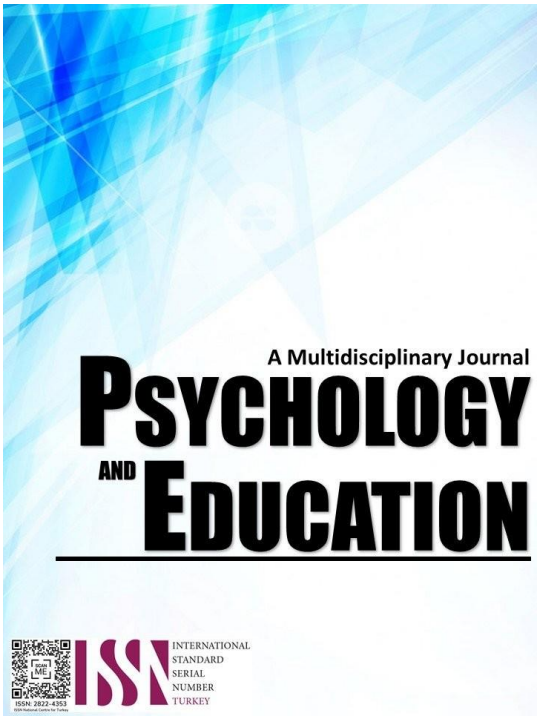
PERCEIVED LEVEL OF KNOWLEDGE, AWARENESS, AND ATTITUDE OF SAINT MARY'S UNIVERSITY SENIOR HIGH SCHOOL STUDENTS TOWARDS ANTIBIOTIC USE



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Research Article

Perceived Level of Knowledge, Awareness, and Attitude of Saint Mary's University Senior High School Students towards Antibiotic Use

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Abstract

The misuse and overuse of antibiotics have led to a significant rise in antibiotic resistance, posing a serious public health threat, especially among younger populations who are increasingly exposed to these medications. This study aims to determine the perceived level of knowledge, awareness, and attitudes of senior high school students at Saint Mary's University, Bayombong, Nueva Vizcaya, Philippines, towards antibiotic use, focusing on profile variables such as sex and academic strand. Utilizing a descriptive-comparative and descriptive-correlational research design, a survey questionnaire was distributed to gather data on students' knowledge, awareness, and attitudes, incorporating quantitative Likert scale items and a qualitative open-ended question. The findings reveal that while most students demonstrate proper knowledge and awareness regarding antibiotic use, significant gaps in understanding, particularly concerning antibiotic resistance, were identified. The study highlights the necessity for targeted educational interventions to enhance students' knowledge and attitudes toward antibiotic use, thereby contributing to improved public health outcomes with serving as a foundation for future research on antibiotic stewardship among young populations.

Keywords: *antibiotic use, knowledge, awareness, attitude, antibiotic resistance*

Introduction

Maintaining an individual's health and taking precautions to lessen the likelihood of contracting certain diseases constitutes good health. However, a study by Ikuta et al. (2022) identified 33 bacterial infections that are significant contributors to disease globally.

Bacterial infection is one of the major concerns in medicine. Bacteria are single-celled creatures that enter the body and cause infections. These infections spread quickly and can be acquired in a variety of ways. An overabundance of pathogenic bacteria causes bacterial infections. Different symptoms can be caused by various kinds of bacteria (Herndon, 2023). According to Cherney (2023), most bacterial infections are contagious and there are many ways that this can occur. However, antibiotic medicines can fight the infection caused by bacteria (What You Should Know About Antibiotics, 2022).

Antibiotics can effectively treat these bacterial infections. It is an effective treatment to eradicate infectious diseases or reduce the number of bacteria in the body. These aid the immune system in combating the microorganisms in the body (Felman, 2023). Over the past eight decades, the discovery of antibiotics has completely changed how infectious diseases are managed and treated. Antibiotics are among the most prescribed and used drugs worldwide (Raihan et al., 2024). Responsibly taking antibiotics is very important because misuse will have negative side effects and eventually lose some of their effectiveness (Institute for Quality and Efficiency in Health Care (IQWiG), 2013). According to Harakeh et al. (2015), improper use of antibiotics will lead to the rise of bacterial infection that are highly resistant to antibiotics.

Misuse of antibiotics causes the formation of bacterial resistance characteristics in 29 populations, posing a current and continuous hazard to people. According to estimates, roughly two-thirds of all oral antibiotics used worldwide can be acquired over-the-counter and are misapplied to illnesses like pneumonia, malaria, TB, and minor infections in children. Because of the recent successful use of antibiotic medicines, people in most societies tend to assume they can manage subsequent illnesses without consulting a doctor. This is a possible risk factor for antibiotic abuse because most patients lack understanding about the disease and the relevant medications used for self-medication. (Battah et al., 2021)

Furthermore, according to Raihan et al. (2024), antibiotics are available without prescription in developing 23 countries such as Uganda, Cameroon, Bangladesh, Pakistan, and, leading to indiscriminate use. Antibiotics are also handled for insufficient periods of time, at wrong intervals between doses, and at inappropriate dosages for inadequate durations. In addition, one of the nations with the greatest rates of antibiotic sharing is the Philippines, and abuse on a worldwide scale. Overuse and misuse are among the factors that contribute to antibiotic resistance. Antibiotics, improper medical procedures, and behaviors that lead to infections (Tagum-Briones et al. al., 2023).

Similarly, a study by Robredo et al. (2022) clearly stated that non-medical professionals often prescribe antibiotics, and it is common for Filipino families and communities to share medication. Those practices highlight the country's inadequate regulation of dispensaries. Additionally, the study found that 29–95% of adults have various misconceptions regarding the proper indications for antibiotic use, instructions for appropriate use, and potential side effects. Wherein many people are unaware of the contribution of improper use and non-adherence to antibiotic resistance, which can significantly affect future health costs. Therefore, it is important to educate the public

and increase knowledge of the policies that can help address this health-related issue.

The Food and Agriculture Organization of the United Nations has stated that the Philippine Action Plan to Combat Antimicrobial Resistance serves as the country's roadmap for containing, controlling, and preventing antibiotic resistance. This plan provides an intervention strategy to address the growing problem of AMR as a unified nation (FAOLEX, n.d.-b).

On the other hand, the Food and Drug Administration implemented the Republic Act 10918, also known as the No Prescription No Dispensing Policy. This policy outlines dispensing as the collective processes carried out by a pharmacist, which includes reviewing, verifying, and interpreting prescriptions. It also encompasses the preparation of medication, packaging, labeling, maintaining records, calculating dosages, and offering advice or information related to the sale or transfer of pharmaceutical products. This applies whether or not there is a prescription or medication order (Republic Act 10918, 2016).

In addition, Republic Act 2382, commonly referred to as the Philippine Medical Act, states that "physicians are the only ones authorized to prescribe medicines" (Republic Act 2382, 1969). Similarly, the Republic Act 5921, known as Pharmacy Law, indicates that "only registered pharmacists can dispense and sell medicines". Before purchasing any medicines, the patient must present the prescription to the pharmacist before any drug can be dispensed (Republic Act 5921, 1969).

These implemented actions and Philippine policy guidelines regarding antibiotic use should not be ignored to address the problem of antibiotic resistance that threatens the advancement of human healthcare, agricultural productivity, and ultimate life expectancy. Misuse and overuse of antibiotics, which arises from a lack of awareness, negligent attitudes, and false assumptions held by the public concerning antibiotics, is one of the causes of antibiotic resistance (Karuniawati et al., 2021).

The World Health Organization has identified antibiotic resistance as a significant concern to human health in the 21st century due to the irrational use of antibiotics without prescription, particularly in developing countries. This has led to the ineffectiveness of many antibiotics, resulting in increased mortality and morbidity from once-treatable infectious diseases (Zaidi et al., 2020). According to Nguyen et al. (2022), the World Health Organization has strongly advocated educational programs for the public regarding antibiotic use and resistance. Studies similar to the study of Harakeh et al. (2015) show that studies on healthcare students' perspectives are scarce worldwide. Still, students' perspectives towards antibiotics are essential in increasing public understanding of health- related issues.

Antibiotic Medicine

Antibiotic medicine is the most purchased drug worldwide. These are essential treatments, particularly in underdeveloped nations where infectious diseases remain the leading cause of mortality (Nepal & Bhatta, 2018).

Moreover, an antibiotic is a dominant drug that, when taken as directed, can effectively treat bacterial infections, and even save lives. These drugs work by eliminating microorganisms or prevent from spreading. Typically, the immune system eradicates bacteria before having a chance to grow and display signs of symptoms. White blood cells (WBCs) play a crucial role in fighting harmful germs, and even in cases where symptoms appear, the immune system can handle the infection and fight it off. However, occasionally, there are instances when the number of dangerous bacteria exceeds the body's ability to eradicate the bacteria. In such cases, antibiotics are helpful (Felman, 2023).

Antibiotics work in the body by killing or stopping the growth of germs to treat bacterial infections. It is accomplished by assaulting the bacterial wall or covering, disrupting the reproduction of microorganisms, and preventing bacteria from producing proteins. Moreover, as soon as one starts to take the antibiotic medicine, it begins to function and work in the body. However, it could take two or three days before a patient feels better (The Healthline Medical Network, 2023). In connection with this, antibiotic medicines have side effects but are not fatal. Some people may experience severe side effects from antibiotics that necessitate medical attention (Crna, 2020).

Since antibiotics are common agents used in modern healthcare (Petel et al., 2023). Therefore, it is crucial to use antibiotics properly to help combat the issue of antibiotic resistance. Ensuring the appropriate use of this medication is essential (Effah et al., 2020).

Antibiotic Use

Antibiotics can treat or prevent bacterial infections but do not work against viral infections (NHS Inform, 2024). When antibiotics are used correctly, they effectively eliminate infections, causing people to feel better. Although antibiotics are safe, they can be equally harmful when misused and overused (Alindayo et al., 2024).

One of the main factors contributing to the misuse and overuse of antibiotics is the inappropriate prescription practices that lead to the misuse and overuse of antibiotics (Waaseth et al., 2019), and the indiscriminate and illogical use of antibiotics, fueled by a lack of knowledge, awareness, and the poor attitude of people who use antibiotics, is one of the factors contributing to antibiotic resistance (Lubwama et al., 2021). However, the issue of antibiotic resistance can be eliminated by using them as directed, maintaining proper cleanliness, and following infection control procedures (Department of Health & Human Services, n.d.).

