ANTIBIOTICS USE BY STUDENTS OF THE UNIVERSITY OF BENIN

NELSON UMUAFEH UGBODAGA MED1807499

DANIEL CHUKWUKA UKA MED1807500

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

MAY, 2026

DECLARATION

I hereby declare that this project work is original and will be carried out by the under-listed students under the supervision of **Prof Omokhoa Adedayo Adeleye** and has not been published elsewhere for the award of a degree or certificate.

NELSON UMUAFEH UGBODAGA

MED1807499

+2347030154937

nelson.ugbodaga@med.uniben.edu

DANIEL CHUKWUKA UKA

MED1807500

+2347085622407

chukwuka.uka@med.uniben.edu

CERTIFICATION

This is to certify that this research work titled "Antibiotics Use by Students of University of Benin" will be carried out in the Department of Community Health, School of Medicine, College of Medical Sciences, University of Benin, Benin City, Edo State, Nigeria as part of the requirements for the award of Bachelor of Medicine, Bachelor of Surgery (MBBS) by **NELSON UMUAFEH UGBODAGA** with matriculation number **MED1807499** and **DANIEL CHUKWUKA UKA** with matriculation number **MED1807500**.

_____ _____

Prof OMOKHOA ADEDAYO ADELEYE **Date**

FWACP,
Professor/Consultant (Project Supervisor),
Department of Public Health and Community Medicine,
School of Medicine,
College of Medicine,
University of Benin/ University of Benin Teaching Hospital (UBTH),
Benin City, Edo State, Nigeria.

_____ _____

Dr. (Mrs) O. E. OBARISIAGBON **Date**

MBBS; MPH; FMCPH
Head of Department,
Associate Professor/Consultant,
Department of Public Health and Community Medicine,
College of Medicine,
University of Benin/ University of Benin Teaching Hospital (UBTH),
Benin City, Edo State, Nigeria.

DEDICATION

We dedicate this work to God Almighty, who has brought us this far in our pursuit of becoming medical doctors. This project is also dedicated to our family, who have been our pillars over the years and have contributed immensely to our project. We also dedicate this to our colleagues, friends, and well-wishers.

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Our appreciation extends to all the lecturers and staff of the Department of Public Health and Community Medicine, as well as the College of Medical Sciences, University of Benin, for the knowledge and professional training instilled in us over the years.

Special thanks go to our dedicated research assistants and the students of the University of Benin who participated in this study. Without their cooperation and willingness to provide the necessary data, this research would not have been possible.

Nelson Umuafeh Ugbodaga**:** My heartfelt gratitude to my parents, Mr. Zacchaeus Majekodunmi Ugbodaga and Mrs. Loveth Ebunoluwa Ugbodaga and siblings, Bisola Ugbodaga and Angela Ugbodaga for their sacrifices, prayers, and constant encouragement which served as a pillar of strength during the rigors of this medical training.

Daniel Chukwuka Uka**:** I wish to thank my parents, AIG Ifeanyi Uka and Mrs. Oluwatoyin Uka, and siblings, Mrs Oluwatobi Lawrence and Uka Ikechukwu for their unwavering financial and emotional support, and for believing in my dreams throughout this journey.

Finally, we appreciate our colleagues and friends in the MB;BS Class of 2024 for the camaraderie and shared memories. To everyone who contributed directly or indirectly to the success of this work, we say thank you.

Nelson Umuafeh Ugbodaga

Daniel Chukwuka Uka

(May, 2026).

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LIST OF ABBREVIATION

AMR	Antimicrobial Resistance
ABU	Ahmadu Bello University
CI	Confidence Interval
HREC	Health Research Ethics Committee
KAP	Knowledge, Attitude and Practice
MBBS	Bachelor of Medicine, Bachelor of Surgery
MDR-TB	Multidrug-Resistant Tuberculosis
MRSA	Methicillin-Resistant Staphylococcus aureus
OR	Odds Ratio
PPMV	Patent and Proprietary Medicine Vendor
SPSS	Statistical Package for the Social Sciences
UBTH	University of Benin Teaching Hospital
UNIBEN	University of Benin
WHO	World Health Organization

DEFINITION OF TERMS

Antibiotics: chemical substances used to treat bacterial infections by either killing bacteria (bactericidal effect) or inhibiting their growth (bacteriostatic effect).

Antimicrobial Resistance (AMR): the ability of microorganisms such as bacteria, viruses, fungi, and parasites to resist the effects of antimicrobial drugs that were previously effective for treating infections.

Antibiotic Resistance: a type of antimicrobial resistance that occurs when bacteria evolve mechanisms that enable them to survive exposure to antibiotics.

Self-Medication: the use of medicines by individuals to treat self-diagnosed illnesses or symptoms without professional medical advice or prescription.

Rational Use of Antibiotics: the appropriate use of antibiotics in the correct dose, duration, and indication as prescribed by a qualified healthcare professional.

Knowledge: the levels of awareness or understanding individuals have regarding antibiotics, their indications, and the concept of antimicrobial resistance.

Attitude: the beliefs, perceptions, or feelings individuals hold toward antibiotics and their appropriate or inappropriate use.

Practice: the actual behaviours or actions of individuals regarding antibiotic use, including adherence to prescriptions and self-medication habits.

Multidrug-Resistant Organisms (MDROs): microorganisms that have developed resistance to multiple classes of antimicrobial drugs, making infections difficult to treat.

Self-Prescribing: the practice of obtaining and using antibiotics without a prescription from a licensed healthcare professional.

Adherence (Medication Adherence): the extent to which patients take medications according to the prescribed dosage, frequency, and duration.

Cross-Sectional Study: a type of observational research design that analyses data from a population at a single point in time.

Prevalence: the proportion of individuals in a population who have a particular condition or behaviour at a specified time.

Biofilm: a structured community of microorganisms that adhere to surfaces and produce protective substances, making them more resistant to antibiotics.

Superbugs: bacteria that have developed resistance to multiple antibiotics and are therefore difficult to treat with standard medications.

ABSTRACT

Background:

Antimicrobial resistance (AMR) is a critical global public health threat, significantly driven by the irrational use of antibiotics. University students represent a key demographic whose medication-related behaviours influence community resistance patterns. This study assessed the knowledge, attitudes, and practices (KAP) regarding antibiotic use and resistance among undergraduate students of the University of Benin, Edo State.

Methods:

A descriptive cross-sectional study design was employed. A total of 430 students were selected using a multi-stage probability sampling technique across eight faculties. Data were collected using a structured, pre-tested, interviewer-administered questionnaire. Analysis was performed using IBM SPSS version 27.0, utilizing descriptive statistics and Chi-square tests to determine associations between variables. Statistical significance was set at $p < 0.05$.

Results:

The mean age of respondents was 20.3 ± 2.9 years. The study revealed a high prevalence of antibiotic use, with 58.8% of students having used an antibiotic in the preceding six months. Overall, 81.6% of respondents demonstrated poor knowledge of antibiotics and AMR. Misconceptions were widespread: 78.1% incorrectly believed antibiotics are effective against viral infections (flu/coughs), and only 10.0% correctly identified the biological mechanism of resistance. Attitudes were predominantly negative (70.2%); notably, 51.0% perceived sharing leftover antibiotics as a "helpful social gesture." Regarding practices, 50.7% demonstrated poor behaviour. The most common source of antibiotics was Patent and Proprietary Medicine Vendors

(29.3%), while only 18.8% obtained drugs via a doctor's prescription. Faculty of study (p=0.005) and Level of study (p=0.005) were significantly associated with knowledge levels, with medical students and seniors performing better. Attitude was a significant predictor of practice ($p < 0.001$).

Conclusion: There is a concerning deficit in antibiotic literacy and a high prevalence of inappropriate practices among students at the University of Benin. The reliance on unregulated vendors and the social normalization of medication sharing underscore the need for urgent interventions. It is recommended that the University administration integrates antimicrobial stewardship modules into the General Studies (GST) curriculum and strengthens the campus health services to reduce reliance on informal medication sources.

CHAPTER ONE

INTRODUCTION

1.1. Background

Antibiotics are chemical substances used in the treatment and prevention of bacterial infections. They work either by killing microorganisms directly (bactericidal effect) or by inhibiting their growth (bacteriostatic effect).[1] Since the discovery of penicillin in the early 20th century, antibiotics have fundamentally transformed medicine, enabling the effective management of infectious diseases that were previously fatal.[2] Their introduction has significantly reduced morbidity and mortality worldwide and has contributed to increased life expectancy.[1,2] Beyond treatment of infections, antibiotics have made complex medical procedures safer, including surgery, chemotherapy, and organ transplantation.[1,2]

The emergence of antimicrobial resistance (AMR) is increasingly threatening the effectiveness of antibiotics. AMR occurs when microorganisms develop mechanisms that allow them to survive exposure to drugs that would normally inhibit or kill them.[3] This resistance renders standard treatments less effective, often resulting in prolonged illness, increased risk of complications, and elevated mortality.[1,3,4] The treatment of resistant infections frequently requires the use of more expensive, less effective, or more toxic alternatives, which increases the burden on healthcare systems.[4,5] Resistant microorganisms can spread within communities and healthcare settings, further complicating treatment efforts.[4]

Several mechanisms contribute to antimicrobial resistance. These include genetic mutations in microorganisms, acquisition of resistance genes through horizontal gene transfer, and selective pressure exerted by excessive or inappropriate use of antibiotics.[4,5] Microorganisms can acquire multiple resistance genes simultaneously, giving rise to multidrug-resistant strains such as

methicillin-resistant Staphylococcus aureus (MRSA), multidrug-resistant Mycobacterium tuberculosis (MDR-TB), and penicillin-resistant Enterococcus species.[4,6] Such multidrug-resistant organisms significantly limit treatment options and pose severe challenges for infection control in hospitals and communities.[4,6]

Antimicrobial resistance is a major global public health threat. The World Health Organization has identified AMR as one of the top ten threats to human health.[3] Resistant infections already contribute to substantial mortality worldwide.[3] Without urgent interventions, AMR has the potential to undermine decades of medical progress and reduce the efficacy of standard treatments for common infections.[3,7] The World Bank has warned that uncontrolled antimicrobial resistance could have severe economic consequences, affecting productivity, healthcare expenditures, and societal wellbeing.[5] Projections by Jim O'Neill indicate that AMR could result in millions of deaths annually if left unchecked, emphasizing the need for coordinated global action.[6,7]

Irrational antibiotic use is one of the primary drivers of resistance.[7] Inappropriate practices include self-medication, incomplete treatment courses, incorrect dosing, and using antibiotics to treat viral infections such as the common cold or influenza.[7,8] Such behaviours create selective pressure that enables microorganisms to survive and propagate resistance mechanisms.[7,8] In many developing countries, including Nigeria, antibiotics are readily available without prescription, exacerbating misuse.[8] Easy access, combined with limited knowledge and misconceptions about antibiotic effectiveness, contributes significantly to inappropriate antibiotic consumption.[8,9]

In Nigeria, the misuse of antibiotics is a significant public health concern. Weak regulatory enforcement, limited public awareness of AMR, and widespread informal access to antibiotics

contribute to the problem.[8,9] Studies have shown that many individuals obtain antibiotics from pharmacies, patent medicine vendors, or informal networks without consulting healthcare professionals.[9,10] These practices often result in inappropriate drug selection, incorrect dosing, and incomplete treatment courses, all of which accelerate the emergence of resistant microorganisms.[9,10]

University students represent an important population for studying antibiotic use and resistance. As young adults and future professionals, their knowledge, attitudes, and practices influence not only their personal health behaviours but also community-wide practices.[11] Several studies in Nigeria have documented high prevalence of antibiotic self-medication among university students. For example, research at University of Ibadan found that students frequently self-medicate due to misconceptions about the effectiveness of antibiotics.[12] A similar study at Ahmadu Bello University reported that students obtained antibiotics without prescriptions and often did not complete treatment courses.[13] In the South-South region, a study among students in Lagos indicated poor knowledge of antimicrobial resistance and frequent inappropriate antibiotic use, including the treatment of non-bacterial illnesses.[14] Research in Edo State also highlighted the influence of peer advice, social media, and online resources on antibiotic misuse among undergraduates.[15] These findings underscore the importance of conducting a localized study at the University of Benin, where specific data on students' knowledge, attitudes, and practices regarding antibiotic use is limited.

Understanding the behavioural determinants of antibiotic use requires a structured approach. The Knowledge, Attitude, and Practice (KAP) model is widely used in public health research to assess health behaviours.[11] The model posits that knowledge influences attitudes, which in turn shape practices and behaviours.[11] Applying the KAP framework to antibiotic use allows

researchers to identify gaps in awareness, misconceptions, and inappropriate behaviours, providing a basis for targeted interventions aimed at promoting rational antibiotic use and curbing AMR.[11,12]

The importance of this study extends beyond individual behaviours. Misuse of antibiotics contributes to the spread of resistant pathogens, which can affect hospital infection control, community health, and overall public health outcomes.[4,6] By examining the knowledge, attitudes, and practices of students at the University of Benin, this study seeks to identify key areas where educational interventions, policy enforcement, and public health campaigns can be implemented. The findings can inform both institutional and national strategies to reduce antibiotic misuse, improve health literacy, and mitigate the long-term public health impact of AMR.[15]

In conclusion, antibiotics are essential to modern medicine, but their effectiveness is increasingly threatened by antimicrobial resistance. Globally, AMR represents a major public health and economic challenge.[3,6,7] In Nigeria, widespread misuse among university students, driven by misconceptions, easy access, and peer influence, further compounds the problem.[9,10,12] Assessing knowledge, attitudes, and practices using the KAP framework provides a strategic approach to understanding behavioural drivers and guiding interventions.[11] This study is therefore crucial to addressing the growing threat of antibiotic resistance at both local and global levels.[15]

1.2. Statement of the Problem

Despite the well-documented benefits of antibiotics, their misuse has become a major driver of antimicrobial resistance worldwide. The increasing prevalence of resistant organisms such as MRSA, MDR-TB, and resistant Enterococcus poses a critical challenge to effective treatment. Antibiotic resistance is projected to cause devastating public health and economic consequences

if not urgently addressed, including millions of preventable deaths and a sharp decline in global productivity.

