

Healthcare Provider Related Factors of Antibiotic Use

Riza G. Castro, Kristel U. Legaspi, Edlhyne Zarah P. Simangan, Jouella Grace M. Tumaliuan,
Maiden Joy D. Utayde, Vic Valiant O. Laureta

Pharmacy Department
School of Health and Allied Sciences
University of Saint Louis
Tuguegarao City, Cagayan

Corresponding author:
vicvaliantlaureta@usl.edu.ph

Abstract—One of the major threats to public health today is the Antibiotic Resistance (AR) which is rising to dangerously high levels in all parts of the world. The formation of resistant bacteria is an inevitable process, which is speeded up due to human behavior. This study focused on the effect of healthcare provider-related factors of antibiotic use. A mixed-method descriptive study was conducted to find out and describe the effect of healthcare providers' practices that affect the antibiotic use of the general public. The quantitative data from survey questionnaires gathered from the users and qualitative data from structured interview questions gathered from the physicians were collected via google forms while qualitative data from the pharmacists were gathered via the face-to-face and online platform. Data triangulation was used to validate the effect of healthcare provider antibiotic practices on antibiotic use among the residents of Tuguegarao City, Cagayan. Using a purposive sampling method, the researchers identified a total of 167 respondents with an age range of 18-60 years, 148 users, 10 physicians working in public/private clinics/ hospitals, and 9 community pharmacists working in a pharmacy/drugstore in Tuguegarao City participated in the study. The results of the study highlight that healthcare providers' antibiotic practices-mainly the physicians' prescribing practices, and pharmacists' dispensing practices- have different effects on the antibiotic use of the users. Physicians have a relative factor on antibiotic use. It emphasizes the physician's factors are mainly their behaviors when prescribing antibiotics and their practices in educating and counseling the users. Although the study concludes that pharmacists do not affect the way of consumption of the users on antibiotics, this highlights the impact of pharmacists enforcing the dispensing practices and their interventions. The strategies and interventions on rational antibiotic use should be encouraged by healthcare providers as it significantly contributes in reducing the antibiotic resistance in the country.

Keywords—antibiotic resistance, antibiotic use, healthcare providers.

I. INTRODUCTION

The World Health Organization (2022) defines antibiotics as medicines used to prevent and treat bacterial infections. These medicines are considered as cornerstone of modern medicine for they are needed to prevent and treat many community- and hospital-acquired bacterial infections. However, one of the major threats to public health today is the Antibiotic resistance (AR) which is rising to dangerously high levels in all parts of the world. Antibiotic Resistance occurs when bacteria change in response to the use of these medicines.

It is a form of drug resistance where bacteria can survive exposure to antibiotics. The bacteria which become resistant to antibiotics may infect humans and animals and the infections they cause become harder to treat as antibiotics become less effective. The formation of resistant bacteria is an inevitable process, which is speeded up due to human behavior according to the (Ventola, 2015; WHO, 2022).

The effectiveness of antibiotics is hampered by the rapid expansion of Antibiotic Resistance (AR) and a key driver of this is the inappropriate antibiotic consumption. Numerous studies have confirmed that increased antibiotic consumption has led to the emergence of antibiotic resistance worldwide. According to Machowska & Lundborg (2018), the crisis in antibiotic resistance has been attributed to the misuse and overuse of antibiotics. When these medicines are misused and overused, the bacteria that is present in an individual may become resistant to antibiotics via de novo gene mutation or by acquiring the genetic information that encodes Resistance from other bacteria. There are fundamental factors that lead to the acceleration of Antibiotic Resistance. According to Machowska & Lundborg (2018), the public's knowledge, attitude, and practices about antibiotics are strong determinants of irrational use of antibiotics.

More than 50% of all antibiotics are prescribed, sold, or dispensed inappropriately, while 50% of the patients are not taking antibiotics correctly. Some of the factors affecting this irrational use include socio-economic status, physicians' knowledge and training, patient load, diagnostic ambiguity, availability of treatment guidelines and pharmaceutical marketing. In developing countries, one of the most important factors affecting antimicrobial resistance is the lack of proper training of healthcare providers regarding proper antimicrobial use and infectious disease clinical diagnosis. There is a need to evaluate the current prescribing practices of antibiotics among the medical doctors and update their knowledge to eradicate the side effects caused by prescribing wrong antibiotics against specific microbial infections (Faizullah et al., 2017).

Antibiotic misuse and overuse in the Philippines have contributed to increased antibiotic-resistant infections, including ciprofloxacin resistance to *Staphylococcus aureus* of 60% and penicillin resistance to *Neisseria gonorrhoeae* of 84%, among others Lestari et. al (2021). According to the Antimicrobial Resistance Surveillance Reference Laboratory (2023), they had observed an increase in antibiotic Resistance

in the country as Filipinos took antibiotics even for sore throats and fevers. The attitudes and practices are linked to consumers' lack of knowledge about the rational use of antibiotics. The irrational use of antibiotics is linked to these patient factors. Nevertheless, the rational use of antibiotics is directly attributed to root factors, such as those from the healthcare-providers, particularly the prescribing physicians and pharmacists who dispense antibiotics. According to Al-Kubaisi et al., (2018), physicians who prescribe antibiotics without thorough examination of their patients and also by pharmacists who freely dispense antibiotics without prescriptions and without counseling have a big impact on inappropriate antibiotic use. The inappropriate drug use practices common in self-medication include short duration of treatment, inadequate dose, sharing of medicines, and avoidance of treatment upon the improvement of disease symptoms are all attributed to the responsibility of these health care providers.

