

# Knowledge, Attitudes, and Practices of Mothers Towards Antibiotic Use and Resistance

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**Abstract**—Nowadays, antimicrobial agents such as Amoxicillin, which have been found to be the type of antibiotics most commonly used worldwide, are widely used to treat common childhood diseases. However, its misuse leads to adverse drug reactions, interactions, and resistance. Antimicrobial resistance has developed into a significant public health problem on a global scale. Its dangers are continuously escalating. This study is conducted to assess the level of knowledge and the attitudes and practices of mothers regarding antibiotic use which can increase the risk and prevalence of antibiotic resistance in Tuguegarao City, Cagayan. The researchers utilized convenience and snowball sampling depending on the current situation of the study's respondents. The study utilized a descriptive quantitative method of research to determine the level of knowledge, attitudes, and practices of mothers when grouped according to their profile variables. A modified questionnaire is used to fit the respondents of the study and was distributed using Google Forms with a total of 394 mothers. The result of this study revealed that the mothers of children aged 2-6 years old in Tuguegarao City has good knowledge, attitude, and practices towards antibiotic use and its resistance, but varied in terms of the sociodemographic profile, consisting age, civil status, family monthly income, highest educational attainment, and source of information about antibiotic use. Overall, the findings of this study helps establish a public-health promotion intervention to increase antibiotic knowledge, attitudes, and practices among the general public.

**Keywords**— antibiotic use, antibiotic resistance, knowledge, attitudes, practices

## I. INTRODUCTION

Through the years, antibiotics served as medications to treat bacterial illnesses in both people and animals. They do this by either killing the bacteria or by making it harder for them to develop and reproduce (Centers for Disease Control and Prevention [CDC], 2022). Antibiotics have been crucial in reducing morbidity and death from infectious illnesses. However, free access and indiscriminate usage are fostering the development of bacterial resistance (Yevutsey et al., 2017). Antibiotic resistance occurs when bacteria become resistant to the drugs intended to kill them. That implies that the bacteria survived and developed (CDC, 2022). With the issue of its

misuse which leads to adverse drug reactions, interactions, and resistance, the dangers of such are continuously escalating (Aslam et al., 2018). Inappropriate prescription practices, inadequate patient education, limited diagnostic facilities, unauthorized sale of antibiotics, and lack of functioning drug regulatory mechanisms contribute to their added resistance (Ayukekbong et al., 2017). It was also alarmingly noted that malpractices such as failing to complete the days prescribed for the antibiotic therapy, leftover drugs not discarded and were given away by other people were considered to be contributory factors to the prevalence of antibiotic resistance (Bandiola et al., 2016). This emerging problem has been observed not only globally but more particularly at homes.

In present times, parents are seen to have control of the medicine intake of their children. Misconceptions held by parents, including their "desire" for unnecessary antibiotics were the key contributors to over usage of medicines. As the elders in their home, the duty to administer medicines has been observed. However, the tendency of self-medicating children with antibiotics was significantly high among parents (Wu et al., 2021; Yu et al., 2014). Not only antibiotics but also other medicines such as analgesics were seen to be practiced by parents through self-medication. Self-medication with previously prescribed medications was usually preferred by parents (Sen Tunc et al., 2021). Furthermore, nonsteroidal anti-inflammatory drugs were more frequently used without a prescription (Garofalo et al., 2015).

Among the influential figures that are responsible for these actions are the mothers who are considered to be the first caregivers of their children. Mothers are responsible for reporting medical-related issues of their children to health care providers. Mothers are supposed to follow a hierarchical power structure, take care of the family's health, and pay attention to the counsel of "senior mothers" (Khazen & Guttman, 2021). With the various antibiotic use practices around the world, the preferences and high demand of mothers' influence patterns of antibiotic use (Rogawski et al., 2017). Most mothers said that they treat their children first at home before taking them to the doctor which further leads to self-medication (Akhtar et al., 2022).