This growing threat is further compounded by irrational antibiotic use, including incomplete treatment courses, self-medication, obtaining antibiotics without prescriptions, and the use of leftover antibiotics from previous treatments. In addition, some students obtain and use antibiotics that have been passed on to them by colleagues, friends, or family members without proper medical consultation. Such practices contribute significantly to inappropriate antibiotic exposure and the acceleration of resistance.

Furthermore, there is a pervasive misconception among students who tend to view antibiotics as a “cure-all” for all types of illnesses, frequently using them to treat non-bacterial infections such as common colds and viral coughs. These inappropriate practices reflect gaps in knowledge, attitudes, and behavioural patterns regarding antibiotic use.

University students, as young adults and future leaders in society, represent a vital population to study because their knowledge, attitudes, and practices toward antibiotic use significantly influence not only their personal health but also broader community behaviours. However, there is limited research evidence on the level of awareness, perceptions, and practices related to antibiotic use and resistance among students in Nigerian universities, particularly at the University of Benin.

1.3. Justification of Study

Antibiotic resistance is widely recognized as a major global public health crisis, posing significant challenges to healthcare delivery, economic stability, and societal well-being.[7] The effectiveness of antibiotics, which were once considered a cornerstone of modern medicine, has been undermined by widespread misuse and inappropriate practices.[7,8] Since their introduction in the early to mid-20th century, antibiotics played a pivotal role in reducing morbidity and mortality associated with bacterial infections and contributed to the development of modern medical practices, including surgery, chemotherapy, and organ transplantation.[8]

However, the persistent misuse of antibiotics has facilitated the emergence of resistant bacterial strains, leading to a decline in the therapeutic efficacy of these essential drugs.[9] Antimicrobial resistance limits treatment options, prolongs illness, increases healthcare costs, and elevates the risk of mortality.[7,9] While bacteria can acquire resistance naturally through mutation or gene transfer, human behaviours significantly accelerate this process. Practices such as self-medication, over-the-counter sales without prescription, sharing antibiotics among peers, and self-diagnosis often result in inappropriate drug selection, incorrect dosing, and incomplete treatment courses.[10] These behaviours not only contribute to the emergence of resistant pathogens but also complicate infection control within communities and healthcare settings.[10]

In the Nigerian context, the misuse of antibiotics is a particularly pressing concern due to weak regulatory enforcement, easy access to medications, and limited awareness of antimicrobial resistance among the general population.[8,10] Studies conducted across various geopolitical zones in Nigeria have documented high levels of self-medication and irrational antibiotic use among undergraduate students. For example, research at Ahmadu Bello University revealed that students frequently engaged in self-medication with antibiotics, often using drugs without proper

prescription or medical guidance.[11] Similar studies at other Nigerian universities, including those in Lagos and Ibadan, have confirmed that undergraduates often rely on peer advice, online resources, and informal sources when obtaining antibiotics, highlighting significant gaps in knowledge, attitudes, and practices.[12,13]

Addressing this knowledge and behavioural gaps is critical because university students are future professionals and potential opinion leaders in society. Their behaviours, perceptions, and understanding of antibiotic use can influence broader community practices and public health outcomes.[11] By assessing students' knowledge, attitudes, and practices, this study aims to provide evidence that can guide educational interventions, health promotion campaigns, and policy initiatives targeted at rational antibiotic use.[11,13]

Moreover, localized data on antibiotic use and resistance in the South-South region of Nigeria, particularly at the University of Benin, are currently limited. Conducting this study will fill this knowledge gap, providing region-specific insights that can support the development of contextually appropriate public health strategies, curricular enhancements in health-related courses, and evidence-based recommendations for antimicrobial stewardship programs.[15]

In addition, the study contributes to global efforts to combat antimicrobial resistance by adding Nigerian data to the body of knowledge on student practices and behaviour patterns regarding antibiotic use. Understanding the local drivers of misuse, including socio-cultural influences, accessibility, and misconceptions about antibiotics, is essential for designing interventions that are both effective and sustainable in similar low- and middle-income country contexts.[15]

Therefore, undertaking this study is justified on multiple fronts: it addresses a critical public health challenge, provides insights into the behavioural determinants of antibiotic misuse among a key demographic, contributes to the development of educational and policy interventions, and

enhances the evidence base for regional and global strategies against antimicrobial resistance.[11,12,15]

1.4. Research Questions

1. Do Students have adequate knowledge regarding the appropriate use of antibiotics and the concept of antibiotic resistance?
2. What are the methods of sourcing antibiotics among students and who are the prescribers?
3. How often do students use antibiotics without a doctor's prescription?
4. What role do pharmacists play in advising or discouraging antibiotic use?
5. What factors affect the practices of antibiotics use among students?

1.5. Aim of the Study

The aim of this study is to assess the knowledge, attitudes, and practices related to antibiotic use and resistance among students of the University of Benin.

1.6. Specific Objectives

1. To evaluate students' knowledge regarding antibiotics and the concept of antimicrobial resistance.
2. To assess students' attitude towards the use of antibiotics.
3. To assess students' practices regarding antibiotic use, including self-medication and adherence patterns.
4. To determine the factors associated with practices towards antibiotics use.

CHAPTER TWO

LITERATURE REVIEW

2.1 Knowledge of students about antibiotic use and resistance

Several international studies have identified significant gaps in students' knowledge regarding antibiotic use and resistance. Global studies reveal widespread gaps in students' knowledge of antibiotics and antimicrobial resistance (AMR). In Saudi Arabia, 59% of non-medical university students had adequate knowledge, but 41% demonstrated insufficient understanding of antibiotic indications and resistance.[1] In Jordan, a cross-sectional study by Abuzzeid et al. involving 560 university students used a self-administered questionnaire to evaluate awareness of antibiotics. Although 90% of participants had heard of antibiotics, 60.7% incorrectly believed that antibiotics could treat viral infections such as the common cold, and only 35.4% correctly identified that antibiotic resistance occurs due to changes in bacteria rather than changes in the human body.[12]

In sub-Saharan Africa, Gemeda et al. conducted a multi-center descriptive study across three Ethiopian universities to assess antibiotic literacy among 800 students. The findings revealed that students enrolled in non-health disciplines had significantly lower knowledge scores compared to health sciences students (OR = 3.2), with over half of the participants unable to correctly define "antibiotic resistance," often attributing it mistakenly to drug expiration or bodily immunity rather than microbial adaptation.[13]

Regionally, other African studies similarly report knowledge deficiencies. For example, research in Ghana found that many tertiary students perceived antibiotics as general remedies for various illnesses, indicating widespread misconceptions about when and how these drugs should be used. Within Nigeria, Akande-Sholabi and Ajamu surveyed 400 undergraduates at the University of Lagos using a structured questionnaire to assess pharmaceutical literacy. Their study highlighted

that 48% of students could not differentiate antibiotics from common analgesics like paracetamol. Furthermore, only 28% recognized that the misuse of antibiotics directly contributes to the emergence of resistant strains in their communities.[14]

Auta et al. (2024) conducted a descriptive cross-sectional study among 1,200 Nigerian undergraduates across six federal universities. Utilizing a structured 20-item literacy tool, they found that while 92.4% had heard of antibiotics, only 31.2% correctly identified the definition of AMR. Notably, 42.1% incorrectly believed antibiotics cure viral coughs, and 35.8% perceived them as effective against malaria.[8]

Other Nigerian studies, such as those conducted among undergraduates at the University of Ibadan, also documented significant misconceptions, with many participants believing antibiotics could be used to prevent non-bacterial illnesses. Collectively, these studies highlight global knowledge gaps, especially among non-health students, underscoring the need for targeted educational interventions.

2.2 Attitudes of students towards use of antibiotics

A questionnaire-based study was conducted by Napolitano et al. among 450 university students in Italy to evaluate attitudes toward antibiotic stewardship. The results showed that 38.5% of students held the attitude that they were entitled to an antibiotic prescription for any respiratory infection and would feel dissatisfied if a doctor refused to prescribe one. About 22% believed antibiotics should be taken at the first sign of any illness to prevent it from worsening.[18]

Research by Melkam et al. in Ethiopia investigated the attitudes of 601 participants, including students, towards medication safety. It was found that 45.3% of participants believed that newer

or more expensive antibiotics were "stronger" and more effective. Furthermore, 33.8% of respondents believed that using antibiotics regularly would boost their immune system, reflecting a dangerous misconception about the drug's prophylactic properties.[19]

A descriptive study was conducted by Olayemi et al. (2017) among 350 students at the University of Ibadan, Nigeria. The study used a Likert scale to measure perceptions. The findings showed that 51% of respondents viewed sharing leftover antibiotics with roommates as a "helpful social gesture." Approximately 64% cited saving money and time as the primary motivation for this positive attitude toward sharing prescription-only medications.[20]

Also, Balami et al. (2022) conducted a cross-sectional survey among 1,071 students in Northern Nigeria. The study found a dismissive attitude toward the need for prescriptions; 40.2% believed that as long as they knew the drug's name, a formal prescription was an unnecessary financial and bureaucratic burden.[25]

2.3 Practices of students regarding antibiotic use

Antibiotic use practices among students have been widely studied due to the strong link between behavioural patterns and the emergence of antimicrobial resistance. In Saudi Arabia, an observational study by Al-Ghamdi et al. among 500 university students in Riyadh identified a 54% prevalence of antibiotic self-medication. The most common practice was obtaining antibiotics from community pharmacies without a medical prescription (62%), followed by the use of leftover medications from previous illnesses (18%).[15]

In Sudan, Eldalo utilized a quantitative questionnaire to assess antibiotic usage among university students. The study revealed that 76% of respondents engaged in self-prescribing. Many reported

using antibiotics for minor ailments like sore throats and coughs, and as many as 45% of students discontinued medication within two days of symptom relief rather than completing the prescribed course, demonstrating poor adherence to treatment regimens.[16]

In the Nigerian context, emerging evidence similarly points to problematic antibiotic practices. Sanya et al. administered a quantitative survey among 600 students in a North-Central Nigerian university and found that 58.3% of respondents had stopped an antibiotic course prematurely, citing perceived recovery as justification. Additionally, 15% admitted to increasing their antibiotic dose without medical advice, reflecting a combination of misuse and risky self-management behaviours.[17]

Also, Okoro et al. (2023) conducted an observational study among 420 students in South-South Nigeria. The study identified that 62.4% of students purchased antibiotics in single "satchets" or units from local vendors. 51.2% admitted to "dosage skipping" to save money, a practice that facilitates sub-therapeutic drug concentrations and resistance.[20]

2.4 Factors associated with antibiotic use practices

An analytical cross-sectional study among 500 Nigerian undergraduates to explore the "digital health divide" was conducted by Amusa et al. (2025). The study utilized a structured questionnaire and bivariate analysis. The findings revealed that students who utilized "Google Search" or social media for symptom diagnosis were 4.2 times more likely to purchase antibiotics without a professional prescription (OR = 4.2). Furthermore, the study found that students residing in off-campus hostels were significantly more likely to patronize unregulated Patent and Proprietary Medicine Vendors (PPMVs) due to physical proximity and perceived "speed of service" compared to those in school-managed hostels ($p < 0.001$).[23]

Umeokonkwo et al. (2021) performed a cross-sectional study involving 302 students at a tertiary institution in Nigeria. Using Chi-square tests and logistic regression, the researchers found that gender was a significant factor, with male students being more likely to engage in self-medication than females. Additionally, the academic field was a major predictor; students in non-science-based faculties were significantly more likely to practice "dosage skipping" (63.8%) and "diagnostic mimicry" (44.8%) compared to their counterparts in medical or health sciences ($p < 0.05$).[27]

Kaba et al. (2020) conducted a multi-stage cross-sectional study among 422 university students in Northwest Ethiopia. Through multivariable logistic regression, the study identified that a monthly income of >3,200 ETB was associated with a 2.5-fold increase in the likelihood of antibiotic acceptability and purchase (aOR = 2.48). Furthermore, the odds of practicing appropriate adherence were twice as high among students with "Good Knowledge" scores compared to those with "Poor Knowledge" (aOR = 2.24), suggesting that factual awareness is a direct determinant of practice.[28]

Gemeda et al. (2020) evaluated 800 students across three Ethiopian universities. The study found that "Year of Study" was a significant factor; first-year students were more prone to irrational use compared to final-year students (OR = 2.8). The research also highlighted that "Peer Pressure" accounted for 22.4% of self-medication triggers, where students relied on the success stories of their roommates rather than seeking clinic-based diagnosis.[13]

Wang et al. (2023) investigated 1,402 university students in China using an analytical survey design. The study identified that "Consumerist Attitudes" (the belief that one has a right to buy any medicine) was the strongest predictor of antibiotic misuse. Approximately 42.1% of students who self-medicated did so as an expression of personal autonomy, viewing the requirement of a

doctor’s prescription as a "bureaucratic barrier." This attitude was positively correlated with higher socioeconomic status and high levels of internet-based self-diagnosis.[30]

Jairoun et al. (2021) conducted a study in the United Arab Emirates involving a large sample of 2,146 university students. The primary factor associated with inappropriate practice was "Convenience." About 51.1% of the students chose self-medication to avoid "long clinic waiting times" and "high consultation costs." The study found that students who had easy access to "leftover" medications in their family homes were 3 times more likely to initiate a course of antibiotics without clinical oversight (OR = 3.1).[31]

CHAPTER THREE

METHODOLOGY

3.1 Study Area

The study will be conducted at the University of Benin (UNIBEN), Benin City, Edo State, Nigeria. Edo State is located in the South-South geopolitical zone, bounded by Kogi to the North, Delta to the South, Anambra to the East, and Ondo to the West. The state is characterized by tropical rainforest vegetation and a population primarily engaged in agriculture, commerce, and education.

UNIBEN was established in 1970 and has grown to become a leading federal institution. It operates two main campuses:

1. Ugbowo Campus (Main): An expansive academic hub housing the administrative block and 13 faculties, including Medical Sciences, Engineering, and Law. It is adjacent to the University of Benin Teaching Hospital (UBTH), a tertiary referral centre.
2. Ekenwan Campus: Situated in the heart of the city, housing the faculties of Arts and Environmental Sciences.