These issues are mainly in the developing world in most parts of Southeast Asian Countries- such as the Philippines (Nepal & Bhatta, 2018; Zanichelli et al., 2019). The highest prevalence of antibiotic resistance is found in countries where people are least aware of the issue which makes the critical gap in the current understanding of antibiotic use. Currently, only few studies are published to date that have looked into the fundamental factors contributing to the Philippines' high antibiotic consumption. Also, the majority of the studies about factors contributing to the inappropriate antibiotic consumption are done from the perspective of patients or the general public. Therefore, to address the issue of the high prevalence of antibiotic resistance in the Philippines, there is a need to find out the other root factors that affect the general public's inappropriate consumption of antibiotics. This study used a combination of quantitative and qualitative research design to find out and describe the effect of health-care providers' practices, particularly the doctors and pharmacists, antibiotic prescribing and dispensing practices which affect the antibiotic use of the general public.

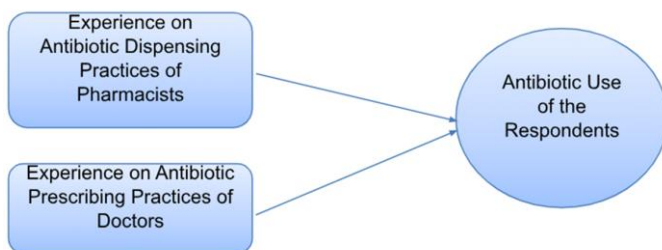


Fig. 1. Factors affecting Antibiotic Use

The figure above shows the independent and dependent variables. The independent variable consists of the users experienced on antibiotic dispensing practices of pharmacists and antibiotic prescribing practices of physicians while the independent variable antibiotic use of the respondents.

II. METHODS

A. Research Design

This study employed descriptive-quantitative research design and qualitative research design. Descriptive quantitative

research design was used to determine the level of antibiotic use among users, antibiotic dispensing behavior of pharmacists as experienced by the users and prescribing behavior of physicians as experienced by the users. On the other hand, qualitative research design was used to know the dispensing behavior of pharmacists and the prescribing behavior of physicians.

B. Locale and Respondents

The study was conducted in Tuguegarao City, Cagayan where there is a sufficient number of pharmacists, drugstores and physicians.

The respondents of the study were 148 residents of Tuguegarao City aged 18-60 years old who had a history of using antibiotics and should have experienced not completing the entire course of antibiotics, skipping doses, using leftover antibiotics for the treatment and purchasing antibiotics without prescription. The study also included 10 physicians who are working in public and private hospitals and clinics and 9 pharmacists working in local drugstore around Tuguegarao City.

TABLE I. PROFILE OF RESIDENT-PARTICIPANTS

Categories	Frequency (n=148)	Percentage
Sex		
Male	80	54.1
Female	60	45.9
Age		
18-39	134	90.6
40-59	11	7.4
60 and above	3	2.0
Educational Attainment		
Elementary	15	10.1
High school	57	38.5
College	68	45.9
Master's	7	4.7
Doctorate	1	0.7
Taken prescribed antibiotics		
Yes	20	13.5
No	128	86.5
Received counseling about antibiotic use		
Yes	55	37.2
No	93	62.8

The table above shows the profile of the residents included as respondents of the study. It can be seen on the table that the majority of them are males. with either a college, masters, or doctorate degree who have taken prescribed antibiotics and have not received any counseling about antibiotic use.

TABLE II. PROFILE OF HEALTH CARE PROVIDER-PARTICIPANTS

Categories	Frequency (n=148)	Percentage
PHYSICIANS		
Sex		
Male	1	10
Female	9	90
Age (Years)		
18-39	8	80
40-59	1	10
60 and above	1	10

Categories	Frequency (n=148)	Percentage
Years in Practice		
< 5 years	5	50
> 5 years	5	50
PHARMACISTS		
Sex		
Male	3	33.33
Female	6	66.67
Age (Years)		
19-26	5	55.56
27-34	3	33.33
> 35	1	11.11
Years of Experience		
< 1	3	33.33
1 to 2	4	44.44
> 2	2	22.22
Working Organization		
Chain	6	33.33
Independent	3	66.67

The table above shows that the majority of physicians included in the study are females and aged 18-39 years. Meanwhile the majority of pharmacists included in the study are females, aged less than 35 years, have a work experience of less than 2 years and are working in independent organizations.

C. Instrument

The study is a mixed-method design which consisted of a survey questionnaire for quantitative which was adopted from the study of Paes et al. (2017) and semi- structured interview questions for qualitative adapted from the study of Eibs et al. (2019) and Saleem et al. (2019). However, the researchers made revisions on some parts of the questionnaire to fit the instrument in the context of the study.

For the quantitative part for the users, the questionnaire is divided into four parts: The first part comprises items that gather the users' demographic profiles, such as their gender, area of residence, age, level of education, income, and antibiotic users' experience which is composed of 3 questions. The options for each statement were yes or no, scored as 1 and 2. For the second part, practices on antibiotic use were composed of 14 questions: i. obtaining antibiotics (4 items) ii. antibiotic consumption and dosing (7 items), and iii. use of leftover antibiotics (3 items). For the third part, questions relating to users' experience on antibiotic dispensing practices of pharmacists were composed of 13 questions. For the last part, 10 questions relating to users' experience on Antibiotic Prescribing Practices of Doctors. The options for each question were 1-never, 2-rarely, 3-sometimes, 4-often, and 5-always while for the negative statements, reverse coding was applied as follows: 5-never, 4-rarely, 3-sometimes, 2-often, 1-always.

