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KNOWLEDGE OF ANTIBIOTICS AND ATTITUDE TOWARDS ANTIBIOTIC USAGE OF RESIDENTS IN RURAL AREAS OF TAGUM CITY

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ABSTRACT

Antibiotic misuse remains a pressing global health concern, underscoring the need to examine community knowledge and attitudes toward antibiotic use. This descriptive-correlational study assessed the knowledge and attitudes of 385 residents from rural areas of Tagum City, Davao del Norte, selected through clustered and random sampling. Data were collected using adapted questionnaires from Siam et al. and Zaidi et al., and analyzed through frequency count, mean, ANOVA, and Pearson-r. Findings revealed that respondents demonstrated a moderate level of knowledge of antibiotics (M = 6.12, SD = 1.69) and an average attitude toward antibiotic usage (M = 3.40, SD = 0.97). No significant differences in knowledge were found when grouped by age, gender, civil status, or educational attainment. In terms of attitude, educational attainment (p=.006) was the only demographic factor showing a significant difference, while no variations were noted across age, gender, or civil status. Importantly, a significant positive relationship was established between knowledge and attitude (p = .000), indicating that higher knowledge of antibiotics is associated with more favorable attitudes toward their use. The study highlights the need to strengthen antibiotic awareness and stewardship programs, particularly by tailoring educational efforts to different levels of educational attainment. Its results are significant to government health agencies, allied health professionals, nursing programs, residents of rural areas, and future researchers in advancing strategies to promote responsible antibiotic use and combat resistance.

Keywords: *Attitude towards Antibiotic Usage, Correlational Research, Knowledge of Antibiotics, Nursing Students, Philippines, Rural Communities*

1.0 INTRODUCTION

Antibiotics are necessary to fight against bacteria-caused diseases. These medications are prescribed to patients to stop bacterial growth and gradually decrease or eliminate the presence of the said pathogen; however, there are populations who have low knowledge about antibiotics especially from rural areas scoring 18.2% (Ulaya et al., 2022) comprising of antibiotic unawareness, appropriate course of intake, as well as antibiotic resistance. Along with that, the same type of respondents has resulted in poor attitude with their antibiotic usage with the score of less than 50% (Raihan et al., 2024) encompassing obtaining antibiotics without prescriptions and prescriptions can be issued by pharmacy, not physicians. Those individuals who have administered inappropriately can be susceptible to bacterial or antibiotic resistance. This misuse allows bacteria to wear down the effects of antibiotics and multiply their population within the body of a human at the same time. Further, according to Xavier et al. (2022) and Nelson & Bran (2022), inappropriately taking antibiotics decreases their effects and inflicts the same amount of physiologic side effects.

In Nigeria, it has been discovered that antibiotic misconception and inappropriate consumption have become a serious issue that has caused the development of significant health problems (Woldegeorgis et al., 2023). In Rwanda and East Africa, some individuals approve purchasing antibiotics without a medical prescription (Nisabwe, 2020). Meanwhile, in Western Saudi Arabia, there are also recorded numbers of individuals withdrawing from antibiotic consumption because their symptoms have stopped (Zaidi et al., 2021). According to research in Cambodia, most respondents acknowledged antibiotic resistance, but few were aware that antibiotics are exclusively effective in combating bacterial diseases (Lim et al., 2021).

In the Philippines, there are several individuals willing to purchase antibiotics from sari-sari stores (Berdida et al., 2022), which is an inappropriate outlet for accessing the said medicine. Additionally, residents have the attitude of taking leftover antibiotics without identifying the pathological cause of their infection (Vidad et al., 2022). Moreover, according to a study by Reñosa et al. (2020), residents are administering antibiotics for viral respiratory infections in several cases.

Region 11 was included on the annual report of the Department of Health – Research Institute for Tropical Medicine having approximately 9% of the population who became resistant to the antibiotic penicillin due to poor attitude towards antibiotic usage leading to depleted therapeutic options for various diseases. This caused Davao City's Southern Philippine Medical Center (SPMC) and other government agencies to warn the public against rampant misconception and misuse of antibiotics in general for over three decades (Dimaano, 2023; Department of Health, 2022).

While several studies have aimed to assess the knowledge of antibiotics and attitudes toward antibiotic use, there is a notable gap in the literature regarding the specific demographic factors influencing these aspects, particularly among residents in rural areas of Tagum City, Davao del Norte. Previous research has highlighted the importance of understanding disparities in knowledge and attitudes regarding antibiotic usage based on demographic characteristics such as age, gender, civil status, and educational attainment (Di et al., 2022). However, there is a lack of literature explicitly examining these factors within the context of rural populations in Tagum City.