According to Fetensa et al. (2020), sufficient knowledge, awareness, and a positive attitude regarding antibiotic resistance are crucial in the prevention of resistance, as inadequate knowledge can lead to misuse. If antibiotic medicine is utilized appropriately, it becomes

an issue that everyone can contribute to resolving. The overuse of antibiotics in medical facilities and by the public is the main cause of antibiotic resistance. Enhancing knowledge, awareness, and attitude toward comprehension of antibiotics and antibiotic resistance through efficient communication, instruction, and training is a crucial part of the World Health Organization's (WHO) worldwide action plan to prevent the additional spread of antibiotic resistance (Sakeena et al., 2018).

Antibiotics are typically not transferable from one infection to another because of a particular type of bacteria being treated. When prescribed correctly, antibiotics are generally safe and have few side effects. Healthcare professionals can assess each patient individually to determine the appropriate antibiotic, dosage, and duration of treatment. Antibiotic use can have side effects, though, and like most medications, they can be minor irritations or potentially fatal. Antibiotic dosages may need to be modified based on the specific patient in case of pregnant or nursing mothers, patients with renal or liver illness, the elderly, and many other patient groups. Antibiotics and drug interactions can also occur often (Anderson, 2023).

According to Marzan et al. (2021), proper use of antibiotics saves millions of lives. However, when an antibiotic is misused due to its availability over-the-counter, without a prescription, and through uncontrolled supply chains, antibiotic resistance results in reduced pharmaceutical efficacy, patient complications during treatment, or higher management costs (Akande-Sholabi & Ajamu, 2021). Accordingly, improved knowledge is an important effort to reduce misconceptions that contribute to inappropriate use (Effah et al., 2020).

Knowledge of Antibiotic Use

According to the study of Alindayo et al. (2024), knowledge of antibiotic use indicates a person's understanding or familiarity with the idea of proper usage of antibiotic use, which includes correct practices and the related adverse effects when taken inappropriately.

Sufficient knowledge about resistance to antibiotics is crucial in the preclusion of resistance, as poor knowledge will result in inappropriate use. Those who acknowledged the emergence of bacterial resistance were more likely to have adequate knowledge of the effectiveness of antibiotics, a better understanding of antibiotic identification, role, side effects, and resistance is suboptimal, and their attitude toward antibiotic consumption needs to be more favorable. (Fetensa et al., 2020).

Having a good understanding of antibiotics is crucial for appropriate utilization and for suppressing the widespread development of antibiotic resistance. A better knowledge of antibiotics can help ensure that was used appropriately, improve treatment outcomes and adherence, and reduce the number of bacteria that resist them (Waaseth et al., 2019). However, insufficient knowledge may result in the self-medication of leftover or nonprescription antibiotics. This behavior is concerning since it raises the possibility of taking the incorrect kind or dosage of antibiotics, leading to resistance (Hughes et al., 2008). Antibiotic users, for example, thought that treating flu or flu-like symptoms always required antibiotics. People typically start taking antibiotics after their symptoms get better (Akkawi et al., 2022).

Knowledge regarding the risks connected with the use and misuse of antibiotics is the key to address antibiotic resistance (Effah et al., 2020). Improving students' knowledge and awareness of antibiotic use and resistance is crucial in addressing the growing problem of antibiotic resistance.

Awareness of Antibiotic Use

Awareness is "the quality or state of being aware, and understanding that something is happening or exists" (Merriam-Webster Dictionary, 2024, para. 1). Awareness of antibiotic use indicates a person's quality or state of being aware of the proper usage of antibiotic and antibiotic resistance. However, being unaware of antibiotics and antibiotic resistance may lead to improper antibiotic use and can cause the problem of antibiotic resistance (Ulaya et al., 2022).

As inappropriate antibiotic use is the primary cause of antibiotic resistance, responses to this phenomenon prioritize promoting public awareness. Nonetheless, there is a lack of public awareness about antibiotic resistance even in wealthy countries, and it is more serious in low- and middle-income countries, where the use of antibiotics without a prescription is common. Thus, additional evidence on public awareness about antibiotic resistance in certain settings should be needed to contextualize and optimize the effectiveness of interventions (Mathew et al., 2019).

Limited patient awareness of possible risks may also contribute to antibiotic misuse. Interest is developing initiatives to raise public awareness about this issue and find ways to reduce antibiotic misuse in a different medical setting. Medical and public health groups also seek increased public input and participation in research, intervention development, and policymaking activities addressing critical concerns such as antibiotic use (Richmond et al., 2019).

Increasing public awareness of the side effects of antibiotics can prevent the development of antibiotic resistance and its effects, which will help reduce the costs to health systems in the uncertain future of human health.

Attitude on Antibiotic Use

According to the study of Alindayo et al. (2024), attitude toward antibiotic use indicates how a person takes antibiotics, positively or negatively.

Positive attitudes can impact the use of antibiotics by imposing sufficient knowledge. Previous studies have examined the attitudes toward antibiotics among pharmacists, physicians, and the general population. These studies have found that positive attitudes toward antibiotic use and interventions aimed at reducing antibiotic resistance can significantly influence both prescribing practices and general public antibiotic usage (Gaygısız et al., 2021).

On the other hand, the prevalence of misuse and overuse of antibiotics due to people negative attitude towards their use contributes to antibiotic resistance (Alindayo et al., 2024). According to Gaygısız et al. (2021), the negative attitude of people contributes to antibiotic resistance by self-medicating themselves without a valid prescription, which is pretty common.Self-medication with antibiotics is commonly hidden as a behavioral problem. This behavior includes leftover antibiotics, acquiring antibiotics without a prescription from the pharmacy, or obtaining antibiotics from a friend or family member. Such practices often stem from a lack of knowledge, misconceptions, and an overly optimistic belief that antibiotics are a cure for everything. Some demonstrate little caution, like not looking at expiry dates (Lim & Teh, 2012). Finally, according to McNulty et al. (2007), some believe antibiotics work against colds. As emphasized by the World Health Organization (WHO), a behavioral change regarding the irrational use of antibiotics is crucial; otherwise, any new addition to the antibiotic will become ineffective (Marzan et al., 2021).

Earlier studies have investigated people's practices and understanding of antibiotic use and resistance. A study by Nisabwe et al. (2020) among university students in Rwanda indicated that these students, who are part of tertiary institutions, exhibited high levels of awareness concerning antibiotic use. However, their attitude towards antibiotic use and resistance was somewhat affected by a limited understanding of how resistance develops and its long-term consequences. Similarly, a study conducted among young Italian doctors by DiGenarro et al. (2020), found that high levels of knowledge regarding antibiotic use and resistance were associated with the experience gained in treating diseases, particularly how patients with cases of antibiotic resistance responded to treatment.

A recent study revealed that while some students had a good understanding of antibiotic resistance, many others held significant misconceptions that could lead to the misuse of antibiotics. The study recommends changes in secondary school teaching methods in Oman to address these misconceptions (Ambusaidi et al., 2022). Additionally, Precha et al. (2024) emphasized that knowledge and attitudes toward antibiotic use and resistance should be conveyed in the curriculum for all university students. Such educational interventions could establish standards for the rational use of antibiotics and contribute to the long-term prevention and control of antibiotic-resistant bacteria. Therefore, these studies indicate a common trend of antibiotic usage accompanied by limited understanding and practices of their mechanism and the potential danger of antibiotic misuse, which can lead to resistance (Hassan et al., 2023).

Currently, most research focuses on the knowledge and attitudes of medical students and the general public regarding antibiotic use and resistance in other countries. However, there is a significant gap in understanding the specific perspectives and practices of senior high school students in the Philippines, who are increasingly exposed to information about antibiotics. Therefore, this study aims to evaluate the knowledge, awareness, and attitudes of Saint Mary's University Senior High School students concerning antibiotic use.

This study needed to be conducted because, according to the Saint Mary's University clinic, approximately 1,836 senior high students annually visit for consultation. Additionally, 15 students seek online consultations. One of the services provided by the clinic includes prescribing antibiotics. The school nurse explained that nurses are authorized to prescribe antibiotics for students who consult online. To ensure proper treatment and follow-up, the clinic follows specific protocols; however, detailed information about these protocols and adherence to instructions from medical staff was not fully discussed during the interview. It was also noted that there is currently no program implemented in the school to educate and raise awareness towards antibiotic use and the risk of antibiotic resistance. To end the interview, the school nurse advised students to adhere to the prescriptions and instructions provided by their physician for the appropriate use of antibiotics (G. Marubat, personal communication, November 29, 2024).

The researchers wanted to know if the level of knowledge, awareness, and attitude among respondents of the senior high school students have a positive direction that can be utilized to deal with the problem of antibiotic misuse or if the students are possibly at risk of developing antibiotic resistance. Therefore, this study analyzed using open-ended questions to assess the level of knowledge on antibiotic use and resistance because the anchor study data was insufficient to reveal misconceptions. After all, it only used closed-questions.

Accordingly, this study is important for understanding the knowledge and awareness of senior high school students regarding antibiotics. It evaluated students' attitudes toward antibiotic use to identify any gaps in knowledge, awareness, and attitude concerning this critical health issue. The study aimed to highlight the significance of thoughtful antibiotic use among senior high school students. By enhancing their knowledge, awareness, and attitudes toward antibiotics, this research can be a guideline of future policies on antibiotic use and resistance in the university clinic.

Additionally, it may help in developing effective strategies to combat the growing threat of antibiotic resistance globally. This improved knowledge might be an important effort to reduce misconceptions and misguided expectations contributing to inappropriate antibiotic use.

The scope of this study only focused on the level of knowledge, awareness, and attitude of Saint Mary's University Senior High School towards antibiotic use in both grades 11 and 12. The researchers only compared the level of knowledge, awareness, and attitude of Saint Mary's University Senior High School towards antibiotic use through the differences of strands and tracks, and based on sex.