For the qualitative part, the researchers used interview questions for both physicians and pharmacists. An 8-item interview guide was used to assess their antibiotic prescribing and dispensing experience. Furthermore, the questionnaire was submitted to experts for face validation.

D. Data Analysis

a) *Quantitative Analysis.* Data from the respondent's demographic profile were analyzed using the frequency and

percentage. To assess the level of antibiotic use among users, level of antibiotic dispensing behavior of pharmacists and level of antibiotic prescribing behavior of physicians weighted mean was used and reversed coded with the following range and qualitative descriptions.

TABLE III. QUALITATIVE INTERPRETATION FOR PHYSICIAN PRESCRIBING BEHAVIOR AND PHARMACIST DISPENSING BEHAVIOR

Mean Range	Qualitative Interpretation
1.00- 1.49	Very Poor
1.50- 2.49	Poor
2.50-3.49	Good
3.50-4.49	Very Good

Pearson correlation coefficient was used to determine the relationship between users' Antibiotic Use and experienced Pharmacist Dispensing Behavior and also to determine the relationship between users Antibiotic Use and experienced Physician Prescribing Behavior.

b) *Qualitative Analysis.* Analysis for the qualitative data for pharmacist and physician was based on thematic analysis by Clarke and Braun (2017) illustrated by the steps below: phase 1 familiarizing yourself with the data which consists of transcribing the data, reading and re-reading and noting down initial codes. For phase 2 generating initial codes which consist of the following step coding the interesting features of the data in a systematic fashion across the data-set and collating data relevant to each code. Phase 3 searching for themes consists of the following steps; collating codes into potential themes and gathering all the data relevant to each potential theme. For phase 4, involved reviewing the themes, consists of the following steps, checking if the themes work in relation to the coded extracts and the entire data-set, and generating thematic map. Phase 5 defining and naming themes consists of the following steps: ongoing analysis to refine the specifics of each theme and generation of clear names for each theme. For the last phase, producing the report consists of the following steps: final opportunity for analysis, selecting appropriate extracts, discussion of the analysis, relating back to research question or literature and producing the report.

E. Ethical Considerations

Researchers followed the rules and standards in directing research based on the Law on Data Privacy Act of 2012. The researchers ensured that the said respondents' rights, identity, and personal information would be respected and protected. Only the researchers had access to the data gathered, can refuse to release the personal information given to them, and can only use it for this research purpose. Informed consent was given to the respondents that contained the purpose of the study. They also have the right to decline their information and identity since this study is voluntary. Researchers are also expected to be more transparent and not fabricate the data or information given by the respondents. Ample time was given for them to answer the questions and this study was subjected to ethical clearance from Region 2 Trauma and Medical Center Institutional Review Board before the conduct of the study.

III. RESULTS AND DISCUSSION

TABLE IV. ANTIBIOTIC USE OF RESIDENTS

Category	Frequency (n=148)	Percentage
Poor	3	2.0
Good	54	36.5
Very Good	84	56.8
Excellent	7	4.7

It can be gleaned that the majority of the users are very good in terms of antibiotic use. In particular, they consult a doctor before starting antibiotics and they get antibiotics at the pharmacy with a prescription. Moreover, the results also imply that the users consume antibiotics as prescribed by the doctor and comply with the dosing regimen recommendation. This implies that the users managed their antibiotic consumption and dosing.

TABLE V. PHARMACISTS' PRACTICES RELATED TO ANTIBIOTIC USE

Variable	Category	Frequency (n=148)	Percentage
Pharmacists	Very Poor	1	.7
Antibiotics Dispensing Practices	Poor	22	14.9
	Good	102	68.9
	Very Good	23	15.5
Pharmacists Practices on Education and Counseling	Very Poor	3	2.0
	Poor	4	2.7
	Good	27	18.2
	Very Good	68	45.9
	Excellent	46	31.1

The results revealed that the majority of the residents have experienced very good pharmacists antibiotics dispensing practices and Pharmacists Practices on Education and Counseling.

The findings of the qualitative data collection from the pharmacists can be clustered into two main themes: A) Pharmacist Antibiotics Dispensing Practices B) Pharmacists Practices on Education and Counseling. These themes describe the practices of pharmacists when dispensing antibiotics to residents.

The results revealed that clients or residents have a very good level in terms of antibiotic use. Particularly, the users have a broad understanding on obtaining antibiotics, antibiotic consumption and dosing, leftover/unfinished antibiotics. This is consistent with previous studies (Jakupi et al., 2019; Jifar et al., 2018) claiming that taking full course of the antibiotic and not using leftover medicine shows a positive practice on antibiotic use.

Moreover, the study revealed that the users consumed antibiotics as prescribed by the doctor. This is consistent with the study of Voidāzan et al. (2019) wherein respondents only take the medication when prescribed by the physician considering that antibiotic resistance can be controlled by the use of fewer antibiotics. The study also shows that respondents do not consider going to another doctor if a doctor refuses to give them antibiotics. This contradicts the study of Wong et al. (2021) wherein there are respondents reported seeking an

alternative doctor in obtaining antibiotics if a doctor refused to prescribe antibiotics.

According to the findings of the study, users consult a doctor before starting their antibiotic. The findings are the same with the study of Jifar et al. (2018) where they highlighted that most of the respondents agreed on the need of the physician before taking antibiotics and getting prescriptions to purchase antibiotics.

When it comes to users obtaining antibiotics most of them get antibiotics at the pharmacy with a prescription and the users comply with the dosing recommendation of the physician. This is now disproving the study of Wong et al. (2021) wherein it reported that there is a small proportion of respondents obtaining antibiotics from a pharmacy without a physician prescription and shows a malpractice when it comes to adherence to recommended doses. As evident in this study, the resident of Tuguegarao City has a good level of practice on antibiotic use.