The urgency of this study is underscored by the critical need for empirical knowledge regarding the prudent use of antibiotics (Lampi et al, 2020), especially in rural areas where access to healthcare resources may be limited. Given the potential impact on public health and treatment regimens, enhancing knowledge and attitudes towards antibiotics at the local, national, and international levels is paramount. Moreover, the scarcity of investigations on antibiotic use specifically in Tagum City emphasizes the significance of this study for improving public awareness and healthcare practices.

This study holds significance for individuals across various demographic groups who undergo or will undergo antibiotic therapy, regardless of age, civil status, gender, or educational background. By addressing the gap in the literature and examining the relationship between demographic factors and knowledge/attitudes towards antibiotics, the findings of this research will contribute to informed decision-making in healthcare. Furthermore, the dissemination of study outcomes through academic channels and international conferences will facilitate knowledge exchange and potentially inform policy and practice within the nursing program and the broader healthcare community. As this study provides new insights and awareness to healthcare and educational facilities fostering awareness and prevention, it also enhances the surveillance and creates emergency guidelines that will serve as the response in terms of outbreak.

Statement of the Problem

This study aimed to assess the level of knowledge of residents in rural areas of Tagum City, Davao del Norte, regarding antibiotics and their attitudes towards antibiotic use. Additionally, it investigated any significant differences in knowledge and attitudes among various demographic groups within the studied population before proceeding to examine the relationships between their level of knowledge of antibiotics and extent of attitude towards antibiotic usage. Specifically, this sought to answer the following:

1. What is the profile of the respondents in terms of: (1) Age; (2) Gender; (3) Civil Status; and (4) Educational Attainment?
2. What is the level of knowledge on antibiotics among residents in rural areas?
3. What is the extent of attitude on antibiotic usage among residents in rural areas?
4. Is there a significant difference in the level of knowledge on antibiotics when analyzed according to age, gender, civil status, and educational attainment?
5. Is there a significant difference in the extent of attitude to antibiotics usage when analyzed according to age, gender, civil status, and educational attainment?
6. Is there a significant relationship between knowledge on antibiotics and attitude to antibiotic usage?

Hypotheses

The following hypotheses were formulated and were tested at 0.05 level of significance.

Ho_1: There is no significant difference in the level of knowledge on antibiotics when analyzed according to age, gender, civil status, and educational attainment.

Ho_2: There is no significant difference in the extent of attitude on antibiotics usage when analyzed according to age, gender, civil status, and educational attainment.

Ho_3: There is no significant relationship between knowledge of antibiotics and attitude to antibiotics usage.

Significance of the Study

Understanding how residents in rural areas perceive and use antibiotics is essential in guiding efforts to promote responsible health practices and prevent antibiotic resistance. The study would be significant to government health agencies and policymakers, as its findings can inform the development and reinforcement of health policies, community programs, and antibiotic stewardship initiatives. Health-allied professionals would likewise benefit, as the results provide evidence for more effective health education strategies and closer monitoring of antibiotic use among clients.

The residents themselves stand to gain from heightened awareness and improved attitudes toward antibiotic usage, ultimately leading to healthier communities. Nursing programs may also draw from the study's findings to strengthen their curricula, enabling future nurses to promote proper antibiotic practices within their profession and communities. Finally, the study would serve as a useful reference for future researchers pursuing related inquiries in different local contexts, thereby contributing to a broader understanding of antibiotic knowledge and attitudes.

2.0 METHODS

Research Design

This study employed quantitative research using descriptive and correlational designs. Quantitative research involves gathering and analyzing numerical data to evaluate causal linkages, identify trends, formulate hypotheses, and generalize findings (Bhandari, 2023). Descriptive research collects information on a particular population or phenomenon to provide an accurate picture of traits and behaviors, often using questionnaires, inquiries, and case studies (Sirsilla, 2023; McCombes, 2023). It is commonly applied in quantitative studies to describe individuals, objects, or situations as they naturally occurred (Siedlecki, 2020). In this study, the descriptive design was used to understand antibiotic knowledge and usage attitudes among the rural population of Tagum City. Further, correlational research examines the relationship between variables without manipulation (Devi et al., 2023) and identifies the degree of association between two or more variables (Cherry, 2023). Here, it was applied to determine the relationship between knowledge of antibiotics and attitudes toward antibiotic usage in the same population.

Respondents

The respondents of this study were residents of selected rural areas of Tagum City. A rural city in the Philippines has only less than 5,000 residents per barangay, less than 100 employees per one establishment, and limited industrialized substructures, access to amenities, and social events (Philippine Statistics Authority, 2023).

Tagum City, Davao del Norte, located in Region XI, Davao Region, is composed of 23 barangays with six (6) rural barangays and 17 urban barangays. This study focused on the six (6) rural barangays of the said localities, namely Bincungan, Busaon, Liboganon, Pandapan, San Agustin, and San Isidro. The identification of rural barangays was obtained through a personal inquiry from the local government of Tagum City, specifically in the Planning and Development Office.

