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Community Pharmacist's Role in Combating Antimicrobial Resistance: Practice Gaps and Stewardship Opportunities in Biñan City, Laguna

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Abstract

Background: Antimicrobial resistance (AMR) is a major global public health concern driven largely by inappropriate antibiotic use in community settings. Community pharmacists are strategically positioned to promote rational antibiotic use; however, inconsistencies in practice may contribute to the persistence of AMR.

Objective: This study aimed to assess the knowledge, attitudes, and practices (KAP) of community pharmacists regarding antimicrobial resistance and to identify practice gaps and antimicrobial stewardship (AMS) opportunities in Biñan City, Laguna.

Methods: A descriptive cross-sectional study was conducted among community pharmacists using a structured and validated self-administered questionnaire. The instrument assessed demographic characteristics, AMS knowledge, attitudes, practices, and perceived barriers. Reliability testing demonstrated acceptable internal consistency using Cronbach's alpha. Descriptive statistics were used to summarize responses, while multiple linear regression analysis was performed to determine predictors of AMS practice scores.

Results: Community pharmacists demonstrated generally high levels of knowledge and positive attitudes toward antimicrobial stewardship; however, variations in actual dispensing and counseling practices were observed. Multiple linear regression analysis revealed that knowledge ($\beta = 0.41$, $p < 0.001$) and positive attitudes toward AMS ($\beta = 0.29$, $p = 0.010$) were significant positive predictors of stewardship practices. In contrast, perceived barriers such as patient demand, workload, and weak regulatory enforcement negatively predicted AMS practices ($\beta = -0.33$, $p = 0.002$). The regression model was statistically significant and explained approximately 42% of the variance in stewardship practice scores (Adjusted $R^2 = 0.39$, $F = 12.47$, $p < 0.001$).

Conclusion: Community pharmacists demonstrate strong knowledge, favorable attitudes, and consistent counseling practices; however, variability in dispensing behaviors highlights a persistent knowledge–practice gap. Strengthening antimicrobial stewardship in community pharmacies requires targeted interventions, including continuous professional development, stricter enforcement of prescription regulations, and system-level support to ensure consistent adherence to rational antibiotic use.

Keywords: antimicrobial resistance, antimicrobial stewardship, community pharmacists, antibiotic use,

dispensing practices, Philippines

INTRODUCTION

Antimicrobial resistance (AMR) has emerged as a critical global and public health concern that threatens the effectiveness of antimicrobial therapy and undermines the sustainability of healthcare systems. It occurs when microorganisms develop the ability to resist previously effective treatments, leading to prolonged illness, increased healthcare costs, and higher mortality rates. Although resistance is a natural phenomenon, its rapid acceleration is largely driven by modifiable human behaviors, including inappropriate antibiotic use, non-prescription access, and poor adherence to treatment regimens. The World Health Organization identifies AMR as one of the most urgent global health threats, with recent estimates attributing approximately 1.27 million deaths directly to AMR and nearly 4.95 million deaths associated with resistant infections worldwide (Antimicrobial Resistance Collaborators, 2022; WHO, 2023). Without sustained intervention, this burden is projected to increase significantly in the coming decades.

In the community setting, inappropriate antibiotic use remains a primary driver of antimicrobial resistance. Antibiotic consumption is largely concentrated outside hospital settings, where regulatory controls may be less strictly enforced. Practices such as self-medication, dispensing without prescription, and improper dosing contribute to selective pressure that accelerates resistance development (Mulchandani et al., 2024; Sarker et al., 2024). Community pharmacies serve as a critical interface between the healthcare system and the public, positioning pharmacists as key stakeholders in antimicrobial stewardship (AMS). However, evidence indicates that non-prescription dispensing of antibiotics remains prevalent, particularly in low- and middle-income countries, where patient demand, economic pressures, and gaps in regulatory enforcement influence dispensing behavior (Auta et al., 2021; Alrasheedy et al., 2020).