A. Antibiotics Dispensing Practices of Pharmacist

The quantitative results reveal that pharmacists have very good antibiotic dispensing practices which is supported by this subtheme. The pharmacists verbalize the need for strict adherence to the physicians' order and to make sure that the prescriptions are correctly written before dispensing any antibiotic to clients.

a) *Adherence to physician's prescription.* The results under this sub theme are about following the doctor's prescription. That pharmacist relayed the instructions of the physicians to the patient wherein the instructions to the patients depend on the prescription prescribed by the physicians. The pharmacists also indicated that they monitor the number of antibiotics sold to patients to ensure completeness of the prescribed drug. Moreover, pharmacists do not sell antibiotics if the prescription does not have doctor's information and that they keep the prescription if the users completed the number of the prescribed antibiotics. The following are sample verbalizations:

P07: "We only relay the doctor's order/signal to the patient especially if they have difficulty reading the instruction on their own because this will affect the patient's compliance. As a Pharmacist, patient counseling is a must, especially those medicines with restrictions like antibiotics."

P02: "I instruct or explain them how to take their antibiotics based on what the doctor prescribed. I always remind them to finish the treatment to prevent antibiotic resistance."

P01: "Instruct the patient to finish taking the antibiotics 5-7 days prior to the instruction of the physician."

b) *Ensuring the presence and correctness of the prescription.* The results indicated in this sub theme that pharmacists ensure that the contents are correct and that they consult with the physicians if they have any questions about the

prescriptions contents. The following are sample verbalizations:

P07: *“From my experience, a patient came to the pharmacy with a violative prescription. The generic name was almost not legible and there was no brand name written. Since I've been working here for a while now, I've been used to reading written prescriptions from doctors. I'm quite sure that the prescribed medication was Cefuroxime 500mg but we cannot dispense medication when we are not 100% sure. So, I call the physician to verify it and I was right. I then went back to the customer and did patient counseling to the patient.”*

P05: *“Approximately, 5 out of 10 patient ask for antibiotics w/o presenting a valid prescription.”-*

P09: *“The patients usually ask for antibiotics without prescription due to financial constraints for a physician's consultation.”*

Along Pharmacist' Dispensing Behavior experienced by the users, the results revealed that users had a very good level when it comes to Pharmacists Antibiotics Dispensing Practices and Pharmacists Practices on Education and Counseling, wherein, the users experience the pharmacists making sure that the prescription of the antibiotics is complete and that they are aware that pharmacists will not dispense any antibiotic without prescription. This is the same with previous studies (Khan et al., 2019; Nguyen et al., 2019) where most of the people were aware of prescription drugs and they understood that using antibiotics required prescriptions. The pharmacist also monitors the number of antibiotics sold to the users to ensure completeness of the prescribed drug. With this, the users become adherent to the antibiotic prescribed.

The users also experience pharmacist counseling about the possible side effects of the antibiotic. They buy and instruct them about the dosage and frequency of the antibiotic that users take. This is consistent with previous studies of (Ndaki et al., 2021; Paes et al., 2017) where pharmacists voluntarily explained adverse effects of the drugs to the patient and also voluntarily explained dosage and frequency. This implies that the users adhere to their antibiotic regimen when the Pharmacist has good dispensing practices, educating and counseling the users on their medication.

The outcome of the study shows that the users experienced a very good antibiotic dispensing behavior of pharmacists. This means that pharmacists are following and enforcing the dispensing practices and policies of antibiotics. Most of the pharmacists are not dispensing antibiotics to a respondent who doesn't have a prescription from a physician and also, pharmacists refuse to sell antibiotics from an old prescription therefore users cannot easily obtain/buy any antibiotic from any pharmacy/drugstore.

Lastly, the results revealed that users show a very good level when it comes to Physician Prescribing Behavior experienced by users. The users experience the doctors asking about the allergies and other clinical information before prescribing antibiotics to the users. The same with the study of Al-Homaidan (2018) where physicians ask about having allergies on a certain type of antibiotics and advice on how to deal with

severe adverse side effects. The finding also revealed that the users experience counseling by a doctor about completing/ adhering to the antibiotic course prescribed. This is the same with the study of Al- Homaidan (2018) wherein physicians advise their patient to complete the full course of treatment. The study also revealed that users experience doctors asking them about history and symptoms of their infection before prescribing antibiotics. This is consistent with the study of Krishnakumar et al. (2019) wherein they took the patient's history of antibiotic treatment into account and most of them avoid prescribing antibiotics that had not proved effective in the patient in the past.

B. Pharmacists' Practices on Education and Counseling

The quantitative results reveal that pharmacists have very good practices related to education and counseling which is supported by this subtheme. The pharmacists verbalized that they perform counseling and some form of health education whenever they dispense antibiotics to clients.

a) *Counseling about appropriate use of antibiotics.* The results under this sub theme are about pharmacists counseling the users and educating on the differences and similarities of the generic and branded drugs. Also, the counseling experience on dealing with the different conditions of the people and the common topics when discussing appropriate use of antibiotics. The following are sample verbalizations:

P01: *“If the medicine prescribed is branded (expensive) and they can't afford, give them options, explain that generic drugs are the same with branded.”*

P03: *“We always tell customers how long they should take the antibiotic. There are instances where pediatric antibiotics are bought with excess volume, whenever this happens, we tell them to disregard the excess after the regimen is over. We also tell them to shake reconstituted antibiotics before administration and that it should be refrigerated.”*

