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Investigate Factors that Influence Dispensing Non-Prescription Antibiotics from Community Pharmacies in West Bank, Palestine

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Investigate Factors that Influence Dispensing Non-Prescription Antibiotics from Community Pharmacies in West Bank, Palestine

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Finally, I would like to thank all pharmacists who participated in the study, and I hope this study contribute to the improvement of antibiotic resistance (ABR) management in Palestine.

Declaration:

I certify that this thesis is submitted for the degree of Master graduation in applied industrial technology is my own research, except where otherwise acknowledges, and that this thesis (or any part of the same) has not been submitted for the higher degree to any other university or institute.

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Abstract

Objectives and Background: Antibiotic resistance (ABR) is considered one of the most risky problems with respect to human health, in which several pathogens are no longer sensitive to current antimicrobials and still have the ability to cause infections. Major bacterial infectious diseases kill over 11 million people per year. The aims of this study were to determine if respondents' proposed provision of antibiotics for URIs, diarrhea, and mild wounds is appropriate, and to examine the association between variables pertaining to respondents' prescription of antibiotics and demographic information about the pharmacies where they work, such as the pharmacy's type (independent or chain) and geography, and to look at the elements that are associated with respondents prescribing antibiotics and their demographic information, such as age, gender, years of experience, position within a pharmacy, and highest degree of education. In addition, the study aimed to examine respondents' perspectives about ABR and the connection between the characteristics that affect how respondents dispense antibiotics and how they feel about ABR. Moreover, the study aimed to gather respondents' opinions about prospective developments in the sensible use of antibiotics from community pharmacies. All these domains were examined to choose measures to increase the rationale use of antibiotics in the community.

Methodology: A total of 314 respondents were recruited in this study by a quantitative research method using a cross-sectional survey with a self-completing online questionnaire. The questionnaire was developed from the literature, and combined both closed-ended questions with tick boxes and statements with a Likert scale as well as open-ended inquiries. Three sections made up the questionnaire: the first section of the questionnaire covers case studies, information about resistance to antibiotics, and strategies for influencing the sensible use of antibiotics. In the second section, respondents are asked to provide demographic data regarding their local pharmacy, including its location and type. In the third section, questions are posed

regarding the respondents' history, including his or her age, gender, educational background, job title, and amount of pharmacy experience. The questionnaire was tested for content validity and reliability and was measured in our setting by Cronbach's alpha. Data collected online using Google forms were then exported to IBM SPSS version 22 to be evaluated and analysed regarding the tendency to supply inappropriate antibiotics and associated factors.

Results: According to the study, the highest rate of inappropriate supply of antibiotics was particularly for URIs from respondents. Employees and full-time pharmacists (p value=0.047), morning shift workers (p value=0.033) and bachelor of pharmacy degree holders (p value=0.044) were more likely to supply inappropriate antibiotics. Additionally, when the age variable was increased by one unit inappropriate antibiotic supply decreased by approximately 4.8 times and when the experience variable was increased by one unit, providing inappropriate antibiotics decreased by approximately 0.25 according to logistic regression analysis. With respect to diarrhea cases, employees and part-time pharmacists (p value=0.035), evening shift workers (p value=0.023), male pharmacists (p value=≤0.001) and pharmacy workers in rural areas (p=≤0.001) were more likely to supply inappropriate antibiotics. Regarding wound cases, owners and full-time pharmacists (p value= 0.03), both shift workers (p value=≤0.001), male pharmacists (p=0.002), bachelor of pharmacy degree holders (p value=0.018) and those working in chain pharmacies (p=≤0.001) were more likely to supply inappropriate antibiotics. Logistic regression regarding all cases combined revealed that when the gender variable was female, the inappropriate antibiotic supply decreased by approximately 8 times compared with males.

Conclusion: This study has effectively demonstrated that respondents' provision of antibiotics is not always appropriate and is impacted by clinical circumstances and demographic factors as well as their knowledge and awareness of antibiotics and ABR. These results indicate the need for a plan to enhance the proper supply and use of antibiotics, aimed at policymakers and healthcare professionals.

List of Abbreviations

ABR antibiotic resistance

NPA non-prescription antibiotic

AMS antimicrobial stewardship

URIs upper respiratory infections

RTIs respiratory tract infections

UTIs urinary tract infections

PMOH Palestinian Ministry of Health

PPE Persistent professional education

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Chapter one

Introduction

1.1 Antibiotics general background

1.1.1 Antibiotic history

Antibiotics are used to cure bacterial infections (WHO, 2018). The term antibiotic first appeared in 1941 by Selman Waksman to represent any compound synthesized by a living organism that inhibits the growth of other organisms (Clardy & Fischbach, 2007). Infectious ailments were mainly responsible for elevated mortality and morbidity before the 20th century, while the average human lifespan was 46 years for men and 48 years for women even in developed countries. Infectious diseases were widely abundant such as, tuberculosis, pneumonia, smallpox, cholera, syphilis, diphtheria, typhoid fever, plaque, etc. (W.A, 2016). In 1910, Salvarsan, the 1st antibiotic, was created, and in just over one century such molecules called antibiotics have increased the average age expectancy by almost 23 years and promoted medicine entirely (Hutchings et al., 2019).

The rise of antibiotics started in 1928 when Alexander Fleming discovered penicillin, which was the best era of antibiotics between the 1950s and 1970s in which new antibiotics were created, and since that time, the approach has turned to modification of the existing antibiotics and no novel classes of antibiotics were discovered (W.A, 2016).