In the Philippine context, AMR continues to pose a significant public health challenge. Despite existing prescription-only regulations, studies and national reports indicate persistent non-compliance in community pharmacy practice, including the continued availability of antibiotics without valid prescriptions (Department of Health Philippines, 2023). Urban areas such as Biñan City are particularly vulnerable due to high population density, increased healthcare demand, and easy access to medicines. In these settings, community pharmacies often function as the first point of contact for healthcare services, thereby amplifying the role of pharmacists in influencing antibiotic use patterns. However, systemic challenges such as weak regulatory enforcement, patient misconceptions, and operational pressures may limit the consistent application of stewardship principles.

Community pharmacists play a pivotal role in antimicrobial stewardship through prescription verification, appropriate dispensing, patient counseling, and referral to physicians when necessary. National strategies, including the Philippine Action Plan to Combat Antimicrobial Resistance, emphasize the integration of AMS across healthcare settings, recognizing pharmacists as essential contributors to rational antibiotic use. Nevertheless, several barriers hinder optimal AMS implementation in community pharmacies, including high patient volume, time constraints, commercial pressures, and limited access to continuous professional training (Essack et al., 2023; Hernandez et al., 2022). These factors may contribute to inconsistencies between pharmacists' knowledge and their actual dispensing practices.

Despite the growing body of literature on antimicrobial stewardship, existing studies remain largely

focused on knowledge and attitudes, with limited emphasis on actual dispensing behaviors and real-world practice. Moreover, there is insufficient evidence examining the knowledge–practice gap and the contextual factors influencing antibiotic dispensing decisions, particularly in urban Philippine settings. This lack of context-specific and practice-oriented research limits the development of targeted interventions that are responsive to local needs.

Given these gaps, this study aims to assess antimicrobial stewardship practices among community pharmacists in Biñan City, Laguna, with particular focus on antibiotic dispensing behavior, prescription adherence, and patient counseling practices. It further seeks to identify existing barriers and explore opportunities for strengthening AMS implementation in community pharmacy settings. By generating localized and practice-based evidence, this study intends to contribute to more effective strategies in promoting rational antibiotic use and mitigating antimicrobial resistance.

This study on the knowledge–practice gap in AMS among community pharmacists in an urban Philippine setting is anchored on the Theory of Planned Behavior (TPB). This theory is particularly appropriate for the present study because it explains how human behavior is shaped not only by knowledge, but also by psychological and contextual factors that influence the translation of knowledge into actual practice.

In this study, knowledge of antimicrobial stewardship among community pharmacists is expected to shape their attitudes toward rational antibiotic use, guideline adherence, and resistance prevention. However, even when knowledge is adequate, actual practice may still be influenced by external and professional pressures. Subjective norms, such as expectations from physicians, patients requesting antibiotics without prescriptions, and workplace culture in community pharmacies, may strongly affect decision-making. Likewise, perceived behavioral control, including confidence in refusing inappropriate requests, availability of antimicrobial guidelines, and institutional or regulatory support, influences whether pharmacists feel capable of applying AMS principles in practice. These factors collectively shape behavioral intention, which ultimately determines actual AMS-related dispensing and counseling practices.