Sampling Technique

The sample size for this study was determined using the Raosoft Sample Size Calculator with a 95% confidence level and a 5% margin of error. Based on the Philippine Standard Geographic Code (2023), the six rural barangays of Tagum City had a combined population of 18,911. From this, the calculator generated a maximum sample size of 385 respondents. A multistage cluster sampling technique was employed, beginning with the selection of barangays as clusters. Within each cluster, respondents were chosen through random sampling, allocating 65 respondents to one cluster and 64 respondents to each of the remaining five clusters. To reach these numbers, 2 to 3 respondents were drawn from 25 households in every barangay.

Measures

This study utilized a single questionnaire composed of three parts: demographic profile, knowledge of antibiotics, and attitude toward antibiotic usage. The instruments for the second and third parts were adapted from Siam et al. (2021) and Zaidi et al. (2020), respectively, and were validated by a panel of experts. The questionnaire was designed to assess the level of knowledge and the extent of attitudes toward antibiotic use among residents in the rural areas of Tagum City, supplemented with profile information such as age, sex, civil status, and educational attainment, which served as indicators.

The demographic section gathered data on age (18–24, 25–34, 35–44, 45–54, 55–65, and above 65), sex (male, female, LGBTQIA+), civil status (single, married, widowed), and educational attainment (elementary level, elementary graduate, high school level, high school graduate, college level, college graduate, and others to be specified).

To measure knowledge, the researchers used a modified 10-item questionnaire from Siam et al. (2021), with objective items having correct or incorrect responses. Each correct answer was given 1 point, while incorrect responses received 0. The original tool demonstrated strong reliability with a Cronbach's alpha of 0.72. Respondents' knowledge levels were interpreted using Bloom's cut-off point: a score of 80%–100% (8–10 points) indicated a high level of knowledge and was considered good, 50%–79% (5–7 points) indicated a moderate level and was considered average, and below 50% (0–4 points) indicated a low level and was considered poor. To determine attitudes, the researchers used a modified 9-item questionnaire from Zaidi et al. (2020). The tool reported a Cronbach's alpha of 0.73, indicating good internal consistency. Responses were rated on a Likert scale, and the extent of attitudes was interpreted as follows: a mean score of 1.00–1.79 was described as very high and implied an excellent attitude; 1.80–2.59 as high and implied a good attitude; 2.60–3.39 as average and implied a fair attitude; 3.40–4.19 as low and implied a poor attitude; and 4.20–5.00 as very low and implied a very poor attitude.

Data Gathering Procedure

The research process followed systematic procedures to ensure ethical compliance, accurate data gathering, and reliable analysis.

1. The study first underwent a technical review by the technical panel, followed by submission to the Research Ethics Committee (REC) for ethical clearance. Data collection commenced only after approval was secured.
2. Upon clearance, the researchers sought endorsement from the program head and obtained formal permission from the School President, Research Director, Vice President for Academic Affairs (VPAA), and Data Privacy Officer.
3. Respondents were identified through face-to-face invitations with the assistance of gatekeepers, after which they received an orientation on the study's purpose, objectives, and procedures. Confidentiality and

data privacy were explained, and respondents signed the Data Privacy Notice and Informed Consent Form prior to participation.

4. To protect participants, precautionary measures were taken such as ensuring visual, physical, and auditory privacy during data collection. The survey was conducted in May 2024 through face-to-face, paper-based administration, with researchers available to clarify questions as needed.
5. Questionnaires were collected immediately after completion, checked for accuracy and completeness, and respondents were thanked and provided with a small token of appreciation.
6. Completed questionnaires were organized and responses were manually tallied by demographic profile (age, sex, civil status, and educational attainment) before encoding into a database. Data were checked for accuracy, consistency, and missing values.
7. Statistical treatments applied included frequency count and percentage for demographics, mean and standard deviation for knowledge and attitudes, One-Way ANOVA for demographic differences, and Pearson R Test for correlations. Findings were presented in tables, graphs, and charts.
8. All collected data, both electronic and physical, will be securely retained for three years. After the retention period, data will be destroyed through hard disk pulverization, permanent deletion of electronic files, and shredding of physical copies to ensure confidentiality.

Analysis and Interpretation

The study employed various statistical tools to analyze the data systematically. Frequency count and percentage were used to determine the distribution of respondents according to age, gender, civil status, and educational attainment, addressing research question one. Meanwhile, the mean was applied to calculate the average responses of participants for each item, while the standard deviation measured the degree of variation or dispersion from the mean. Both the mean and standard deviation were used to answer research questions two and three.

To examine differences and relationships among variables, advanced statistical tests were utilized. A one-way ANOVA was applied to determine the significance of differences across groups based on age, sex, civil status, and educational attainment, which addressed research questions four and five. Finally, the Pearson R test was used to measure the strength and direction of the correlation between respondents' knowledge of antibiotics and their attitudes toward antibiotic usage, providing answers to research question six.