The university has an undergraduate population of approximately 40,000 students.[24] The Ugbowo campus environment is surrounded by bustling commercial areas such as Uselu, and Lagos-Benin Expressway, where numerous unregulated pharmacies and Patent and Proprietary Medicine Vendor (PPMV) shops are located. These shops often serve as the first point of care for students residing in the large on-campus hostels (e.g., Hall 1, Hall 2, Hall 3, and Hall 4) and off-campus lodges (e.g., BDPA, Osasogie).

3.2 Study Design

A descriptive cross-sectional study design will be employed. This design is appropriate as it provides a comprehensive overview of this study at a specific point in time, allowing for the estimation of prevalence and the identification of associations between variables without manipulating the environment.

3.3 Study Population

The target population includes all undergraduate students of the University of Benin. The study population consists of currently registered undergraduate students from both the Ugbowo and Ekenwan campuses who are present and enrolled for the 2024/2025 academic session during the period of data collection. The sampling frame will be obtained from the departmental registers or student attendance lists across the selected faculties.

3.4 Selection Criteria

Inclusion Criteria:

Currently registered undergraduate students of the University of Benin.

Students who are present on campus during the period of data collection.

Students who voluntarily give informed consent to participate.

Exclusion Criteria:

Students with severe illness or cognitive impairment that prevents them from providing accurate information.

3.5 Sample Size Determination

The minimum sample size (n) will be determined using the Cochran formula for a single proportion in a large population:

$$n = \frac{Z^2 pq}{d^2}$$

Where:

Z = Standard normal deviate (1.96 at 95% confidence interval).

P = Prevalence of antibiotic self-medication among undergraduates from a previous Nigerian study (p = 0.48 or 48%).[11]

q= Complement of p (1 - 0.48 = 0.52).

d = Degree of precision (0.05).

$$n = \frac{1.96^2 \times 0.48 \times 0.52}{0.05^2} = \frac{3.8416 \times 0.2496}{0.0025} = 383.5$$

Approximating to the next whole number, n = 384.

To allow for potential non-response, incomplete data, or withdrawal of consent, an additional 10% will be added to the minimum sample size (384 + 38.4 = 422.4).

Final Adjusted Sample Size (ns) = 423 students.

3.6 Sampling Method

A multi-stage sampling technique will be employed to select the 423 respondents:

Stage 1: Selection of Faculties. The university's 15 faculties will be stratified into "Science-based" and "Arts-based." Eight faculties will be selected using Simple Random Sampling via balloting.

Stage 2: Proportionate Allocation. The total sample size (430) will be divided across the selected faculties based on the ratio of their student populations.

Stage 3: Selection of Respondents. In the selected faculties, systematic random sampling will be applied in lecture halls. Students will be randomly invited to participate until the allocated number for that department is reached.

3.7 Data Management

a. Data Collection Tool

The research instrument is a structured, standardized questionnaire. It is an analogue tool divided into five sections:

Section A: Sociodemographic characteristics.

Section B: Knowledge of antibiotics and Antimicrobial Resistance.

Section C: Attitudes towards antibiotic use.

Section D: Practices regarding antibiotic use.

The tool will be pretested on 30 students (10% of minimum sample) at a separate tertiary institution to ensure clarity and validity.

b. Questionnaire Administration

The questionnaire will be self-administered. Four research assistants will be engaged to assist in distribution and collection. They will be trained on the study objectives, the systematic sampling protocol, and ethical conduct during data collection.

c. Data Collation

Completed questionnaires will be checked for completeness. Data will be coded and entered into a template developed using IBM Statistical Package for Social Sciences (SPSS) version 25.0.

d. Data Presentation

Data will be presented using numerical methods (mean, standard deviation for continuous variables) and non-numerical methods (frequency distribution tables and charts for categorical variables). Variables like knowledge level, self-medication prevalence, and sources of antibiotics will be presented using bar charts and pie charts.

e. Data Analysis

Descriptive analysis (frequencies and percentages) will be performed for all variables. To test for significant associations between categorical variables (e.g., faculty of study vs. self-medication practice), the Chi-square test will be used. Point estimates will include p-values and Odds Ratios (OR), while interval estimates will be provided as 95% Confidence Intervals (CI). The level of statistical significance is set at $p < 0.05$.

f. Scoring System:

Knowledge: 10 questions. Correct = 1, Incorrect/DK = 0. Scores ≥70% are "Good Knowledge."

Attitude: 10 Likert-scale items (5 = Strongly Agree to 1 = Strongly Disagree). Scores ≥70% indicate a "Positive Attitude."

Practices: Analysed via frequencies of adherence and self-medication trends.

3.8 Ethical Considerations

Approval to conduct the study will be obtained from the Health Research Ethics Committee (HREC) of the University of Benin Teaching Hospital. Formal permission will be sought from the Deans of the selected faculties. Informed consent will be obtained from each participant before administration. All data will be anonymized to ensure confidentiality.

3.9 Study Limitations

Recall Bias: Respondents may not accurately remember their antibiotic use in the last 6 months. To minimize this, the questionnaire includes specific time frames and examples of common antibiotics.

Social Desirability Bias: Students may provide "correct" answers regarding their practices to appear responsible. This will be mitigated by ensuring anonymity and emphasizing that the study is for research purposes only.

3.10 Anticipated Strengths of the Study

The use of a multi-stage probability sampling technique ensures that the findings are representative of the University of Benin undergraduate population. Additionally, this study provides an up-to-date and local look at what causes antibiotic resistance by focusing on how the internet affects health choices. By collecting new data on how searching for symptoms online leads to self-diagnosis, the research offers a clearer understanding of the social factors common in a Nigerian university. This approach ensures that the findings are reliable and can be used to create better health programs for students.

CHAPTER FOUR

RESULTS

A total of 430 respondents participated in the study with 100% response rate. The results are presented in the following sections in line with the specific objectives.

SECTION A: Socio-demographic characteristics of students

SECTION B: Knowledge of antibiotics and antibiotics resistance among students

SECTION C: Attitude towards antibiotics use among students

SECTION D: Practices regarding antibiotics use among students

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 1 showing Socio-demographic characteristics of students

Variables	Frequency (n = 430)	Percent
Sex		
Male	217	50.5
Female	213	49.5
Age group (years)		
16–20	245	57.0
21–25	154	35.8
26–30	31	7.2
Mean±SD	20.3± 2.9	
Faculty		
Arts	38	8.8
Basic Medical Science	48	11.2
Education	28	6.5
Engineering	43	10.0
Life Science	101	23.5
Management Science	33	7.7
Physical Science	71	16.5
Social Science	66	15.3
Current level of study		
100 Level	80	18.6
200 Level	155	36.0
300 Level	87	20.2
400 Level	96	22.3
500 Level	12	2.8
Place of residence		
On-campus (Hostel)	241	56.0
Off-campus (Private Lodge)	189	44.0
Average monthly allowance (Naira)		
<₦20,000	120	27.9
₦21,000–₦50,000	100	23.3
₦51,000–₦100,000	65	15.1
>₦100,000	145	33.7

The distribution of respondents by sex was nearly equal, with males accounting for 217 (50.5%) and females for 213 (49.5%).

Regarding age distribution, the majority of respondents were aged 16–20 years 245 (57.0%), followed by those aged 21–25 years 154 (35.8%), while 31 (7.2%) were aged 26–30 years.

In terms of faculty affiliation, Life Science had the highest representation 101 (23.5%), followed by Physical Science 71 (16.5%), Social Science 66 (15.3%), Basic Medical Science 48 (11.2%), Engineering 43 (10.0%), Arts 38 (8.8%), Management Science 33 (7.7%), and Education 28 (6.5%).

Regarding current level of study, the majority were in 200 Level 155 (36.0%), followed by 400 Level 96 (22.3%), 300 Level 87 (20.2%), 100 Level 80 (18.6%), and 500 Level 12 (2.8%).

For place of residence, slightly more than half lived on-campus in hostels 241 (56.0%), while 189 (44.0%) lived off-campus in private lodges.

Concerning average monthly allowance, the distribution was: more than ₦100,000 accounted for 145 (33.7%), less than ₦20,000 for 120 (27.9%), ₦21,000–₦50,000 for 100 (23.3%), and ₦51,000–₦100,000 for 65 (15.1%).

SECTION B: KNOWLEDGE OF ANTIBIOTICS USE AND RESISTANCE

Table 2: Knowledge of antibiotics use and resistance among students

Variables	True (%)	False (%)	Don't know (%)
Antibiotics are effective for treating the common cold, flu, and viral coughs	336 (78.1)	51 (11.9)	43 (10.0)
Antibiotics are indicated for the treatment of uncomplicated malaria	294 (68.4)	53 (12.3)	83 (19.3)
Drugs like Paracetamol, Ibuprofen, and Aspirin are types of antibiotics	180 (41.9)	146 (34.0)	104 (24.2)
Antibiotics are used primarily to treat bacterial infections	292 (67.9)	60 (14.0)	78 (18.1)
Antibiotic resistance means the human body has built up a tolerance to the drug	336 (78.1)	43 (10.0)	51 (11.9)
Resistance occurs when bacteria change and become able to survive antibiotic exposure	312 (72.6)	49 (11.4)	69 (16.0)
"Superbugs" are bacteria that cannot be killed by most common antibiotics	90 (20.9)	109 (25.3)	231 (53.7)
Skipping a few doses of antibiotics does not contribute to resistance if you finish the rest	145 (33.7)	139 (32.3)	146 (34.0)
Biofilms are protective bacterial layers that make infections harder to treat	124 (28.8)	82 (19.1)	224 (52.1)
Antimicrobial Resistance (AMR) is currently a major problem in Nigerian hospitals	151 (35.1)	83 (19.3)	196 (45.6)
Antibiotics should always be taken for the full course even when symptoms improve	309 (71.9)	74 (17.2)	47 (10.9)

Cronbach α=0.557

Regarding knowledge of antibiotics effectiveness for treating common cold, flu, and viral coughs, the majority incorrectly believed this to be true 336 (78.1%), while 51 (11.9%) correctly identified it as false, and 43 (10.0%) did not know.

For the indication of antibiotics in treating uncomplicated malaria, a substantial proportion incorrectly believed this to be true 294 (68.4%), while 53 (12.3%) correctly identified it as false, and 83 (19.3%) did not know.

Concerning whether drugs like Paracetamol, Ibuprofen, and Aspirin are types of antibiotics, 180 (41.9%) incorrectly believed this to be true, while 146 (34.0%) correctly identified it as false, and 104 (24.2%) did not know.

Regarding the primary use of antibiotics for treating bacterial infections, the majority correctly identified this as true 292 (67.9%), while 60 (14.0%) incorrectly said it was false, and 78 (18.1%) did not know.

For the understanding of antibiotic resistance as the human body building up tolerance to the drug, the majority held this misconception as true 336 (78.1%), while only 43 (10.0%) correctly identified it as false, and 51 (11.9%) did not know.

Regarding resistance occurring when bacteria change and survive antibiotic exposure, the majority correctly identified this as true 312 (72.6%), while 49 (11.4%) incorrectly said it was false, and 69 (16.0%) did not know

For knowledge of "superbugs" as bacteria that cannot be killed by most common antibiotics, only 90 (20.9%) correctly identified this as true, while 109 (25.3%) incorrectly said it was false, and the majority 231 (53.7%) did not know.

Concerning whether skipping doses does not contribute to resistance if the rest is finished, 145 (33.7%) incorrectly believed this to be true, while 139 (32.3%) correctly identified it as false, and 146 (34.0%) did not know.

Regarding biofilms as protective bacterial layers making infections harder to treat, only 124 (28.8%) correctly identified this as true, while 82 (19.1%) incorrectly said it was false, and the majority 224 (52.1%) did not know.

Regarding the practice of taking antibiotics for the full course even when symptoms improve, the majority correctly identified this as true 309 (71.9%), while 74 (17.2%) incorrectly said it was false, and 47 (10.9%) did not know.

Table 3: correctness of responses to knowledge of antibiotics use and resistance among students

Variables n=430	Responses Correct (%)	Incorrect (%)
Antibiotics are effective for treating the common cold, flu, and viral coughs	51 (11.9)	379 (88.1)
Antibiotics are indicated for the treatment of uncomplicated malaria	53 (12.3)	377 (87.7)
Drugs like Paracetamol, Ibuprofen, and Aspirin are types of antibiotics	146 (34.0)	284 (66.0)
Antibiotics are used primarily to treat bacterial infections	292 (67.9)	138 (32.1)
Antibiotic resistance means the human body has built up a tolerance to the drug	43 (10.0)	387 (90.0)
Resistance occurs when bacteria change and become able to survive antibiotic exposure (	312 (72.6)	118 (27.4)
"Superbugs" are bacteria that cannot be killed by most common antibiotics	90 (20.9)	340 (79.1)
Skipping a few doses of antibiotics does not contribute to resistance if you finish the rest	139 (32.3)	291 (67.7)
Biofilms are protective bacterial layers that make infections harder to treat	124 (28.8)	306 (71.2)
Q16: Antimicrobial Resistance (AMR) is currently a major problem in Nigerian hospitals	151 (35.1)	279 (64.9)
Antibiotics should always be taken for the full course even when symptoms improve	309 (71.9)	121 (28.1)
Antibiotics are effective for treating the common cold, flu, and viral coughs	51 (11.9)	379 (88.1)
Antibiotics are indicated for the treatment of uncomplicated malaria	53 (12.3)	377 (87.7)
Drugs like Paracetamol, Ibuprofen, and Aspirin are types of antibiotics	146 (34.0)	284 (66.0)
Antibiotics are used primarily to treat bacterial infections	292 (67.9)	138 (32.1)

Regarding the statement that antibiotics are effective for treating common cold, flu, and viral coughs, only 51 (11.9%) provided correct responses, while the majority 379 (88.1%) provided incorrect responses.