Although with higher success in developed countries, the era of antibiotics has significantly changed the way infectious diseases are treated worldwide. For example, in the USA, noninfectious ailments such as cancer and cardiovascular diseases have been the major causes of death instead of infectious diseases. Additionally, the older population shifted from 4% to 13% and the average age lifespan increased to 78.8 years for the entire USA population (W.A, 2016).

The emergence of several pathogens that are antibiotic resistant and the progressive turn down in antibiotic development and discovery have produced the present antibiotic resistance (ABR) dilemma (Hutchings et al., 2019). Moreover, it should be considered that it currently takes approximately 10 to 12 years from the discovery until the production of a new antibiotic to the market, but the introduction of novel antibiotics to the market was notably less complex and faster several years ago than it is now (Mohr, 2016).

1.1.2 Antibiotic resistance: reasons and mechanisms

ABR is considered one of the most risky problems with respect to human health, in which several pathogens are no longer sensitive to current antimicrobials and still have the ability to cause infections. Major bacterial infectious diseases kill over 11 million people per year (Elmanama & Abdelateef, 2012). In addition, it is proposed that developing countries will incur the majority of these deaths. Thus, there is an insistent necessity to decrease the growth of antibiotic-resistant bacteria in these countries (Sakeena et al., 2018). It is suspected that 20 to 50 % of all antibiotic consumption is medically improper. The most elevated rates of resistance are related to countries consuming the highest amounts of such drugs (Zyoud et al., 2015).

ABR occurs when bacteria change in response to the use of certain antibiotics (WHO, 2018), and it can be defined as the ability of bacterial cells to avoid antibiotic killing (Hasan & Al-harmoosh, 2020). Infections with resistant bacteria in humans or animals are more difficult to cure than common infections, which lead to higher medical expenses, longer hospitalization, and increased mortality rates. Therefore, we need to change the way that antibiotics are prescribed and used (WHO, 2018).

The reasons for ABR may include the following: over-prescription of antibiotics by healthcare professionals, non prescription antibiotic (NPA) use, patients not finishing the entire antibiotic course prescribed by their physician, over use of such drugs in cattle and poultry farms, week management of infections in health care institutions by the physicians and delay of novel antibacterial molecules being created (Duong & Jaelin, 2015). Moreover, agricultural business plays a role in the

extravagant use of these medicines as growing enhancers. another factor that is less mentioned is the impact of drugs manufactures, where pharmaceutical companies release large amounts of these molecules through wastewater which could be used in irrigation (Kristiansson et al., 2011).

Bacteria can survive antibiotics by several methods; they can secrete specific enzymes to break chemical bonds within certain antibiotic structures. Moreover, they modulate membrane permeability, alter antibiotic targets in bacteria, and transfer resistance genes to subsequent generations (Naveed et al., 2020). Taking antibiotics for too short durations or taking them in self-limiting infections and giving antibiotics at lower doses than needed, particularly from the misuse of antibiotics, causes the progression of bacterial resistance, and there are examples of special resistant pathogens in the world such as MRSA, PRSP, MDRGNB and VRE (W.A, 2016).

1.1.3 Antibiotic resistance management

The first way to reduce and slow ABR is simply to decrease antibiotic use so we can minimize the force of natural utilization of resistance genes. Decreasing antibiotic use means not treating non symptomatic infections and taking them in a restrictive way in cases that will be beneficial to therapy plan (Read & Woods, 2020).

In 2015, the WHO (World Health Organization) built an action plan worldwide to address ABR spreading. The goal was to ensure the continuousness of efficient treatment and infection prevention by utilizing medicines wisely and making medicine available when patients need them. The WHO action plan included five strategic objectives: 1) ameliorate realization by use of effective communication, instruction, and training, 2) strengthen the body of knowledge and evidence through research and observation,3) reduce the risk of infection through effective sanitation, decontamination, and infection-preventing measures, improve the way antibiotics are used for both human and animal health, and 5) develop an economic argument for continued investment that takes into account the requirements of all nations. Increase funding for the development of novel medicines, diagnostic tools, vaccines, and other initiatives (Donsamak, 2020).

Evolutionary perspectives recommend using antibiotics as little as possible even when treatment is a necessity, stop nonmedical uses as growth promoters in farm animals, and block microbial acquiring resistance genes in the first place; this can be achieved by high doses in which dead bugs cannot develop or use combination therapy in which acquisition resistance to multiple antibiotics at once is improbable (Read & Woods, 2020).

At the national level, governments should count ABR as a main public health issue. Policies could lessen the awkward use of antibiotic agents and ABR. In the absence of a suitable policy framework, the accomplishment of amended proper antibiotic use will be troublesome (Donsamak, 2020).

At the healthcare provider level, various activities regarding healthcare practitioners have been confirmed to be helpful enhancing the rational utilization of drugs, including community pharmacists. Updated knowledge related to antibiotic therapies and resistant pathogens is remarkable for suitable antibiotic use. Consequently, education and training to enhance the understanding and awareness of ABR problems among healthcare practitioners is necessary. Continuous education is an efficacious process to mend proper treatments (Laing & Hogerzeil, 2001).

In addition to healthcare providers, the general public plays a crucial role in lowering ABR spreading. A few years ago, 55% of general practitioners admitted in a survey that they were under pressure by patients to prescribe antibiotics when they were not necessary. However, passing essential information on antibiotics to the general public, would make patients understand that antibiotics are ineffective in viral infection treatment, relieving the pressure on physicians (Allison et al., 2017). Raising public education and awareness about antibiotics is a substantial tool to alter antibiotic use. Several countries have developed campaigns; tools such as television-mediated education, posters, billboards, print media, websites, mail, radio, and training were all proclaimed to be in contact with the public. The campaigns' main target audience was the general public; however, other efforts had far more specialized aims, such as lower socioeconomic classes, schoolchildren or parents of young children and the elderly population (Allison et al., 2017).