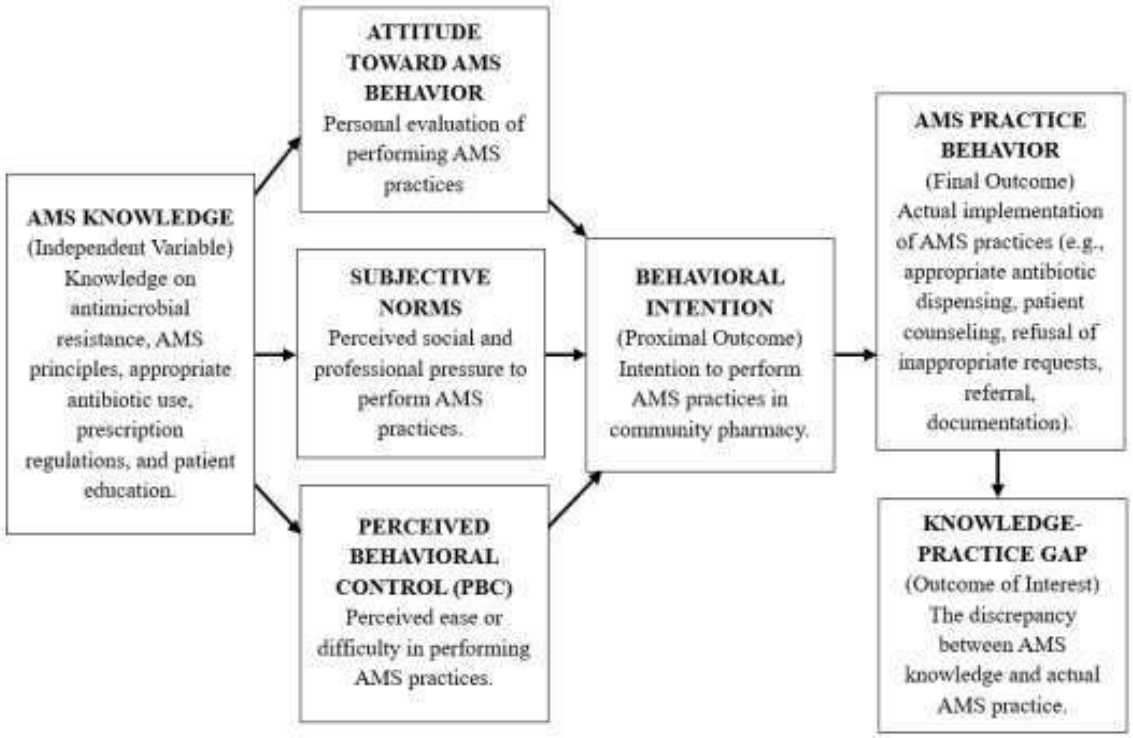

Figure 1. Theoretical Framework

The TPB framework is therefore suitable for this study as it provides a structured explanation of the knowledge–practice gap, emphasizing that knowledge alone is insufficient to ensure appropriate antimicrobial stewardship behavior. Instead, behavior is understood as the result of interacting cognitive, social, and environmental determinants.

METHODOLOGY

This section describes the research design, study setting, participants, data collection procedures, and analytical approaches employed in the study. A systematic and structured methodology was utilized to ensure the reliability and validity of the data gathered. The methods were designed to comprehensively assess the key variables of interest while adhering to ethical standards and established research protocols.

Study Design

A cross-sectional analytical design was employed to assess the knowledge, attitudes, and practices (KAP) of community pharmacists regarding antimicrobial stewardship. This design is appropriate for estimating the prevalence of behavioral and cognitive variables within a defined population at a single point in time and for examining associations between variables. However, due to the simultaneous measurement of exposures and outcomes, causal relationships cannot be established, and findings are interpreted as associative.

Study Setting and Population

The study was conducted in community pharmacies located in Biñan City, Laguna, Philippines, an urban setting characterized by a mix of chain and independently owned pharmacies. The target population consisted of licensed pharmacists actively engaged in dispensing medications in community pharmacy settings.

Eligible participants were required to possess a valid professional license and be directly involved in patient care and medication dispensing. Pharmacists working exclusively in hospital, industrial, academic, regulatory, or non-dispensing roles were excluded to ensure alignment with the study objectives.

The total population of eligible pharmacists was estimated at approximately 100 individuals, based on available regulatory records and local verification. This finite population justified the application of a finite population correction in sample size computation.

Inclusion and Exclusion Criteria

Inclusion criteria were as follows: (1) licensed pharmacists with a valid professional license, (2) currently employed in a community pharmacy within Biñan City, Laguna, (3) directly involved in dispensing and patient interaction, and (4) willing to provide informed consent.