Ethical Considerations

This research was reviewed and approved by the SMCTI–REC to ensure adherence to ethical standards. Safeguards were implemented during data collection to guarantee confidentiality, voluntary participation, and respect for participants' rights. The study addressed all ten ethical dimensions, namely: social value, informed consent, participant vulnerability, risks, benefits and safety, privacy and confidentiality, justice, transparency, researcher qualifications, adequacy of facilities, and community involvement. Specifically, the study's social value lay in assessing knowledge and attitudes toward antibiotic use in rural communities, providing evidence for future health campaigns and antibiotic stewardship programs. Respondents provided informed consent after being oriented in both English and Bisaya, with assurances of anonymity, privacy, and voluntary participation. They were reminded of their right to withdraw at any point, and care was taken to avoid coercion or intimidation. Risks were minimized by ensuring a safe, convenient setting for answering questionnaires, while potential benefits included improved awareness of antibiotic use among participants and the community.

Confidentiality and data protection followed the National Ethical Guidelines for Health-Related Research (2017) and the Data Privacy Act of 2012, with questionnaires secured in password-protected files and physical copies stored safely. Justice was upheld through cluster and random sampling to ensure fair representation, while transparency was maintained by clearly communicating the study's purpose, procedures, and outcomes. The qualifications of the researchers, supported by academic training, relevant coursework, and guidance from a nurse research adviser, ensured competence and sensitivity in conducting the study. Adequate facilities and updated resources supported data collection and analysis. Finally, community involvement was promoted by directly engaging rural residents, orienting them on the value of their participation, and planning to share findings with stakeholders, including the local government and healthcare institutions, to inform education programs and health policies.

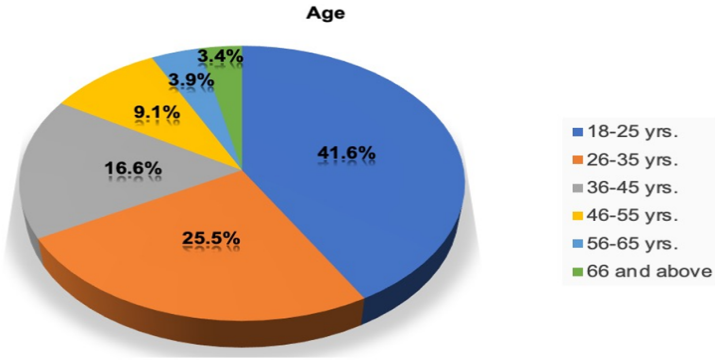
3.0 RESULTS AND DISCUSSION

Demographic Profile of the Respondents

Demographic profiles offer significant information on the characteristics of a population that enables researchers to find trends and patterns within a sample. In this chapter, demographic profiles are presented having a total number of three hundred eighty-five (385) participants in the survey. Respondents are clustered in terms of the age, gender, civil status, and educational attainment of each participant in Rural barangays in Tagum City.

Figure 1

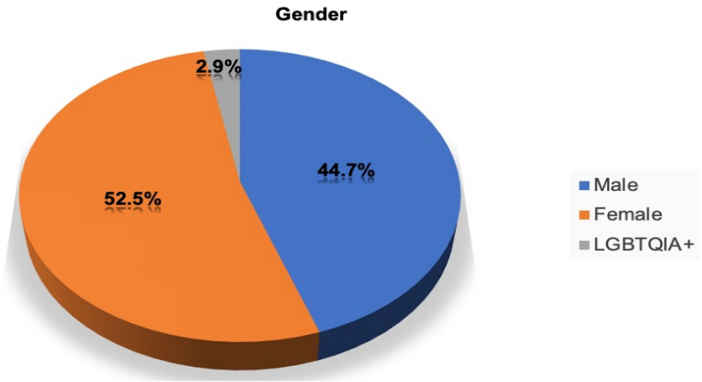
Demographic Profile of Respondents in Terms of Age



A person's age typically determines his or her expertise and experience with a certain topic or subject. In this study, age brackets are clustered into 6 divisions, starting with the legal age of 18 years old. Based on Figure 1, the pie chart presents the percentage of respondents based on the age bracket, with mostly 18-25 years old respondents having 41.6% of the total population and 3.4% for the 66 and above bracket being the least number of participants.