P07: *“It is given with written instructions for PWD and senior citizen patients and instructing verbally for those patients refusing to have a written one.”*

b) *Correcting misconceptions about antibiotics.* The results under this subtheme discuss the reasons why users demand for antibiotics without prescription and the inappropriate ways of administering antibiotics. The following are sample verbalizations:

P02: *“That they left their prescription at home, or that it's their maintenance medicine. Some also say they misplaced one or two.”*

P09: *“The patients usually ask for antibiotics without prescription due to financial constraints for a physician's consultation.”*

P01: *“ibubudbod sa sugat, “masakit ang ngipin” “masakit ang ulo”*

TABLE VI. PHYSICIANS' PRACTICES RELATED TO ANTIBIOTIC USE

Variable	Category	Frequency (n=148)	Percentage
Physicians' Antibiotics Prescribing Practices	Very Poor	1	0.7
	Poor	1	0.7
	Good	13	8.8
	Very Good	80	54.1
Physicians' Practices on Education and Counseling	Excellent	53	35.8
	Very Poor	1	0.7
	Good	13	8.8
	Very Good	54	36.5
	Excellent	80	54.1

The table above shows that the majority of physicians have very good practices in prescribing antibiotics and that they have excellent practice on counseling and education of their patients about antibiotic use.

The findings of the qualitative data collection from the pharmacists can be clustered into two main themes: A) Pharmacist Antibiotics Dispensing Practices B) Pharmacists Practices on Education and Counseling. These themes describe the practices of pharmacists when prescribing antibiotics to residents.

A. Physician consideration for antibiotics prescribing

The quantitative results reveal that physicians have very good practices related to prescribing antibiotics which is supported by this subtheme. The physicians verbalized the need to consider certain factors about their patients before prescribing antibiotics. Physicians were asked about the factors that have an effect on their decision to prescribe antibiotics and how they decide which patients need antibiotics. The physicians ask about history and symptoms of infection and also the presence of any allergies and other clinical and personal information before prescribing antibiotics. The following are sample verbalizations:

PH01: "depends on the history, physical examinations, and laboratory results of a patient"

PH02: "It depends on the symptoms and health condition of the patients"

PH03: "Availability if medicines, financial constraints"

PH04: "Depends on the type of disease/s to be treated, type of antibiotic pregnancy category, age"

B. Physicians' practices on education and counseling

The quantitative results reveal that physicians have excellent practices related to education and counseling about antibiotic use which is supported by this subtheme. The physicians verbalized the need to educate patients about strict adherence to and completion of the antibiotic regimen and also to address any misconceptions or misinformation verbalized by their patients about antibiotics and the underlying diseases.

a) *Strict adherence to physician instructions on correct antibiotic use.* The results under this sub theme are about the information and instruction of physicians that prevents antibiotic resistance such as compliance to dosage regimen and adherence to the prescription. Physicians were asked what

information do they give to a patient concerning antibiotic medicine The following are sample verbalizations:

PH01: "Regarding strictly following the frequency and duration to avoid antibiotic resistance"

PH02: "Right dosage and importance of duration and completion of antibiotics"

PH03: "The dosing, time when to take and for how many days to take the antibiotic"

b) *Addressing patients with misconceptions about antibiotics.* The results of this subtheme are about the needed information to correct the misconceptions of patients on antibiotic use. The following are sample verbalizations:

PH04: "I counsel them with regards to their Completion of antibiotics as prescribed to avoid resistance"

PH05: "that they should not take just any antibiotic, if not prescribed by doctor, also the adverse effects"

PH06: "I educate my patients about antibiotic resistance and the importance of consulting with a doctor for proper treatment"

This study has also identified themes that lend critical insights on practices of physicians when prescribing antibiotics and shed light on the underlying gap on the factors that affect antibiotic use. The themes have sub themes relating to the consideration for prescribing antibiotics, strict adherence to physician instruction on correct antibiotic use, and educating patients with misconceptions about antibiotics.

The importance of such elements has highlighted that physician prescribing behaviors have underlying factors. Physicians' considerations include clinical condition or status of the patient which include results of laboratory tests, history of antibiotic use and history of allergies. They also consider the financial condition of the patient and the availability of the antibiotic in the market. These underlying factors influence their decision to prescribe antibiotics, including issues such as medicine shortages, potential side effects due to hygienic conditions, time constraints, laboratory results, availability of medications, financial limitations, and the high risk of antibiotic resistance.

The results reveal that physicians are doing their part when it comes to prescribing antibiotics. This indicated that the positive behavior on antibiotic prescribing of physicians can greatly reduce the inappropriate use of antibiotics.

The connection of this factor to physicians is supported by the findings of Basu & Garg (2018) noted that prescribing antibiotics to patients represents an ethical dilemma for physicians. Navasardyan et al (2016) also noted in the study that most doctors prescribed antibiotics simply because of patient demands and pressure. Hence, it is up to the physicians whether they prescribe antibiotics to the patients based on their considerations and not on the pressure and demands of patients. Consequently, physicians really demonstrate a big factor on antibiotic resistance and antibiotic use based on their ability and capacity and their personality in prescribing antibiotics.

Consultation and counseling of the physicians also highlight the underlying factors on antibiotic use. Results of the study

showed that physicians are doing their responsibility when it comes to consultation standards and counseling before prescribing antibiotics. This is important because patients are most likely having higher trust in physicians and thus it relatively increases antibiotic regimen adherence. Thus, when the physician instructs the patient well and mentions the complete information during the antibiotic regimen of patients, and provides complete counseling regarding the patients' misconceptions.