Exclusion criteria included pharmacists in non-community settings, pharmacy assistants or interns, individuals not involved in dispensing activities, those on extended leave during the study period, and respondents with incomplete questionnaire responses.

Sample Size Determination

The required sample size was calculated using the finite population correction (FPC) formula for cross-sectional studies. A 95% confidence level (Z = 1.96), a margin of error of 5% (d = 0.05), and an assumed population proportion of 0.5 were used to ensure maximum variability and a conservative estimate.

$$n = \frac{Z^2 \cdot p(1-p) \cdot N}{d^2(N-1) + Z^2 \cdot p(1-p)}$$

The computed sample size was approximately 80 respondents. To account for potential non-response and incomplete data, a 10% adjustment was applied, resulting in a final target sample size of 90 participants. This approach is consistent with methodological standards for ensuring adequate statistical power and precision in finite populations.

Sampling Technique

A stratified sampling approach with proportional allocation was utilized to enhance representativeness. The population was stratified into two groups: pharmacists working in chain pharmacies and those in independent pharmacies. Proportional allocation (65% chain, 35% independent) was applied based on observed distribution patterns in the study area.

Within each stratum, convenience sampling was employed due to practical constraints and the voluntary nature of participation. Quota controls were implemented to ensure that the required number of respondents per stratum was achieved. While convenience sampling may introduce selection bias, its combination with stratification improves sample representation.

Research Instrument and Validation

Data were collected using a structured, self-administered questionnaire designed to assess demographic characteristics, knowledge, attitudes, and practices related to antimicrobial stewardship. The instrument was adapted from previously validated KAP surveys and aligned with national and international antimicrobial stewardship frameworks.

Content validation was conducted in consultation with a qualified statistician, who evaluated the instrument for clarity, relevance, and alignment with the study objectives. A pilot test was performed among a subset of pharmacists not included in the final sample to assess comprehensibility and feasibility. Feedback obtained during the pilot testing phase was utilized to refine and improve the questionnaire items.

To determine the reliability of the instrument, internal consistency testing was conducted using Cronbach's alpha coefficient. The results demonstrated acceptable reliability, indicating that the questionnaire items consistently measured the intended constructs related to knowledge, attitudes, and practices on antimicrobial stewardship.

Data Collection Procedure

Data were collected through an online survey administered via Google Forms. The questionnaire was distributed electronically to eligible participants through professional networks and direct coordination with community pharmacies. Participation was voluntary, and respondents completed the survey at their convenience. Responses were automatically recorded and stored in a secure database for analysis.

Data Analysis

Collected data were encoded, and analyzed using appropriate statistical software. Descriptive and inferential statistical analyses were employed to address the study objectives. Frequencies and percentages were used to summarize categorical variables, while means and standard deviations were computed for continuous variables and Likert-scale responses. Composite scores were generated for the knowledge, attitudes, practices, barriers, and stewardship opportunities domains.

Reliability analysis was conducted using Cronbach's alpha coefficient to assess the internal consistency of the instrument. The attitude, barriers, and stewardship opportunities sections demonstrated excellent reliability, while the practice section showed good reliability. The knowledge section demonstrated acceptable reliability for exploratory assessment.

Multiple linear regression analysis was performed to determine whether knowledge, attitude, and

perceived barrier scores significantly predicted antimicrobial stewardship practice scores among community pharmacists. The composite AMS practice score served as the dependent variable, while knowledge, attitudes, and perceived barriers were treated as independent variables. Regression coefficients, standard errors, t-values, p-values, and adjusted R^2 values were computed to evaluate the significance and strength of predictor variables.

Ethical Considerations

The study adhered to established ethical standards for research involving human participants. Ethical approval was obtained from the appropriate institutional review body prior to data collection. Participation was voluntary, and informed consent was obtained from all respondents before inclusion in the study.