Figure 2

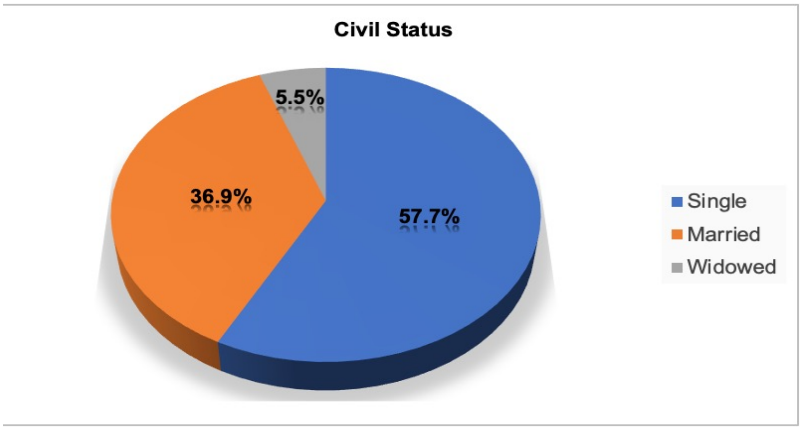
Demographic Profile of Respondents in Terms of Gender



Gender influences human choices, circumstances, and experiences, and understanding gender trends, dynamics, and biases can enhance the accuracy and inclusivity of research. In this study, respondents identified as male, female, or LGBTQIA+, reflecting the researchers' commitment to promoting equality and minimizing bias or discrimination. The majority of respondents were female (52.5%), followed by male respondents (44.7%), while members of the LGBTQIA+ community represented the smallest group at 2.9%.

Figure 3

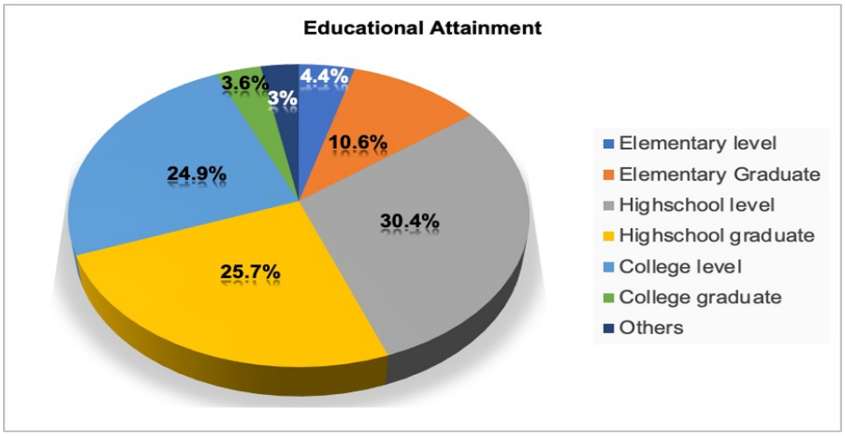
Demographic Profile of Respondents in Terms of Civil Status



Civil status was included to better understand respondents' needs and preferences based on life stage and social standing, which can guide the customization of services and solutions. In this study, civil status categories included single, married, and widowed. Results show that the majority of respondents were single (57.7%), followed by married individuals (36.9%), while widowed respondents comprised the smallest group at 5.5%.

Figure 4

Demographic Profile of Respondents in Terms of Educational Attainment



When it comes to educational attainment, the majority of respondents were high school level (30.4%), high school graduates (25.7%), and college level (24.9%). In contrast, only a small portion came from the elementary level (4.4%), college graduates (3.6%), and other educational levels (3%).

Level of Knowledge on Antibiotics among Residents in Rural Areas

Table 1 shows the level of knowledge of antibiotics among residents of rural areas. The data shows that at 95 percent confidence level, the level of knowledge on antibiotics in rural areas is at moderate level which implies that their knowledge is average with 6.12 ± 1.68 (SD>1.00) signifying high variability.

The level of knowledge of antibiotics among residents of rural areas from their answers in the survey questionnaires shows a mean of 6.12 with a descriptive level of moderate level. Further, the results obtained a standard deviation of 1.68 which indicates a high dispersion of the scores in respect to the category mean of this variable. This further implies that the level of knowledge from the mean of 6.12 is average.

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Table 1. *Level of Knowledge on Antibiotics among Residents in Rural Areas*

Variable	SD	Mean	Descriptive Equivalent
Knowledge on Antibiotics	1.68	6.12	Moderate Level

According to Zaidi et al. (2019), a basic comprehension of the function and application of antibiotics is considered a moderate level of knowledge. This entails understanding that the purpose of antibiotics is primarily to combat bacterial illnesses, appreciating the significance of finishing required coursework, and being conscious of the potential consequences of improper usage, including antibiotic resistance. But there may also be certain fallacies involved, such as the idea that medications may cure viral illnesses.

These findings support the research of Karuniawati et al. (2021), which found that respondents generally knew different aspects of use of antibiotics as well as the public awareness when it is misused. Additionally, more studies revealed that 63% of the participants in her research had a moderate understanding of antibiotics, including their uses, side effects, and indications for treating bacterial illnesses (Shrestha, 2023; Zaidi et al., 2021).