Research Questions

This study aimed to assess the perceived level of knowledge, awareness, and attitude of Saint Mary's University Senior High School students towards antibiotic use. Specifically, the research seeks to answer the following questions:

1. What is the respondents' perceived level of knowledge about antibiotic use?
2. What is the respondents' perceived level of awareness towards using antibiotics?
3. What is the respondents' perceived level of attitude towards antibiotic use?
4. Is there a significant difference between the respondents' perceived level of knowledge, awareness, and attitude of antibiotic use when grouped according to:
    4.1. Sex; and
    4.2. Strand?
5. Is there a significant relationship between the respondents' perceived level of knowledge and awareness towards antibiotic use?
6. Is there a significant relationship between the respondents' perceived level of knowledge and attitude towards antibiotic use?
7. Is there a significant relationship between the respondents' perceived level of attitude and awareness towards antibiotic use?
8. What are the respondents' perceptions on the importance of using antibiotics properly?

Methodology

Research Design

This study employed both qualitative and quantitative methods. It is primarily a descriptive-comparative analysis, as it examines the levels of knowledge, awareness, and attitudes towards antibiotic use among Saint Mary's University Senior High School students, categorized by demographic profiles, strands, tracks, and sex. Additionally, it is descriptive- correlational, as it explores the correlation between students' perceived knowledge, awareness, and attitudes regarding antibiotics. The qualitative aspect is emphasized through a phenomenological research design that includes open-ended questions.

The study identified several issues, including antibiotic resistance, the ineffectiveness of older medications, and inappropriate prescription practices. It proposed intervention strategies, such as reducing over-prescription to combat antibiotic resistance. These interventions are implemented by disseminating research findings to the public through surveys and various media, with the intention of observing the future impact of these efforts.

Respondents

The respondents of this study were composed of 274 students; this sample size was calculated using Raosoft. The respondents are from STEM, HUMSS, ABM, ICT, HE, and AD strands of grades 11 and 12. Simple random sampling method was used to guarantee representation from various strands such as STEM, HUMSS, ABM, TVL-ICT, TVL-HE, and AD.

This study is limited to senior high school students at Saint Mary's University and was classified according to strand and sex. The respondents were distributed, with 158 females and 116 males represented across the six strands. The strand STEM consists of 168 respondents, HUMSS consists of 45 respondents, ABM consists of 22 respondents, and TVL- ICT consists of 14 respondents, while TVL-HE consists of 13 respondents and AD consists of 12 respondents. The purpose of the study is to gather insights into the perspectives and experiences of Saint Mary's University senior high school students regarding antibiotic use.

Table 1. Demographic Variable Table

Variables	*Groups*	*Frequency*	*Percentage*
Sex	Female	158	57.7%
	Male	116	42.3%
Total		274	100%
Strand	STEM	168	61.3%
	HUMSS	45	16.4%
	TVL-ICT	14	5.1%
	TVL-HE	13	4.7%
	ABM	22	8.0%
	AD	12	4.4%
Total		274	100%

Table 1 presents a summary of the demographic profile of the respondents, showcasing both frequency and percentage. Out of 274 participants in the study, over half are female, accounting for 57.7%, while 42.3% are male. Among these participants, 168 are STEM students (61.3%), 45 are HUMSS students (16.4%), 14 are TVL-ICT students (5.1%), 13 are TVL-HE students (4.7%), 22 are ABM students (8.0%), and 12 are AD students (4.4%).

Instrument

This study primarily employed a survey questionnaire as its data-gathering tool. Adapted and modified from various research studies on antibiotic use and resistance, the questionnaire drew inspiration from a notable study titled "A population-based survey on knowledge, attitude, and awareness of the general public on antibiotic use and resistance" by Effah et al. in 2020. This study concentrated on evaluating the public's level of knowledge, misconceptions, and overall attitude toward antibiotics.

Additionally, another research study that influenced the questionnaire was "Nursing Students' Knowledge and Awareness of Antibiotic Use, Resistance and Stewardship: A Descriptive Cross-Sectional Study" conducted by Rifano-Blanco et al. in 2019, which assessed general and specific knowledge and awareness. Moreover, the questionnaire was also adapted from the research entitled "Medical Students' Understanding, Attitudes, Awareness of Antibiotic Resistance" authored by Alsakran et al. in 2023, which evaluated knowledge, awareness, and attitude.

Finally, the questionnaire was adapted as well from the research titled "Antibiotic Resistance Awareness among Undergraduate Students in Quito, Ecuador" conducted by Ortega-Paredes et al. (2022). This questionnaire mainly focused on assessing knowledge and attitude. The adapted questionnaires were revised and changed into the perspective of the first-person point of view, but not all statements were adopted.

The survey was divided into three sections. The first section gathers essential information about the respondents, including their sex and optionally, their name. The second section features a Likert scale ranging from 1 to 4, with 1 being the lowest and 4 the highest. This section is subdivided into three parts: the respondents' level of knowledge regarding antibiotic use and resistance, their awareness of these issues, and their general attitudes and practices concerning the proper use of antibiotics. The third section comprises open-ended questions, which respondents are encouraged to answer honestly and clearly.

Table 2. *Result of Reliability Test for the Perceived Level of Knowledge towards Antibiotic Use*

Cronbach's Alpha	*N of Items*
.74	15

Table 2.2 presents the reliability test result for the perceived knowledge regarding antibiotic use. The table indicates a Cronbach's alpha of .74 across 15 items, confirming that the questionnaire of perceived level of knowledge about antibiotic use is reliable (as it exceeds 0.7).

Table 3. *Result of Reliability Test for the Perceived Level of Awareness towards Antibiotic Use*

Cronbach's Alpha	*N of Items*
.80	13

Table 2.3 presents the reliability test result for the perceived awareness regarding antibiotic use. The table indicates a Cronbach's alpha of .80 across 13 items, confirming that the questionnaire of perceived level of awareness towards antibiotic use is reliable (as it exceeds 0.7).

Table 4. *Result of Reliability Test for the Perceived Level of Attitude towards Antibiotic Use*

Cronbach's Alpha	*N of Items*
.70	15

Table 2.4 presents the reliability test result of the perceived attitude regarding antibiotic use. The table indicates Cronbach's alpha is equal to .70 across 15 items. Therefore, the questionnaire of perceived level of attitude about antibiotic use is reliable ($\alpha \geq 0.7$).

Procedure

The adapted questionnaire was modified by the researchers. The survey questionnaire has undergone content validation and checked by the researcher's adviser. Then, a written permit was forwarded to the principal of Saint Mary's Senior High School to ask permission for the researcher to distribute questionnaires inside the campus. Upon the grant of the request, the questionnaires were distributed to the respondents. The collected data was tabulated, analyzed, and interpreted by the researcher. Finally, after the interpretation, the results are reported.

Data Analysis

The demographic data of the respondents was analyzed through descriptive and inferential statistics. The respondents are classified as a group and described according to their profile.

Frequency count and percentage distribution were utilized to summarize the profile of the respondents.

Mean and Standard deviation were used to determine the level of knowledge, awareness, and attitude of the respondents toward antibiotic use.

The independent sample t-test was used to determine whether there is a significant difference in the senior high school students' level of knowledge, awareness, and attitude towards antibiotics regarding sex.

The researcher compared the level of knowledge, awareness, and attitude of the senior high school towards antibiotic use in terms of strand using One-Way ANOVA.

Pearson correlation was used to determine if there is a significant relationship between the perceived level of knowledge, awareness, and attitude of the students toward antibiotic use.

The open-ended question was provided and answered by the senior high school students to state the perception of the importance of using antibiotics properly. They answered this through the questionnaire that was distributed by the researcher. The individual responses were recorded and analyzed using thematic analysis.

Table 5. *Mean Range and its Qualitative Interpretation on the Level of Knowledge*

Mean Range	*Qualitative Interpretation on the level of knowledge*
1.00-1.49	Not Knowledgeable
1.50-2.49	Moderate Knowledgeable
2.50-3.49	Knowledgeable
3.50-4.00	Very Knowledgeable

Table 5 presents the mean range and its qualitative interpretation of the level of knowledge. Based on the analysis, the means interpreted as follows: not knowledgeable in the point range of 1.00-1.49, moderately knowledgeable in the point range of 1.50-2.49, knowledgeable in the point range of 2.50-3.49, and very knowledgeable in the point range of 3.50-4.00.

Table 6. *Mean Range and its qualitative Interpretation on the Level of Awareness*

Mean Range	*Qualitative Interpretation on the level of Awareness*
1.00-1.49	Not Aware
1.50-2.49	Slightly Aware
2.50-3.49	Aware
3.50-4.00	Highly Aware

Table 2.6 presents the mean range and its qualitative interpretation of the level of awareness. Based on the analysis, the means interpreted as follows: not aware in the point range of 1.00-1.49, slightly aware in the point range of 1.50-2.49, aware in the point range of 2.50-3.49 and highly ware in the point range of 3.50-4.00 and interpreted as highly aware.

Table 7. *Mean Range and its qualitative Interpretation on the level of attitude*

Mean Range	*Qualitative Interpretation On the level of Attitude*
1.00-1.49	Highly Negative
1.50-2.49	Negative
2.50-3.49	Positive
3.50-4.00	Highly Positive

Table 7 presents the mean range and its qualitative interpretation of the level of attitude. Based on the analysis, the means interpreted as follows: highly negative in the point range of 1.00-1.49, negative in the point range of 1.50-2.49, positive in the point range of 2.50-3.49, and highly positive in the point range of 3.50-4.00.

Results and Discussion

This section presents the results, discussion, and implications derived from the research conducted on the perceived levels of knowledge, awareness, and attitudes of Saint Mary's University Senior High School students regarding antibiotic use.

Table 8 displays the level of knowledge regarding antibiotic use. As can be seen, the respondents show overall knowledge, with a total mean score of 2.82. Although the respondents demonstrate adequate knowledge, there is still a general understanding of the respondents that needs to be addressed based on the student response to the statements that reveal gaps in their knowledge of the proper usage of antibiotics. The results of the survey about when and how to take antibiotics indicated that students are well-informed on the topic. The majority of students agreed that they should only stop taking antibiotics once they have completed the full course as directed, which

received the highest average score (M= 3.22). Additionally, most of the participants disagreed on discontinuing antibiotic courses when feeling better M=2.93, which shows that the respondents are responsible for taking antibiotics because even though they might feel better after a few days of treatment, they still ensure to finish the entire antibiotic regimen to complete the resolution of the infection.