With limited studies that discuss the use of antibiotics and its resistance in the Philippines, the need to study such is of the essence (Bandiola et al., 2016; Bulario et al., 2018). In the Philippines alone, prevalence of antibiotic self-medication has ranged from 31% to 66%, reporting a greater overall prevalence compared to the rest of Southeast Asia (Barber et al., 2017; Kim et al., 2014). Looking into the root cause of the problem is essential in combating an emerging issue on antibiotic use and resistance. In Cagayan, there is no to little recognition on the prevailing issue of antibiotic usage among children especially to the mothers of children aged 2-6 years old in Tuguegarao City because the information with regards to antibiotic use and resistance is limited. Overall, these findings call for a thorough understanding of the knowledge, attitudes, and practices of mothers towards antibiotic use and resistance – all of which are possible through research that focuses on such.

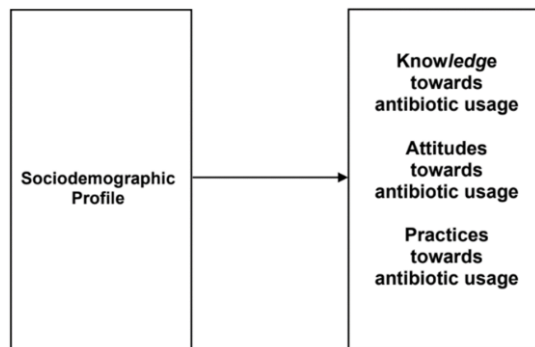


Fig. 1. Research Paradigm

The framework presents the underlying variables of the study. The independent variable consists of the sociodemographic profile of the respondents. The dependent variables consist of knowledge, attitudes, and practices towards antibiotic usage of the respondents that varies in terms of the profile variable. The arrow shows how the profile variables influence the knowledge, attitudes, and practices of mothers towards antibiotic use.

## II. METHODS

### E. Research Design

The study utilized a descriptive quantitative method of research to describe the mothers' knowledge, attitude, and practices on their children regarding antibiotic use and its resistance.

### F. Locale and Respondents

The study was conducted in Tuguegarao City, Cagayan. The study involves the mothers in Tuguegarao City. The researchers utilized convenience and snowball sampling depending on the current situation of the study's respondents. A total of 394 respondents responded to the given questionnaire. The respondents included mothers of children aged 2-6 years old, residents of Tuguegarao City and who were willing to participate in the data collection.

### G. Instrument

The study's instrument is a 3-page modified questionnaire wherein either "yes" or "no" option was used instead of

utilizing the rating scale provided by the original author. Along with changing the rating scale, several variables were also added like the sources of knowledge to add more data on the extent of knowledge of the respondents. The questionnaire is divided into four sections: the respondents' profile which comprises of their name (optional), age, barangay, civil status, religion, source of information about antibiotic use from Bulario et al., (2018), number of children, health seeking behaviors, health history of child, and their socioeconomic status; knowledge about antibiotics use and its resistance from Farshi et al., (2020), and the attitudes, and practices about antibiotics and their usage from Nepal et al., (2019). Wherein the questions were modified to fit the respondents of the study.

Questions about knowledge are separated into four categories, each of which may be answered by the participants with either "yes" or "no," namely "identification of antibiotics" (Q1-Q3), "knowledge on the role of antibiotics" (Q4-Q7), "side-effects of antibiotics" (Q8-Q10), and "antibiotic resistance" (Q11-Q13). The attitudes questions are broken down into three categories, each of which may also be answered with either "yes" or "no" by the responds, namely "preference for use of antibiotics" (Q1-Q5), "antibiotic resistance and safety" (Q6-Q8), and "attitudes to doctor's prescribing antibiotics" (Q9-Q10). The six questions about practices are a Likert scale type questionnaire ranging from Always (5) to Never (1).

The questions are phrased in declarative language and the sentences were tailored to the target respondents' point of view, who are mothers. Along with the variables previously provided by the initial tool, more variables were added to the profile variable section, including the Mother's educational background, occupation, and Family Monthly Income. The English version of the questionnaire will be translated to Filipino to make the terms on the surveys clearer and easier to grasp for the participants.