This is inconsistent with the result of the study from Tangcharoensatien et al. (2021) which found that more of the population has a low level of knowledge regarding antibiotics, especially the awareness of its use and the effects of abusing it.

Extent of Attitude on Antibiotic Usage among Residents in Rural Areas

Table 2 shows the extent of attitude on antibiotic usage among residents in rural areas. The highest mean is the item “When I get a cold, I will take antibiotics to help me get better more quickly” with the mean value of 3.70 with the descriptive equivalent of low level indicating that greater population from the respondents has the extent of attitude for misuse of antibiotics. This item has the standard deviation of 1.55 indicates a moderate level of variation in the attitudes of the residents. While some of the residents could be highly positive, others might be more indifferent or negative. The second highest mean is “I expect antibiotics to be prescribed by my doctor if I suffer from common cold symptoms.” with the mean of 3.49 which has a descriptive equivalence of low extent of attitude, also indicating that their extent of attitude towards antibiotic use is poor. The mean indicates that respondents' attitudes on the usage of antibiotics were generally not particularly positive. The replies showed a fair degree of variability, as indicated by the 1.48 standard deviation, indicating that responses from respondents ranged significantly around the mean.

The lowest mean is the item “I will use leftover antibiotics for a respiratory illness” with the mean of 2.98 with the descriptive equivalence of average level of extent of attitude towards antibiotic usage. The slightly-below neutral attitude indicates that most of the respondents do not use leftover antibiotics for respiratory illnesses. This also has a standard deviation of 1.63 showing moderate variability in responses. This is followed by the item “If my family member is sick, I usually will give my antibiotics to them” with a mean of 3.20. This mean score of 3.20 proves the idea of administering family members antibiotics without a prescription is generally agreed upon by the respondents. The responses show a moderate degree of variability, as indicated by the 1.55 standard deviation.

Table 2. *Extent of Attitude on Antibiotic Usage among Residents in Rural Areas*

	Mean	SD	Descriptive Equivalent
1. When I get colds, I will take antibiotics to help me get better more quickly	3.70	1.55	Average
2. I expect antibiotics to be prescribed by my doctor if I suffer from common cold symptoms	3.49	1.48	Low
3. I normally stop taking antibiotics when I start feeling better	3.48	1.59	Low
4. If my family member is sick, I usually will give my antibiotics to them	3.20	1.55	Average
5. I normally keep antibiotics stocks at home in case of emergency	3.43	1.54	Low
6. I will use leftover antibiotics for a respiratory illness	2.98	1.63	Average
7. I will take antibiotics according to the instructions on the label	3.42	1.58	Low
8. I normally will look at the expiry date of antibiotics before taking it	3.40	1.64	Low
9. When a family member or a friend feels sick, I recommend antibiotics	3.43	1.59	Low
Overall Mean	3.39	1.58	Average

From the descriptive analysis shown in Table 2, out of 385 respondents yield a significance of 3.38 mean with standard deviation of 0.98 for the extent of attitude towards antibiotic usage among residents of rural areas with the descriptive equivalent of moderate. The mean of 3.38 implies that the extent of attitude towards antibiotic usage among residents of rural areas is fair. The standard deviation of 0.98 (SD<1.00) indicates that the distribution of the dataset is more compact and less dispersed around the mean, demonstrating a homogenous dataset.

These results support the studies of Jairoun et al. (2019) and Sunusi et al. (2019) with the finding of average attitude towards antibiotic usage with the awareness of harmful effects on antimicrobial resistance within self and family. Both researches have 60%-76% results on attitude towards antibiotic usage. Further, according to the study of Vidad et. al (2022), the respondents have moderate attitudes towards antibiotic use but can still hav the possibility for misconception or misunderstanding.

This opposes the study of Isah et al. (2023) with the findings that their respondents have inadequate attitude towards antibiotic usage. Moreover, the study of Bhardwaj et. al (2021) found that the respondents have appropriate attitude towards the use of antibiThe findings of this study have found that the respondents are aware of the antibiotic resistance on the contrary of the findings of the opposing study.

Significant Difference in the Level of Knowledge on Antibiotics when Analyzed according to Age, Gender, Civil Status, and Educational Attainment

Table 3 shows the significant differences in the level of knowledge about antibiotics among residents of rural areas when analyzed by age, gender, civil status, and educational attainment. The results indicate that these factors do not significantly influence the level of knowledge among residents, as all p-values are greater than 0.05. Regarding age, respondents aged 36-45 scored the lowest in antibiotic knowledge with a mean score of 5.97, compared to those aged 66 and above, who scored the highest at 6.62. All respondent scores fall within the moderate descriptive level, indicating an average knowledge of antibiotics among rural residents. The study also showed that males had a slightly higher mean score (6.27) than LGBTQIA+ respondents (6.18) and females (6.00). In terms of civil status, widowed respondents had the highest knowledge score with a mean of 6.57, followed by married respondents at 6.18 and single respondents at 6.05. Regarding educational attainment, college-level respondents scored the highest with a mean of 6.33, while high school graduates and others scored the lowest at 6.00 and 3.00, respectively.