For the statement that antibiotics are indicated for the treatment of uncomplicated malaria, only 53 (12.3%) provided correct responses, while the vast majority 377 (87.7%) provided incorrect responses.

Concerning whether drugs like Paracetamol, Ibuprofen, and Aspirin are types of antibiotics, 146 (34.0%) provided correct responses, while the majority 284 (66.0%) provided incorrect responses.

Regarding the statement that antibiotics are used primarily to treat bacterial infections, the majority 292 (67.9%) provided correct responses, while 138 (32.1%) provided incorrect responses.

For the statement that antibiotic resistance means the human body has built up tolerance to the drug, only 43 (10.0%) provided correct responses, while the overwhelming majority 387 (90.0%) provided incorrect responses.

Concerning whether resistance occurs when bacteria change and survive antibiotic exposure, the majority 312 (72.6%) provided correct responses, while 118 (27.4%) provided incorrect responses.

Regarding the statement about "superbugs" as bacteria that cannot be killed by most common antibiotics, only 90 (20.9%) provided correct responses, while the majority 340 (79.1%) provided incorrect responses.

For the statement that skipping doses does not contribute to resistance if the rest is finished, 139 (32.3%) provided correct responses, while the majority 291 (67.7%) provided incorrect

responses.

Concerning biofilms as protective bacterial layers making infections harder to treat, only 124 (28.8%) provided correct responses, while the majority 306 (71.2%) provided incorrect responses.

Regarding AMR as currently a major problem in Nigerian hospitals, 151 (35.1%) provided correct responses, while the majority 279 (64.9%) provided incorrect responses.

For the statement that antibiotics should always be taken for the full course even when symptoms improve, the majority 309 (71.9%) provided correct responses, while 121 (28.1%) provided incorrect responses.

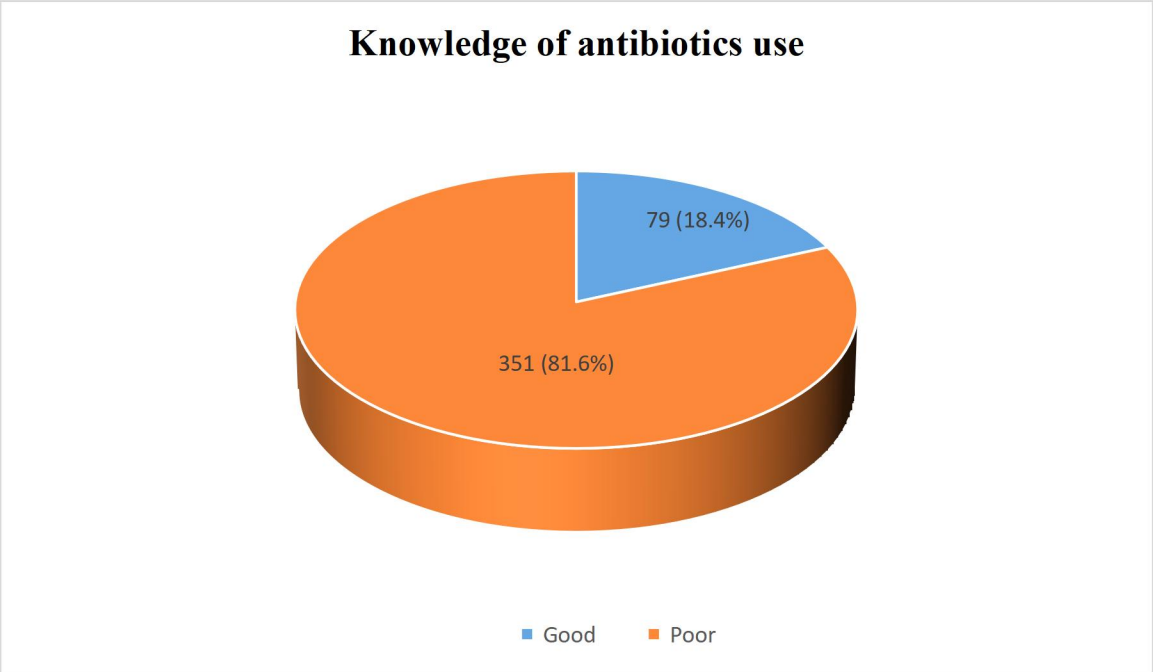

Figure 1 presents the overall level of knowledge of antibiotics use among the respondents. The chart shows that the vast majority of respondents had poor knowledge 351 (81.6%), while only 79 (18.4%) demonstrated good knowledge of antibiotics use.

Table4: factors associated with knowledge of antibiotics use and resistance among students

Variables	Level of knowledge		Test statistic ($\chi 2$)	p-value
	Good (n=73) Freq(%)	Poor (n=129) Freq(%)		
Sex				
Male	36 (16.6)	181 (83.4)	0.928	0.335
Female	43 (20.2)	170 (79.8)		
Age(years)				
16–20	45 (18.4)	200 (81.6)	0.744	0.689
21–25	30 (19.5)	124 (80.5)		
26–30	4 (12.9)	27 (87.1)		
Faculty				
Non-Medical Sciences	63 (16.5)	319 (83.2)	8.065	**0.005**
Medical Sciences	16 (33.3)	32 (66.7)		
Level of Study				
Lower	32 (13.6%)	203 (86.4%)	7.813	**0.005**
Higher	47 (24.1%)	148 (75.9%)		
Place of Residence				
On-campus (Hostel)	41 (17.0%)	200 (83.0%)	0.676	0.411
Off-campus	38 (20.1%)	151 (79.9%)		
Monthly Allowance				
<₦100,000	62 (21.8%)	223 (78.2%)	6.447	**0.011**
≥₦100,000	17 (11.7%)	128 (88.3%)		

Sex was not significantly associated with knowledge of antibiotics use and resistance ($\chi^2 = 0.928$, $p = 0.335$). However, a slightly higher proportion of females had good knowledge [43 (20.2%)] compared to males [36 (16.6%)], while poor knowledge was more common among males [181 (83.4%)] than females [170 (79.8%)].

Age group also showed no significant association with knowledge ($\chi^2 = 0.744$, $p = 0.689$). Respondents aged 21–25 years had a marginally higher proportion of good knowledge [30 (19.5%)] compared to those aged 16–20 years [45 (18.4%)] and 26–30 years [4 (12.9%)].

Faculty was significantly associated with knowledge of antibiotics use and resistance ($\chi^2 = 8.065$, $p = 0.005$). Students in medical sciences had a higher proportion of good knowledge [16 (33.3%)] compared to those in non-medical sciences [63 (16.5%)], while poor knowledge was more prevalent among non-medical students [319 (83.2%)].

Level of study was also significantly associated with knowledge ($\chi^2 = 7.813$, $p = 0.005$). Students in higher levels had a greater proportion of good knowledge [47 (24.1%)] compared to those in lower levels [32 (13.6%)], whereas poor knowledge was more common among lower-level students [203 (86.4%)].

Place of residence was not significantly associated with knowledge ($\chi^2 = 0.676$, $p = 0.411$), although respondents living off-campus had a slightly higher proportion of good knowledge [38 (20.1%)] compared to those living on-campus [41 (17.0%)].

Monthly allowance showed a statistically significant association with knowledge ($\chi^2 = 6.447$, $p = 0.011$). Respondents earning less than ₦100,000 had a higher proportion of good knowledge [62 (21.8%)] compared to those earning ≥₦100,000 [17 (11.7%)], while poor knowledge was more common among those earning higher allowance [128 (88.3%)].

SECTION C: ATTITUDE TOWARDS ANTIBIOTICS USE AMONG RESPONDENT

Table 5: Attitudinal response towards antibiotics use among students

Attitude	Strongly agree(n = 430) Freq (%)	Agree (n=430) Freq (%)	Neutral (n=430) Freq (%)	Disagree (n=430) Freq (%)	Strongly disagree (n=430) Freq (%)
Antibiotics are "strong" medicines that speed up recovery for any minor illness	166 (38.6)	167 (38.8)	46 (10.7)	40 (9.3)	11 (2.6)
Newer or more expensive "branded" antibiotics are fundamentally more potent than generics	106 (24.7)	183 (42.6)	80 (18.6)	57 (13.3)	4 (0.9)
It is safe to buy antibiotics without a doctor's prescription if I have used them before	17 (4.0)	87 (20.2)	122 (28.4)	161 (37.4)	43 (10.0)
I feel entitled to an antibiotic prescription whenever I visit the school clinic for a cough	59 (13.7)	141 (32.8)	112 (26.0)	90 (20.9)	28 (6.5)
Sharing leftover antibiotics with a sick roommate is a helpful social gesture	79 (18.4)	134 (31.2)	81 (18.8)	94 (21.9)	42 (9.8)
I stop taking my antibiotics as soon as I feel better to avoid taking too much "chemicals"	96 (22.3)	118 (27.4)	51 (11.9)	119 (27.7)	46 (10.7)
I trust the advice of a "chemist" shop attendant more than waiting for hours at the clinic	27 (6.3)	73 (17.0)	93 (21.6)	186 (43.3)	51 (11.9)
The risk of antibiotic resistance is exaggerated and does not really affect young people	48 (11.2)	120 (27.9)	128 (29.8)	74 (17.2)	60 (14.0)
Antibiotics are effective in treating viral infections such as the flu	133 (30.9)	171 (39.8)	79 (18.4)	30 (7.0)	17 (4.0)
Using antibiotics unnecessarily can cause future infections to become harder to treat	174 (40.5)	134 (31.2)	92 (21.4)	14 (3.3)	16 (3.7)

Cronbach α=0.557

Regarding the statement that antibiotics are "strong" medicines that speed up recovery for any minor illness, the majority either strongly agreed 166 (38.6%) or agreed 167 (38.8%), while 46 (10.7%) were neutral, 40 (9.3%) disagreed, and 11 (2.6%) strongly disagreed.

For the belief that newer or more expensive "branded" antibiotics are fundamentally more potent than generics, 106 (24.7%) strongly agreed, 183 (42.6%) agreed, 80 (18.6%) were neutral, 57 (13.3%) disagreed, and only 4 (0.9%) strongly disagreed.

Concerning whether it is safe to buy antibiotics without a doctor's prescription if used before, the majority disagreed 161 (37.4%), while 122 (28.4%) were neutral, 87 (20.2%) agreed, 43 (10.0%) strongly disagreed, and 17 (4.0%) strongly agreed.

Regarding feeling entitled to an antibiotic prescription when visiting the clinic for a cough, 141 (32.8%) agreed, 112 (26.0%) were neutral, 90 (20.9%) disagreed, 59 (13.7%) strongly agreed, and 28 (6.5%) strongly disagreed.

For sharing leftover antibiotics with a sick roommate as a helpful gesture, 134 (31.2%) agreed, while 94 (21.9%) disagreed, 81 (18.8%) were neutral, 79 (18.4%) strongly agreed, and 42 (9.8%) strongly disagreed.

Concerning stopping antibiotics as soon as feeling better to avoid "chemicals," 119 (27.7%) disagreed, 118 (27.4%) agreed, 96 (22.3%) strongly agreed, 51 (11.9%) were neutral, and 46 (10.7%) strongly disagreed.

Regarding trusting a "chemist" shop attendant more than waiting at the clinic, the majority disagreed 186 (43.3%), while 93 (21.6%) were neutral, 73 (17.0%) agreed, 51 (11.9%) strongly disagreed, and 27 (6.3%) strongly agreed.

For the belief that the risk of antibiotic resistance is exaggerated and does not affect young

people, 128 (29.8%) were neutral, 120 (27.9%) agreed, 74 (17.2%) disagreed, 60 (14.0%) strongly disagreed, and 48 (11.2%) strongly agreed.

Concerning whether antibiotics are effective in treating viral infections such as the flu, the majority either agreed 171 (39.8%) or strongly agreed 133 (30.9%), while 79 (18.4%) were neutral, 30 (7.0%) disagreed, and 17 (4.0%) strongly disagreed.

Regarding the statement that using antibiotics unnecessarily can cause future infections to become harder to treat, the majority either strongly agreed 174 (40.5%) or agreed 134 (31.2%), while 92 (21.4%) were neutral, 16 (3.7%) strongly disagreed, and 14 (3.3%) disagreed.

Table 6: Correctness of attitudinal responses

Variables	Appropriate Freq(%)	Inappropriate Freq(%)
antibiotics are "strong" medicines that speed up recovery for any minor illness	379 (88.1)	51 (11.9)
Newer or more expensive "branded" antibiotics are fundamentally more potent than generics	369 (85.8)	61 (14.2)
It is safe to buy antibiotics without a doctor's prescription if I have used them before	226 (52.6)	204 (47.4)
I feel entitled to an antibiotic prescription whenever I visit the school clinic for a cough	312 (72.6)	118 (27.4)
Sharing leftover antibiotics with a sick roommate is a helpful social gesture	294 (68.4)	136 (31.6)
I stop taking my antibiotics as soon as I feel better to avoid taking too much "chemicals"	265 (61.6)	165 (38.4)
I trust the advice of a "chemist" shop attendant more than waiting for hours at the clinic	193 (44.9)	237 (55.1)
The risk of antibiotic resistance is exaggerated and does not really affect young people	296 (68.8)	134 (31.2)
Antibiotics are effective in treating viral infections such as the flu	383 (89.1)	47 (10.9)
Using antibiotics unnecessarily can cause future infections to become harder to treat	122 (28.4)	308 (71.6)

Regarding the statement that antibiotics are "strong" medicines that speed up recovery for any minor illness, the majority 379 (88.1%) provided appropriate responses, while 51 (11.9%) provided inappropriate responses.

For the statement about newer or more expensive "branded" antibiotics being fundamentally more potent than generics, the majority 369 (85.8%) provided appropriate responses, while 61 (14.2%) provided inappropriate responses.

Concerning whether it is safe to buy antibiotics without a doctor's prescription if used before, 226 (52.6%) provided appropriate responses, while 204 (47.4%) provided inappropriate responses.

Regarding feeling entitled to an antibiotic prescription when visiting the clinic for a cough, the majority 312 (72.6%) provided appropriate responses, while 118 (27.4%) provided inappropriate responses.