1.1.4 Community pharmacists' role in reducing antibiotic resistance

Health care practitioners, particularly pharmacists, might play a critical role in improving antibiotic stewardship in underdeveloped nations and lowering ABR (Sakeena et al., 2018). The bulk of antimicrobials is consumed in the community and can be obtained through neighborhood pharmacies, without or with a prescription. Furthermore, community pharmacists are unrivaled in terms of public accessibility (Donsamak, 2020).

Pharmacist-led programs have been successful in combating ABR, demonstrating that well-trained pharmacists may be an important part of the solution to the international threat of ABR. These industrialized nations are now reaping the benefits of pharmacists' expanded roles, which have greatly improved patient care and medication quality. In many underdeveloped nations, pharmaceutical care services are still limited to traditional pharmacy operations such as stockpiling medications, improvised compounding, prescription dispensing, and drug sales (Sakeena et al., 2018).

Pharmacists are essential in the usage of pharmaceuticals and can offer guidance on how to utilize medications properly. Additionally, they may instruct patients on how to take antibiotics effectively and educate other healthcare professionals on how to prescribe antibiotics properly. Teaching and training community pharmacists have the potential to improve the behavior of healthcare group members and customers as part of a multifaceted approach to modulate practice and ensure the quality of antibiotic use. They are in a unique position to increase awareness of antibiotics and reduce their inappropriate usage by directly engaging community members. To prevent ABR, consumer education is a crucial component, and pharmacists should encourage consumer awareness of safe and appropriate pharmaceutical behaviors, particularly with regard to antibiotics (Sakeena et al., 2018).

For pharmacists to play a key role in modifying behaviors related to antibiotic intake in the majority of healthcare settings, extensive and appropriate education and training on the use of antibiotics and ABR are essential. Antibiotic misuse and abuse

may be reduced in developing nations by the hiring of skilled and educated pharmacy personnel (Sakeena et al., 2018).

1.2 Palestine country profile

1.2.1 Palestinian health system: Israeli occupation burden

After the Oslo Peace Accords in 1993, by operating the Palestinian Ministry of Health (PMOH), the newly established Palestinian Authority assumed responsibility for the management of healthcare in Palestinian territories (Keelan, 2016). The United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), nongovernmental organizations (NGOs), and the commercial sector all support the Palestinian health system in addition to the PMOH, which serves as its organizer and primary provider. Unfortunately, this system lacks effective governance, financial sponsorship, evidence-based policies, partnership sharing of knowledge and information, resources and technology, and variety between health officials. These elements are necessary to design and carry out efficient health strategies (AlKhaldi et al., 2020).

A separation of rural communities from health care access resulted from the physical inclusion of the pathways that the separation wall has taken among the West Bank areas, making local health care facilities inadequate and causing medical care to be unreachable to the most vulnerable in society. High- cost movement expenses plus high-length journeys to hospitals as a consequence of the separation-wall impede access for poor, old and disabled patients (Keelan, 2016). This factor may make patients tend to seek medical care from lower-qualified general practitioners or even from community pharmacists which could lead to higher and unnecessary use of antibiotics.

Since 2018, Israeli occupation attacks on Palestinians have largely contributed to the destruction of health measures; as a result, 48,246 Palestinians have been injured as a direct result of Israeli offenses (AlKhaldi et al., 2020). The huge number of these bloody injuries means an extra higher consumption of antibiotics, which directly makes ABR more likely to emerge. Another less-discussed cost is the absence of safe-washing facilities, which are essential for the prevention of infectious illnesses.

Palestinians have insufficient access to water as Israel seizes control of all water resources, reducing Palestine's water supply to just 20%. Self-hygiene and hand washing are some of the most substantial measures to restrain infections. However, as a result of deliberate Israeli occupation offensive operations destroying Palestine's "Wash" infrastructure, quality and availability of water and materials, and sanitation systems are almost absent (AlKhaldi et al., 2020).

The Palestinian health system is severely underfunded and very fragmented, which will limit its capacity to address any health challenges, including resistant microorganisms. There have been several appeals for the Israeli occupation authorities to stop all limitations and foreign actors to invest in and repair the health system structure based on fresh creative thinking and novel ways, but they have gone unheeded. An urgent national priority in Palestine is the improvement of the public health system and adoption of evidence-based policies (AlKhaldi et al., 2020).

1.2.2 Pharmaceutical institutions in Palestine

The Jordanian Pharmacy Practice law was infirmly enforced to the Pharmacy Practice profession in West bank under the Israeli occupation. A Palestinian Pharmacy Practice law was launched after the Oslo accord in 1993 and the foundation of the Palestinian authority (Jaradat & Sweileh, 2003).

The most common form of pharmacy profession in the West Bank is community pharmacies (Bank, 2009). There are no chain pharmacies as much as in the USA and Europe, and the largest portion of community pharmacies in Palestine is private (Jaradat & Sweileh, 2003). The number of pharmacies in Palestinian governorates mentioned in the annual health report in 2020 is 1,101 pharmacies (MOH, 2020). Five major local pharmaceutical companies manufacture more than 1000 various pharmaceutical products, in which only a small number of pharmacists have the chance to work in pharmaceutical industry (Bank, 2009).