Table 3. *Significant Difference on the Level of Knowledge among Residents of Rural Areas when Analyzed According to Age, Gender, Civil Status, and Educational Attainment*

Groups	Mean	F	p-value	Remarks
Age				
36-45 years old	5.97			
46-55 years old	5.94			
26-35 years old	6.10	.657	.656	Not Significant
56-65 years old	6.60			
18-25 years old	6.15			
66 and above	6.62			
Gender				
Male	6.27			Not
Female	6.00	1.221	0.296	Significant
LGBTQIA+	6.18			
Civil Status				
Single	6.05			Not
Married	6.18	1.051	.351	Significant
Widowed	6.57			
Educational Attainment				
High School Level	6.10			
High School Graduate	6.00			
College Level	6.33			
Elementary Graduate	6.17	.973	.444	Not Significant
Elementary Level	6.12			
College Graduate	6.21			
Others	3.00			

All groups in terms of age, gender, civil status, and educational attainment have the p-value of greater than 0.05 (>0.05) indicating remarks of they are not significant in influencing the level of knowledge among residents of rural areas.

These results support the study of Crucis et al. (2019) showing that there is no significance on the level of knowledge of antibiotics and demographic factors. Moreover, according to De Guzman et. al (2022) and Pennino et. al (2023), there were no significant differences noticed in terms of age, sex, and civil status in influencing the level of knowledge of antibiotics.

This also opposes the notion that the knowledge of antibiotics can be influenced by age and education level (Mallah et al, 2022) as well as gender and marital status (Pham-Duc & Sriparamananthan 2021; Bianco, 2020) emphasizing that the knowledge of antibiotics outside urban areas are in uniformity despite their demographic profile.

Significant Difference in the Extent of Attitude to Antibiotic Usage when Analyzed according to Age, Gender, Civil Status, and Educational Attainment

Table 4 shows the significant differences in the extent of attitudes toward antibiotic usage among rural residents when analyzed by age, gender, civil status, and educational attainment. The results indicate that only educational attainment had a statistically significant relationship with the extent of attitude, with a p-value of 0.025 (less than 0.05), highlighting differences among educational groups.

Table 4. *Significant Difference in the Extent of Attitude to Antibiotic Usage when Analyzed according to Age, Gender, Civil Status, and Educational Attainment*

Groups	Mean	F	p-value	Remarks
Age				
36-45 years old	3.41			
46-55 years old	3.24			
26-35 years old	3.39	1.698	.134	Not Significant
56-65 years old	3.75			
18-25 years old	3.33			
66 and above	3.67			
Gender				
Male	3.45			
Female	3.37	.841	.432	Not Significant
LGBTQIA+	3.11			
Civil Status				
Single	3.42			
Married	3.35	0.382	0.682	Not Significant
Widowed	3.50			
Educational Attainment				
High School Level	3.66			
High School Graduate	3.64			
College Level	3.55			
Elementary Graduate	3.36	2.445	0.025	Significant
Elementary Level	3.15			
College Graduate	3.16			
Others	2.89			

By age, respondents aged 46-55 scored the highest with a mean of 3.24, rated as "average," indicating a fair attitude toward antibiotic usage, while respondents aged 66 and above had a mean of 3.67, rated as "low," indicating a poor attitude. For gender, LGBTQIA+ respondents had the highest mean of 3.11, followed by females at 3.37, both categorized as "average," suggesting a fair attitude toward antibiotic use. Males had the lowest score with a mean of 3.45, rated as "low," indicating a poor attitude. In terms of civil status, married respondents scored the highest with a mean of 3.35 (average), while widowed and single respondents scored 3.5 and 3.42, respectively, both rated as "low," indicating poor attitudes toward antibiotics.

Educational attainment showed the only significant difference, with a p-value of 0.025. Respondents with vocational or similar qualifications had the highest mean of 2.89, followed by elementary and college graduates with means of 3.15 and 3.16, all rated as "average." High school graduates had the lowest mean of 3.64, rated as "low," indicating a poorer attitude toward antibiotic use.

These findings suggest that educational attainment significantly influences attitudes toward antibiotic usage, indicating that those with higher education tend to have a better understanding and attitude toward antibiotic use.

The results of this study support the findings of Alqarni and Abdulbari (2019), which indicate that educational attainment significantly influences attitudes toward antibiotic use. Similar results were found by Tagum-Briones et al. (2023) and Berdida et al. (2022), showing that educational attainment plays a significant role in shaping residents' attitudes regarding decision-making on antibiotic use.