For sharing leftover antibiotics with a sick roommate, the majority 294 (68.4%) provided appropriate responses, while 136 (31.6%) provided inappropriate responses. Concerning stopping antibiotics as soon as feeling better, the majority 265 (61.6%) provided appropriate responses, while 165 (38.4%) provided inappropriate responses. Regarding trusting a "chemist" shop attendant more than waiting at the clinic, 237 (55.1%) provided inappropriate responses, while 193 (44.9%) provided appropriate responses. For the belief that the risk of antibiotic resistance is exaggerated, the majority 296 (68.8%) provided appropriate responses, while 134 (31.2%) provided inappropriate responses. Concerning whether antibiotics are effective in treating viral infections, the vast majority 383 (89.1%) provided inappropriate responses, while only 47 (10.9%) provided appropriate responses.

Regarding the statement about unnecessary antibiotic use causing future infections to become harder to treat, the majority 308 (71.6%) provided inappropriate responses, while 122 (28.4%) provided appropriate responses.

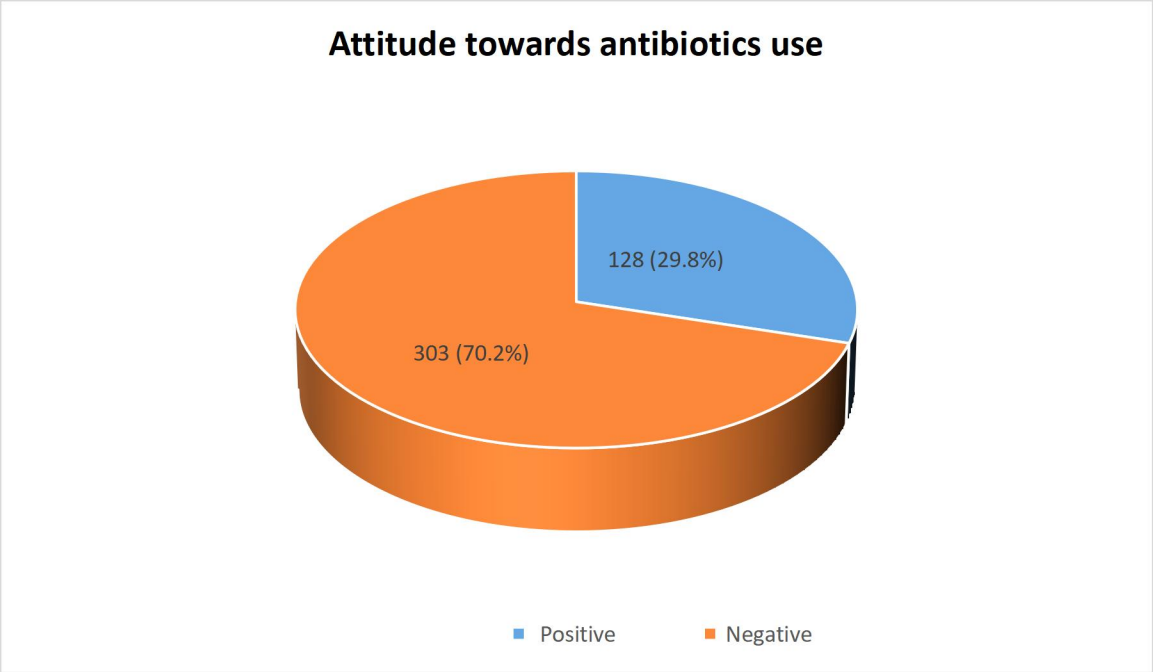

Figure 2 illustrates the overall attitude towards antibiotics use among the respondents. The chart reveals that the majority of respondents had a negative attitude 302 (70.2%), while 128 (29.8%) demonstrated a positive attitude towards antibiotics use

Table 7: factors associated with attitude towards antibiotics use among students

Variables	Attitude		Test statistic($\chi 2$)	p-value
	Positive (n=128) Freq(%)	**Negative (n=302) Freq(%)**		
Sex				
Male	52 (24.0)	165 (76.0)	7.059	**0.008**
Female	76 (35.7)	137 (64.3)		
Age (years)				
16–20	67 (27.3)	178 (72.7)	1.605	0.448
21–25	51 (33.1)	103 (66.9)		
26–30	10 (32.3)	21 (67.7)		
Faculty				
Non-Medical Sciences	110 (28.8)	272 (71.2)	1.545	0.214
Medical Sciences	18 (37.5)	30 (62.5)		
Level of Study				
Lower	51 (21.7)	184 (78.3)	16.124	**<0.001**
Higher	77 (39.5)	118 (60.5)		
Place of Residence				
On-campus (Hostel)	61 (25.3)	180 (74.7)	5.208	**0.022**
Off-campus	67 (35.4)	122 (64.6)		
Monthly Allowance				
<₦100,000	93 (32.6)	192 (67.4)	3.316	0.069
≥₦100,000	35 (24.1)	110 (75.9)		
Knowledge				
Poor	98 (27.9)	253 (72.1)	3.118	0.077
Good	30 (38.0)	49 (62.0)		

Sex was significantly associated with attitude towards antibiotics use ($\chi^2 = 7.059$, $p = 0.008$). A higher proportion of females had a positive attitude [76 (35.7%)] compared to males [52 (24.0%)], while negative attitude was more common among males [165 (76.0%)] than females [137 (64.3%)].

Age group was not significantly associated with attitude ($\chi^2 = 1.605$, $p = 0.448$). Respondents aged 21–25 years had slightly higher positive attitude [51 (33.1%)] compared to those aged 16–20 years [67 (27.3%)] and 26–30 years [10 (32.3%)].

Faculty showed no significant association with attitude ($\chi^2 = 1.545$, $p = 0.214$), although students in medical sciences had a higher proportion of positive attitude [18 (37.5%)] compared to those in non-medical sciences [110 (28.8%)].

Level of study was significantly associated with attitude ($\chi^2 = 16.124$, $p < 0.001$). Students in higher levels (300–500L) had a greater proportion of positive attitude [77 (39.5%)] compared to those in lower levels (100–200L) [51 (21.7%)], while negative attitude was more common among lower-level students [184 (78.3%)].

Place of residence was also significantly associated with attitude ($\chi^2 = 5.208$, $p = 0.022$). Students residing off-campus had a higher proportion of positive attitude [67 (35.4%)] compared to those living on-campus [61 (25.3%)], whereas negative attitude was more prevalent among on-campus residents [180 (74.7%)].

Monthly allowance was not significantly associated with attitude ($\chi^2 = 3.316$, $p = 0.069$), although respondents earning less than ₦100,000 had a higher proportion of positive attitude [93 (32.6%)] compared to those earning ≥₦100,000 [35 (24.1%)].

Knowledge was also not significantly associated with attitude ($\chi^2 = 3.118$, $p = 0.077$), though respondents with good knowledge had a higher proportion of positive attitude [30 (38.0%)] compared to those with poor knowledge [98 (27.9%)].

SECTION D: PRACTICES TOWARDS ANTIBIOTICS USE AMONG STUDENTS

Table 8: Practices regarding antibiotics use

Variable	Frequency (n=436)	Percent
Used an antibiotic in the last 6 months		
Yes	253	58.8
No	177	41.2
How antibiotic was obtained (primary source(n=253)		
Doctor's prescription	63	24.9
Pharmacist's recommendation	60	23.7
Recommendation from a Chemist or PPMV	77	30.4
From a friend/roommate	16	6.3
Leftover from a previous illness	37	14.6
How antibiotic was dispensed		
Full pack/blister in its original box	122	48.2
Loose sachets/single units	131	51.8
Reason for last antibiotic use (n=253)		
Sore throat/Cough	65	26.6
Fever	58	23.8
Skin infection	36	14.8
Stomach upset	69	28.3
Other	16	6.6
finish the entire course as written on label		
Always	74	17.2
Sometimes	210	48.8
Never	146	34.0
Check expiry date when self-medicating		
Yes	112	26.0
No	174	40.5
Never check	126	33.5
Frequency of taking antibiotics without a prescription		
Never	26	6.0
Rarely	112	26.0
Sometimes	94	21.9
Often	124	28.8
Always	74	17.2

Cronbach α=691

More than half of the respondents had used an antibiotic in the last 6 months 253 (58.8%), while 177 (41.2%) had not.

Regarding how antibiotics were obtained (primary source), the most common source was recommendation from a Chemist or Patent and Proprietary Medicine Vendor (PPMV) 126 (29.3%), followed by pharmacist's recommendation 102 (23.7%), doctor's prescription 81 (18.8%), leftover from a previous illness 81 (18.8%), and from a friend/roommate 40 (9.3%).

For how antibiotics were dispensed, slightly more than half received loose sachets/single units 226 (52.6%), while 204 (47.4%) received full pack/blister in its original box.

Concerning the reason for last antibiotic use, the distribution was: fever 113 (27.6%), sore throat/cough 109 (26.7%), stomach upset 109 (26.7%), skin infection 59 (14.4%), and other reasons 19 (4.6%).

Regarding completion of the entire course as written on the label, the majority sometimes finished the course 210 (55.0%), while 98 (25.7%) never finished the course, and only 74 (19.4%) always finished the course.

For checking expiry dates when self-medicating, 153 (39.1%) did not check, 126 (32.2%) never checked, while only 112 (28.6%) checked the expiry date.

Concerning the frequency of taking antibiotics without a prescription, 124 (31.6%) did so often, 112 (28.6%) rarely, 94 (24.0%) sometimes, 36 (9.2%) always, while only 26 (6.6%) never took antibiotics without a prescription.

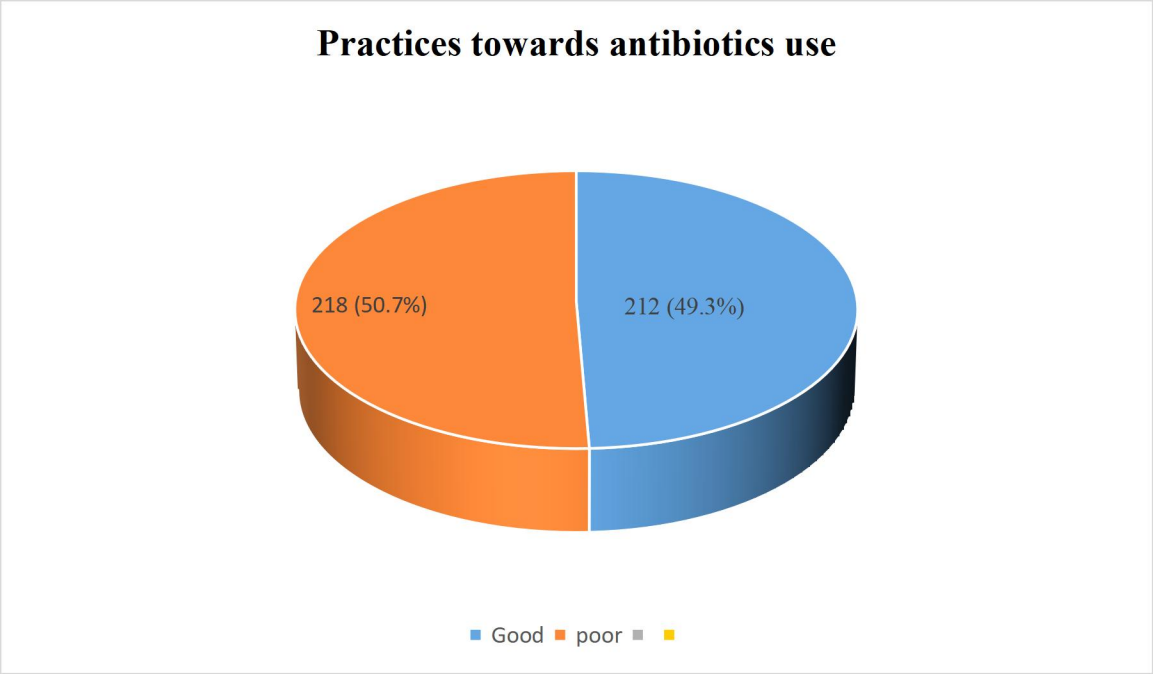

Figure 3 depicts the overall practices towards antibiotics use among the respondents. The chart shows that practices were almost equally divided, with 218 (50.7%) demonstrating poor practices and 212 (49.3%) demonstrating good practices towards antibiotics use.

Table9: Factors associated with practices towards antibiotics use among students

Variables	Practices		Test statistic (χ^2)	p-value
	Good (n=212) Freq(%)	Poor (n=218) Freq(%)		
Sex				
Male	105 (48.4)	112 (51.6)	0.147	0.702
Female	107 (50.2)	106 (49.8)		
Age group (years)				
16–20	115 (46.9)	130 (53.1)	3.448	0.178
21–25	77 (50.0)	77 (50.0)		
26–30	20 (64.5)	11 (35.5)		
Faculty				
Non-Medical Sciences	184 (48.2)	198 (51.8)	1.763	0.184
Medical Sciences	28 (58.3)	20 (41.7)		
Level of study				
Lower level (100–200L)	98 (41.7)	137 (58.3)	11.976	**0.001**
Higher level (300–500L)	114 (58.5)	81 (41.5)		
Place of residence				
On-campus (Hostel)	105 (43.6)	136 (56.4)	7.212	**0.007**
Off-campus (Private Lodge)	107 (56.6)	82 (43.4)		
Monthly allowance				
<N100,000	153 (53.7)	132 (46.3)	6.492	**0.011**
≥N100,000	59 (40.7)	86 (59.3)		
knowledge				
Poor	158 (45.0)	25 (31.6)	3.520	0.061
Good	54 (68.4)	193 (55.0)		
Attitude				
Positive	72 (56.3)	56 (43.8)	14.005	**<0.001**
negative	140 (46.4)	162 (53.6)		

Sex was not significantly associated with practices towards antibiotic use ($\chi^2 = 0.147$, $p = 0.702$). Males had 105 (48.4%) good practice and 112 (51.6%) poor practice, while females had 107 (50.2%) good practice and 106 (49.8%) poor practice.