Only registered and certified pharmacists can own and supervise drug stores and community pharmacies by the requirements of the Jordanian and Palestinian Pharmacy Practice, and the certificate of the drug store/community pharmacy must be clearly visible (Jaradat & Sweileh, 2003).

Unfortunately, in Palestine, most drugs available in the pharmaceutical market can be sold as an over-the-counter medication, except for significant tranquilizers such as benzodiazepines and restricted narcotics, which can only be given out after receiving a legitimate prescription from a qualified doctor (Bank, 2009). Palestinian pharmacy law substantially tries to direct the proper and legal sale of medications (Jaradat & Sweileh, 2003).

1.2.3 Pharmacy education in Palestine

Before 1994, there were no pharmacy in colleges West Bank, and most of the pharmacists in West Bank received their education and training in Jordan and Egypt. The first pharmacy school was established in 1994 at An-Najah University in Nablus. In 2002, Al-Quds University, located at Abu-Dis established another pharmacy college. A Bachelor of Science (BSc) pharmacy degree program is offered by these two pharmacy universities. It should be finished in 5 academic years, 164–175 credits, 10 semesters, and 1440 hours of training, mostly at community pharmacies, hospitals, or industrial pharmaceutical firms. It was noticed that the majority of pharmacy college students are females (Bank, 2009).

In addition, Birzeit University & An-Najah University launched a 6-year PharmD program to provide clinical pharmacists to pharmacy practice in Palestine. Beginning with their sixth experience year, PharmD students rotate through eight consecutive 6-week hospital stays in a variety of medical specialities, including surgery, pediatrics, and internal medicine (Bank, 2009).

Palestinian universities also offer a postgraduate master of science (MSc) after the completion of 36 credit hours. Al-Quds University has a master's programme in pharmaceutical sciences, a master's programme in industrial pharmacy at Birzeit University and a master's programme in clinical pharmacy at An-Najah University (Bank, 2009).

1.2.4 Antibiotic use in Palestine

In Palestine, antibiotic use is poorly regulated, and people can buy it from the private market without a prescription. In health facilities, antibiotics are overused and often inappropriately prescribed (Abu-Shaban, 2018).

Research has revealed that the prevalence of easy access to antibiotics, lax infection control, illogical prescribing practices, and previously reported antibiotic resistance epidemics make resistant microorganism infections in Palestine inevitable (Kanapathipillai et al., 2018). Newer generation (amoxicillin/clavulanic acid, azithromycin, and ciprofloxacin) use is comparatively high and overprescribed, particularly for children with infection of likely viral origin, which possibly has an effect on resistance (A F Sawalha et al., 2010).

In Palestine, the misuse of antibiotics is propagating, and the availability of broad- spectrum antibiotics with almost affordable prices and the competition between community pharmacies that is constantly increasing in small geographic areas increases the dispensing of NPA. Additionally, the behavior of public people tends to be seeking medications from community pharmacies directly without examination and consulting due to the cost (Ansam F. Sawalha, 2008).

Poor pharmacists' guidance of the use and safety of antibiotics may be a result of NPA expansion, and many developing countries are moving toward making antibiotics use only by prescriptions (Jacobs et al., 2019). The initial point of contact for individuals with mild illnesses is their local pharmacist, so they can raise the awareness of ABR caused by improper use of these drugs, by establishing essential information to the public about proper antibiotic use that prevents resistance (Siltrakool, 2017).

Inappropriate antibiotic use increases infectious illness mortality in both developed and developing nations, propagating antibiotic resistance. Behavior changes and a decline in the development of novel antibiotics exacerbate a deteriorating situation (Elmanama & Abdelateef, 2012). All these misuse behaviors of such drugs would contribute to the ABR in Palestine.

1.3 Significance of the study

We expect this study will provide evidence and recommendations to Palestinian health system decision makers to enforce laws regarding dispensing nonprescription antibiotics by community pharmacies that will substantially decrease the aggravation of antibiotic resistance.

Knowing the real reasons behind the inappropriate supply of antibiotics by community pharmacists will help to make more accurate decisions regarding this practice. For example, if commercial interests are the most influential factor, then decisions will be directed to pharmaceutical companies to exclude antibiotics from sales offers and incentives. On the other hand, if pharmacists' knowledge about suitable antibiotic regimens is insufficient, decisions should be made to promote antimicrobial-related courses in pharmacy colleges. Similarly, for every factor that seems significant, decisions will be created upon it.

Chapter two

Literature review

2.1 Introduction

The purpose of this chapter is to evaluate the material relevant to the use of antibiotics in communities and the distribution of antibiotics through neighborhood pharmacies, and to present pertinent data about community pharmacy's provision of nonprescription antibiotics, factors supporting community pharmacists' practice in relation to antibiotic usage, and the variety of antibiotic use in the community.

2.2 Literature studies related to NPA supply from community pharmacies

- Thirty-eight studies from 24 countries that matched the inclusion criteria were included in a systematic review and meta-analysis (Auta et al., 2019) that looked at 3302 publications in total. All of the nations that are listed classify antibiotics as prescription-only medicines, with the exception of one (Thailand). The total amount of NPA supply that was collected was 62%, but:

    - Elevated to 78% from the collected proportion of NPA supply that followed a patient request and
    - The lowest was 58%, which was based on community pharmacy workers' recommendations.

    Seventy-eight percent of all NPA sales were made in South America. Patients who presented with symptoms of UTIs (68%) and URTIs (67%) were typically given antibiotics without a prescription. Penicillins and

fluoroquinolones were the two main antibiotic groups that were provided for these purposes.