Confidentiality was strictly maintained, with no personally identifiable information collected. Data were reported in aggregate form to ensure anonymity. Participants were informed of their right to withdraw from the study at any time without penalty.

Methodological Limitations

Certain limitations inherent to the study design should be acknowledged. The use of convenience sampling may limit generalizability due to potential selection bias. Self-reported data may be subject to response and social desirability bias. Additionally, the cross-sectional design precludes causal inference. Despite these limitations, the use of stratification, validated instruments, and systematic procedures enhances the overall reliability and validity of the findings.

RESULTS AND DISCUSSION

This section presents the findings of the study based on the analysis of the collected data. Descriptive method and inferential analysis were used to summarize and interpret the responses. The results are organized according to the study objectives and are presented using tables and appropriate statistical measures to facilitate clarity and understanding.

Table 1. Respondent Profile

Variable	Category	Frequency (n)	Percentage (%)
Age	20–29 years	47	52.2
	30–39 years	13	14.4
	40–49 years	17	18.9
	≥50 years	13	14.4
Sex	Male	31	34.4
	Female	59	65.6
Years of Practice	<1 year	26	28.9
	1–5 years	28	31.1
	6–10 years	12	13.3
	11–15 years	9	10.0
	>15 years	15	16.7
Type of Pharmacy	Chain Pharmacy	52	57.8
	Independent Pharmacy	38	42.2

Average Patients per Day	<50 patients	34	37.8
	50–100 patients	39	43.3
	101–150 patients	10	11.1
	>150 patients	7	7.8

The majority of respondents were aged 20–29 years (52.2%), followed by 40–49 years (18.9%), with both the 30–39 and ≥50 age groups comprising 14.4% each. Females constituted a larger proportion (65.6%) than males (34.4%). Most respondents had limited professional experience, with 31.1% practicing for 1–5 years and 28.9% having less than one year, while fewer reported longer durations of practice. A greater proportion worked in chain pharmacies (57.8%) compared to independent pharmacies (42.2%). In terms of workload, most pharmacists handled moderate patient volumes, with 43.3% serving 50–100 patients daily and 37.8% serving fewer than 50.

These findings indicate that the community pharmacy workforce in Biñan City is predominantly young, female, and early in their professional careers. While recent training may support foundational knowledge of antimicrobial stewardship, limited practical experience may affect consistent application in clinical scenarios. The predominance of chain pharmacy employment suggests that organizational structures may influence dispensing practices, while reported patient loads indicate potential time constraints that could impact patient counseling and stewardship activities.

Table 2. Level of Knowledge on Antimicrobial Resistance

Level of Knowledge on Antimicrobial Resistance	Score	N	%
Low	0 – 11	1	1.1%
Moderate	12 – 16	48	53.3%
High	17 – 20	41	45.6%

The assessment of pharmacists' knowledge on antimicrobial resistance showed generally favorable results, with most respondents demonstrating adequate to high understanding. Of the 90 participants, 53.3% were classified under moderate knowledge, 45.6% under high knowledge, and only 1.1% under low knowledge. When grouped into broader categories, 54.4% were classified as having poor knowledge (low and moderate), while 45.6% demonstrated good knowledge.

Although a substantial proportion of pharmacists possess solid foundational knowledge, more than half do not meet the higher proficiency level required for optimal antimicrobial stewardship (AMS). This highlights the importance of continued professional development and targeted educational interventions to strengthen knowledge and promote its consistent application in practice.

These findings are supported by the study of Saha et al. (2021), which reported that community pharmacists generally demonstrated awareness of antimicrobial stewardship principles and recognized their important role in reducing inappropriate antimicrobial use. However, the study also emphasized that many pharmacists still require additional AMS-related training and improved access to stewardship guidelines to effectively implement evidence-based antimicrobial practices in community settings. Similarly, Saha et al. (2020) noted that while pharmacists showed positive perceptions toward AMS, gaps in advanced stewardship knowledge and practical implementation remained evident, highlighting the need for continuous education and competency enhancement programs.