Table 8. *Level of Knowledge towards Antibiotic Use*

Statements	*M*	*SD*	*QI*
1. I know that I can only stop taking antibiotics once I have taken all the antibiotics as directed.	3.22	0.76	Knowledgeable
2. I know that I can only stop taking antibiotics when I feel better.	2.93	0.87	Knowledgeable
3. I know that it is okay to use antibiotics that were given by a friend or family member, as long as they were used to treat the same illness.	2.51	0.89	Knowledgeable
4. I know that it is okay to buy the same antibiotics that I have been requested before to a doctor without a prescription.	2.28	0.97	Moderately Knowledgeable
5. I know that antibiotics often cause side effects such as diarrhea and headaches.	2.85	0.76	Knowledgeable
6. I know that fever can be treated by antibiotics.	2.80	0.84	Knowledgeable
7. I know that colds and flu can be treated by antibiotics.	2.89	0.84	Knowledgeable
8. I know that antibiotic resistance is an issue that could affect me or my family.	2.86	0.79	Knowledgeable
9. I know that antibiotic resistance is only a problem for people who take antibiotics regularly.	2.76	0.78	Knowledgeable
10. I know that the more antibiotics we use in society, the higher is the risk that resistance develops and spreads.	2.85	0.70	Knowledgeable
11. I know that resistance can spread from person to person.	2.62	0.82	Knowledgeable
12. I know that new antibiotics are usually better than old ones.	2.86	0.78	Knowledgeable
13. I know that bacteria can become resistant to antibiotics.	2.95	0.73	Knowledgeable
14. I know that antibiotics can kill good bacteria which are present in my body.	2.85	0.75	Knowledgeable
15. I know that antibiotics are used to treat viral infections.	3.04	0.75	Knowledgeable
Total	2.82	0.41	Knowledgeable

Legend: Knowledge: 1.00-1.49 = Not Knowledgeable; 1.50-2.49 = Moderately Knowledgeable; 2.50-3.49 = Knowledgeable; 3.50-4.00 =Very Knowledgeable; N – Population size; M – Mean score; SD – Standard Deviation; QI – Qualitative Interpretation

Moreover, concerning the use of antibiotics, the results indicated that most students disagreed with taking antibiotics prescribed by a friend or family member for the same illness (M=2.51). While believing that taking a new antibiotic is better than the old one (M=2.86), both results generate knowledge. However, when it comes to statement number 4, which received the lowest mean score, the students show moderate knowledge because the majority agreed to the negative statement about buying the same antibiotics that have been requested before by a doctor without a prescription (M= 2.28), this indicates that most of the respondents buy the old prescribed antibiotics rather than consulting the doctor.

Furthermore, results discovered that respondents are aware of antibiotic side effects, including diarrhea and headaches (M=2.85). On the other hand, the majority of the respondents disagree that fever caused by virus (M=2.80), colds and flu (M=2.89), and viral infection (M=3.04) can be treated by antibiotics, which generates good knowledge. Nevertheless, despite the majority disagreeing with this statement, some participants still believe that antibiotics can treat viral infections, as revealed in their responses to the open- ended question.

In terms of antibiotic resistance, the respondents demonstrate general knowledge that this issue could affect themselves and their families (M=2.86). It was also presented that most respondents disagreed with two statements: first, that antibiotic resistance is the sole issue for individuals who take antibiotics regularly (M=2.76); and second, that an increase in antibiotic usage in society leads to a higher risk of developing and spreading resistance (M=2.85). Lastly, the results indicated that the respondents recognize that antibiotic resistance can spread from person to person (M=2.62), that bacteria can develop resistance to antibiotics (M=2.95), and that antibiotics can eliminate good bacteria that are present in the body (M=2.85). Overall, these findings present that the respondents are knowledgeable that the development of resistance results from misuse and overuse of antibiotics.

The first results regarding taking antibiotics imply that the respondents know when to use and when to stop taking antibiotics. This also aligns with how they know where antibiotic medicine is used such as treating infection, particularly bacterial infection. However, although the majority are knowledgeable regarding which infection antibiotics can treat, there is still a need for them to be cautious since some of the respondents hold the misconception that antibiotics treat viral infections and may lead them to take antibiotics unnecessarily.

On the other hand, the result regarding accessibility indicates that some of the respondents are moderately knowledgeable that it is not okay to buy antibiotics without a prescription. Thus, without having enough knowledge of this situation, people can misuse antibiotics which may lead them to develop antibiotic resistance and experience further side effects. Therefore, it is important to be knowledgeable regarding this because it can help people make the right decision in properly purchasing antibiotics.

Lastly, the result regarding antibiotic's effects, such as developing antibiotic resistance implies that the respondents are knowledgeable about the risks that can be acquired when antibiotics are misused and that antibiotic resistance does not only affect people who take

antibiotics regularly but also those who take it improperly. Being knowledgeable can be essential as it can help people to be cautious in taking antibiotics and reduce the possibility of developing its side effects.

The results align with the findings of Mboya et al. (2020), where 89 participants (58.6%) indicated that antibiotics should be stopped after completing the prescribed dosage. However, more than a quarter of participants held a different view. In contrast, 58 participants (38.2%) believed that "antibiotics should be stopped when they felt better," which contradicts the findings of this study.

In terms of accessibility and availability of antibiotics, the study by Mboya et al. (2020) aligns with this research but presents conflicting results. In their study, 50.7% of respondents (77 participants) believed they should use antibiotics obtained from friends or family if they had previously taken them for the same or a similar illness. Similarly, Alsakran et al. (2023) found differing results, showing the lowest confidence in new antibiotics being better than old ones, with a mean of 0.28, a standard deviation of 0.499, and an estimated knowledge rate of 28%. Furthermore, Mboya et al. (2020) contradict this study's findings by revealing that 65.1% of participants (95 individuals) felt they should request a specific antibiotic if they had used it before for similar symptoms or diseases.

Lastly, on the topic of antibiotic resistance, the findings of Carter et al. (2016), with 92% agreeing that inappropriate antibiotic use contributes to resistance. Similarly, Marzan et al. (2020) found that 82.0% of students reported that antibiotic overuse could lead to the emergence of resistance.

The overwhelming agreement among participants highlights the urgent need for educational initiatives to address inappropriate antibiotic use. The findings suggest that increased awareness and responsible prescription practices are crucial for mitigating antibiotic resistance. These results underscore the importance of integrating antibiotic stewardship programs in healthcare settings and academic curricula to avert the development of resistant strains.

Table 9. *Level of Awareness towards Antibiotic Use*

Statements	*M*	*SD*	*QI*
1. I am aware and heard about antibiotic resistance.	2.95	0.81	Aware
2. I am aware that a wrong use of antibiotics can lead to a loss of sensitivity of an antibiotic to a specific pathogen.	3.31	0.65	Aware
3. I am aware that antibiotics can cause side effects like allergic reactions.	3.26	0.69	Aware
4. I am aware that if symptoms improve before the full course of antibiotic, I can stop taking it.	2.95	0.82	Aware
5. I am aware that antibiotics are useful for bacterial infections.	3.16	0.67	Aware
6. I am aware that antibiotics are indicated to reduce any kind of pain that was caused by infection.	3.10	0.73	Aware
7. I am aware that antibiotics can cause secondary infections after killing good bacteria present in my organism.	2.93	0.74	Aware
8. I am aware that colds and coughs should always be treated with antibiotics as I will recover more quickly.	2.86	0.81	Aware
9. I am aware that antibiotics should always be prescribed as preventive measures to fight against future infections.	3.08	0.75	Aware
10. I am aware that inappropriate use of antibiotics causes antibiotic resistance.	3.09	0.77	Aware
11. I am aware that my poor infection control practices can cause spread of antibiotic resistance.	2.99	0.75	Aware
12. I am aware that antibiotics are overused nationally and internationally in healthcare.	3.05	0.73	Aware
13. I am aware that appropriate use of antibiotics causes antibiotic resistance.	2.96	0.83	Aware
Total	3.05	0.43	Aware

Legend: Knowledge: 1.00-1.49 = Not Aware; 1.50-2.49 = Slightly Aware; 2.50-3.49 = Aware; 3.50-4.00 =Highly Aware; N – Population size; M – Mean score; SD – Standard Deviation; QI– Qualitative Interpretation

The results concerning awareness of antibiotic use are summarized in Table 9. The findings reveal that respondents have an overall awareness level categorized as "Aware," with a total mean score of 3.05. The respondents demonstrated a strong understanding in several areas, particularly regarding the consequences of improper antibiotic use. According to the table, the statement highlighting that improper use of antibiotics can lead to reduced sensitivity to specific pathogens received the highest mean score of 3.31, indicating that students are knowledgeable about this critical issue. Conversely, the statement suggesting that antibiotics can help achieve faster recovery from colds and coughs received the lowest agreement, with a mean score of 2.86.

The data on antibiotic resistance and misuse show that respondents possess an understanding of the topic. The mean score for Statement 1, to assess awareness of antibiotic resistance, is 2.95, indicating that respondents are aware of the issue. This is supported further by Statement 10, where respondents agree, with a mean score of 3.09, that incorrect antibiotic usage leads to resistance, suggesting an understanding of the effects. Furthermore, Statement 12, with a mean of 3.05, shows respondents' awareness of antibiotic overuse both nationally and internationally, indicating knowledge of the global context. Though their response is contrary to Statement 13, which relates to the understanding that appropriate use of antibiotics can also contribute to resistance, the mean score of 2.96 indicates awareness which suggests that respondents believe in this statement.

Furthermore, the respondents show some misconceptions. Statement 4, which suggests that antibiotics can be stopped once symptoms improve before completing the full course, has a mean score of 2.95, indicating a common misunderstanding among participants. In Statement 9, where antibiotics are stated as being prescribed as preventive measures against future infections, the mean score of 3.08

shows awareness, suggesting some respondents may believe in this practice, even though it is not always recommended.

Regarding side effects and consequences of antibiotic use, the data shows a good level of awareness. The average mean score for Statement 3, which discusses the possibility of antibiotics causing side effects such as allergic reactions is 3.26, suggesting understanding of these risks. Similarly, Statement 7 which was about antibiotics that can cause secondary infections by killing good bacteria, has a mean score of 2.93, indicating awareness with the statement.