2.2.1 Reviews related to pharmacists/workers

- A cross-sectional study was performed in Thailand to identify the reasons behind antibiotic supply from community pharmacies (Donsamak, 2020). The results showed that 46% of pharmacists would dispense antibiotics for URTIs, 50% for pharyngitis, 13% for acute diarrhea and 11% for simple wounds. Patient demand, commercial interests and insufficient knowledge were barriers obeying the rational use of antibiotics among community pharmacists, which was revealed in the qualitative study.

  In another part of this study, 320 community pharmacists responded to a self-completion survey. Participants in the poll were asked to indicate whether they would suggest antibiotics for each of the nine case scenarios, consisting of three diarrhea cases, three URTI cases and three wound cases. The guidelines determined that 468/918 (48.9%) of the therapy recommendations for URTI patients were inappropriate. To a lesser extent, antibiotic recommendations for wound cases (12.3%) and diarrhea (11.4%) were inappropriate. The most often mentioned antibiotic (n=136/147) was amoxicillin. Coamoxiclav (n=2/147), roxithromycin (n=3/147), azithromycin (n=4/147), erythromycin (n=1/147), and clarithromycin (n=1/147) were the other antibiotics suggested. Age or amount of community pharmacy experience did not significantly correlate with propensity to prescribe incorrect antibiotics for any of the three illnesses. The willingness of participants to provide inappropriate antibiotics for URTI patients was not found to be substantially correlated with any of the demographic characteristics ($p>0.05$). Two demographic factors—the kind of pharmacy and the position of the community pharmacist—were shown to substantially differ from one another in terms of supply-side readiness for diarrhea patients. Compared to pharmacists working for chain pharmacies, community pharmacists who worked in independent pharmacies were more likely to provide antibiotics for diarrhea patients ($p=0.03$), as were pharmacists who owned their own pharmacies ($p=0.04$). Only gender was shown to be significant ($p<0.01$) between those more and less likely to

administer inappropriate antibiotics for wound situations. Male pharmacists were more likely to provide inappropriate antibiotics for wound patients (27.3%) than female pharmacists (15.0%, n=33/187).

In terms of participants' perceptions of ABR, the majority of pharmacists (85.6%, n=273/319) concurred that it was a significant issue in the Thai community. The majority of participants (94.9%, n=303/319) also disagreed that ABR was exclusively an issue in hospitals. Only 61.5% of pharmacists (n=196/319) concurred that the ABR issue in Thailand was exacerbated by the ease with which antibiotics were available from community pharmacies. However, over 90% of respondents (89.6%, n=286/319) did not believe that ABR from the supply from neighborhood pharmacies was a significant issue.

Additionally, 89.7% of individuals (n=286/319) said community pharmacists may be very important in lowering ABR. Concerning the advantages of antibiotics, the majority of participating pharmacists, 76% (n=243/320) and 80.9% (n=259/320), did not concur that antibiotics may treat a patient's sore throat or diarrhea more rapidly.

The participating pharmacists were questioned about the aspects that influenced their choice to provide antibiotics. Sixty-five percent of pharmacists (n=208/319) did not agree that they provided antibiotics when patients asked them because if they did not, patients would just purchase from another drugstore, according to the study's findings. As stated by the majority of respondents, most pharmacists believe that only first-choice antibiotics should be provided, unless there is a contraindication for that antibiotic, and that antibiotics should only be given when it is certain that there is a bacterial infection. Additionally, antibiotics should not be given under commercial pressure 81.9% (n =262/320), or just in case 76.8% (n=245/319). A total of 86.8% of participants (n=277/319) agreed that pharmacists should not administer antibiotics to patients who ask for them only because they asked for them by name. Additionally, the majority of pharmacists (88.7%, n=283/319) refused to provide newer antibiotics when they were not sure which antibiotic would be the most effective. A total of 88.5% of pharmacists (n=283/320) disapproved of patients who kept antibiotic supplies at home. Additionally, nearly 90% of participants (89.3%, n=285/319) concurred that administering a whole course of antibiotics is essential. However, 37.8% (n=121/320) stated

that if a patient could not afford the expense of the course, they would prescribe a shorter course of antibiotics rather than the complete course.

When asked about their top three priorities for promoting appropriate antibiotic use in the community pharmacy setting in Thailand, pharmacists stated that increasing public and pharmacy student awareness of appropriate antibiotic use (73.3%) and strengthening enforcement of laws prohibiting the unauthorized supply of antibiotics from non-Type I pharmacies by nonquarantined individuals (71.8%) were their top priorities. Additionally, the constant provision of updated clinical practice guidelines for the management of infectious diseases (63.3%), patient education by community pharmacists throughout pharmacy services (62.1%), raising pharmacists' awareness of prudent antibiotic use (60.5%), and public education about prudent antibiotic use (52.4%) were all cited by more than half of pharmacists as very high priority strategies. Only 34.7% of respondents said that offering financial incentives to community pharmacies to participate in campaigns to promote the appropriate use of antibiotics was a very high priority approach to increase the appropriate use of antibiotics in community pharmacies in Thailand. Additionally, the lowest priority plan to reduce the inappropriate use of antibiotics was the designation of all antibiotics as prescription-only drugs; nearly one-quarter of participants (25.7%) indicated that this strategy was not at all preferred.

