) All of the above ( )

22. Which of the following can increase the risk of getting infections in the hostel? (Tick all that apply)

Overcrowding ( ) Poor sanitation ( ) Sharing toilets and bathrooms ( ) Poor ventilation ( ) Irregular cleaning ( ) Inadequate water supply ( ) Sharing eating utensils ( ) Indiscriminate waste disposal ( )

23. Hand-washing with soap and water can prevent the spread of infections. True ( ) False ( ) I don't know ( )
24. Proper toilet hygiene can reduce the risk of getting infections. True ( ) False ( ) I don't know ( )
25. Sharing personal items like towels and combs can spread infections. True ( ) False ( ) I don't know ( )
26. Keeping your room and surroundings clean can help prevent infections. True ( ) False ( ) I don't know ( )
27. Which of the following are effective ways to prevent community-acquired infections? (*Select all that apply*)

(a) Regular handwashing ( )

(b) Using clean toilets ( )

(c) Drinking clean water ( )

(d) Eating properly cooked food ( )

(e) Avoiding sharing of personal items ( )

(f) Proper waste disposal ( )

(g) Seeking early medical treatment when sick ( )

(h) All of the above ( )

28. Covering your mouth and nose when coughing or sneezing can prevent the spread of respiratory infections. True ( ) False ( ) I don't know ( )
29. Early treatment of infections can prevent complications and spread to others. True ( ) False ( ) I don't know ( )

SECTION C: ATTITUDE TOWARDS COMMUNITY-ACQUIRED INFECTIONS AND PREVENTIVE MEASURES

Please indicate your level of agreement with each statement:

A = Agree, N = Neutral, D = Disagree

Statement	**A**	**N**	**D**
30. Community-acquired infections are a serious health problem in university hostels.			
31. Handwashing with soap and water is important in preventing infections.			
32. I am willing to practice good hygiene to prevent infections.			
33. The university should provide adequate sanitation facilities to prevent infections.			
34. I would seek medical attention early if I develop symptoms of an infection.			
35. It is my responsibility to keep my environment clean to prevent infections.			
36. Sharing personal items like towels and combs is acceptable among roommates.			
37. I believe that infections can be prevented through proper hygiene practices.			
38. Health education programs on infection prevention should be organized regularly in hostels.			
39. Overcrowding in hostels increases my risk of getting infections.			
40. I would encourage my roommates to practice good hygiene.			
41. Religious belifefs may increase the risk of community acquired infections			
42. Cultural beliefs may cause community acquired infections			
43. Do you think you are at risk of contracting infections while living in the hostel?			

SECTION D: PREVALENCE ASSESSMENT

DOMAIN 1: HYGIENE PRACTICES

44. Source of Water? (*Tick all that apply*)

Overhead water tanks ( ) Underground water reservoir ( ) Well ( ) External borehole ( )

45. How do you store water? (*Tick all that apply)*

Open bucket ( ) Covered bucket ( ) Jerry cans ( ) Plastic drums ( ) I do not store water ( )

46. How often do you wash your hands with Soap and Water?

Always ( ) Often ( ) Sometimes ( ) Rarely ( ) Never ( )

47. Has there been times when you could not access water?

Yes ( ) No ( )

48. What did you do? _____

49. When do you wash your hands? (Tick all that apply)

Before eating ( ) After using the toilet ( ) After sneezing/coughing ( ) After touching dirty surfaces ( ) Before preparing food ( ) After handling waste ( )

50. Type of toilet facilities in hostel: Water closet ( ) Ventilated Improved Pit ( ) Pit latrine ( )

51. Do you use the toilet facilities provided in the hostel? Always ( ) Often ( ) Sometimes ( ) Rarely ( ) Never ( )

52. Are there hand washing facilities available near the toilets? Yes ( ) No ( )

53. Is soap available? Yes ( ) No ( )

If you use the toilet facilities, Please indicate your level of agreement with each statement:

A = Always, O = Often, S = Sometimes, R = Rarely, N = Never

STATEMENT	**A**	**O**	**S**	**R**	N
A. Are toilets generally clean?					
B. Is there regular water supply?					
C. Are there issues with sewage overflow?					
D. Is the drainage system functioning properly?					
E. Is there visible fecal matter on floor or walls?					
F. Is there stagnant water near the toilet block?					
G. Has then been times when the toilet facilities were clogged?					