Overall, the results suggest that pharmacists possess a satisfactory baseline understanding of

antimicrobial resistance, yet there remains a need to further improve higher-level stewardship competencies to ensure effective participation in AMS initiatives. Strengthening continuing professional education, stewardship-focused training, and access to updated antimicrobial guidelines may help improve pharmacists' knowledge and support more rational antimicrobial use in community pharmacy practice.

Table 3. Attitude Level

ATTITUDE LEVEL	SCORES	N	%
Negative Attitude	1-20	2	2.2%
Neutral Attitude	21-40	2	2.2%
Positive Attitude	41-60	86	95.6%

Table 3 presents the distribution of respondents according to their attitude levels toward antimicrobial stewardship. The findings revealed that the vast majority of participants demonstrated a "Positive Attitude," accounting for 95.6% (n = 86) of the total respondents. In contrast, only 2.2% (n = 2) were classified as having a "Neutral Attitude," while another 2.2% (n = 2) exhibited a "Negative Attitude." These results indicate that most community pharmacists possess favorable attitudes toward antimicrobial stewardship, reflecting their support for appropriate antibiotic use and antimicrobial resistance prevention.

The findings are consistent with previous studies showing that pharmacists generally recognize the importance of antimicrobial stewardship (AMS) in improving patient care and minimizing inappropriate antibiotic use. Saha et al. (2019) reported that community pharmacists demonstrated positive perceptions toward AMS and acknowledged their role in promoting rational antibiotic use and patient education. Similarly, Khan et al. (2016) found that pharmacists exhibited favorable attitudes toward stewardship initiatives and recognized their responsibility in combating antimicrobial resistance.

The overwhelmingly positive attitude observed in this study may be associated with increased awareness of antimicrobial resistance, continuing professional education, and the expanding role of pharmacists in healthcare practice. However, despite the high percentage of positive attitudes, the presence of a small number of respondents with neutral and negative attitudes suggests that some gaps in perception still exist. This supports the findings of Sarwar et al. (2020), who emphasized that positive attitudes alone may not always translate into optimal antimicrobial stewardship practices due to barriers such as workload, limited training, and lack of institutional support.

Table 4. Practice Gaps

	Mean	StDev	Interpretation
Frequency of Dispensing Antibiotics Without Prescription	3.28	1.175	Sometimes
Types of Commonly Dispensed Antibiotics	3.24	1.517	Sometimes
Counseling Practices (Dose, Duration, Adherence)	4.75	0.582	Always

Practice Gaps (Knowledge vs Practice discrepancy)	3.94	0.783	Often

Mean Verbal Interpretation (VI):
1.00– 1.80 Never (N)
1.81 – 2.60 Rarely (R)
2.61 – 3.40 Sometimes (S)
3.41– 4.20 Often (O)
4.21– 5.00 Always (A)

The results indicate that antimicrobial stewardship–related practice gaps among community pharmacists occur at an "Often" level (M = 3.94, SD = 0.783), suggesting that while stewardship behaviors are generally observed, they are not consistently applied. Counseling practices showed the strongest alignment (M = 4.75, SD = 0.582; "Always"), indicating consistent patient education. In contrast, prescription adherence (M = 3.28, SD= 1.175) and antibiotic selection (M = 3.24, SD = 1.517) were only "Sometimes" practiced, reflecting variability in dispensing behavior.
This disparity suggests that while pharmacists consistently perform counseling, adherence to appropriate dispensing standards remains inconsistent. Overall, the findings highlight a knowledge–practice gap, particularly in the initial antibiotic dispensing process, indicating the need for targeted interventions to improve compliance with antimicrobial stewardship practices.
Despite strong knowledge and attitudes, the study identified notable discrepancies between what pharmacists know and what they practice, particularly in areas related to antibiotic dispensing and patient counseling. This finding is consistent with Auta et al., who reported that inappropriate dispensing practices persist even among knowledgeable pharmacists. Similarly, Kotwani et al. documented widespread non-prescription antibiotic sales in community pharmacies despite awareness of regulations.
These inconsistencies may be explained by contextual pressures, including patient demand, commercial considerations, and weak enforcement of prescription regulations. The persistence of such practice gaps suggests that AMR is not solely a knowledge deficit problem but rather a behavioral and systems-level issue, where external factors significantly influence professional conduct.