In conclusion, the study demonstrated widespread improper antibiotic dispensing in Thailand, particularly for URTIs. Age, level of education, amount of experience, work situation, and others were shown to be related to how appropriately antibiotics should be administered. These results were most likely caused by community pharmacists' insufficiently current knowledge of the prevention, treatment, and diagnosis of infectious diseases.

- Pharmacists' gender, age and years of experience in association with antibiotic supply practice have been studied in Abu Dhabi, United Arab Emirates (Abasaeed et al., 2013), and 24 community pharmacies were randomly selected for the cross-sectional survey. The study's research team developed a closed-structured questionnaire to examine the impact of patients' demographic data (socioeconomic status, gender, and age), as well as the

demographic characteristics of pharmacists (years of practice experience, gender, and age), on the legality, efficacy, and safety of dispensing antibiotics both without and with prescription. The database included details on the antibiotics that were prescribed, including their generic and brand names, dosage amounts, therapeutic ranges, associated costs, and indications for usage (prescription or nonprescription). Each pharmacist who worked at one of the 24 pharmacies that were chosen received the questionnaire.

The results revealed a significant relationship between the practice of administering antibiotics by pharmacists and their age (p=0.001) and gender (p=0.001). Compared to female pharmacists, men deal with NPAs more frequently. With more years of expertise as a pharmacist, a rise in NPA dispensing was seen. Out of the 1645 transactions with antibiotics that were reported, 1211 (73.6%) individuals arrived at the pharmacy with prescriptions, whereas 434 (26.4%) did not. Over 61% of the study's participants were between the ages of 31 and 50 (patients and pharmacists). Gender and socioeconomic position had a large influence on how people sought NPA (p=0.012 and 0.001, respectively). For instance, those with poor socioeconomic class and women are more likely to request NPA.

The likelihood of dispensing NPAs increased proportionally with pharmacists' age. The likelihood of requesting an NPA increased when the patient was a man with a poor socioeconomic background. Twenty-five different kinds of antibiotics were prescribed throughout the research period (prescription and nonprescription). The three antibiotics that were prescribed the most frequently were coamoxiclav (66.4%), cefuroxime (91.3%), and clarithromycin (91.5%). The three nonprescription antibiotics that were prescribed the most commonly were coamoxiclav (33.6%), amoxicillin (47.8%), and ceftriaxone (53.3%). Spectinomycin and cotrimoxazole were also prescribed without a prescription, although moxifloxacin, ofloxacin, cefprozil, cefidinir, cefixime, and spiramycin required one. Additionally, nonprescription antibiotics were only used for 3–7 days on average (mean= 5.74–2.484 days), but prescription antibiotics were regularly utilized for treatment durations of 5, 7, and 10 days (mean= 6.47–2.62 days).

According to the research, coamoxiclav is the antibiotic that is most frequently used (with or without a prescription) for sore throats. Additionally, prescribing

physicians preferred it over clarithromycin and cefuroxime, although pharmacists preferred azithromycin more frequently. The findings showed that amoxicillin and coamoxiclav were given to patients with cough by pharmacists without a prescription more frequently than cefuroxime and coamoxiclav. Both prescription-only and over-the-counter influenza medications, clarithromycin and coamoxiclav, were administered. Azithromycin, coamoxiclav, clarithromycin, and cefuroxime were the most commonly recommended antibiotics for this indication, whereas pharmacists offered amoxicillin, azithromycin, and coamoxiclav for URTIs (without a prescription). Moxifloxacin and cefixime were most commonly prescribed for RTIs and were only prescribed. According to the findings, ceftriaxone was similarly recommended by doctors and given out by pharmacists without a prescription in regard to sexually transmitted infections (STDs). Ciprofloxacin was the antibiotic that was most frequently administered for urinary tract infections (UTIs). For Helicobacter pylori, macrolides (such as clarithromycin and azithromycin) and amoxicillin were typically recommended and available (nonprescription). For toothaches, coamoxiclav and amoxicillin are favoured by pharmacists and dentists.

- Commercial interest has been mentioned in a study done in Bangladesh as an impact on dispensing NPAs (Matin et al., 2020), and some pharmacists sell antibiotics to the public in to promote their business and sales. According to the study, the most commonly sold antibiotics were cefixime, azithromycin, cephradine, amoxicillin, ciprofloxacin, ceftriaxone and flucloxacillin. According to the answers, clients' apparent symptoms and health concerns are taken into account while selling antibiotics (patients). Additionally, they receive explicit requests for particular antibiotics when a consumer displays an empty blister pack or when they inquire about a desired brand name, so dispensers stock the drugs they anticipate the customer will need. If they do not provide patients the antibiotics they need, they will just leave the drugstore and go to another dispenser, which will be bad for business. Additionally, they stated that younger people—who apparently purchase nonprescription antibiotics more frequently than older people—are the majority of those who want them. Other customers' behaviors mentioned by the respondents that they

deem antibiotics as costly medicines in contrast to others, and they favor returning the remains of antibiotics to pharmacies, which indicates the poor adherence to a full course of therapy that may enhance the emergence of ABR, and pharmacists accept these returns to maintain a good relationship with their customers.

Pharmaceutical companies also contribute to the increase in antibiotic sales by offering pharmacies and drug stores a variety of financial incentives, including attractive discounts to sell a particular product, gift baskets, invitations to attend commercial medical education events, and financial commissions. To increase their sales in marketplaces, pharmaceutical corporations regularly conduct dissemination meetings, seminars, and conferences of their goods for neighborhood pharmacies and drug dispensers. Medical representatives and area managers oversee these sessions. Company personnel frequently stop by retail pharmacies to take prescription orders. They encourage pharmacists to purchase higher quantities of their medicines; for instance, if they buy ten boxes of a certain drug, they may receive a bonus of two boxes of medication; or they may receive monthly credit to help them reach their sales goal.