54. If you don't always use the toilet facilities, what do you do? (Tick all that apply)

Open urination ( ) Open defecation ( ) Use buckets in the room ( ) Go to nearby bushes ( ) Use of paper bags ( ) Not applicable ( )

55. How do you dispose of your refuse? In the waste bins provided ( ) Throw in the gutter ( ) Throw outside the hostel ( ) Burn it ( ) Others (specify): _____

56. If in waste bins, are the bins: Covered with lids ( ) Uncovered ( ) Damaged ( )

57. How often are the waste bins emptied? Daily ( ) Twice Daily ( ) Weekly ( ) Irregularly ( )

58. Where is Waste disposed of? Central waste collection points ( ) Open dumping ( ) Burned ( ) Others (specify):_____

59. Do you share any of the following personal items with your roommates? (Tick all that apply)

Towels ( ) Combs/brushes ( ) Razors ( ) Toothbrushes ( ) Eating utensils (plates, spoons) ( ) Drinking cups ( ) None of the above ( )

60. Where do you usually eat your meals? In my room ( ) In the hostel kitchen ( ) At a restaurant/cafeteria ( ) Outside the hostel ( )
61. Do you wash fruits and vegetables before eating them? Always ( ) Often ( ) Sometimes ( ) Rarely ( ) Never ( )
62. What is the source of water you use in the hostel? (Tick all that apply)

Pipe-borne water ( ) Borehole ( ) Well water ( ) Sachet water ( ) Bottled water ( ) Stream/river ( )

63. Do you clean your room? Yes ( ) No ( )
64. How often do you clean your room? Daily ( ) 2-3 times a week ( ) Once a week ( ) Once in two weeks ( ) Rarely ( )
65. Do you share your personal belongings? Yes ( ) No ( )
66. How often do you wash your bed sheets? Weekly ( ) Biweekly ( ) Monthly ( ) Rarely ( )

DOMAIN 2: INFECTION HISTORY

67. In the past 6 months, have you experienced any of the following infections while living in the hostel? (Tick all that apply)

Respiratory Tract Infections:

Common cold ( ) Cough ( ) Flu/Influenza ( ) Sore throat ( ) Pneumonia ( ) Tuberculosis ( )

Gastrointestinal Infections:

Diarrhea ( ) Vomiting ( ) Typhoid fever ( ) Food poisoning ( ) Cholera ( ) Dysentery ( )

Skin and Soft Tissue Infections:

Ringworm ( ) Scabies ( ) Boils/Abscesses ( ) Skin rashes ( ) Impetigo ( ) Athlete's foot ( )

Urinary Tract Infections:

Painful urination ( ) Frequent urination ( ) Urinary tract infection (UTI) ( )

Eye Infections:

Conjunctivitis/Pink eye ( ) Stye ( )

Other Infections:

Malaria ( ) Others (specify): _____

68. If you answered 'None' to question 67, skip to Section E. If you experienced any infection, how many times did you have these infections in the past 6 months?

Once ( ) Twice ( ) Three times ( ) More than three times ( )

DOMAIN 3: HOSTEL-RELATED COMMUNITY-ACQUIRED INFECTIONS

69. Do you think the infections you experienced were related to hostel living conditions? Yes ( ) No ( ) Not sure ( )
70. If yes to question 51, which hostel conditions do you think contributed to your infection? (Tick all that apply)

Overcrowding ( ) Dirty toilets/bathrooms ( ) Poor ventilation ( ) Sharing facilities with many people ( ) Inadequate water supply ( ) Poor waste disposal ( ) Dirty environment ( ) Others (specify): _____

SECTION E: TYPES OF COMMUNITY-ACQUIRED INFECTIONS

71. Have you experienced any of the following symptom(s) in the past 6 months? (*You may select more than one*)

Fever ( ) Chills ( ) Nausea ( ) Vomiting ( ) Headache ( ) Loss of Appetite ( ) Itchy eyes ( ) genital itch ( ) Others (specify): _____