A process of validation had been applied to the questionnaire. The researchers asked one registered nurse and two registered pharmacists to conduct the validation of the research instrument. The validation results showed that the questionnaire is relevant and succinct, hence, no revisions were noted.

### H. Data Analysis

The sociodemographic profile of the respondents, as well as their responses to the knowledge, attitudes, and behaviors questions, was examined using descriptive statistics. Their sociodemographic profiles were analyzed using frequency and percentage.

Responses from the knowledge, attitudes, and practices part of the questionnaire were analyzed using mean. The knowledge part of the questionnaire was interpreted using the table below according to Farshi et al., (2020).

TABLE I. QUALITATIVE INTERPRETATION FOR MEAN SCORE VALUES

Mean Score	Qualitative Interpretation
Knowledge	
10-13	Good
5-9	Moderate
1-4	Poor
Attitude	
0.50-1.00	Good
0.0-0.49	Poor
Practices	
4.50-5.00	Very Good
3.50-4.49	Good
2.50-3.49	Acceptable
1.50-2.49	Poor
1.00-1.49	Very Poor

I. Ethical Considerations

The researchers strictly adhered to the ethical considerations. The respondents' identities and personal information remained confidential throughout the study. Moreover, the participants were given the chance to refuse to participate when answering the questionnaire with no penalty or loss of benefits. During the face-to-face collection, the researchers strictly adhered to the safety protocols to ensure safety like the use of face masks, frequent handwashing and maintaining social distance. The researchers do not have any form of conflict interest in the conduct of this research. This study has not received any external funding nor assistance from any outside organization that may put the participants in any risk.

The researchers sought the respondents' informed consent and were provided with all of the information needed for the study. Furthermore, the information collected by the researchers from the respondents remained confidential and those who directly contributed to the development of this research were the only ones with access to this information. No individual identification was used in any reports or publications resulting from this study. The information is kept in locked files at all times and the collected data will be properly destroyed after analysis.

Furthermore, Ethics Clearance from Region 2 Trauma and Medical Center- Institutional Review Board (R2TMC-IRB) was obtained prior to the implementation of the data collection procedure of this research to ensure that it is carried out in a responsible and ethically accountable manner.

III. RESULTS

The tables below show the information gathered from the researchers' questionnaires. Furthermore, it addressed the following research questions to determine mothers' knowledge, attitudes, and practices about antibiotic usage and resistance.

TABLE II. PROFILE OF THE RESPONDENTS

Variables	Categories	Frequency (n=394)	Percentage
Age	20-26	90	22.84

Variables	Categories	Frequency (n=394)	Percentage
	27-33	176	44.67
	34-40	99	25.13
	41-47	29	7.36
Civil Status	Single	74	18.78
	Married	289	73.35
	Separated	23	5.84
	Widow	8	2.03
Religion	Roman Catholic	294	74.6
	Jehovah's Witness	5	1.3
	Iglesia in Cristo	38	9.6
	Born Again	23	5.8
	Pentecost	21	5.3
	Mormon	8	2.0
	Baptist	3	0.8
Others	2	0.5	
Number of Children	1	191	48.5
	2	148	37.6
	3	42	10.7
	4	10	2.5
	5	3	0.8
Health Seeking Behavior	Positive	391	99.2
	Both positive and negative	3	0.8
Number of Illnesses of Child/ren	1	294	74.6
	2	74	18.8
Number of Medical Problems of Child	1	165	41.9
	2	119	30.2
	3	75	19.0
	4	21	5.3
	5	10	2.5
	6 or more	5	1.3
Number of Information Sources about Antibiotic Use	1	63	16.0
	2	138	35.0
	3	118	29.9
	4	58	14.7
	5 or more	17	4.3
Family Income	Less than 10,957	36	9.1
	10,957-21,914	77	19.5
	21,914-43,828	139	35.3
	43,828 to 76,699	99	25.1
	76,699-131,483	27	6.9
131,484 to 214,140	6	1.5	
Highest Educational Attainment	High school Undergraduate	8	2.0
	High school Graduate	114	29.0
	College Graduate	272	69.0
Occupation	Business	118	29.9
	Natural and applied sciences	23	5.8
	Social sciences	165	41.9
	Maintenance	14	3.6
	Students	11	2.8
	Housewife	60	15.2
	Others	3	0.8