Age group was also not significantly associated with practices ($\chi^2 = 3.448$, $p = 0.178$). Respondents aged 26–30 years had the highest proportion of good practice 20 (64.5%), compared to those aged 21–25 years 77 (50.0%) and 16–20 years 115 (46.9%), although this difference was not statistically significant.

Faculty showed no significant association with practices ($\chi^2 = 1.763$, $p = 0.184$). Students in medical sciences had a higher proportion of good practice 28 (58.3%) compared to those in non-medical sciences 184 (48.2%), but this was not statistically significant.

Level of study was significantly associated with practices ($\chi^2 = 11.976$, $p = 0.001$). Students in higher levels (300–500L) had better practices 114 (58.5%) compared to those in lower levels (100–200L) 98 (41.7%), while poor practice was higher among lower-level students 137 (58.3%).

Place of residence was significantly associated with practices ($\chi^2 = 7.212$, $p = 0.007$). Students living off-campus had higher good practice 107 (56.6%) compared to those living on-campus 105 (43.6%), while poor practice was higher among on-campus residents 136 (56.4%).

Monthly allowance was also significantly associated with practices ($\chi^2 = 6.492$, $p = 0.011$). Students earning less than ₦100,000 had higher good practice 153 (53.7%) compared to those earning ≥₦100,000 59 (40.7%), while poor practice was higher among those with higher allowance 86 (59.3%).

Knowledge was not significantly associated with practices ($\chi^2 = 3.520$, $p = 0.061$), although respondents with good knowledge had higher good practice 54 (68.4%) compared to those with poor knowledge 158 (45.0%).

Attitude was significantly associated with practices ($\chi^2 = 14.005$, $p < 0.001$). Respondents with positive attitude had higher good practice 72 (56.3%) compared to those with negative attitude 140 (46.4%), while poor practice was higher among those with negative attitude 162 (53.6%).

CHAPTER FIVE

DISCUSSION

This study assessed the knowledge, attitudes, practices, and factors associated with practices related to antibiotic use and resistance among 430 undergraduate students at the University of Benin, Edo State, Nigeria. The findings are discussed below in line with the specific objectives of the study.

The sociodemographic profile of respondents showed a nearly equal distribution by sex, reflecting balanced gender representation in the university student population. The mean age of respondents was in the early twenties, consistent with the typical age range for undergraduate students in Nigerian tertiary institutions. More than half of respondents were aged sixteen to twenty years, while over one-third were aged twenty-one to twenty-five years, and a small minority were aged twenty-six to thirty years, indicating that the vast majority of participants were young adults in their formative years of health behaviour development. In terms of faculty affiliation, Life Science had the highest representation, accounting for nearly one-quarter of respondents, followed by Physical Science with nearly one in six, Social Science with about one in seven, and Basic Medical Science with about one in nine, while Arts, Engineering, Management Science, and Education accounted for smaller proportions, reflecting the relative sizes of these faculties within the university. Regarding current level of study, over one-third were in 200 Level, while 400 Level, 300 Level, and 100 Level accounted for approximately one-fifth each, and 500 Level accounted for a very small proportion, indicating good representation across academic years with concentration in the middle levels. For place of residence, slightly more than half lived on-campus in university hostels, while less than half lived off-campus in

private lodges, a distribution that reflects the limited availability of on-campus accommodation and the proliferation of private student housing around the university. This residential pattern is consistent with findings from other Nigerian university studies and has implications for healthcare access and antibiotic procurement behaviours, as students living off-campus may have different proximity to healthcare facilities and patent medicine vendors compared to those in campus hostels.[14] Concerning average monthly allowance, about one-third received more than one hundred thousand naira, over one-quarter received less than twenty thousand naira, nearly one-quarter received twenty-one thousand to fifty thousand naira, and about one in seven received fifty-one thousand to one hundred thousand naira, indicating substantial variation in students' financial resources which may influence their ability to access formal healthcare services versus reliance on cheaper informal sources such as patent medicine vendors. This is consistent with findings from a cross-sectional study conducted among 400 undergraduates at the University of Lagos, which similarly reported diverse socioeconomic profiles among students that influenced healthcare-seeking behaviours and medication procurement practices.[14] Similarly, a multi-center descriptive study conducted across three Ethiopian universities among 800 students found that sociodemographic characteristics including age, gender, and field of study were associated with health literacy and medication use patterns.[13]

This study found that the vast majority of respondents had poor knowledge of antibiotics use and resistance, with only about one in five demonstrating good knowledge. Regarding specific knowledge items, the overwhelming majority incorrectly believed that antibiotics are effective for treating common cold, flu, and viral coughs, with only about one in nine providing correct responses, and similarly, the vast majority incorrectly believed that antibiotics are indicated for the treatment of uncomplicated malaria. Additionally, the majority incorrectly believed that drugs

like Paracetamol, Ibuprofen, and Aspirin are types of antibiotics, while only about one-third provided correct responses. Concerning understanding of antibiotic resistance mechanisms, the overwhelming majority incorrectly believed that antibiotic resistance means the human body has built up tolerance to the drug, with only one in ten providing correct responses, and the majority incorrectly responded or did not know about superbugs as bacteria that cannot be killed by most common antibiotics, with only about one in five providing correct responses. The probable reason for this poor knowledge is multi-layered. The widespread misconception that antibiotics treat viral infections reflects fundamental gaps in health education both at the secondary school level and within university curricula for non-medical students, as basic microbiology and pharmacology concepts are not adequately taught outside health sciences faculties. Many students in Arts, Social Sciences, and Management Sciences have never received formal instruction on the differences between bacteria and viruses or the mechanisms of antimicrobial action, leaving them vulnerable to misinformation from family members, peers, and unqualified medication vendors. The confusion between antibiotics and common analgesics such as Paracetamol and Ibuprofen suggests that students categorise medications based on their experiential use patterns rather than pharmacological classifications, perceiving any drug that makes them feel better as belonging to the same category. Additionally, the incorrect understanding of antibiotic resistance as the human body building tolerance rather than bacterial adaptation reflects the anthropocentric framing of health information in popular discourse, where biological processes are often explained in terms of what happens to the human body rather than at the microbial level. The low awareness of superbugs and advanced concepts such as biofilms indicates that public health messaging in Nigeria has not effectively penetrated university campuses, and students are not exposed to the global discourse on antimicrobial resistance that is

prominent in international media and scientific literature. Furthermore, the university environment itself may contribute to knowledge deficits, as students experiencing high academic stress, financial constraints, and limited access to healthcare may prioritise quick symptomatic relief over understanding disease mechanisms and rational medication use. This is consistent with findings from a cross-sectional study conducted among 560 university students in Jordan, which found that although the majority had heard of antibiotics, a substantial proportion incorrectly believed that antibiotics could treat viral infections such as the common cold, and only about one-third correctly identified that antibiotic resistance occurs due to changes in bacteria rather than changes in the human body.[12] Similarly, a multi-center descriptive study across three Ethiopian universities involving 800 students revealed that students enrolled in non-health disciplines had significantly lower knowledge scores compared to health sciences students, with over half of participants unable to correctly define antibiotic resistance, often attributing it mistakenly to drug expiration or bodily immunity rather than microbial adaptation.[13] This finding has important public health implications because poor knowledge of antibiotics and antimicrobial resistance contributes to inappropriate self-medication, failure to complete treatment courses, sharing of medications among peers, and inappropriate pressure on healthcare providers to prescribe antibiotics for viral infections, all of which accelerate the development and spread of resistant bacterial strains and undermine the effectiveness of these life-saving drugs. The University of Benin administration should mandate the inclusion of a compulsory one-credit General Studies course on rational medication use and antimicrobial stewardship in the General Studies Programme for all first-year students across all faculties, covering basic microbiology, the difference between bacterial and viral infections, correct use of common medications including antibiotics and analgesics, the mechanisms and consequences of antimicrobial

resistance, and appropriate healthcare-seeking behaviours, using interactive teaching methods including case studies, role-plays, and multimedia presentations to enhance learning and retention.

Faculty affiliation was significantly associated with knowledge of antibiotics use and resistance, with students from Medical Sciences having significantly higher proportion of good knowledge compared to those from Non-Medical Sciences. The probable reason for this association is multi-layered. Medical Sciences students receive formal instruction in microbiology, pharmacology, and clinical medicine as core components of their curriculum, providing them with detailed understanding of infectious diseases, antimicrobial agents, mechanisms of action, appropriate indications, and the biological basis of resistance. Their education emphasises evidence-based practice and rational prescribing, and they are exposed through clinical attachments to the real-world consequences of antimicrobial resistance including treatment failures and hospital-acquired infections with multidrug-resistant organisms. Additionally, Medical Sciences students are socialised into a professional culture that values scientific accuracy and adherence to clinical guidelines, making them more critical of misinformation and more likely to seek authoritative sources when uncertain about medication-related questions. The curriculum in Basic Medical Sciences includes courses such as Medical Microbiology, Pharmacology and Therapeutics, and Public Health, where antibiotic stewardship and antimicrobial resistance are explicitly taught and assessed through examinations and practical sessions. In contrast, students in Arts, Social Sciences, Engineering, and Management Sciences have no formal exposure to these topics unless they elect to take optional health-related courses, and their knowledge is therefore derived primarily from personal experiences, family advice, media consumption, and informal peer education which may perpetuate misconceptions. The significant knowledge gap between

Medical Sciences and Non-Medical Sciences students also reflects the broader issue of health literacy disparities in Nigerian society, where specialised health knowledge is concentrated among health professionals while the general population relies on fragmented and often inaccurate health information. This is consistent with findings from a multi-center descriptive study conducted across three Ethiopian universities which found that students enrolled in non-health disciplines had significantly lower knowledge scores compared to health sciences students, with an odds ratio of three point two for poor knowledge among non-health students.[13] Similarly, a cross-sectional study conducted among undergraduates at the University of Lagos found that students in health-related faculties demonstrated significantly better pharmaceutical literacy and ability to differentiate antibiotics from other classes of drugs compared to students in non-health faculties.[14] This finding is significant because it reveals that health knowledge is not equitably distributed across the university population, and students outside health sciences are vulnerable to medication misuse due to inadequate education, with potential consequences for their own health and for public health through contribution to antimicrobial resistance. The University of Benin Directorate of General Studies should partner with the Faculty of Medical Sciences to develop and deliver peer-led health education programmes where senior medical students and interns serve as health ambassadors in non-medical faculties, conducting quarterly interactive seminars on rational medication use, antibiotic stewardship, and antimicrobial resistance using culturally relevant examples and addressing common misconceptions specific to student populations, with evaluation and feedback mechanisms to assess programme effectiveness and continuous improvement.

Level of study showed a statistically significant association with knowledge, with students at higher levels of study demonstrating better knowledge compared to those at lower levels. The

probable reason for this association is multi-layered. Senior students have had more years of university education during which they may have been exposed to health-related information through general studies courses, health campaigns on campus, interactions with peers from medical and health sciences faculties, and maturation of critical thinking skills that enable them to evaluate health information more discerningly. Higher-level students are also more likely to have experienced personal or witnessed peer experiences with illness and medication use over their years at university, providing opportunities for learning from consequences of inappropriate antibiotic use such as treatment failures, adverse drug reactions, or prolonged illness due to resistance. Additionally, senior students may have greater access to university health services and more familiarity with healthcare providers at the university clinic, potentially receiving counselling and education during consultations that enhance their knowledge. The longer duration of stay at university also increases cumulative exposure to health promotion activities such as World Antibiotics Awareness Week campaigns, student health club activities, and seminars organised by the university health centre or student affairs division. Furthermore, higher-level students tend to have more developed information-seeking behaviours and may be more likely to use online resources, attend voluntary seminars, or engage in health-related discussions that expand their knowledge beyond what is formally taught in their core curriculum. However, it is also possible that the association reflects confounding by age and maturity, as higher-level students are generally older and may have greater life experience and health consciousness than first- and second-year students who are recent secondary school graduates. This is consistent with findings from international studies showing that knowledge scores tend to improve with advancing academic levels, reflecting both educational exposure and cognitive development. Similarly, a descriptive study conducted in Ghana among tertiary students found

that senior students demonstrated better understanding of appropriate medication use compared to junior students, attributed to cumulative learning experiences and greater health literacy development over time. This finding is significant because it suggests that knowledge improves with academic progression, indicating that sustained exposure to university environment and educational activities can enhance health literacy even among non-health students, and interventions should therefore target early-year students who are at highest risk of poor knowledge and inappropriate practices. The University of Benin Health Services Centre should develop a structured antibiotic stewardship orientation programme for all newly admitted first-year students during freshers' week, covering the basics of antibiotic use, dangers of self-medication and sharing of drugs, recognition of when to seek professional care versus self-management, and orientation to the university health services and how to access them, ensuring that every student receives foundational health education at entry point before they develop inappropriate medication behaviours.

Monthly allowance showed a statistically significant but counterintuitive association with knowledge, with students receiving less than one hundred thousand naira demonstrating better knowledge compared to those receiving one hundred thousand naira or more. The probable reason for this unexpected finding is multi-layered and merits careful interpretation. Students with lower monthly allowances may face financial constraints that make them more cautious and deliberate about healthcare expenditures, leading them to seek proper diagnosis and prescription from qualified healthcare providers at the free or subsidised university health centre rather than purchasing medications impulsively from expensive private pharmacies or patent medicine vendors. Financial limitation may therefore paradoxically promote better health-seeking behaviour and greater exposure to professional medical advice which enhances knowledge. In

contrast, students with higher allowances may have the financial freedom to purchase medications on demand without consulting healthcare providers, relying on self-diagnosis and recommendations from pharmacy attendants or peers, which deprives them of opportunities to learn correct information from qualified professionals. Additionally, wealthier students may be more likely to frequent private clinics and pharmacies where medication dispensing is often transaction-driven with minimal counselling, whereas poorer students using the university health centre receive more comprehensive consultation and health education from doctors and nurses who have more time and institutional mandate to educate patients. It is also possible that students from lower socioeconomic backgrounds have greater family experience with communicable diseases and medication use in resource-constrained settings, leading to more pragmatic and informed approaches to antibiotic use, whereas wealthier students may have grown up in more privileged environments where ready access to healthcare created a sense of entitlement and less need to understand the nuances of rational medication use. However, alternative explanations cannot be ruled out, including possible confounding by unmeasured variables such as parental education, urban versus rural background, or patterns of internet use and information-seeking behaviours that may differ between socioeconomic groups. The finding may also reflect social desirability bias, where students from lower-income backgrounds provided more socially acceptable responses to knowledge questions despite not necessarily practicing what they know, though this cannot be verified from cross-sectional data. This finding contrasts with the typical pattern observed in many health studies where higher socioeconomic status correlates with better health knowledge, and warrants further investigation in future research using more sophisticated methods to disentangle the complex relationships between income, healthcare access patterns, and knowledge acquisition. This finding is significant because it challenges assumptions that

financial resources necessarily translate into better health knowledge and highlights the importance of healthcare access patterns and quality of patient-provider interactions in shaping health literacy. The University of Benin Health Services Centre should strengthen its free healthcare services for students and ensure that every consultation includes structured health education tailored to students' needs, with particular emphasis on antibiotic stewardship, and should also conduct targeted outreach to students with higher socioeconomic status who may be bypassing the university health system in favour of private providers where they receive less education despite paying more for services.