In terms of general knowledge about the role of antibiotics, Statement 5 reveals a mean score of 3.16, indicating that respondents have a clear understanding that antibiotics are intended for bacterial infections. However, Statement 6 has a mean score of 3.10, suggesting a misconception, as respondents agree that antibiotics can be used to reduce pain caused by infection, which is not their primary function.

Regarding personal practices and their effects on antibiotic resistance, Statement 11 has a mean score of 2.99, which reflects an understanding that inadequate infection control practices can lead to the increase of resistance.

The findings imply that recognizing the link between inappropriate antibiotic use and resistance shows a strong understanding of the consequences of misuse. This also indicates that respondents have a foundational awareness of antibiotic resistance and understand its potential impact on public health. Moreover, a high level of awareness about the consequences of improper antibiotic use suggests that students are likely to engage in discussions about responsible practices. However, the misconception that taking antibiotics can be stopped once symptoms improve reveals a significant gap in understanding. This misunderstanding can contribute to increased antibiotic resistance, as incomplete courses may allow bacteria to adapt and survive, further complicating future treatment options.

As to the usefulness of antibiotics for bacterial infections, the acknowledgment that antibiotics are effective for bacterial infections indicates a solid grasp of their intended use. However, the recognition that antibiotics can help reduce pain from infections and the belief that antibiotics hasten recovery from colds and coughs reveals a significant misconception with far-reaching consequences.

The respondents' understanding that antibiotics can cause secondary infections indicates a nuanced awareness of their broader effects. Furthermore, awareness that antibiotics should not be used preventively highlights a growing understanding of their proper application, leading to more responsible behaviors and reduced misuse. Lastly, recognizing the link between poor infection control and antibiotic resistance shows students are grasping the broader public health context.

The findings are consistent with a study by Carter et al. (2016), which indicated that most participants agree that improper use of antibiotics contributes to antibiotic resistance. This study shows that while people recognize that antibiotic misuse contributes to resistance, many do not consider it a major issue. To enhance awareness and understanding of antibiotic resistance, the study suggests specific learning goals, such as distinguishing between the immune response and bacterial adaptation.

Furthermore, the misunderstanding among the respondents about stopping antibiotics once their symptoms improve is in line with the findings of McNulty et al. (2015), who discovered that 40% of patients believed they could discontinue antibiotics when they started feeling better. This suggests a persistent misconception about antibiotic use. It implies that a significant portion of the population still believes it's acceptable to stop taking antibiotics once symptoms improve, highlighting the need for better public education on the importance of completing prescribed courses.

As to the belief that antibiotics can hasten recovery from viral infections such as colds and coughs, a study by the World Health Organization (2019), found that up to 50% of patients expect antibiotics for viral infections, which can lead to inappropriate prescriptions. This suggests a significant misunderstanding remains about antibiotics' effectiveness against viral infections. With up to 50% of patients expecting antibiotics for colds and coughs, healthcare providers may feel pressured to prescribe them inappropriately, contributing to antibiotic resistance. This implies that educational campaigns must emphasize the distinction between bacterial and viral infections to reduce unnecessary antibiotic use.

The respondents' understanding that antibiotics can cause secondary infections is supported by Laxminarayan et al. (2013), which found that antibiotic misuse can lead to Clostridium difficile infections, a serious complication that affects approximately 500,000 Americans annually. Additionally, the awareness that antibiotics should not be used preventively is consistent with a survey conducted by the European Centre for Disease Prevention and Control (2020), which revealed that only 30% of respondents understood that antibiotics are ineffective for preventing infections. This implies that while there's some awareness about the misuse of antibiotics, a significant gap remains. The fact that only 30% recognize antibiotics are ineffective for prevention highlights a crucial need for more targeted education on their proper use.

Table 10 illustrates the level of attitude toward antibiotic use. The data shows the respondents acquire a positive overall attitude toward antibiotic use, with a total mean score of 2.99. Respondents demonstrate strong agreement with several statements, particularly in adhering to medical prescriptions. Based on the table, the statements about using antibiotics when prescribed by a doctor (M = 3.46) and authorized nurse (M=3.00) generate a positive attitude, showing the respondents' dedication to following medical recommendations or the doctor's advice. On the contrary, the statement "I buy antibiotics from a pharmacy without prescription" shows a negative attitude and has the lowest mean score (M = 2.19) among the statements, suggesting that respondents are inclined to partake in this dangerous activity.

Table 10. *Level of Attitude towards Antibiotic Use*

Statements	*M*	*SD*	*QI*
1. I only use antibiotics when it was prescribed by a doctor.	3.46	0.69	Positive
2. I only use antibiotics when it was prescribed by a nurse.	3.00	0.83	Positive
3. I buy antibiotics from a pharmacy without a prescription.	2.19	1.01	Negative
4. I always use a doctor's prescription to purchase antibiotics from pharmacies.	3.31	0.78	Positive
5. I should not keep antibiotics and use them later for other illnesses.	2.84	0.92	Positive
6. I need to take responsibility for using antibiotics responsibly.	3.41	0.66	Positive
7. I am worried about the impact that antibiotic resistance will have on my health and my family.	3.34	0.64	Positive
8. I am not at risk of getting an antibiotic-resistant infection, as long as I take my antibiotics correctly.	3.18	0.70	Positive
9. I usually use hand hygiene (hand washing or alcohol hand rub) to reduce the risk of spreading common infections.	3.39	0.59	Positive
10. If I get an infection, I often wait and see, rest, and take it easy, and see if the infection goes away on its own before taking antibiotic.	3.11	0.77	Positive
11. I usually take a self-prescribed antibiotic if I have a cold or sore throat.	2.66	0.92	Positive
12. I usually take a self-prescribed antibiotic for high body temperature (fever).	2.68	0.92	Positive
13. I do think that hand hygiene will reduce the chance of infection transmission.	3.27	0.77	Positive
14. I have ever started an antibiotic therapy after a simple doctor call, without a proper medical examination.	2.55	0.95	Positive
15. I use leftover antibiotics when I have a cold, sore throat, or flu without consulting my doctor.	2.41	1.04	Negative
Total	2.99	0.37	Positive

Legend: Knowledge: 1.00-1.49 = Highly Negative; 1.50-2.49 = Negative; 2.50-3.49 = Positive; 3.50-4.00 =Highly Positive; N – Population size; M – Mean score; SD – Standard Deviation; QI– Qualitative Interpretation

Table 10 illustrates the level of attitude toward antibiotic use. The data shows the respondents acquire a positive overall attitude toward antibiotic use, with a total mean score of 2.99. Respondents demonstrate strong agreement with several statements, particularly in adhering to medical prescriptions. Based on the table, the statements about using antibiotics when prescribed by a doctor (M = 3.46) and authorized nurse (M=3.00) generate a positive attitude, showing the respondents' dedication to following medical recommendations or the doctor's advice. On the contrary, the statement "I buy antibiotics from a pharmacy without prescription" shows a negative attitude and has the lowest mean score (M = 2.19) among the statements, suggesting that respondents are inclined to partake in this dangerous activity.

Furthermore, the findings about attitudes regarding antibiotic responsibility indicate that participants acknowledge the significance of their role. Respondents appear to feel responsible for using antibiotics, as shown by the mean score of 3.41 for the statement about showing responsibility for using antibiotics responsibly. Another statement that shows the respondents have a positive attitude towards using antibiotics responsibly is that most agree that they should not keep and use antibiotics for other illnesses (M=2.84). The idea of responsible antibiotic use was reinforced by the respondent's agreement with the statement about always using the doctor's prescription to purchase antibiotics from pharmacies, with a mean score of 3.31. Additionally, they are aware of the problem as seen by the statement "I am worried about the impact that antibiotic resistance will have on my health and my family" (M = 3.34) and believe that they will not be at risk of getting an antibiotic-resistance infection, as long as they take the antibiotics correctly (M=318), which expresses concern about the negative effects of incorrect use.

Despite the overall favorable attitude, there are some misconceptions. The statement about usually taking self-prescribed antibiotics if having a cold or sore (M=2.66) and fever (M=2.68) is under the qualitative interpretation of positive but still indicates that some respondents consider this practice appropriate. Similarly, in the statement about using leftover antibiotics when having a cold, sore throat, or flu without consulting my doctor (M= 2.41). Moreover, another statement shows that the majority of them disagreed with "If I get an infection, I often wait and see, rest and take it easy, and see if the infection goes away on its own before taking antibiotics" and most of the respondents preferably go to a doctor rather than continue to do these practices and their symptoms may get worse (M=3.11). The statistics indicate that some of the respondents engage in this incorrect behavior.

Data on infection control awareness indicates a proper degree of comprehension. With a mean score of 3.39, the statement "I usually use hand hygiene (hand washing or alcohol hand rub) to reduce the risk of spreading common infections" was found to be positively viewed in terms of infection control procedures. Likewise, a strong trust in the efficacy of hand hygiene is reflected in the statement, "I do think that hand hygiene will reduce the chance of infection transmission" (M = 3.27).

The findings imply that the respondents recognize the importance of only using prescribed medicines when it comes to the proper usage of antibiotics. However, some dismissed the fact that consuming leftover medicine without consultations from the doctor is vile, as they did not treat the risks as they lack of broader perspective of the possible effects of risks, such as antibiotic resistance to be a significant problem, which was similar to the study conducted by Carter et al. (2016).

On the other hand, the findings from the results of statement 9, imply that the respondents engaged in routine practice to take preventive measures against the dissemination of bacteria, which demonstrates that respondents have knowledgeable infection control that bacteria can also transfer through physical contact.

The willingness of some respondents to risk taking leftover antibiotics to treat their illness is concerning, especially when treating colds, as colds are caused by viral infections. Although antibiotics can be prescribed if secondary infections occur as a complication after the weakening of the immunity system caused by viral infections, they are discouraged from use as a remedy to treat colds as they can worsen their symptoms by exposing themselves to potential risks of allergic reactions, demanding treatment of future bacterial infections.