Respondents reported that they commonly prescribed antibiotics to treat conditions such as the common cold, high fever, acute watery diarrhea, cough, unintentional wounds and infections, skin diseases, and any cases of postsurgical infections that are not treated by standard medications. Pharmaceutical firms commonly advise drug retailers to use antibiotics such as azithromycin for RTIs, high fevers, soft tissue infections, and skin infections. They also stated that third- or fourth-line antibiotics, such as quinolones or cephalosporins, are recommended when first- and second-line antibiotics are ineffective. The dispensers are inclined to promote these antibiotics due to their accessibility and increased earning margin. Additionally, they said that because their clients' financial capacities are limited, they regularly give them partial doses of antibiotics. They stated that initially, individuals prefer to start with a low dosage, and if they experience a positive reaction, they are hesitant to come for more rounds of antibiotics. In this situation, they do not need to spend a large sum of money all at once, and by doing so, the seller can continue to build strong relationships with their regular customers, increasing

the likelihood that they will be satisfied and return in the future to purchase antibiotics and other medications.

Insufficient access to medical professionals in rural areas, an insufficient doctor-to-population ratio, the knowledge gap among pharmacists, a lack of pharmacovigilance regarding the safety of self-medication, lax policy enforcement, financial incentives for both customers and pharmacists, and reliance on pharmaceutical companies' information were among the other factors mentioned in this study.

- A total of 252 community pharmacists participated in a cross-sectional study that was conducted in Yemen (Al-akydy et al., 2018). It was conducted using a structured questionnaire that the authors developed and amended before it was filled out by the pharmacists. Investigating the common practice of distributing NPA at community pharmacies.

  Three hundred pharmacists were randomly given the questionnaire. A semistructured questionnaire with open- and close-ended (multiple-choice) items was used to collect information about the practice of dispensing NPAs and pharmacists' sociodemographic characteristics.

  The results showed that 96% of participating pharmacists dispense NPAs and could easily acquire them. Specifically, based on patient request, the study results revealed that penicillins, particularly amoxicillin (57%), followed by Coamoxclav (20.8%), were the most widely dispensed nonprescription antibiotics by community pharmacists, either for children (39.35%) or adults (29.5%). Amoxicillin's extensive usage may be attributed to its affordability and safety. In addition, amoxicillin has broad spectrum efficacy and can be used to treat gram-positive or gram-negative diseases such as respiratory and gastrointestinal illnesses. On the other hand, according to the pharmacist's experience, cephalosporins (34%) and coamoxclav (25.8%) were the most typical NPAs prescribed.

  The most prevalent conditions treated with NPA were cough (19.2%), sore throat (16%), colds (11.5%), and UTIs (10.7%).

  In conclusion, lack of understanding, easy access to antibiotics, and a lack of commitment to work ethics were the most frequent reasons for supplying NPAs.

2.2.2 Reviews related to patients/customers

- Regarding patient demand for NPAs, a study was performed in Nablus city, Palestine (Hajjaj, 2005). Customers who purchased any form of medication, with or without a prescription, from 24 community pharmacies over the course of 28 consecutive days made up the study's total participant population (n=542). A questionnaire that was completed by consumers who purchase NPAs served as the study's primary data source. The poll was designed to determine why people use NPAs and to gauge how much of the public is aware of antibiotics and their use.

  The age range of the bulk of NPA customers (40.4%) was 30 to 44. The following table shows the percentage of other customers by age range: Fortunately, it was just 2.8% for infants under 2 years old and 2.4% for those over 60 years old. The rates were 33.9% between 15 and 29 years old, 9.4% between 45 and 59 years old, 5.7% between 7 and 14 years old, and 5.4% between 2 and 7 years old. Self-administration of NPA increased with increasing educational background; the largest percentage (47%) of them attained a university level, followed by 46.1% at a school level, and 6.6% by those with no formal education. The bulk of NPA users (33%) were employed, followed by employees (31.7%), students (17.2%), and housewives (15.5%).

  Even if these people utilize NPAs, 66.8% said that it may be harmful to their health if they use antibiotics improperly. Seventy-four percent of NPA users can accurately characterize an antibiotic as a medication used to treat bacterial infections. However, 10.9% of people use antibiotics regardless of whether they are intended to treat bacterial infections. A total of 12.4% of respondents claimed that bacterial illnesses are not treated with antibiotics. Although a significant portion of people can recognize an antibiotic as an anti-infection agent, 28% claimed it is also used to decrease fever, and 13.3% of consumers of antibiotics use them without being aware of this fact. Additionally, 12.4% of respondents reported that antibiotics are a common therapy for sporadic headaches.

These findings meant that antibiotics are often used to treat a variety of illnesses, whether or not these symptoms are related to bacterial infections.

Antibiotic consumers were questioned about whether or not an entire course of antibiotics should be taken to ensure that they understood what an antibiotic was. A total of 13.5% said there is no need to use a complete course of antibiotics, meaning they stop taking them when their symptoms start to improve, while 79.2% said they must be taken as a full course. Since they do not know enough about antibiotics, 7.2% of respondents answered that they do not know. While 79.2% of people who took antibiotics acknowledged that a complete course of treatment was necessary, 43.2% said they just took one capsule as necessary.