These findings, however, contrast with those of Effah et al. (2020), who found no significant relationship between educational attainment and attitudes toward antibiotic use. Additionally, Alqarni and Abdulbari (2019) observed that respondents with adequate knowledge of antibiotics demonstrated a positive attitude toward their use, suggesting that educational interventions should target groups with lower income and educational levels to promote appropriate antibiotic use.

Significant Relationship between Knowledge on Antibiotics and Attitude to Antibiotic Usage

Table 5 shows the significant relationship between knowledge on antibiotics and attitude towards antibiotic usage. The result showed 0.00 p-value indicating a relationship between the two variables. This result indicates that the knowledge of antibiotics does influence the attitude towards antibiotic usage.

Table 5. *Significant Relationship between Knowledge on Antibiotics and Attitude to Antibiotic Usage*

Variables Correlated	r	p-value	Decision on H_o	Decision on Relationship
Knowledge and Attitude	-0.144	0.00	Reject	Significant

The r value of -0.144 indicates that there is a weak negative association between the two variables signifying that whether the level of knowledge of antibiotics or extent of attitude towards antibiotic use decreases slightly when the other increases. This means that when the level of knowledge of antibiotics among residents from rural areas increases, they tend to follow their own judgment and often lead to inappropriate decision-making.

The results also highlight that residents from rural areas with a low level of knowledge about antibiotics tend to exhibit a fair extent of attitude toward antibiotic use. This is largely due to the belief that antibiotics are typically prescribed by doctors and often require regular medical check-ups.

These findings reveal a significant negative correlation between the respondents' knowledge of antibiotics and their attitude toward their use. This correlation suggests a minimal decline in the extent of attitude as knowledge level increases, though this decline is very slight. These findings contrast with the studies of Alqarni and Abdulbari (2019) and Alnasser et al. (2021), which reported a positive correlation between respondents' knowledge of antibiotics and their attitude toward antibiotic use.

Similarly, this study's findings oppose the findings of Paredes et al. (2022) who found positive and notable correlations between attitudes and knowledge levels. Additionally, Baddal et al. (2022) found a significant relationship between these two variables, where an increase in one variable corresponded with an increase in the other.

Conclusions

The following conclusions were drawn from the findings of the study.

1. Residents in rural areas of Tagum City demonstrated a moderate level of knowledge about antibiotics, indicating awareness but also gaps that may lead to misconceptions.
2. Their attitudes toward antibiotic usage were at an average level, suggesting a mix of appropriate and potentially inappropriate practices.
3. No significant differences were found in knowledge of antibiotics when grouped according to age, gender, civil status, and educational attainment, which implies that knowledge levels are relatively consistent across demographic groups.
4. Attitudes toward antibiotic usage did not significantly differ by age, gender, or civil status; however, educational attainment was found to significantly influence attitudes, highlighting the role of formal education in shaping perspectives on antibiotic use.
5. A significant positive relationship was established between knowledge of antibiotics and attitudes toward their usage, suggesting that higher knowledge is associated with more appropriate attitudes and behaviors.

Recommendations

Based on the conclusions of this study, the following recommendations are proposed:

1. Continuous health education initiatives should be implemented to enhance their knowledge and attitudes toward antibiotics. This includes community-based campaigns that emphasize responsible antibiotic use, proper administration, and the importance of preventing misuse.
2. Allied health practitioners, in partnership with local and national government bodies, should actively strengthen antibiotic stewardship programs. This may be achieved through regular monitoring, public health

seminars, accessible online platforms, and community engagement activities that promote accurate and reliable information about antibiotics.

3. Nursing programs should integrate comprehensive modules on antibiotic use and resistance into their curriculum. This will better equip student nurses to provide effective patient education and to advocate for responsible antibiotic practices in their professional roles.
4. Subsequent studies should build on these findings by conducting similar investigations in other rural and urban contexts. Comparative analyses across diverse populations will broaden understanding and guide more targeted interventions.

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5.0 COMPETING INTERESTS

Authors have declared that no competing interests exist.

6.0 AUTHOR'S CONTRIBUTION

The study was designed and the initial manuscript drafted by one of the researchers, while another focused on the literature review. The administration of the survey questionnaires was carried out by two researchers. In addition, two others provided guidance in refining the selection of respondents and in improving the study's statement of the problem, methodology, and results.

7.0 CONSENT

All authors confirm that written informed consent was obtained from the patient (or other authorized parties) for the publication of this case report and any related images. Further, a copy of the signed consent is available for review by the Editorial office, Chief Editor, or Editorial Board members of this journal.

8.0 ETHICAL APPROVAL

This study was reviewed and approved by the SMCTI Research Ethics Committee, with ethical clearance reference number SMCTI-REC(BSN)2024-002. All participants provided written informed consent prior to their involvement in the study.

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