With these, the primary strength of this study therefore lies in widening the current understanding on the practices of antibiotic use, and it reveals the healthcare-related factors of antibiotic use. This can be cohesively applied in making a strategy on reducing the inappropriate antibiotic use through the healthcare team.

TABLE VII. RELATIONSHIP BETWEEN ANTIBIOTIC USE OF RESIDENTS AND HEALTHCARE PROVIDER PRACTICES

Variable	R-value	p-value	Decision
Pharmacists Antibiotics Dispensing Practices	0.146	0.077	Accept Ho
Pharmacists Practices on Education and Counseling	0.102	0.215	Accept Ho
Physicians Antibiotics Prescribing Practices	0.221	0.007	Reject Ho
Physicians Practices on Education and Counseling	0.395	0.000	Reject Ho

* SIGNIFICANT AT 0.05 LEVEL

The table above shows that there is no relationship between the antibiotic use of residents and the dispensing behaviors of pharmacists. However, it can be seen that the antibiotic use of residents is positively correlated with the physicians' prescribing behavior.

The study revealed that the Users' Antibiotic Use and experienced Pharmacists Dispensing behavior have a positive relationship with Pharmacists Antibiotic Dispensing Practices. The study also shows that there is no significant Relationship between Users' Antibiotic Use and experienced Pharmacist Dispensing Behavior as to Dispensing Practices. Furthermore, the study also revealed that there is no significant relationship between Users' Antibiotic Use and experienced Pharmacist Dispensing Behavior as to Education and Counseling Practices but shows a positive relationship between the two. These study findings are consistent with previous research (Alhomoud et al., 2018; Roque et al., 2013), which identified poor regulation of antibiotics—due to insufficiently enforced policies—and the practice of acquiring antibiotics from pharmacies without a prescription as key reasons for antibiotic self-treatment. With this finding, Pharmacists in Tuguegarao City have proven that the strict enforcement on the policies regarding antibiotic dispensing can contribute in reducing the Antibiotic resistance in the country. However, it is then revealed that pharmacist antibiotic dispensing is not a factor on the inappropriate antibiotic use.

This study has identified themes that lend critical insights on pharmacists' practices when dispensing antibiotics and shed

light on the underlying gap on the factors that affect antibiotic use. The themes have sub themes relating to the adherence to physicians' prescription, ensuring presence and correctness of prescription, counseling about appropriate use of antibiotics, and correcting misconceptions about antibiotics. Such elements revealed that pharmacists demonstrated a very good dispensing behavior and that this has proved that different demographics of pharmacists are not an underlying factor on their positive antibiotic dispensing practices. The study of Chokshi et al. (2019) highlighted that medical practitioners play an important role in consumption and control of antibiotics. The outcome of the study showed that the importance of such elements/ themes has highlighted that pharmacists are doing their roles and responsibilities when it comes to Antibiotic dispensing. For example, they are complying with the physician's prescription and that they know that it is their role to relay the instruction/ prescription of the physician to the patient. This supports the study of Brennan and Mattick (2013) which noted that pharmacists disseminated the information to both patients and their physicians. The pharmacist also offered to contact the patient's physician to discuss the medication use. With the patient's consent, the prescriber was sent a copy and asked if he or she wished to start the identified medication. The pharmacist made a follow-up call to the patient to inform him or her about the prescriber's decision. Thus, instructions and education of the patient also depend on the prescription.

Despite the said role of the pharmacist in relying on the physicians' prescription, pharmacists also ensure the presence and correctness of the prescription. Although Paravattil et. al (2021) said that there is a limited collaboration between pharmacists and prescribers, the study reveals that there is a collaboration of pharmacists and physicians in terms of ensuring the correctness of prescription. Since it is mentioned, pharmacists verify to the physicians when they are unsure on the given prescriptions which include the medicines prescribed (involves the generic and brand name tandem) and instructions to the patients (pertains to the dosing regimen). This finding supports the conclusion in Albassam et. al (2020) that collaborative practice between physicians and pharmacists has a positive effect on healthcare outcomes.

These practices are connected to the role of pharmacists in counseling about the appropriate use of antibiotics and correcting the misconception about antibiotics as an intervention in a possible medication error from the physician. The results showed that this practice of pharmacists includes the counseling about the correct dosage the patient should take, highlighting the correct patient compliance to dosage regimen, and the importance of the branded and generic name and the difference of generic and branded medicines. This result proved the findings of Özcebe (2022) that in the communication of pharmacists and patients during counseling it is focused on the treatment duration, the prescribed dosage, and side effects. Thus, this result reveals that physicians' antibiotic prescription is the basis of pharmacists in correct dispensing of the prescribed antibiotics to the patients.

IV. CONCLUSION

The researchers conclude that the residents of Tuguegarao use antibiotics in a favorable manner. The residents also believe

that pharmacists' and physicians' practices relating to antibiotic use are very good. However, only the physicians' practices on antibiotic prescribing are related to the antibiotic use of the residents. However, the pharmacists' role on antibiotic use and the prevention of antibiotic resistance should not be overlooked. The researchers also conclude that pharmacists and physicians are able to adhere to important guidelines that may assist clients in the correct and responsible use of antibiotics and eventually the prevention of antibiotic resistance.