72. When you had any of these symptoms, what did you do? (Tick all that apply)

Went to the university health center ( ) Went to a hospital/clinic outside the university ( ) Bought drugs from a pharmacy ( ) Used herbal/traditional remedies ( ) Self-medicated with drugs at home ( ) Did nothing ( ) Others (specify): _____

73. How long did it take you to seek treatment after noticing symptoms?

Immediately (same day) ( ) Within 1-2 days ( ) Within 3-7 days ( ) After more than a week ( ) Did not seek treatment ( )

74. Did you complete the treatment prescribed to you? Yes ( ) No ( ) Not applicable ( )
75. If no to question 56, why didn't you complete the treatment?_____
76. Felt better before finishing ( ) Too expensive ( ) Experienced side effects ( ) Lost the medication ( ) Forgot to take it ( ) Others (specify): _____

SECTION F: RISK FACTORS INFLUENCING RECURRENCE OF COMMUNITY-ACQUIRED INFECTIONS

77. How would you describe the condition of the toilet/bathroom facilities in your hostel?
78. Very clean ( ) Clean ( ) Fairly clean ( ) Dirty ( ) Very dirty ( )
79. Is water always available in your hostel? Yes, always ( ) Yes, most of the time ( ) Sometimes ( ) Rarely ( ) Never ( )
80. How would you describe the ventilation in your room? Excellent ( ) Good ( ) Fair ( ) Poor ( ) Very poor ( )
81. How often are the common areas (toilets, bathrooms, corridors) cleaned?

Daily ( ) 2-3 times a week ( ) Once a week ( ) Rarely ( ) Never ( )

82. Are there adequate waste bins in your hostel? Yes ( ) No ( )
83. How often is waste collected from your hostel?

Daily ( ) 2-3 times a week ( ) Once a week ( ) Rarely ( ) Never ( ) I don't know ( )

84. Do you think overcrowding in your room increases your risk of getting infections? Yes ( ) No ( ) Not sure ( )
85. Have you ever avoided using the hostel toilet/bathroom because of its condition? Yes ( ) No ( )
86. Is soap readily available in the hostel toilets/bathrooms? Yes, always ( ) Sometimes ( ) Rarely ( ) Never ( )
87. Do you have access to hand sanitizer in the hostel? Yes ( ) No ( )

88. What barriers prevent you from practicing good hygiene in the hostel? (Tick all that apply)

Lack of water ( ) Lack of soap ( ) Dirty facilities ( ) Overcrowding ( ) Too busy/no time ( ) Don't see it as important ( ) None ( ) Others (specify): _____