Regarding adherence to professional medical advice, there is a clear inclination among respondents to use antibiotics only when prescribed by healthcare providers. This reflects a positive attitude towards following medical guidance, which is essential for ensuring effective treatment and minimizing the risk of misuse.

In terms of risk perception, many individuals express confidence in their ability to use antibiotics responsibly, suggesting a belief that they can avoid antibiotic resistance through correct usage. While this confidence is encouraging, it may also reveal a misunderstanding of the complexities surrounding antibiotic resistance, highlighting the need for enhanced education on this critical public health issue.

Lastly, there is a noticeable contrast in attitudes towards the timing and necessity of antibiotic use. Some respondents demonstrate a cautious approach, preferring to allow their bodies to recover naturally before resorting to antibiotics, while others exhibit a tendency towards self-medication. This duality in attitudes suggests a need for clearer communication regarding when antibiotic treatment is appropriate and the risks associated with self- prescribing.

Regarding adherence to medical prescriptions, the study by Geta K. and Kibret M. (2022) contradicts the finding of this study, showing that 51.7% of respondents (120 individuals) incorrectly believe that antibiotics should used only when prescribed by a doctor or nurse. In contrast, the study by Chandran D. and Manickavasagam P. (2022) aligns with this research results, indicating that most pharmacists observed that most patients requesting medication without a prescription were asking for drugs to treat specific symptoms (n = 9, 60%).

The study conducted by Geta K. and Kibret M. (2022) revealed that 55.6% of respondents (129 individuals) agree that everyone should take responsibility for the use of antibiotics. Additionally, the findings were consistent regarding the use of leftover antibiotics, with 54.3% of respondents strongly agreeing that people should not keep antibiotics for later use in treating other illnesses.

Furthermore, the study conducted by Alnasser et al. (2024) regarding the purchasing of antibiotics with a prescription aligns with this research. Their findings indicate that 91.33% of respondents disagreed with the notion that antibiotics should be accessible without a prescription. Additionally, concerning the impact of antibiotics, the results are consistent with the study by Geta K. and Kibret M. (2022). In their research, 49.6% of respondents expressed concern about the effects of antibiotic resistance on their health and their families. Lastly, regarding the perception of risk associated with antibiotic resistance, the findings echoed those of Geta K. and Kibret M. (2022), as 47.4% of respondents believed they were not at risk of developing antibiotic resistance, provided that antibiotics are taken correctly.

The findings indicate that the behavior of respondents contradicts the study by Zaidi et al. (2020), which revealed that the majority agreed with the statement, "When I get a cold, I will take antibiotics to help me get better more quickly." Conversely, there is a finding that aligns with this study regarding antibiotic usage; most respondents provided the correct answer to the statement, "Antibiotics are used to stop fever." The discussion in Zaidi et al.'s study highlighted a lack of knowledge about antibiotics and other commonly used medications. Additionally, the results concerning the use of leftover antibiotics align with the findings of Alsakran et al. (2023). Their research included the statement, "Do you use leftover antibiotics when you have a cold, sore throat, or flu without consulting your doctor?" which indicated that medical students demonstrated a high level of agreement with this statement. However, this contrasts with the study by Eiffah et al. (2020), which found that 9.7% (251 out of 632) of respondents believed in a "wait and see" approach when faced with infections, opting to rest without taking any medication.

In the context of infection control procedures, the study by Lalithabai et al. (2022) highlights the significance of antibiotics and emphasizes that effective handwashing is the most crucial method for preventing infections caused by microorganisms. This practice received the highest rating in the study and attained a score of 97.1%.

Overall, the findings indicate that although there is a mostly favorable attitude toward responsible antibiotic use, substantial gaps in comprehension and practice persist, leading to antibiotic abuse. This highlights the need for focused measures, such as public education and clearer instructions from healthcare providers, to address misconceptions and reduce inappropriate practices. Furthermore, the findings imply that prioritizing antibiotic stewardship in community education and clinical settings is essential to prevent the emergence and spread of antibiotic-resistant bacteria.

Table 11 illustrates the significant differences in the perceived level of knowledge about antibiotic use when grouped by sex. The results indicate that female respondents have a mean score of 2.76, reflecting a level of knowledge that is qualitatively interpreted as knowledgeable. Similarly, male respondents have a mean score of 2.90, which indicates knowledgeable. However, the difference in knowledge levels between the sexes is not statistically significant (Sig. = .631). Therefore, there is no significant difference in the level of knowledge regarding antibiotic use based on sex.

This indicates that both female and male respondents gained similar knowledge about antibiotic use, suggesting that gender does not significantly influence an individual's level of understanding. This finding supports the notion that the study's results are consistent

across both sexes.

Table 11. *Significant Difference in Perceived Level of Knowledge towards Antibiotic Use According to Sex*

Variable	*Sex*	*N*	*M*	*SD*	*QI*	*t*	*df*	*Sig.*
Level of Knowledge	Female	158	2.76	.41	Knowledgeable	-2.86	272	0.631
	Male	116	2.90	.40	Knowledgeable			

Legend: Level of Knowledge: 1.00-1.49 = Not Knowledgeable; 1.50-2.49 = Moderate Knowledgeable; 2.50-3.49 = Knowledgeable; 3.50-4.00 = Very Knowledgeable (p<0.05)
N – Population size; M – Mean score; SD – Standard Deviation; QI – Qualitative Interpretation; F – f-statistics t – t-value; df – degree of freedom; Sig – Significant Difference

The results contradict the study of Akande-Sholabi et al. (2021), which indicates that females were more knowledgeable about self-medication than males. This is possible because both female and male respondents were educated and acquired information about the proper use of antibiotics. The school could consider introducing educational programs on responsible antibiotic use to ensure that students will continue to be informed and knowledgeable about the responsible use of antibiotics.

Table 12. *Significant Difference in Perceived Level of Awareness towards Antibiotic Use According to Sex*

Variable	*Sex*	*N*	*M*	*SD*	*QI*	*t*	*df*	*Sig.*
Level of Awareness	Female	158	3.05	.43	Aware	0.07	272	0.953
	Male	116	3.05	.44	Aware			

Legend: Level of Awareness: 1.00-1.49 = Not Aware; 1.50-2.49 = Slightly Aware; 2.50-3.49 = Aware; 3.50-4.00= Highly Aware (p<0.05)
N – Population size; M – Mean score; SD – Standard Deviation; QI – Qualitative Interpretation; F – f-statistics t – t-value; df – degree of freedom; Sig – Significant Difference

Table 12 presents the result of the significant difference in the perceived level of awareness towards antibiotic use when grouped according to sex. As shown in the table, both female and male respondents show awareness as a qualitative interpretation with an equal mean score of 3.05. The results show that both sexes possess the same level of awareness concerning antibiotic usage (Sig. =0.958). Consequently, there is no significant difference in the level of awareness towards antibiotic use when grouped according to sex.

This implies that both female and male respondents have the same level of awareness towards antibiotic use, suggesting that sex does not have a significant role in influencing an individual's level of awareness.

Both female and male respondents demonstrate a proper understanding of antibiotic use. This finding contradicts the study by Tangcharoensathien et al. (2021), which indicated that female respondents were more likely to be aware of appropriate antibiotic use and antimicrobial resistance (AMR). One possible explanation for the discrepancy is that societal gender roles and perceptions regarding the responsible use of antibiotics have become more similar over time. Although both genders exhibit comparable levels of awareness, there is still a pressing need to implement programs such as awareness campaigns and discussion activities. These initiatives would not only enhance their understanding but also encourage more responsible usage of antibiotics.

Table 13. *Significant Difference in Perceived Level of Attitude towards Antibiotic Use According to Sex*

Variable	*Sex*	*N*	*M*	*SD*	*QI*	*t*	*df*	*Sig.*
Level of Attitude	Female	158	2.95	.35	Positive	-2.08	272	0.083
	Male	116	3.04	.39	Positive	-2.05		

Legend: Level of Attitudes: 1.00-1.49 = Highly Negative; 1.50-2.49 = Negative; 2.50-3.49 = Positive; 3.50-4.00 = Highly Positive (p<0.05)
N – Population size; M – Mean score; SD – Standard Deviation; QI – Qualitative Interpretation; F – f-statistics t – t-value; df – degree of freedom; Sig – Significant Difference

Table 13 presents the results regarding the perceived attitudes toward antibiotic use based on sex. The data indicate that female respondents demonstrated a positive attitude, reflected by a mean score of 2.95. In contrast, male respondents also exhibited a positive attitude, with a slightly higher mean score of 3.04, which is 0.09 points greater than that of females. The findings suggest that both sexes hold similar attitudes toward antibiotic use, as indicated by a significance level (Sig.) of 0.083. Therefore, there is no significant difference in attitudes toward antibiotic use when comparing the two groups based on sex.

This implies that both female and male respondents exhibit similar attitudes toward antibiotic use, indicating that sex does not significantly influence an individual's perspective on the matter. Such findings suggest that the factors shaping opinions on antibiotic use are likely more complex and influenced by other variables, such as education, awareness, or personal experiences, rather than simply the individual's sex. This uniformity in attitude across genders highlights the importance of focusing on broader educational and awareness campaigns to address misconceptions or enhance understanding about antibiotic use and resistance.

Although both females and males generally have a positive attitude towards antibiotic use, there is a noticeable difference in the mean score. This finding contradicts the study of Pogurschi et al. (2022), which indicates that females tend to have inappropriate attitudes regarding antibiotic use compared to males. To address these findings, various approaches can be implemented for both sexes.

These include sending reminder messages before prescriptions are given, comparing antibiotic prescription rates with professional peers, and improving communication skills to manage patients' demands for antibiotics.