The table shows the profile of the respondents and the health history of their children. Majority of the respondents belong to the age range of 27-33, married, Roman Catholic, college graduates, and have a family income of Php 21,914-43,828. Also, most of the mothers only have one child and they have positive health seeking behaviors. From the choices given, the majority of the respondents responded that their child only had

one disease out of the seven diseases provided, and from the medical problems, the majority of the respondents responded that their child only had one medical problem out of the seventeen medical problems provided. From the sources of knowledge in using antibiotics, most of them responded that they obtained the knowledge from two of the given choices out of the seven sources. Most of the respondents work in the field of Social Sciences with a frequency of 165, followed by Business with a frequency of 188, while fields of work classified as others is the least line of work with a frequency of 3.

TABLE III. MOTHERS' LEVEL OF KNOWLEDGE, ATTITUDES, AND PRACTICES TOWARDS ANTIBIOTIC USE AND RESISTANCE

Variables	Categories	Frequency (n=394)	Percentage
Knowledge	Good	332	84.3
	Poor	62	15.7
Attitude	Good	302	76.6
	Poor	92	23.4
Practices	Very Good	32	8.1
	Good	169	42.9
	Acceptable	185	47.0
	Poor	8	2.0

Majority of the respondents have good knowledge towards the identification of antibiotics, role of antibiotics, side effects of antibiotics and antibiotic resistance. On the other hand, the result shows that the respondents also have good attitudes towards preference for use of antibiotics, antibiotic resistance and safety and attitudes to doctors prescribing antibiotics. Lastly, results also show that the respondents have good practice towards antibiotic usage.

The present study revealed that most mothers' knowledge about antibiotics is good, meaning that they are knowledgeable in identifying antibiotics, the roles of antibiotics, the side-effects of antibiotics, and antibiotic resistance. The majority of the mothers knew that penicillin was an antibiotic and that antibiotics should not be used in any fever disease and cold and should only be used when having an infection. They are also knowledgeable about the side-effects of antibiotics and that they should complete its full course of treatment. This finding is in line with the findings of Nepal et al., (2019) and Firouzabadi and Mahmoudi, (2020), which revealed that respondents had a reasonable understanding of antibiotic use and resistance. This finding contrasts with Agarwal et al., (2015) and Al-Ayed, (2019), who found that respondents' knowledge of antibiotic use and resistance was lacking. This is due to misunderstandings about whether antibiotics should be used for bacteria or viruses, a lack of understanding of the differences between bacteria and viruses, leading to the belief that antibiotics are effective against both, and misconceptions about the role of antibiotics when their child is sick. This is also demonstrated in a study by Siddiqui et al., (2014), where respondents indicate a lack of understanding of the repercussions. Overall, the outcomes of this study suggest that mothers do not find the role of antibiotics and their effects perplexing due to their level of knowledge.

The current study found that the respondents have a good attitude toward antibiotic use and resistance in terms of

mothers' attitudes toward antibiotic use and resistance. Most respondents have positive attitudes toward antibiotic use, antibiotic resistance, and safety, as well as attitudes toward doctors administering antibiotics. Majority of the mothers knew that antibiotics should not be used when their child is experiencing colds or fever, and would not use antibiotics as a preventive measure. They also knew how antibiotics are unsafe, where misuse and not following its course of treatment may lead to resistance. Most of the mothers also believe their doctors' advice when it comes to giving their child antibiotics. This finding is similar to Crasis et al., (2019), who found that respondents had a favorable attitude toward antibiotic use. However, this contradicts the findings of Paredes et al., (2022), who found that respondents' attitudes toward antibiotics are inadequate. They discovered significant gaps in parents' attitudes, such as their ignorance of the fact that antibiotics cannot heal viral infections. This finding suggests that when parents have more knowledge, they develop more positive attitudes regarding antibiotic use (Kim et al., 2021), a conclusion supported by the current study.