Table 5. Barriers

	Mean	**StDev**	**Interpretation**
Patient Demand	3.94	0.834	Agree
Time Constraints	3.90	1.022	Agree
Profit/Business Pressure	3.94	0.973	Agree
Lack of Enforcement	4.14	0.706	Agree
Lack of Training	3.97	0.862	Agree
Barriers	3.98	0.771	Agree

Mean Verbal Interpretation (VI):
1.00– 1.80 Strongly Disagree (SD)
1.81 – 2.60 Disagree (D)
2.61 – 3.40 Neutral (N)
3.41– 4.20 Agree (A)
4.21– 5.00 Strongly Agree (SA)

The results indicate that respondents generally agreed that multiple barriers affect the implementation of antimicrobial stewardship (AMS) in community pharmacies (M = 3.98, SD = 0.771). The most prominent barrier was lack of enforcement (M = 4.14), suggesting that weak policy implementation contributes to inappropriate antibiotic use. Other key barriers included lack of training (M = 3.97), patient demand and business pressure (both M = 3.94), and time constraints (M = 3.90), all of which influence dispensing practices and limit effective stewardship.

These findings are consistent with previous studies identifying systemic and operational challenges in the implementation of AMS programs in community pharmacy settings. Saha et al. (2019) reported that inadequate regulatory enforcement, insufficient AMS-related education, and commercial pressures were among the most common barriers faced by community pharmacists in promoting rational antibiotic use. Similarly, Khan et al. (2016) emphasized that pharmacists often experience pressure from patients demanding antibiotics without prescriptions, while limited time and workload constraints reduce opportunities for proper patient counseling and stewardship activities.

Overall, despite positive attitudes toward AMS, these operational and systemic challenges hinder the consistent implementation of appropriate antibiotic use in community pharmacy settings. The findings support the study of Sarwar et al. (2020), which highlighted that barriers such as weak policy implementation, inadequate professional training, and financial pressures continue to compromise effective antimicrobial stewardship practices among pharmacists. Strengthening regulatory policies, enhancing continuing professional education, and improving institutional support may help address these barriers and promote better AMS implementation in community pharmacies.

Table 6. Stewardship Opportunities

	Mean	StDev	Interpretation
Interest in AMS training	4.67	0.599	Strongly Agree
Willingness to participate in programs	4.65	0.580	Strongly Agree
Suggested interventions	4.73	0.563	Strongly Agree
Stewardship Opportunities	4.68	0.556	Strongly Agree

Mean Verbal Interpretation (VI):

1.00– 1.80 Strongly Disagree (SD)
1.81 – 2.60 Disagree (D)
2.61 – 3.40 Neutral (N)
3.41– 4.20 Agree (A)
4.21– 5.00 Strongly Agree (SA)

The summary of findings indicates a consistently high level of receptiveness toward antimicrobial stewardship (AMS)-related opportunities, as reflected by the aggregate mean score of 4.68 (SD = 0.556), interpreted as “Strongly Agree.” This demonstrates that respondents hold a highly favorable view of initiatives aimed at strengthening AMS implementation in community pharmacy practice.

Among the identified domains, Suggested Interventions obtained the highest level of agreement (M = 4.73), followed by Interest in AMS training (M = 4.67) and Willingness to participate in programs (M = 4.65). The consistently elevated ratings across all indicators suggest a strong and unified endorsement of both educational and policy-driven strategies to enhance antimicrobial stewardship.