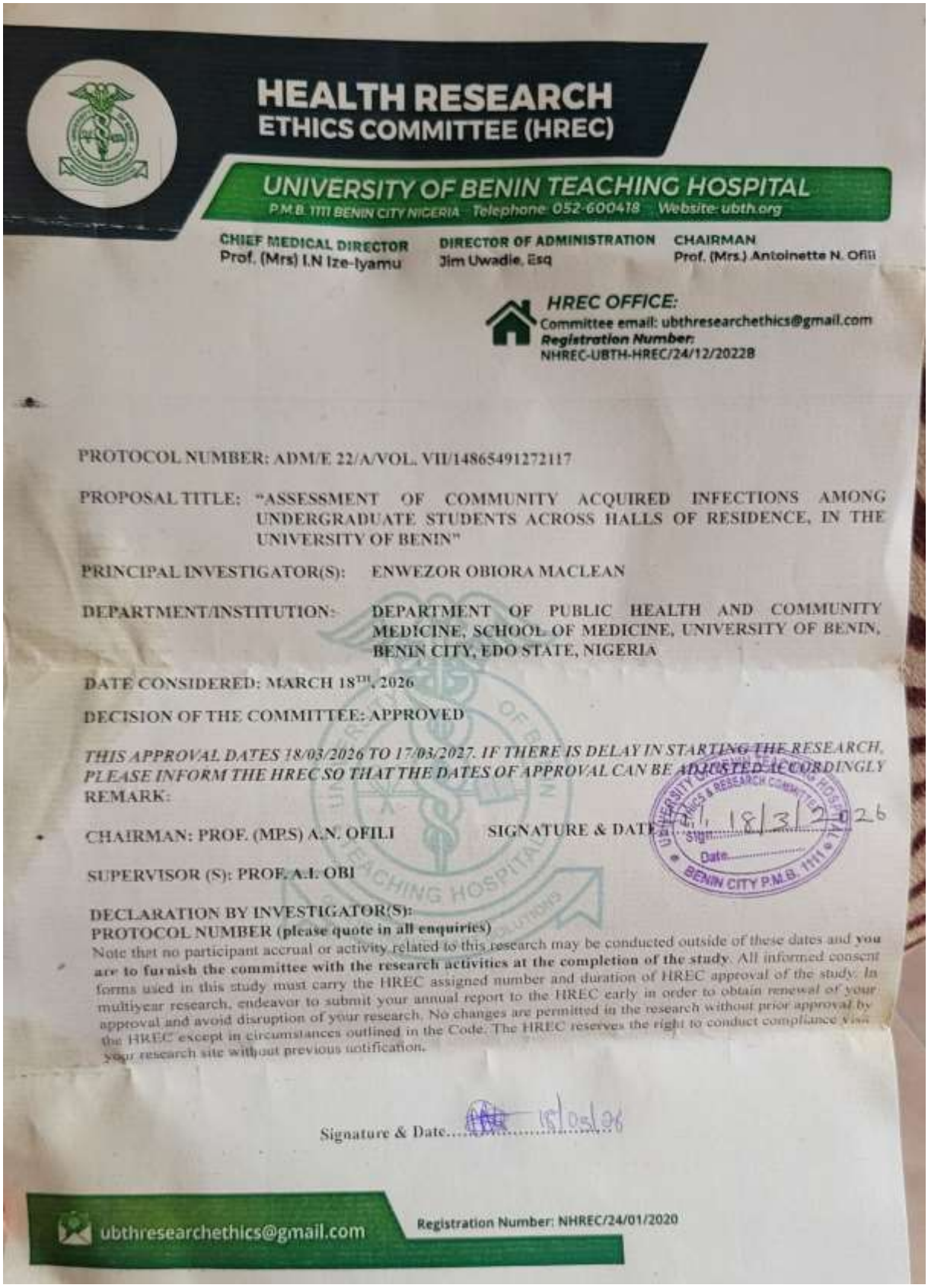
89. What do you think can be done to reduce the occurrence of infections in the hostel?

Please indicate your level of agreement with each statement:

SA = Strongly Agree A = Agree, N = Neutral, D = Disagree, SD = Strongly Disagree

STATEMENT	**SA**	**A**	**N**	**D**	**SD**
A. Regular cleaning and disinfection of toilets and bathrooms					
B. Improved waste disposal system					
C. Constant water supply					
D. Provision of handwashing facilities with soap					
E. Regular fumigation/Pest control					
F. Health education on hygiene practices					
G. Reduction of overcrowding					
H. Regular inspections by hall management					
I. Prompt repair of damaged toilets/drainage					
J. Provision of waste covered bins					
K. Enforcemet of Sanitation rules					
L. Regular medical screening of residents					

APPENDIX II
ETHICAL APPROVAL



HEALTH RESEARCH ETHICS COMMITTEE (HREC)

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Registration Number:
NHREC-UBTH-HREC/24/12/2022B

PROTOCOL NUMBER: ADM/E 22/A/VOL. VII/14865491272117

PROPOSAL TITLE: "ASSESSMENT OF COMMUNITY ACQUIRED INFECTIONS AMONG UNDERGRADUATE STUDENTS ACROSS HALLS OF RESIDENCE, IN THE UNIVERSITY OF BENIN"

PRINCIPAL INVESTIGATOR(S): ENWEZOR OBIORA MACLEAN

DEPARTMENT/INSTITUTION: DEPARTMENT OF PUBLIC HEALTH AND COMMUNITY MEDICINE, SCHOOL OF MEDICINE, UNIVERSITY OF BENIN, BENIN CITY, EDO STATE, NIGERIA

DATE CONSIDERED: MARCH 18TH, 2026

DECISION OF THE COMMITTEE: APPROVED

THIS APPROVAL DATES 18/03/2026 TO 17/03/2027. IF THERE IS DELAY IN STARTING THE RESEARCH, PLEASE INFORM THE HREC SO THAT THE DATES OF APPROVAL CAN BE ADJUSTED ACCORDINGLY

REMARK:

CHAIRMAN: PROF. (MRS) A.N. OFILI SIGNATURE & DATE 18/3/2026

Sign.....
Date.....