V. RECOMMENDATIONS

In the light of the findings and conclusion derived from the study, the researchers recommend the following:

- Clients need to be educated on the role of pharmacists in antibiotic use in order to foster correct antibiotic use and prevent the occurrence of antibiotic resistance;
- Pharmacists should have a strong pharmacist- patient relationship in order to improve the medication adherence of the patient. Continuous implementation of health education programs about proper use of antibiotics and antibiotic resistance;
- There's an urgent need for more studies exploring the relationship of antibiotic dispensing and prescribing practices of healthcare providers with antibiotic use, as it was challenging to find plenty of relevant studies;
- Expand the research into a longitudinal study to look at further characteristics that could influence the development of effective antibiotic use, dispensing practices of pharmacists and prescribing practices of physicians; and
- Future research can broaden the study in order to consider other areas who are not aware of antibiotic use.

ACKNOWLEDGMENT

The researchers would like to express their appreciation and sincerest gratitude to the people behind the success of this study for, without them, the researchers would not have accomplished this humble output;

First, we give our passionate admiration and gratefulness to God for giving us the strength, courage, and guidance despite the tough situation all throughout the conduct of this study. We give our greatest gratitude to Ms. Ivy Paulette B. Antonio, our research instructor, for her sacrifices and efforts in providing us the knowledge and understanding we needed to successfully finish the study. We also give our utmost gratitude to Ms. Jonalyn P. Santos, for guiding and imparting her knowledge and skills to help us achieve the accomplishment of the study. We give our earnest appreciation to our friends and family for their support and sacrifices.

Lastly, we endlessly give our gratitude to our beloved school, University of Saint Louis Tuguegarao, for letting us improve with the Louisian Core Values which motivated us to do the best in this study.

REFERENCES

Albassam A, Almohammed H, Alhujaili M, Koshv S & Awad A (2020) Perspectives of primary care physicians and pharmacists on interprofessional collaboration in Kuwait: A quantitative study. *PLoS one*, 15(7), e0236114. <https://doi.org/10.1371/journal.pone.0236114>

Alhomoud, F., Aljamea, Z., & Basalelah, L. (2018). "Antibiotics kill things very quickly" – consumers' perspectives on non-prescribed antibiotic use in Saudi Arabia. *BMC Public Health*, 18(1). <https://doi.org/10.1186/s12889-018-6088-z>

Al-Homaidan, H. T., & Barrimah, I. F. (2018). Physicians' knowledge, expectations and practice regarding antibiotic use in primary health care. *International journal of health sciences*, 12(3), 18. <https://pubmed.ncbi.nlm.nih.gov/29896067/>

Al-Kubaisi, K. A., de Ste Croix, M., Vinson, D., Ellis, L., Sharif, S. I., & Abdulkarem, A. R. (2018). What drives using antibiotic without prescriptions? A qualitative interview study of university students in United Arab Emirates. *Pharmacy Practice*, 1172. <https://doi.org/10.18549/pharmpract.2018.02.1172>

Antimicrobial Resistance Surveillance Reference Laboratory. (2023). *Antimicrobial Resistance Surveillance Program Annual Report 2022*. Manila, Philippines. Accessed from https://arsp.com.ph/wp-content/uploads/2023/06/2022_annual_report_summary.pdf

Basu, S., & Garg, S. (2018). Antibiotic prescribing behavior among physicians: ethical challenges in resource-poor settings. *Journal of medical ethics and history of medicine*, 11. <https://pubmed.ncbi.nlm.nih.gov/30258555/>

Brennan, N., & Mattick, K. (2013). A systematic review of educational interventions to change behaviour of prescribers in hospital settings, with a particular emphasis on new prescribers. *British journal of clinical pharmacology*, 75(2), 359-372. <https://doi.org/10.1111/j.1365-2125.2012.04397.x>

Clarke V & Braun V (2017) Thematic analysis *The journal of positive psychology*, 12(3), 297-298. <https://doi.org/10.1080/17439760.2016.1262613>

Chokshi, A., Sifri, Z., Cennimo, D., & Horg, H. (2019). Global contributors to antibiotic resistance. *Journal of global infectious diseases*, 11(1), 36. DOI: 10.4103/jgid.jgid_110_18

Eibs, T, Koscalova A, Nair M, Grohma P, Kohler G, Bakhit R G & Jimenez, C. (2020). Qualitative study of antibiotic prescription patterns and associated drivers in Sudan, Guinea-Bissau, Central African Republic and Democratic Republic of Congo. *BMJ open*, 10(9), e036530. <https://doi.org/10.1136/bmjopen-2019-036530>

Faizullah, M., Rahman, N. U., Umar, N. I., Anwar, M., & Sarfraz, M. (2017). A cross-sectional study on knowledge, attitude and practices of medical doctors towards antibiotic prescribing patterns and resistance in Khyber Pakhtun Khawah, Pakistan. *Journal of Applied Pharmaceutical Science*. Published. <https://doi.org/10.7324/japs.2017.71205>

Jakupi, A., Raka, D., Kaae, S., & Sporrang, S. K. (2019). Culture of antibiotic use in Kosovo - an interview study with patients and health professionals. *Pharmacy Practice*, 17(3), 1540. <https://doi.org/10.18549/pharmpract.2019.3.1540>

Jifar, A., & Ayele, Y. (2018). Assessment of Knowledge, Attitude, and Practice toward Antibiotic Use among Harar City and Its Surrounding Community, Eastern Ethiopia. *Interdisciplinary Perspectives on Infectious Diseases*, 2018, 1-6. <https://doi.org/10.1155/2018/8492740>

Khan, F. U., Khan, F. U., Hayat, K., Ahmad, T., Khan, A., Chang, J., Malik, U. R., Khan, Z., Lambojon, K., & Fang, Y. (2021). Knowledge, Attitude, and Practice on Antibiotics and Its Resistance: A Two-Phase Mixed-Methods Online Study among Pakistani Community Pharmacists to Promote Rational Antibiotic Use. *International Journal of Environmental Research and Public Health*, 18(3), 1320. <https://doi.org/10.3390/ijerph18031320>

Krishnakumar, J., & Tsopra, R. (2019). What rationale do GPs use to choose a particular antibiotic for a specific clinical situation? *BMC Family Practice*, 20(1). <https://doi.org/10.1186/s12875-019-1068-7>

Lestari, E.S., J.A. Severin, and H.A. Verbrugh (2012) Antimicrobial resistance among pathogenic bacteria in Southeast Asia. *Southeast Asian Journal of Tropical Medicine & Public Health*; 43(2): p. 385-422. PMID: 23082591.