Finally, the current study discovered that mothers practiced good antibiotic administration to their children. Most mothers are educated about the whole course of antibiotic treatment, as well as how to get and use antibiotics. People's actions or behaviors that demonstrate their acquisition of knowledge and attitudes are referred to as practice (Wan et al., 2016). It is commonly considered that a person's attitudes will influence his or her actions. This discovery is in line with the findings of Kim et al., (2021), who found that attitudes predict antibiotic use practices. The findings matched those of a Jordanian study (Alkhladi et al., 2015), which found that women with positive attitudes were 6.3 times more likely than those with negative attitudes to have good antibiotic use practices.

TABLE IV. SIGNIFICANT DIFFERENCES IN KAP WHEN GROUPED ACCORDING TO PROFILE VARIABLES

Mean Score	Knowledge		Attitude		Practices	
	p-value	Decision	p-value	Decision	p-value	Decision
Age	.115	Accept Ho	.022	Reject Ho	.017*	Reject Ho
Civil Status	.000	Reject Ho	.093	Accept Ho	.017*	Reject Ho
Number of Children	.169	Accept Ho	.680	Accept Ho	.484	Accept Ho
Health Seeking Behavior	.729	Accept Ho	.299	Accept Ho	.832	Accept Ho
Number of Illness of Child	.054	Accept Ho	.120	Accept Ho	.844	Accept Ho
Number of Medical Problems of Children	.709	Accept Ho	.073	Accept Ho	.056	Accept Ho

Sources of Information	.019*	Reject Ho	.065	Accept Ho	.187	Accept Ho
Family Income	.099	Accept Ho	.094	Accept Ho	.010*	Reject Ho
Highest Educational Attainment	.000*	Reject Ho	.041*	Reject Ho	.026*	Reject Ho
Occupation	.474	Accept Ho	.068	Accept Ho	.068	Accept Ho

The table above shows that there is no significant difference in the mother's knowledge when grouped according to age, number of children, health seeking behavior, number of illness of children, number of medical problems of children, family income and occupation. Meanwhile, there is no significant difference in their attitudes when grouped according to civil status, number of children, health seeking behavior, number of illness of children, number of medical problems of children, sources of information, family income and occupation. Lastly, there is no significant difference in their practices when grouped according to number of children, health seeking behavior, number of illness of children, number of medical problems of children, sources of information and occupation.

However, the table shows significant differences on the mother's knowledge when grouped according to their civil status, sources of information, and highest educational attainment, while the table shows significant difference on their attitudes when grouped based on age, and highest educational attainment. Lastly, there is a significant difference in the respondents' practices when grouped according to age, civil status, family income, and highest educational attainment.

Based on the results, the findings may vary when grouped according to profile variables, however, constant significant differences are observed on the mother's highest educational attainment, while variables like; number of children, health seeking behavior, number of illness of children, number of medical problems of children, and occupation remains no significant difference on the mother's KAP.

The findings of the current study show that the mothers' knowledge, attitudes, and practices vary in terms of their age, civil status, sources of information, family income, and highest educational attainment.

In terms of age, the results of the current study showed a significant difference in terms of their attitudes when giving antibiotics to their children which revealed that middle aged mothers have a lower level of attitude giving their children antibiotics compared to the young adults. The findings are similar to those of Bulario et al., (2018), who found that when a mother's age increases, her likelihood to self-medicate her child increases as well. In a study conducted in India, the inclination to self-medicate was 2.07 times more common among people aged 35. This could be because persons in this age group are more financially independent and have gained

some awareness of health issues and their treatment by this age (Varadarajan, 2017).

The current study also found a significant difference in terms of age and their practices towards antibiotic use. Middle aged mothers were found to have better practices of antibiotic usage compared to the young adults. This indicates that older mothers may have more experience contacting doctors, resulting in better practices. This is consistent with the findings of Napolitano et al., (2013), who found that among respondents who had never self-medicated with antibiotics, the young were more likely than the older to take an antibiotic without a physician's prescription because those who are younger in age strongly predicts intentional self-medication.