This study found that the majority of respondents had negative attitudes towards antibiotics use, with only about three in ten demonstrating positive attitudes. Regarding specific attitudinal items, the vast majority either strongly agreed or agreed that antibiotics are strong medicines that speed up recovery for any minor illness, reflecting an inappropriate belief in antibiotics as general health tonics rather than specific antimicrobial agents. Similarly, the majority either strongly agreed or agreed that newer or more expensive branded antibiotics are fundamentally more potent than generics, demonstrating misconceptions about pharmaceutical equivalence and susceptibility to marketing messages that brand-name products as superior. Additionally, nearly half either strongly agreed or agreed that sharing leftover antibiotics with a sick roommate is a helpful social gesture, while nearly half either strongly agreed or agreed that they stop taking antibiotics as soon as they feel better to avoid taking too much chemicals, both attitudes reflecting dangerous practices that contribute to incomplete treatment and antimicrobial resistance. Concerningly, the vast majority either strongly agreed or agreed that antibiotics are effective in treating viral infections such as the flu, which is factually incorrect and drives inappropriate antibiotic demand for self-limiting viral illnesses. However, some positive attitudes

were also observed, as the majority disagreed with the statement that it is safe to buy antibiotics without a doctor's prescription if used before, and the majority disagreed with trusting a chemist shop attendant more than waiting at the clinic, suggesting some recognition of the importance of professional healthcare. The probable reason for these predominantly negative attitudes is multi-layered. The perception of antibiotics as powerful cure-alls reflects cultural beliefs in Nigerian society where medications are often viewed through a lens of strength and potency, with the implicit assumption that stronger medicines produce faster results regardless of the specific nature of the illness. This is reinforced by advertising messages from pharmaceutical companies and informal health practitioners who market antibiotics as solutions for various ailments without emphasising their specific antibacterial indications. The belief that branded antibiotics are superior to generics reflects both mistrust of generic medications, which are often perceived as substandard or fake in the Nigerian context where pharmaceutical regulation is weak and counterfeit drugs are a genuine problem, and also status-seeking behaviour where brand-name products are preferred as markers of quality and prestige. The attitude that sharing antibiotics is a helpful gesture reflects communal values in Nigerian culture where sharing resources with friends and family is expected and praised, but this prosocial orientation becomes harmful when applied to prescription medications where individual dosing and duration matter for effectiveness and prevention of resistance. The practice of stopping antibiotics upon feeling better reflects both a misunderstanding of the difference between symptomatic improvement and bacterial eradication, and also a rational response to medication costs where completing full courses represents a significant financial burden for students with limited resources, leading them to preserve leftover drugs for future use. Additionally, negative attitudes may be reinforced by peer norms within the student community where casual antibiotic use is normalised, modelled by

friends and roommates, and discussed openly without stigma or correction, creating a social environment where inappropriate practices are not challenged. This is consistent with findings from a cross-sectional study conducted in Jordan which found widespread inappropriate attitudes toward antibiotics including beliefs in their effectiveness for viral infections and acceptance of non-prescription use.[12] Similarly, research conducted among undergraduates at the University of Lagos revealed that many students held misconceptions about antibiotic potency and appropriateness for treating various illnesses, often influenced by advertising and peer behaviours.[14] This finding has important public health implications because negative attitudes toward antibiotics underpin inappropriate behaviours including self-medication, premature discontinuation of treatment, sharing of prescriptions, and pressure on healthcare providers to prescribe antibiotics for viral infections, all of which contribute to antimicrobial resistance and compromise individual and population health. The University of Benin Student Affairs Division should partner with the Faculties' Students Representative Councils to launch a campus-wide peer-led behaviour change campaign under the theme of responsible medication use, utilising student ambassadors trained in motivational interviewing techniques to conduct dormitory-based discussion groups addressing social norms around antibiotic sharing, emphasising the individual and collective harms of misuse, and promoting positive alternative behaviours such as seeking care at the health centre and completing prescribed courses, with monitoring and evaluation to assess campaign reach and impact on attitudes.

This study found that practices regarding antibiotic use were almost equally divided between good and poor practices, with slightly more than half demonstrating poor practices. More than half of respondents had used an antibiotic in the last six months, indicating high prevalence of antibiotic consumption in the student population. Regarding how antibiotics were obtained, the

most common source was recommendation from a Chemist or Patent and Proprietary Medicine Vendor, followed by pharmacist's recommendation, doctor's prescription, leftover from a previous illness, and from a friend or roommate, revealing that less than one-quarter obtained antibiotics through proper medical channels while the majority relied on informal sources. For how antibiotics were dispensed, slightly more than half received loose sachets or single units rather than full packs in original packaging, a practice that compromises medication labelling, dosing information, and quality assurance. Concerning reasons for antibiotic use, fever was the most common, followed by sore throat or cough, stomach upset, and skin infection, with these indications spanning both appropriate bacterial infections and likely viral or self-limiting conditions where antibiotics may be unnecessary. Regarding treatment completion, only a small minority always finished the entire course as written on the label, while nearly half sometimes finished and about one-third never finished, indicating widespread non-adherence that promotes antimicrobial resistance. For checking expiry dates when self-medicating, only about one-quarter checked, while substantial proportions did not check or never checked, raising safety concerns about consumption of expired or degraded medications. Concerning frequency of taking antibiotics without a prescription, only a very small minority never did so, while the majority engaged in non-prescription antibiotic use with varying frequency from rarely to always, demonstrating that self-medication is normative behaviour in this population. The probable reason for these practices is multi-layered. The high prevalence of antibiotic use in the past six months reflects the burden of infectious diseases in the student population living in crowded dormitories with shared sanitation facilities, frequent contact with peers, academic stress that may compromise immune function, and inadequate preventive health measures, creating conditions where respiratory tract infections, gastroenteritis, and skin infections are common.

The predominance of informal sources for antibiotic procurement reflects multiple barriers to accessing formal healthcare including long waiting times at the university health centre, limited clinic hours that conflict with lecture schedules, geographical distance for students living off-campus, user fees at private clinics that exceed student budgets, and the convenience of patent medicine vendors located near campus gates and student residential areas who operate extended hours and provide immediate service without appointment or registration. Additionally, patent medicine vendors actively promote antibiotic sales because these are high-margin products, often providing unsolicited recommendations and enabling students to purchase medications with minimal questioning or counselling. The practice of dispensing antibiotics in loose sachets is driven by cost considerations, as purchasing a few tablets or capsules is cheaper than buying full packs, allowing students to match expenditure to immediate affordability rather than therapeutic requirements, but this practice deprives them of package inserts with dosing instructions and encourages premature discontinuation when the purchased quantity is exhausted. The widespread failure to complete antibiotic courses reflects both knowledge gaps about the importance of full treatment duration and practical barriers including cost constraints, side effects that discourage continuation, symptomatic improvement that reduces perceived need for ongoing medication, and loss or forgetting of medications in busy student schedules. Non-adherence is also reinforced by peer modelling, as students observe roommates and friends discontinuing antibiotics without apparent adverse consequences, normalising the behaviour and creating social proof that incomplete treatment is acceptable. The high rates of non-prescription use reflect not only supply-side factors such as weak pharmaceutical regulation and commercial incentives for vendors, but also demand-side factors including students' desire for quick relief, confidence in self-diagnosis based on previous experiences or internet searches, and avoidance of formal

healthcare due to time constraints and perceived hassles. This is consistent with findings from a cross-sectional study conducted at Ahmadu Bello University which revealed that students frequently engaged in self-medication with antibiotics, often using drugs without proper prescription or medical guidance, citing convenience, cost, and familiarity as primary motivations.[11] Similarly, a descriptive cross-sectional survey conducted in Ikorodu Local Government Area, Lagos State, found that the majority of caregivers obtained antibiotics from informal sources and demonstrated poor adherence to treatment courses, patterns similar to those observed among university students.[27] This finding has important public health implications because widespread inappropriate antibiotic practices among university students contribute significantly to antimicrobial resistance by creating selective pressure that favours resistant bacterial strains, and students who develop resistant infections may spread these organisms to their peers, family members, and broader community contacts, amplifying public health risks. The Edo State Ministry of Health should strengthen enforcement of regulations governing the operation of patent medicine vendors around university campuses, requiring licensing verification, regular inspections, and penalties for dispensing prescription-only medications without valid prescriptions, while simultaneously working with the University of Benin Health Services Centre to extend clinic operating hours including weekend and evening services, introduce walk-in consultations for minor ailments to reduce waiting times, and deploy mobile health units to student residential areas to increase access to professional care and reduce reliance on informal medication sources.

Level of study showed a statistically significant association with practices, with students at higher levels demonstrating significantly better practices compared to those at lower levels. The probable reason for this association is multi-layered. Senior students have had more years to

learn from their own experiences and those of peers regarding the consequences of inappropriate antibiotic use, including treatment failures due to resistance, adverse drug reactions from self-medication, and financial losses from purchasing ineffective or unnecessary medications. This experiential learning may motivate behaviour change toward more rational practices even if formal knowledge remains limited. Additionally, higher-level students are more likely to have developed relationships with healthcare providers at the university clinic through repeated consultations over their years of study, building trust and familiarity that encourages appropriate healthcare-seeking rather than self-medication. The longer duration at university also provides more opportunities for exposure to health education campaigns and peer education initiatives that may positively influence practices. Furthermore, senior students may have greater maturity and future orientation, recognising the long-term health consequences of inappropriate medication use and being more willing to invest time and resources in proper healthcare. However, it is also possible that improved practices reflect confounding by other unmeasured variables that differ between junior and senior students. This is consistent with findings from studies in other university settings showing that practices tend to improve with academic progression, though knowledge-practice gaps may persist. This finding is significant because it suggests that practices can improve over time through a combination of experience, education, and maturation, indicating that early intervention with first- and second-year students could accelerate this learning and prevent years of inappropriate practices during the vulnerable junior student period. The University of Benin should implement a longitudinal antibiotic stewardship mentorship programme pairing first-year students with trained senior student mentors who can provide ongoing guidance, share experiences, and model appropriate healthcare behaviours throughout the freshman year, with evaluation to assess impact on knowledge, attitudes, and practices.

Place of residence showed a statistically significant association with practices, with students living off-campus demonstrating better practices compared to those living on-campus. The probable reason for this association is multi-layered and somewhat counterintuitive. Students living off-campus in private lodges may have greater autonomy and privacy in managing their health, allowing them to seek care at healthcare facilities of their choice without the social visibility and peer influence present in crowded dormitories where medication-sharing is common and self-medication practices are modelled by roommates. Off-campus students may also be older and more mature on average, as senior students often move out of university hostels to private accommodation, and this greater maturity may translate into more responsible health behaviours. Additionally, off-campus students may have developed relationships with local pharmacies and private clinics in their neighbourhoods where they receive more personalised service and counselling compared to the impersonal dispensing common at patent medicine vendors near campus gates who cater to the mass student market. However, it is also possible that off-campus students face greater geographic barriers to accessing the free university health centre and are therefore more selective and deliberate about when to use antibiotics, whereas on-campus students may have easier physical access but paradoxically less considered use. The finding may also reflect selection effects, where students who choose to live off-campus differ systematically from those who remain on-campus in ways that correlate with health behaviours, including family socioeconomic status, independence, and health consciousness. This is significant because it suggests that residential environment and social context shape medication practices independently of individual knowledge and attitudes, and interventions must therefore address the environmental and social determinants of behaviour. The University of Benin should strengthen health promotion activities within on-campus hostels through training of hall wardens

and resident tutors to serve as health champions who can facilitate peer education sessions, challenge inappropriate medication practices, and refer students with health concerns to the university clinic, creating a health-promoting residential environment that counteracts negative peer influences.

Monthly allowance showed a statistically significant association with practices, with students receiving less than one hundred thousand naira demonstrating better practices compared to those receiving one hundred thousand naira or more. The probable reason for this association mirrors the pattern observed for knowledge, where financial constraints paradoxically promote more cautious and appropriate healthcare behaviours. Students with limited budgets cannot afford to waste money on unnecessary medications or ineffective self-treatment, creating an economic incentive to seek proper diagnosis and treatment from the subsidised university health centre where care is more affordable and evidence-based. In contrast, wealthier students may engage in more experimental and impulsive medication use, purchasing antibiotics casually without medical consultation because the financial cost is negligible relative to their allowance. This pattern is consistent with economic theories of healthcare utilisation suggesting that out-of-pocket costs influence care-seeking and medication adherence behaviours. This finding is significant because it challenges the assumption that poverty is a barrier to appropriate medication practices and suggests that in contexts where subsidised healthcare is available, financial constraints may actually promote rational use by steering patients toward formal healthcare systems. Policymakers should recognise that expanding access to affordable or free healthcare for students is not only a social equity measure but also a strategy for promoting rational antibiotic use and combating antimicrobial resistance.