Machowska, A., & Stålsby Lundborg, C. (2018). Drivers of Irrational Use of Antibiotics in Europe. *International Journal of Environmental Research and Public Health*, 16(1), 27. <https://doi.org/10.3390/ijerph16010027>

Navasardyan, N., Harutunyan, T., & Abrahamyan, I. (2016). Antibiotic use: a cross-sectional survey of knowledge, attitude and practice among Yerevan adult population. *Master of Public Health Integrating Experience Project, Yerevan: American University of Armenia*. Accessed from https://chs.aua.am/files/2016/06/Nare-Navasardyan_Thesis-project.pdf

Ndaki, P., Mushi, M., Mwanga, J., Konje, E., Ntinginya, N., Mmbaga, B., Keenan, K., Sabiti, W., Kesby, M., Benitez-Paez, F., Sandeman, A., Holden, M., & Mshana, S. (2021). Dispensing Antibiotics without Prescription at Community Pharmacies and Accredited Drug Dispensing Outlets in Tanzania: A Cross-Sectional Study. *Antibiotics*, 10(8), 1025. <https://doi.org/10.3390/antibiotics10081025>

Nepal, G., & Bhatta, S. (2018). Self-medication with Antibiotics in WHO Southeast Asian Region: A Systematic Review. *Cureus*, 10(4), e2428. <https://doi.org/10.7759/cureus.2428>

Nguyen, H. O., Nguyen, N. T., Hughes, C. M., & O'Neill, C. (2019). Trends and impact of antimicrobial resistance on older inpatients with urinary tract infections (UTIs): A national retrospective observational study. *PLoS one*, 14(10), e0223409. <https://doi.org/10.1371/journal.pone.0223409>

Özcebe, H., Üner, S., Karadağ, O., Darvani, A., Gershuni, O., Czabanowska, K., & Brzoska, P. (2022). Perspectives of physicians and pharmacists on rational use of antibiotics in Turkey and among Turkish migrants in Germany, Sweden and the Netherlands: a qualitative study. *BMC primary care*, 23(1), 29. <https://doi.org/10.1186/s12875-022-01636-8>

- Paes, M., & Sa, S. (2017). Drug dispensing practices in private pharmacies in Goa. *National Journal of Physiology, Pharmacy and Pharmacology*, 1. <https://doi.org/10.5455/njppp.2017.7.1041109112017>
- Paravattil B, Zolezzi M, Nasr Z, Benkhadra M, Alasmari M, Hussein S, & Maklad, A. (2021). An interventional call-back service to improve appropriate use of antibiotics in community pharmacies. *Antibiotics*, 10(8), 986. <https://doi.org/10.3390/antibiotics10080986>
- Roque, F., Soares, S., Breitenfeld, L., López-Durán, A., Figueiras, A., & Herdeiro, M. T. (2013). Attitudes of community pharmacists to antibiotic dispensing and microbial resistance: a qualitative study in Portugal. *International Journal of Clinical Pharmacy*, 35(3), 417–424. <https://doi.org/10.1007/s11096-013-9753-4>
- Saleem, Z., Hassali, M. A., Hashmi, F. K., Godman, B., & Saleem, F. (2019). Antimicrobial dispensing practices and determinants of antimicrobial resistance: a qualitative study among community pharmacists in Pakistan. *Family Medicine and Community Health*, 7(3), e000138. <https://doi.org/10.1136/fmch-2019-000138>
- Ventola C. L. (2015). The antibiotic resistance crisis: part 1: causes and threats. *P & T: a peer-reviewed journal for formulary management*, 40(4), 277–283. World Health Organization (2020) Antimicrobial Resistance <https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance>
- Wong, L. P., Alias, H., Husin, S. A., Ali, Z. B., Sim, B., & Ponnampalavanar, S. S. L. S. (2021). Factors influencing inappropriate use of antibiotics: Findings from a nationwide survey of the general public in Malaysia. *PLOS ONE*, 16(10), e0258698. <https://doi.org/10.1371/journal.pone.0258698>
- World Health Organization. (2022). *Antimicrobial Resistance Multi-Partner Trust Fund annual report 2021*. Food & Agriculture Org. Accessed from <https://books.google.com/books?hl=en&lr=&id=fx4FAAAQBAI&oi=fnd&pg=PA14&dq=antimicrobial+resistance+surveillance+program+annual+report+2022+department+of+health&ots=TSCCqzmeM&sig=tz6yRm7Z1jW-bCgEiHzm3GsKwfg>
- Zanichelli, V., Tebano, G., Gyssens, I., Vlahović-Palčevski, V., Monnier, A., Stanic Benic, M., Harbarth, S., Hulscher, M., Pulcini, C., & Huttner, B. (2019). Patient-related determinants of antibiotic use: a systematic review. *Clinical Microbiology and Infection*, 25(1), 48–53. <https://doi.org/10.1016/j.cmi.2018.04.031>