Moreover, the study found a significant difference with the knowledge of mothers when grouped according to their civil status. It revealed that the mothers who are married have a better level of knowledge compared to the respondents who are single and divorced and widowed mothers have a lower degree of knowledge than single and married mothers. This is in line with the findings of Gao et al., (2020), who found that married persons had a better grasp of information than single people. This could be possible because, in addition to self-defense, married people are also responsible for their families. A finding comparable to that of Dadari (2020), who found that married participants have greater antibiotic knowledge than single participants. Married and single participants were also shown to have greater knowledge than divorced participants. The findings of the Social Sciences Research Centre University of Hong Kong (2017), which revealed that female divorced/separated/widowed respondents were more likely to say they had never heard of antibiotic resistance to support this study. As a result, ignorance about antibiotic resistance may reduce these individuals' knowledge and may be a factor in their understanding of effective antibiotic use.

The current study also discovered that when mothers are categorized by their civil status, there is a significant difference in their practices. This suggests that separated mothers have better practices than single and married mothers. The current findings are similar to Dadari (2020). They found that Separated participants scored 7.0 percent in antibiotic self-prescription while married participants scored 93.0 percent, implying that Widow participants have better antibiotic usage practices than married participants.

Regarding the sources of information used by mothers, the current study discovered that those who use two or four sources of information have more knowledge than those who only use one. This suggests that there was a desire for more readily available, consistent information for parents to use when their child was ill. This is in line with a study by Napolitano et al., (2013), which revealed that more sources of information about antibiotics were judged valuable by participants.

On the other hand, the current study found a significant difference in terms of the mothers' practices towards antibiotic usage when grouped according to their family monthly income. The study revealed that mothers with a higher family monthly income tend to have a lower level of practice than those with lower incomes. Compared to a prior study that found that parents with higher income had better antibiotic use behaviors

(Kim et al., 2021), the current study's result was in the opposite direction. Intuitively, it would seem that parents with higher income would have better antibiotic usage habits. However, the current study discovered an unexpected result. Highly educated and high-income respondents may not believe in the benefits of adhering to the medication regimen, whereas those with lower income may have more faith in healthcare providers' advice and demonstrate more therapeutic compliance. The findings of this study are likely to explain why low-income parents had higher practice scores on antibiotic use in their children. Other studies, on the other hand, found a link between monthly income and self-medication. Low-income parents often self-medicate their children because of the high cost of clinic visits and the lack of medical insurance. In addition, research shows that unemployed women are more likely to self-medicate their children than employed mothers (World Health Organization, 2010; Bulario et al., 2018). This contradicts the finding of this current study since the mothers with lower income may be more trusting to healthcare providers' advice, hence, stated by Kim et al., (2021).

Furthermore, in terms of the mothers' highest educational attainment, the current study revealed that mothers whose highest educational attainment are college and college undergraduate have better knowledge from those who are a high school graduate. This is in congruence to the study of Bert et al., (2016), and Albayrak et al., (2021), where parents with a lower level of education had a significantly lower chance of receiving a good score than parents with at least a college degree. According to Farshi et al. (2020), low parental education is the most significant risk factor for antibiotic overuse. Nepal et al., (2019) also observed comparable results in this area. This suggests that a greater education level can lead to a better understanding of antibiotic resistance and side effects. This is similar to a study in Indonesia that indicated that people with a low degree of formal education had more confusion regarding antibiotics (Chinnasami et al., 2016).

Regarding mothers' attitudes on antibiotic use, mothers with a college undergraduate degree have a better attitude than mothers with a high school diploma. Similarly, Nepal et al. (2019) found that respondents with greater levels of education showed more appropriate views than those with lower levels of education (Nepal et al., 2019). According to Albayrak et al., (2021), education level was significantly related to attitudes about antibiotic use, with those with a high education level having better attitudes than those with a low education level.