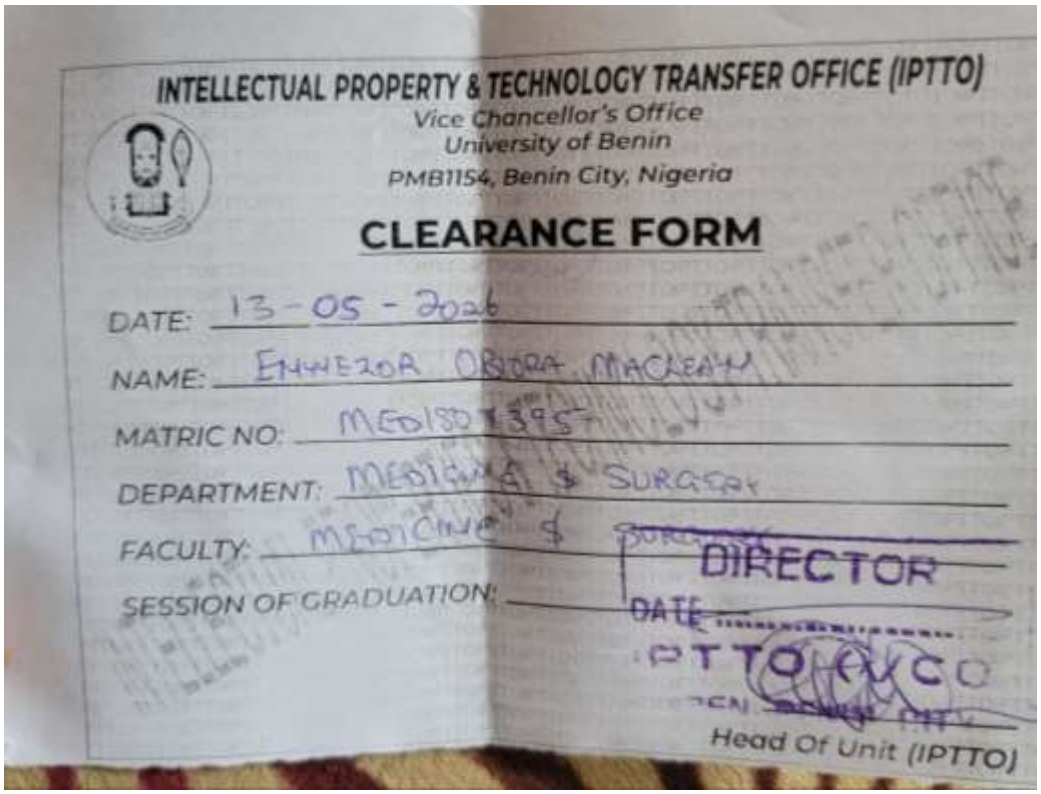
SUPERVISOR (S): PROF. A.I. OBI

DECLARATION BY INVESTIGATOR(S):
PROTOCOL NUMBER (please quote in all enquiries)
Note that no participant accrual or activity related to this research may be conducted outside of these dates and **you are to furnish the committee with the research activities at the completion of the study**. All informed consent forms used in this study must carry the HREC assigned number and duration of HREC approval of the study. In multiyear research, endeavor to submit your annual report to the HREC early in order to obtain renewal of your approval and avoid disruption of your research. No changes are permitted in the research without prior approval by the HREC except in circumstances outlined in the Code. The HREC reserves the right to conduct compliance visit your research site without previous notification.

Signature & Date..... 18/03/26

ubthresearchethics@gmail.com Registration Number: NHREC/24/01/2020

APPENDIX III
PLAGIARISM TEST CLEARANCE FORM



INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)
Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 13-05-2026
NAME: ENWEZOR OBIORA MACLEAN
MATRIC NO: MED/180139[illegible]
DEPARTMENT: MEDICINE & SURGERY
FACULTY: MEDICINE & [illegible]
SESSION OF GRADUATION: [illegible]

DIRECTOR
DATE
IPTTO

Head Of Unit (IPTTO)