This study makes several important contributions to knowledge regarding antibiotic use and antimicrobial resistance among university students in Nigeria. First, it provides contemporary baseline data from the University of Benin, a major federal university in the South-South geopolitical zone where previous research on student antibiotic practices has been limited, thereby filling an important evidence gap and enabling context-specific programming for this institution and similar universities in the region. Second, the study reveals a concerning knowledge-practice gap where even students with relatively good knowledge about antibiotics and resistance engage in inappropriate practices such as self-medication and incomplete treatment courses, challenging the assumption that health education alone is sufficient to change behaviour and highlighting the importance of structural and environmental determinants including medication access patterns, social norms, and healthcare system factors. Third, the finding that Medical Sciences students have significantly better knowledge than Non-Medical Sciences students quantifies the magnitude of health literacy disparities within the university population and demonstrates the need for universal health education rather than reliance on trickle-down effects from health professionals to the general student body. Fourth, the study documents the dominant role of patent medicine vendors in antibiotic procurement among students, revealing that less than one-quarter obtain antibiotics through proper medical channels, thereby identifying a critical intervention point for antimicrobial stewardship efforts targeting both supply-side regulation of vendors and demand-side education of students. Fifth, the counterintuitive finding that students with lower monthly allowances demonstrate better knowledge and practices than wealthier students challenges conventional assumptions about socioeconomic gradients in health behaviours and suggests that in contexts with subsidised healthcare, financial constraints may promote rather than hinder appropriate medication use, with

implications for health systems strengthening and financing policies. Sixth, the study provides insights into specific misconceptions and attitudes that drive inappropriate antibiotic use among Nigerian university students, including beliefs that antibiotics are general health tonics, that branded products are superior to generics, and that sharing leftover medications is a helpful social gesture, thereby identifying targets for tailored behaviour change communication. Seventh, by documenting practices such as purchasing antibiotics in loose sachets without packaging or instructions, the study highlights quality assurance and patient safety issues in informal medication markets that warrant regulatory attention. Finally, the study contributes methodologically by demonstrating the feasibility and value of conducting large-scale knowledge, attitude, and practice surveys on sensitive health topics such as self-medication within Nigerian university settings, providing a model for similar assessments at other institutions.

The findings of this study have several important policy implications for antimicrobial stewardship in Nigerian universities and the broader healthcare system. First, the extremely poor knowledge of antibiotics among the vast majority of students, including widespread misconceptions about antibiotics treating viral infections and confusion between antibiotics and analgesics, indicates that health education in Nigerian secondary schools and university general studies programmes is grossly inadequate and requires urgent curriculum reform to include essential health literacy topics as core rather than optional components, with dedicated teaching time, qualified instructors, and assessment to ensure learning outcomes are achieved. Second, the significant knowledge gap between Medical Sciences and Non-Medical Sciences students reveals that health knowledge is inequitably distributed across the university population, and policies must ensure that every student regardless of faculty receives foundational education on

rational medication use through compulsory general studies courses, orientation programmes, and ongoing campus-wide health promotion campaigns that reach all students not just those in health-related disciplines. Third, the predominance of patent medicine vendors as sources of antibiotics for students, with less than one-quarter obtaining drugs through proper medical prescription, signals a regulatory failure requiring immediate action by pharmaceutical regulatory authorities to enforce laws prohibiting over-the-counter sales of prescription-only antibiotics, conduct regular inspections of vendors operating around university campuses, impose meaningful penalties for violations, and potentially implement innovative regulatory models such as mandatory electronic prescription verification systems that prevent dispensing without valid prescriptions. Fourth, the finding that more than half of students engage in non-prescription antibiotic use with varying frequency demonstrates that antimicrobial stewardship interventions cannot rely solely on prescriber-focused strategies but must also address demand-side factors through social marketing campaigns that denormalise self-medication, peer education programmes that challenge social norms supporting antibiotic sharing, and structural interventions that reduce barriers to accessing formal healthcare including expansion of student health services, elimination of user fees, extension of clinic hours, and deployment of mobile health units to residential areas. Fifth, the widespread practice of incomplete antibiotic treatment courses among students indicates that interventions must go beyond knowledge provision to address practical barriers to adherence including medication costs, side effects management, and follow-up care, potentially through subsidised antibiotic provision at university health centres where adherence can be monitored and supported, patient education counselling delivered alongside prescriptions, and SMS reminder systems to encourage treatment completion. Sixth, the unsafe practice of purchasing antibiotics in loose sachets without original packaging or

instructions highlights the need for stronger quality assurance policies requiring all dispensed medications to be accompanied by proper labelling with drug name, strength, dosing instructions, expiry date, and warnings regardless of package size or purchase source, with public education campaigns to inform students about their right to this information and how to identify substandard or falsified medications. Seventh, the negative attitudes toward antibiotics including beliefs in their universal efficacy and acceptance of sharing practices reveal that cultural and social norms surrounding medication use are deeply entrenched and require sustained multi-year behaviour change communication employing diverse channels including social media, campus radio, student theatre, and faith-based institutions to reach students where they live, study, and socialise with messages tailored to resonate with youth culture while maintaining scientific accuracy. Eighth, the association between higher level of study and better practices suggests that the university environment can positively influence health behaviours over time through accumulated education and experience, indicating that early intervention with first-year students during orientation is critical to establish appropriate medication practices before negative habits become entrenched, and universities should invest in comprehensive freshman health education as a priority intervention. Finally, the findings underscore the need for multi-sectoral collaboration involving university administration, student affairs, health services, academic faculties, student unions, pharmaceutical regulatory bodies, patent medicine vendor associations, and state health authorities to develop and implement comprehensive antimicrobial stewardship policies that address both knowledge deficits and structural determinants of inappropriate antibiotic use, with clear coordination mechanisms, defined roles and responsibilities, adequate resource allocation, and monitoring and evaluation frameworks to track progress toward measurable targets for reducing antimicrobial resistance.

CONCLUSION

In relation to knowledge, it was identified that the vast majority of respondents had poor knowledge of antibiotics use and resistance, with only about one in five demonstrating good knowledge.

In relation to attitude, it was found that the majority of respondents had negative attitudes toward antibiotics use, with only about three in ten demonstrating positive attitudes.

In relation to practices, it was found that practices were almost equally divided between good and poor, with slightly more than half demonstrating poor practices.

RECOMMENDATIONS

The following recommendations are made based on the findings from this study, with the hope that if implemented, they will improve antibiotic use practices among university students and contribute to national efforts to combat antimicrobial resistance.

TO THE GOVERNMENT

1. The government should develop and implement a national antimicrobial stewardship policy that includes mandatory health literacy education on rational medication use in all tertiary institutions, ensuring that every student regardless of faculty receives foundational knowledge about antibiotics, antimicrobial resistance, and appropriate healthcare-seeking behaviours through compulsory General Studies courses.

2. Adequate funding should be provided for nationwide awareness campaigns targeting young adults through social media platforms, campus radio stations, and student-focused digital content, with messaging that addresses specific misconceptions about antibiotics treating viral infections, clarifies the difference between antibiotics and analgesics, explains antibiotic resistance mechanisms, and promotes completion of prescribed treatment courses.

3. The government should strengthen enforcement of pharmaceutical regulations through the National Agency for Food and Drug Administration and Control and the Pharmacists Council of Nigeria, conducting regular inspections of patent medicine vendors operating around university campuses, imposing meaningful penalties for over-the-counter sales of prescription-only antibiotics, and implementing innovative regulatory mechanisms such as mandatory electronic prescription verification systems.

4. The government should incorporate antibiotic stewardship indicators into the National Health Insurance Scheme, ensuring that insured students can access appropriate medical consultation and prescribed antibiotics at subsidized rates while preventing reimbursement for non-prescribed antibiotic purchases, thereby creating financial incentives for proper healthcare-seeking behaviours.

TO THE UNIVERSITY OF BENIN

1. The university should mandate the inclusion of a comprehensive module on rational medication use and antimicrobial stewardship within the existing General Studies Programme for all first-year students, covering basic microbiology concepts, antibiotic mechanisms of action, appropriate indications for antibiotic use, dangers of self-medication and incomplete treatment, and antimicrobial resistance as a public health threat.
2. The University Health Services Centre should strengthen its capacity to provide accessible, affordable, and high-quality primary healthcare to students by extending clinic operating hours to include evenings and weekends, introducing walk-in consultation services for acute minor illnesses to reduce waiting times, deploying mobile health units to student residential areas, and ensuring consistent availability of essential medications and diagnostic services.
3. The university should organize regular antibiotic awareness campaigns during orientation weeks, health awareness days, and World Antibiotics Awareness Week, utilizing peer educators from the Faculty of Medical Sciences to conduct interactive

sessions in halls of residence, faculties, and student centres, with emphasis on dispelling misconceptions and promoting appropriate healthcare-seeking behaviours.

4. The university should establish an antimicrobial stewardship committee comprising representatives from Medical Sciences, Pharmacy, Health Services, Student Affairs, and hall administration to develop institutional policies on antibiotic use, monitor prescribing practices at the university clinic, coordinate educational interventions, and liaise with regulatory authorities to address inappropriate antibiotic sales in the university environment.

TO THE STUDENTS AND COMMUNITY

1. Students should take personal responsibility for their health by seeking professional medical consultation at the university health centre or registered private clinics when experiencing symptoms of infection, rather than self-diagnosing and purchasing antibiotics from patent medicine vendors based on previous experience or peer advice.
2. Students should complete the entire course of antibiotics exactly as prescribed by healthcare providers even when symptoms improve before the medication is finished, recognizing that premature discontinuation contributes to antimicrobial resistance and increases risk of treatment failure and recurrent infections.
3. Students should avoid sharing prescribed antibiotics with roommates, friends, or family members even when they appear to have similar symptoms, as different infections require different antibiotics and dosing regimens, and sharing medications can lead to inappropriate treatment, adverse drug reactions, and spread of resistant organisms.

4. Students should actively participate in antibiotic awareness programmes organized by the university, student health clubs, and peer educator networks, using these opportunities to update their knowledge, clarify misconceptions, and learn about antimicrobial resistance as a global health threat that affects everyone including young healthy adults.

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APPENDIX

QUESTIONNAIRE

Dear Respondent,

We are 600l medical students of the university of Benin, Benin City. We are currently conducting a study to assess antibiotics use by students of the University of Benin. Your participation is voluntary. All information provided will be kept anonymous and confidential.

Instructions: Please tick the most appropriate box or fill in the blank as required.

SECTION A: SOCIODEMOGRAPHIC CHARACTERISTICS

1. Age (at last birthday): _____ years
2. Sex: Male [ ] Female [ ]
3. Faculty: _____ (e.g., Medical Sciences, Arts, Engineering)
4. Current Level of Study: 100L [ ] 200L [ ] 300L [ ] 400L [ ] 500L [ ] 600L [ ]
5. Place of Residence: On-campus (Hostel) [ ] Off-campus (Private Lodge) [ ]
6. Average Monthly Allowance: < N20,000 [ ] N21,000 - N50,000 [ ] N51,000 - N100,000 [ ] > N100,000 [ ]

SECTION B: KNOWLEDGE OF ANTIBIOTICS AND RESISTANCE

Instructions: Please select the option that best represents your understanding.

S/N	Statement	True	False	Don't know
7.	Antibiotics are effective for treating the common cold, flu, and viral coughs.			
8.	Antibiotics are indicated for the treatment of uncomplicated malaria.			
9.	Drugs like Paracetamol, Ibuprofen, and Aspirin are types of antibiotics.			
10.	Antibiotics are used primarily to treat bacterial infections			
11.	Antibiotic resistance means the human body has built up a tolerance to the drug.			
12.	Resistance occurs when bacteria change and become able to survive antibiotic exposure.			
13.	"Superbugs" are bacteria that cannot be killed by most common antibiotics.			
14.	Skipping a few doses of antibiotics does not contribute to resistance if you finish the rest.			
15.	Biofilms are protective bacterial layers that make infections harder to treat.			
16.	Antimicrobial Resistance (AMR) is currently a major problem in Nigerian hospitals.			
17.	Antibiotics should always be taken for the full course even when symptoms improve.			

SECTION C: ATTITUDE TOWARDS ANTIBIOTIC USE

Instructions: Please rate your level of agreement with each statement:

S/N	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
18.	I believe antibiotics are "strong" medicines that speed up recovery for any minor illness.					
19.	Newer or more expensive "branded" antibiotics are fundamentally more potent than generics.					
20.	It is safe to buy antibiotics without a doctor's prescription if I have used them before.					
21.	I feel entitled to an antibiotic prescription whenever I visit the school clinic for a cough.					
22.	Sharing leftover antibiotics with a sick roommate is a helpful social gesture.					
23.	I stop taking my antibiotics as soon as I feel better to avoid taking too much "chemicals."					
24.	I trust the advice of a "chemist" shop attendant more than waiting for hours at the clinic.					
25.	The risk of antibiotic resistance is exaggerated and does not really affect young people.					
26.	Antibiotics are effective in treating viral infections such as the flu.					
27.	Using antibiotics unnecessarily can cause future infections to become harder to treat					

SECTION D: PRACTICES REGARDING ANTIBIOTIC USE

28. Have you used an antibiotic in the last 6 months? Yes [ ] No [ ]
29. If yes, how did you obtain it? (Select the primary source): Doctor's prescription [ ] Pharmacist's recommendation [ ] Recommendation from a "Chemist" or PPMV [ ] From a friend/roommate [ ] Leftover from a previous illness [ ]
30. How was the antibiotic dispensed to you? A full pack/blister in its original box [ ] Loose "satchets" or single units (e.g., 2 or 4 capsules) [ ]
31. What was the reason for your last antibiotic use? Sore throat/Cough [ ] Fever [ ] Skin infection [ ] Stomach upset [ ] Other: _____
32. Do you usually finish the entire course as written on the label? Always [ ] Sometimes [ ] Never [ ]
33. When self-medicating, do you check the expiry date on the drug packaging? Yes [ ] No [ ] Never check [ ]
34. How often do you take antibiotics without a doctor's prescription? Never [ ] Rarely [ ] Sometimes [ ] Often [ ] Always [ ]

Thank you for your time and cooperation.