Finally, regarding mothers' practices, the current study discovered that college graduates have better practices than high school and college undergraduates. According to Nepal et al., (2019), parents with greater educational attainment have more acceptable antibiotic use behaviors than parents with lower educational attainment. Also, the study of Agarwal et al., (2015) supports the current study's findings where respondents with greater levels of formal education had a higher KAP score, with 90 percent of postgraduates and 84.1 percent of graduates having a score of more than 5, compared to only 67 percent of those educated up to high school.

The limitation of this study was the limited interaction with the respondents. Due to the pandemic, the researchers were not

able to gather data face to face with the respondents in the early phase of the data gathering. Hence, the researchers gathered data virtually using Google Forms and it was a challenge for the researchers to obtain data online as some possible respondents are not responsive, maybe due to lack or slow internet connectivity or busy schedules. Henceforth, the researchers had difficulty completing the target sample size. But due to the decreasing reported cases of individuals getting infected with COVID-19, the restrictions in the City of Tuguegarao were no longer too strict and the researchers were given the chance to at least gather data face to face with the respondents. It was also a challenge for the researchers to find mothers with children aged 2-6 years old, becoming the reason why the one-month target for the data gathering was extended.

#### IV. CONCLUSION

The result of this study revealed that the mothers of children aged 2-6 years old in Tuguegarao City have good knowledge, attitude, and practices towards antibiotic use and its resistance, but varied as the result showed in details that in terms of age, respondents aged 34-40 has lower attitudes but better practices compared to the respondents aged 20-33. While married respondents have better knowledge than single respondents. On the other hand, separated respondents have better practices than single and married respondents. It also showed that it is in fact that better knowledge is attained when more informational resources are used rather than lesser resources. Moreover, it also showed that practices are better with respondents earning average family monthly income compared to respondents who have low and high family income. Meanwhile, college graduate respondents also have better knowledge, attitudes and practices than those with lower educational attainment. It was also revealed in this study that the internet and old prescriptions are the most used sources of knowledge about antibiotic use. It is also a new knowledge derived from this study that middle-aged mothers have lower knowledge of antibiotics used and their resistance compared to the young adults but have better practice towards antibiotic usage compared to the said age range. It was also revealed that separated mothers have lower knowledge about antibiotic use and its resistance compared to single and married mothers but have better practices in antibiotic usage compared to the single and married mothers. The study also found out that mothers with higher family income tend to have lower practice toward antibiotic usage. The findings of this study are critical because they provide valuable information for developing a public-health promotion intervention to improve general public knowledge, attitudes, and practices about antibiotics, as well as assisting policymakers in tailoring and designing effective multifaceted interventions to improve antibiotic use in the future. Hence, the result of this study bridged the gap in the scarcity of data in terms of the population's knowledge, attitude, and practices towards antibiotic use and its resistance in Tuguegarao City, Cagayan.

#### V. RECOMMENDATIONS

Based on the findings of this study, the researchers recommend that the findings may be transmitted or shared with the City Health Office as a model for developing future initiatives and activities to combat antibiotic misconception and



misuse. The data will also most likely increase awareness and comprehension on the study's conclusions in each barangay in Tuguegarao City. Moreover, the University of Saint Louis Tuguegarao's School of Health and Allied Sciences may also organize a Service Learning Program to enhance the knowledge of mothers on recent findings and updates regarding antibiotics, with the research study's findings as a framework. It is highly recommended that the Nursing Department distribute information concerning antibiotics and resistance using a variety of channels to provide mothers more access in acquiring information regarding antibiotic use. It is also highly recommended to conduct studies on KAP regarding antibiotic use for parents and guardians and not only for mothers. Furthermore, apart from mothers, studies on KAP regarding antibiotic use for other specific population groups are also highly encouraged. The use of multiple sources of information on acquiring knowledge about antibiotics is in fact also highly recommended. Moreover, future researchers should investigate the association between the respondent's religion and KAP on antibiotic use, as data in this area is limited and should also investigate the role of prescribers and pharmacies in association to antibiotic misuse. Lastly, more local research should also be conducted to assess the general public's knowledge, attitudes, and practices toward the use of antibiotics.

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