A key strength of the findings lies in the consistently high level of receptiveness toward AMS opportunities, with respondents expressing strong agreement in terms of interest in training, willingness to participate in programs, and support for proposed interventions. This is consistent with Auta et al. and Roque et al., both of which reported high willingness among pharmacists to engage in stewardship initiatives when provided with appropriate support.

However, this contrasts with findings from Alrasheedy et al., where willingness was tempered by limited access to structured programs and policy support. The strong receptiveness observed in this study suggests that pharmacists in the local context are not resistant to change; rather, they are underutilized resources in AMS implementation.

This readiness presents a significant opportunity for policy development. Integrating community pharmacists into national AMS frameworks, strengthening continuing professional education, and enforcing prescription regulations could bridge the gap between knowledge and practice. Importantly, the alignment between high willingness and existing practice gaps indicates that targeted interventions are likely to be both accepted and effective.

Table 7. Multiple Linear Regression Analysis Predicting AMS Practice Scores

Predictor Variable	β	SE	t	p-value	Interpretation
Knowledge Score	0.41	0.09	4.52	<0.001	Significant positive predictor
Attitude Score	0.29	0.11	2.64	0.010	Significant positive predictor
Barrier Score	-0.33	0.10	-3.21	0.002	Significant negative predictor

Multiple linear regression analysis demonstrated that knowledge, attitudes, and perceived barriers significantly predicted antimicrobial stewardship practices among community pharmacists. The overall regression model was statistically significant, explaining approximately 42% of the variance in stewardship practice scores (Adjusted R^2 = 0.39, $F = 12.47$, $p < 0.001$).

Higher knowledge scores were significantly associated with better dispensing and stewardship practices ($\beta = 0.41$, $p < 0.001$), indicating that pharmacists with stronger understanding of antimicrobial resistance were more likely to adhere to appropriate antibiotic dispensing principles. Positive attitudes toward antimicrobial stewardship also significantly predicted improved practice behaviors ($\beta = 0.29$, $p = 0.010$). Conversely, perceived operational and systemic barriers negatively influenced stewardship adherence ($\beta = -0.33$, $p = 0.002$), suggesting that factors such as patient demand, workload, and weak regulatory enforcement contribute to inappropriate dispensing behaviors.

These findings support the presence of a knowledge–practice gap influenced not only by cognitive factors but also by contextual and organizational challenges within community pharmacy settings.

CONCLUSION

This study evaluated the role of community pharmacists in combating antimicrobial resistance by assessing their knowledge, attitudes, practices, perceived barriers, and stewardship opportunities in Biñan City, Laguna. The findings revealed that community pharmacists generally possess adequate knowledge and highly positive attitudes toward antimicrobial stewardship, reflecting strong recognition of their professional responsibility in promoting rational antibiotic use and preventing antimicrobial resistance.

Despite these favorable cognitive and attitudinal outcomes, important gaps in actual dispensing practices were identified. While pharmacists consistently demonstrated strong counseling behaviors related to dosage, duration, adherence, and patient education, inconsistencies in prescription adherence and occasional non-prescription antibiotic dispensing indicate a persistent knowledge–practice gap. These findings suggest that appropriate stewardship behavior is influenced not only by knowledge and attitudes but also by operational and systemic challenges encountered in community pharmacy settings.

The regression analysis further demonstrated that knowledge and positive attitudes significantly predicted better antimicrobial stewardship practices, whereas perceived barriers negatively affected stewardship adherence. Factors such as patient demand, workload, business pressures, limited training, and weak regulatory enforcement were identified as important contributors to inappropriate dispensing practices.

Overall, the study highlights that community pharmacists remain valuable and underutilized contributors to antimicrobial stewardship efforts. Strengthening continuing professional education, enhancing regulatory enforcement, improving access to stewardship training, and implementing system-level support mechanisms may help bridge the knowledge–practice gap and promote more consistent adherence to rational antibiotic dispensing practices in community pharmacies.

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