Table 14. *Significant Difference in Perceived Level of Knowledge towards Antibiotic Use According to Strand*

Variable	*Strand*	*N*	*M*	*SD*	*QI*	*F*	*df*	*Sig.*
Level of Knowledge	STEM	168	2.82	.45	Knowledgeable	1.02	5	0.405
	HUMSS	45	2.75	.36	Knowledgeable			
	TVL-ICT	14	3.00	.39	Knowledgeable			
	TVL-HE	13	2.90	.24	Knowledgeable			
	ABM	22	2.77	.35	Knowledgeable			
	AD	12	2.87	.30	Knowledgeable			

Legend: Knowledge: 1.00-1.49 = Not Knowledgeable; 1.50-2.49 = Moderate Knowledgeable; 2.50-3.49 = Knowledgeable; 3.50-4.00 = Very Knowledgeable
N – Population size; M – Mean score; SD – Standard Deviation; QI – Qualitative Interpretation; F – f-statistics t – t-value; df – degree of freedom; Sig – Significant Difference

The data in table 14 shows the significant difference in perceived level of knowledge towards antibiotic use when categorized by strand. As presented in the table, the strand Science, Technology, Engineering, and Mathematics (STEM) respondents showed knowledgeable qualitative interpretation with a total mean score of 2.82, as indicated in the table. Followed by the Humanities and Social Science (HUMSS) strand with a total mean score of 2.75 which is also under the knowledgeable as the qualitative interpretation. Both Technical-Vocational-Livelihood-Information and Communication Technology (TVL-ICT) and Technical-Vocational-Livelihood-Home Economics (TVL-HE) showed knowledgeable qualitative interpretation, with a mean score of 3.00 and 2.90, respectively. The Accountancy, Business, and Management (ABM) strand had a slightly lower mean score of 2.77, also showed a knowledgeable qualitative interpretation, while the Arts and Design (AD) strand scored 2.87, maintaining the same qualitative interpretation.

The data implies that all strands are considered knowledgeable and show no significant difference in using antibiotics. In other words, when it comes to the academic strand, it does not influence an individual's knowledge of using antibiotics. Therefore, the students believe they understand antibiotics regardless of their chosen path. These findings could suggest that the knowledge of a person towards antibiotic use is more influenced by other factors, such as culture, technology, and individual experiences.

The study by Jairoun et al. (2019) investigated the knowledge, attitude, and practices of antibiotic use among university students (medical and non-medical students). Regarding the belief in the usage of antibiotics, medical students generally knew far more than non- medical students ($p = 0.0001$, $p = 0.000$, and $p = 0.002$), showing a contradiction in the findings of this study. Although medical and non-medical college students show significant differences in understanding the usage of antibiotics regarding academic strands, there are no significant differences. Consequently, all strands are considered knowledgeable, but enhancing the existing educational quality on the proper use of antibiotics is a must. Implementing workshops that not only engage the students but also help them understand the negative consequences of antibiotic misuse can strengthen their ability to apply what they've learned, ensuring that students will not only retain the information but also enable them to develop how to make wise decisions on using antibiotics responsibly.

Table 15. *Significant Difference in Perceived Level of Awareness towards Antibiotic Use According to Strand*

Variable	*Strand*	*N*	*M*	*SD*	*QI*	*F*	*df*	*Sig.*
Level of Awareness	STEM	168	3.08	.46	Aware	.85	5	0.514
	HUMSS	45	3.04	.37	Aware			
	TVL-ICT	14	3.07	.26	Aware			
	TVL-HE	13	3.04	.49	Aware			
	ABM	22	2.88	.43	Aware			
	AD	12	3.04	.45	Aware			

Legend: Awareness: 1.00-1.49 = Not Aware; 1.50-2.49 = Slightly Aware; 2.50-3.49 = Aware; 3.50-4.00 = Highly Aware
N – Population size; M – Mean score; SD – Standard Deviation; QI – Qualitative Interpretation; F – f-statistics t – t-value; df – degree of freedom; Sig – Significant Difference

The significant difference in the perceived level of awareness about antibiotic use according to strand is shown in table 15. The strand of Science, Technology, Engineering, and Mathematics (STEM) students had a mean score of 3.08, which shows a qualitative interpretation of "aware". The Humanities and Social Sciences (HUMSS) students had a mean score of 3.04, indicating a qualitative interpretation of "aware". Technical-Vocational- Livelihood- Information and Communications Technology (TVL-ICT) students had a mean score of 3.07, while Technical-Vocational-Livelihood- Home Economics (TVL-HE) had a mean score of 3.04, both indicating the qualitative interpretation of "aware." Finally, the Arts and Design (AD) students also had a mean score of 3.04, reflecting "aware" as the qualitative interpretation. Accountant and Business Management (ABM) students, on the other hand, had a slightly lower mean score of 2.88, which still corresponds to the qualitative interpretation of "aware."

The outcome implies that despite pursuing different strands and tracks, there are no noticeable differences in the level of awareness. The similarities of awareness regarding antibiotic use from different strands and tracks suggest that further research must be conducted on antibiotic use for more reliable results and sources to support the findings about the differences in awareness towards antibiotic use.

The findings of this study contradict the research conducted by Kanneppady et al. (2019) regarding the consumption of antibiotics without a prescription among students in both preclinical and clinical phases. Specifically, it was observed that clinical-phase students

displayed a heightened awareness of antibiotic over-the-counter consumption compared to their preclinical counterparts (p = 0.008). Despite this contradiction, the current study emphasizes the necessity for medical students to possess a comprehensive understanding of antibiotic resistance and its fundamental mechanisms to mitigate the misuse of antibiotics. While students across different academic strands exhibited comparable levels of awareness, there is a pressing need to implement online educational initiatives aimed at enhancing awareness and understanding of antibiotic resistance, as well as promoting the appropriate use of antibiotics in collaboration with healthcare professionals. This approach is essential for improving the overall awareness of the participants involved.

Table 16. *Significant Difference in Perceived Level of Attitude towards Antibiotic Use According to Strand*

Variable	*Strand*	*N*	*M*	*SD*	*QI*	*F*	*df*	*Sig.*
Level of Attitude	STEM	168	3.00	.39	Positive	1.25	5	0.285
	HUMSS	45	2.99	.31	Positive			
	TVL-ICT	14	3.10	.26	Positive			
	TVL-HE	13	2.90	.36	Positive			
	ABM	22	2.84	.33	Positive			
	AD	12	2.93	.27	Positive			

Legend: Attitude: 1.00-1.49 = Highly Negative; 1.50-2.49 = Negative; 2.50-3.49 = Positive; 3.50-4.00 = Highly Positive
N – Population size; M – Mean score; SD – Standard Deviation; QI – Qualitative Interpretation; F – f-statistics t – t-value; df – degree of freedom; Sig – Significant Difference

The significant difference in the perceived level of attitude toward antibiotic use when grouped by strand is presented in Table 16. The Technical-Vocational-Livelihood- Information, Communication, and Technology (TVL-ICT) strand had the highest mean score of 3.90, indicating a positive attitude. In contrast, the Accountancy, Business, and Management (ABM) strand had the lowest mean score of 2.84, still reflecting an "agree" attitude. The results show no significant difference (0.285) in the perceived level of attitude toward antibiotic use when grouped by strand. The results show no significant difference (0.285) in the perceived level of attitude toward antibiotic use when grouped by strand.

The data suggests that regardless of the strand of the respondents, there is no noticeable difference in their attitudes towards the use of antibiotics. In other words, whether a person is studying science, humanities, business, or any other field does not seem to influence their opinions on how antibiotics should be used. This finding could suggest that attitudes towards antibiotic use are more influenced by factors like personal experiences, cultural beliefs, or education outside of their specific academic field.

The results of this study align with the study of Jairoun et al. (2019), who examined medical and non-medical students' attitudes toward the use of antibiotics. Medical students generally had much better attitudes toward antibiotic use compared to non-medical students (p = 0.0001, p = 0.000, and p = 0.002). This may suggest that medical students, in general, have better attitudes toward antibiotic use, mainly due to their specializations. These findings emphasize the need for further research on antibiotic use across different specializations and strands.

Table 17. *Significant Correlation between the Perceived Level of Knowledge and Awareness towards Antibiotic Use*

	Pearson's r	*p-value*	*QD*
Knowledge — Awareness	.539	.000	High Positive Correlation

Legend: +0.80–+0.99 – Very High Correlation | +0.60–+0.79 – Moderately High Correlation | +0.40–+0.59 – High Correlation | +0.20–+0.39 – Moderately Low Correlation | +0.01–+0.19 – Very Low Correlation
Not Significant (p > 0.05)

Table 3.17 presents the significant relationship between the perceived level of knowledge and awareness towards antibiotic use. As seen, there is a high positive correlation (r = .539) between perceived level knowledge and awareness of antibiotic use. The Pearson correlation results indicate a significant relationship between the two variables.

The results suggest a high positive correlation between the knowledge of antibiotic use and awareness. Thus, respondents who are most likely to be knowledgeable about antibiotic use are also critically aware. Conversely, if the respondents have low knowledge, then they are not aware of the proper way of using antibiotics. Given overall results of the study, the respondents are knowledgeable and aware on the use of antibiotics. However, educational interventions are still needed to aim at increasing knowledge about antibiotics that could significantly enhance their awareness and proper usage, potentially reducing misuse and antibiotic resistance.

The findings of this study align with those of Khan et al. (2022), indicating a significant relationship between the level of knowledge and awareness of antibiotic use and various demographic factors. Specifically, the study found a positive association between education level, age, occupation, and family income with improved knowledge and awareness about antibiotics and antibiotic resistance (ABR). This study implies that targeted educational programs considering these demographic factors could be highly effective in enhancing knowledge and awareness about antibiotics and ABR, ultimately contributing to better public health outcomes. Likewise, the results of Tangcharoensathien et al. (2019) contradict the study where knowledge about antibiotic use and AMR awareness was still low among

respondents. They propose the following to improve the respondent's knowledge and awareness by assessing, monitoring, and strengthening health professionals' antibiotics stewardship capacity where antibiotics are appropriately prescribed and dispensed; introduce other effective regulatory measures that strengthen health professional communication skills as they are key change agents for increasing AMR awareness, and use interventions to target specific groups with messages and communication to fill their knowledge gaps and concerns.

Table 3.18. *Significant Correlation between the Perceived Level of Knowledge and Attitude towards Antibiotic Use*

	Pearson's r	*p-value*	*QD*
Knowledge — Attitude	.545	.000	High Positive Correlation

Legend: +0.80–+0.99 – Very High Correlation | +0.60–+0.79 – Moderately High Correlation | +0.40–+0.59 – High Correlation | +0.20–+0.39 – Moderately Low Correlation | +0.01–+0.19 – Very Low Correlation
Not Significant (p > 0.05)

Table 18 shows the significant relationship between the perceived level of knowledge and attitude towards antibiotic use. As can be seen, there is a high positive correlation between the perceived level of knowledge and attitude (r=.545). The Pearson correlation results imply a significant relationship between the two variables.

The result implies a significant positive correlation between the knowledge and attitude of the respondents towards antibiotic use. Therefore, if the respondents are knowledgeable about using antibiotics, the respondent has a positive attitude. Conversely, if the respondents have low knowledge, then there is a possibility that they will have a negative effect on their attitude toward antibiotic use. Given the overall result of the study, the respondents are knowledgeable and have a positive attitude towards antibiotic use. Therefore, developing interventions is still needed by educating and raising awareness on the proper use of antibiotics.

The results of this study align with the findings of the study by Wang et al. (2023), indicating a significant relationship among the knowledge, attitude, and multi-stage behavior of the respondents involved. Specifically, the results demonstrate that knowledge positively influences attitude, highlighting the importance of being informed. This correlation underscores the need for targeted public health education initiatives. Such initiatives would aim to enhance the public's understanding and help them develop a correct perception of the threats related to antibiotic use. By fostering a more informed public, these educational efforts can contribute to a more responsible approach to antibiotic consumption, ultimately aiding the global fight against antibiotic resistance.

Table 19. *Significant Correlation between the Perceived Level of Attitude and Awareness towards Antibiotic Use*

	Pearson's r	*p-value*	*QD*
Attitude — Awareness	.610	.000	Very High Positive Correlation

Legend: +0.80–+0.99 – Very High Correlation | +0.60–+0.79 – Moderately High Correlation | +0.40–+0.59 – High Correlation | +0.20–+0.39 – Moderately Low Correlation | +0.01–+0.19 – Very Low Correlation
Not Significant (p > 0.05)

Table 19 shows the significant relationship between the perceived level of attitude and awareness towards antibiotic use. As can be seen, there is a strong positive correlation between the perceived level of attitude and awareness (r=.610). The Pearson correlation results implies that there is a significant relationship between the two variables.

The result implies that the attitude and awareness towards antibiotic use have a very high positive correlation. Therefore, if the respondents have a positive attitude toward antibiotics, the respondents are also aware. The result also implies that a positive attitude, such as appropriately taking prescribed antibiotics, results in awareness of preventing antibiotic resistance. Conversely, if the respondents have a negative attitude, they are unaware of the side effects of improper usage of antibiotics. The overall result of the study shows that the respondents' attitude is positive and aware. However, improvement and development of enhancing their awareness and practices in taking antibiotics is needed to prevent antibiotic resistance.

The results of this study are consistent with the findings of the survey conducted by Alkhalifah et al. (2022), indicating that the overall antibiotic awareness level was 54.7%, while appropriate antibiotic practices stood at 68.3%. There was a positive and significant correlation between the scores for awareness and practices. Specifically, the results demonstrate that awareness positively influences attitude, highlighting the importance of educating and raising awareness. These findings highlight the need to enhance public awareness and understanding regarding appropriate antibiotic use through targeted efforts such as informative posters, structured educational sessions, and guidance from physicians. By fostering awareness in the public, these educational efforts can lead to change in individuals' behavior regarding antibiotic usage, ultimately contributing to reducing mortality rates associated with antibiotic misuse.

Table 3.13 shows the thematic analysis of the respondents' perceptions on the importance of using antibiotics properly. It is shown that most of the respondents' perception is to prevent risk, infection, overdose, complication, harm, accident, allergies, bacteria, and viruses (26.28%) as well as improper use of antibiotic side effects (20.07%). For the faster recovery (9.12%) and to ensure safety of your health

(7.66%). While others said, it is important for prevention of negative or bad side effects (7.30%) as well as to prevent antibiotic resistance (6.57%). Some suggest that it should be prescribed by a professional doctor (5.84%) and the importance of having awareness in proper use of antibiotics (4.74%). However, some of the respondents did not answer (1.82%).

Table 20. *Thematic Analysis of the Respondents' Perceptions on the Importance of Using Antibiotics Properly*

Statements	*Example Quote*	*Frequency n (%)*
Prevention of Risks, Infection, Overdose, Complication, Harm, Accident, Allergies, Bacteria, and Virus	"To avoid bacteria/viruses." "To avoid further health complication." "It is important to use antibiotic properly, for us to prevent infections." "To lessen the risk of allergies and to always maintain good health." "To avoid being overdose in antibiotic."	72 (26.28)
Side effects on improper use of antibiotics	"Because this may lessen the time for you to recover(slower). This may also cause worsening other infections to your current condition." "Because it may lead to some side effects and it can only make it a bigger problem." "Because improper take of antibiotics can cause side effects and lead to illnesses."	55 (20.07)
Faster Recovery	"To keep the antibiotic effective when curing an illness." "It heals our situation or illness faster and boost our immune system." "To heal properly and faster recovery."	29 (10.58)
Prevention of Sickness/Illness/Disease	"It is important to use antibiotic properly to avoid sickness." "To prevent extreme disease." "To avoid further chaos or further more illness."	25 (9.12)
Ensure Safety of your Health	"To be safe." "To ensure safety about your health." "Because when we use proper antibiotic it will make use even more safe and our health would not be at risk."	21 (7.66)
Prevention of Negative Side Effects or Bad Effects	"To prevent its negative side effects that would otherwise causes us more harm than good." "So that we can avoid the bad effects." "It is important to use antibiotic properly because if you used antibiotic properly it may cause side effects and it can affect your health."	20 (7.30)
Avoid Antibiotic Resistance	"To avoid antibiotic resistance." "It is important to us antibiotic properly for us to avoid antibiotic resistance that can also worsen our illness. Also, if we didn't take it seriously it can actually cause death." "To reduce the risk of getting antibiotic resistance."	18 (6.57)
Prescribed by a Professional Doctor	"Because, we don't know the effect if we don't use it properly, and we must consult to a professional Doctor before we bought medicines and antibiotics." "Only take antibiotic if it is prescribe by professionals." "If it is prescribe by a doctor."	16 (5.84)
Awareness in Proper Use of Antibiotics	"I think it is important to use antibiotic properly as it could affect our health or well-being. Antibiotics can either affect us positively or negatively, that's why we should be aware how to properly use antibiotics." "Because overdosing an antibiotic can cause problem in our body and sometimes may lead to sickness getting more. So it is important to be aware in the importance of using or taking it."	13 (4.74)
No Answer	N/A	5 (1.82)
Total		274 (100)

The result implied that most respondents believe the importance of using antibiotics properly can prevent risk, infection, overdose, complication, harm, accident, allergies, bacteria, and viruses, which indicated that the respondents are aware and knowledgeable that responsibly taking antibiotics can help to avoid the risks associated with the improper use of antibiotics. However, they are unaware that antibiotics cannot effectively treat viral infections. The study recommends that educational intervention is needed to enhance knowledge and awareness about the specific infection that can only effectively be treated by antibiotics. According to Karuniawati et al. (2021), continue public education programs with the aim of not only increasing knowledge but also improving attitudes and practices in the use of antibiotics.

The findings also suggest that the respondents believe that improper use of antibiotics may lead to negative side effects, such as antibiotic resistance, and it may worsen the condition of a person. It implies that the respondents are open to the possibility of difficulties in treating of the bacteria due to antibiotic resistance, which shows similar results from the study of McCullough et al. (2015). Although the respondents have a complete understanding of the side effects of improper usage of antibiotics, educational interventions are still needed to change the public's beliefs.

Furthermore, most of the respondents believe that proper use of antibiotics is important because this will help them to recover faster from the bacterial infection. It implies that having adequate knowledge towards following the said prescription will result in a more

positive effect to perform a proper attitude towards antibiotic use. Therefore, to help the students improve their knowledge and have a correct attitude regarding the usage of antibiotics, the study of Zaidi et al. (2020) suggests that awareness campaigns are needed to promote proper student use of antibiotics in younger generations.

Conclusions

In conclusion, the comprehensive study reveals that while the majority of students possess adequate knowledge, awareness, and attitudes toward antibiotic use, there are evident gaps that necessitate further education and targeted awareness efforts. These gaps highlight the importance of policy guidelines for university clinics and implementing educational programs that focus on the responsible use of antibiotics and the potential dangers of misuse, this will guide the students in responsible antibiotic usage. The research further demonstrates no significant differences in knowledge, awareness, and attitudes based on sex or academic strand, emphasizing the lack of impact these demographic factors have on students' understanding of antibiotic use. Additionally, the study identifies a strong positive correlation between students' attitudes and awareness, indicating that a positive attitude towards antibiotics is often accompanied by a higher level of awareness and understanding of their proper use. However, it is important to note that these findings are specific to the sample population studied and may differ when applied to other groups or educational settings. Such variability underscores the need for ongoing research and tailored educational strategies across diverse populations.

With the significant findings of this study, the researcher suggests the following recommendations:

This study may serve as a basis for educating and raising awareness of antibiotic use in the curriculum across all strands and grade levels. This ensures that all of the students from different backgrounds will receive a comprehensive amount to fill and enhance their knowledge, awareness, and attitude will help to inform the importance of being responsible in using antibiotics.

More programs or seminars that collaborate with healthcare professionals about the importance of responsible antibiotic use may be offered to enhance the knowledge, awareness, and attitude of the students. These programs, such as symposiums, may include information on the importance of responsible antibiotic use during prescriptions and the difference between an immunological response and bacterial adaptability.

Implement a prescription protocol requiring medical professionals to assess the necessity of antibiotics and ensure proper follow-up consultations.

The University or school clinics of the school may further help to share information that will contribute to the knowledge, awareness, and proper practices of the students by offering seminars and programs that will help in educating and promoting the proper use of antibiotics and prevention of antibiotic resistance.

For future researchers:

They may also consider conducting a study that compares the knowledge, awareness, and attitude of students between private schools and public schools towards antibiotic use or antibiotic resistance.

The population may also consist of faculty and staff. This ensures equal representation for the whole school community.

The questionnaires may be disseminated equally to the population with consistent sample sizes across various profiles like profession/academic strands and sex/gender.

They may also deliberate proper orientation and instruction to the respondents about the questionnaire to ensure that all parts of the questionnaire are answered honestly and no statements are left blank.

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