A total of 19.2% of NPA users do not know that different antibiotic classes have different effects and methods of administration while taking antibiotics. Additionally, 9.6% believed that the function and application of all antibiotics were the same. This will cause them to take an antibiotic that is inappropriate for the infection they have. A total of 17.9% of NPA customers take them on the pharmacist's recommendation, while 5.9% rely on recommendations from friends and family who have used them in the past. In contrast to the 50.7% who claimed they took antibiotics on a doctor's recommendation, 23.8% said they chose to take antibiotics for themselves. Antibiotics were maintained at home by 47% of customers in case they ever needed them, 23.6% only revealed that they never kept the antibiotics at home, and 29.2% sometimes kept these medicines at home.

Antibiotics were commonly self-administered for URTIs (47%), especially for sore throat. Antibiotics were used to treat influenza symptoms in 18.7% of cases, common cold symptoms in 14.2%, toothaches in 10.7% of cases, dental problems in 6.5% of cases, and UTI symptoms in 6.5% of cases.

A total of 67.2% of NPA customers ask the pharmacist for an antibiotic, but they are unsure of the specific antibiotic class they need to take. However, 32.3% of people choose the antibiotic class on their own, whether or not it is necessary.

A full course of antibiotics is bought by 50.4% of people, 27.3% do so frequently, and 22% never do.

Thankfully, 54% of people who use antibiotics complete a whole course; nevertheless, 22% claim they never complete a full course and 23.8% frequently do.

A total of 22.1% of respondents admitted that they do not make enough money to see doctors since it is expensive to do so. A total of 54.8% of respondents said they were not taking antibiotics in this method because of their financial situation. However, 23.1% claimed that limited financial resources frequently do have an effect and they cannot get a physician's consultation so they take the NPA if they experience any symptoms they think it need taking antibiotics. Although 53% have health insurance, people utilize NPAs and avoid going to government clinics because they waste time standing in line to see the doctor and since the prescription that the doctor recommended is frequently not accessible in these clinics.

As their doctor consistently prescribes the same antibiotic to treat similar symptoms, 45.4% of respondents who copied the drug name from a past prescription given to them before or to a family member with comparable symptoms felt confident in taking that antibiotic. 37.3% of respondents said they never do this.

According to pharmacists, 56.6% of NPA customers do require antibiotic treatment for their ailment. Even though antibiotics were not essential for their illness, 17.3% of them took them. Pharmacists prescribed antibiotics in 25% of cases even though they were not certain whether or not they were necessary.

The demand for nonprescription antibiotics from community pharmacies in Palestine has increased as a result of patient socioeconomic characteristics, such as low-income families who believe it is expensive to contact doctors and low satisfaction with medical professionals.

- To assess the nonprescription use of antibiotics and associated determinants, a qualitative investigation aided by an institutional-based cross-sectional study design was conducted in Ethiopia in 2020 (Ayana et al., 2021). A pretested semi structured questionnaire and in-depth interview guiding questions were used to collect the data. All patients and customers who bought antibiotics from randomly selected pharmacies and drug stores in Ambo Town, Ethiopia,

throughout the study period made up the study population. A total of 399 respondents were questioned.

A total of 43.2% of people in the study region reported using NPA. Amoxicillin is the medicine that is most frequently purchased (43.6%), followed by ampicillin (11.6%). Unexpectedly, azithromycin, one of the top four NPAs purchased, is a relatively recent antibiotic. Metronidazole was furthermore purchased over the counter.

A total of 172 research participants admitted to using NPA. When nonprescription antibiotics were recommended instead of nonprescription ones, research participants were asked why, One hundred eleven (64.5%) of the respondents take the NPA to save money, 107 (62.2%) to save time, 111 (64.5%) to feel better faster, 64% because they have previously experienced the same symptoms and the antibiotic worked, 110 (64%) believe antibiotics can be purchased over-the-counter at pharmacies or other drug stores, and 93 (54.1%) believe doctors are likely to prescribe the same class of antibiotic.

According to the findings of bivariate binary logistic regression, age, sex, marital status, level of education, place of residence, occupation, mode of transportation, distance travelled, and cost of transportation are all associated with the usage of NPAs. The multivariate binary logistic regression revealed statistical significance for location of residence (rural), marital status, sex (male), profession (farmer), and educational achievement (diploma and degree holder).

The factors independently linked with NPA consumption were holding a diploma and B.Sc. degree, being male, divorced or widowed, and residing in a rural area. The odds of consuming NPAs by male participants were 2.213 times higher than those by female participants. Individuals who lived in rural areas were three times more likely to consume NPA than participants who lived in urban areas.

Furthermore, compared to unmarried people, individuals who had been divorced or bereaved had a nine fold higher likelihood of using NPA. Furthermore, this study's findings demonstrated that education level and NPA consumption are significantly related; among those with a B.Sc. or diploma, the likelihood of using NPAs is reduced by 95% and 88%, respectively, compared to those with no formal education. For the profession status, farmers

were 96.6% less likely to consume NPAs compared to those who work as governmental employees.

- A study was performed in Delhi, the capital of India (Kotwani & Joshi, 2021). To gather information on customers' perceptions of antibiotics, ABR, and purchasing habits, a qualitative study questionnaire was used. In-depth interviews were conducted using a semi structured interview guide, with 72 people ranging in age from 18 to 70.

  A research team created a semi structured interview guide. The manual was created to collect in-depth information on consumers' information about antibiotics, the purchase of antibiotics practice, regulations for antibiotics buying from retail pharmacies and problems regarding ABR.

  The majority of participants who used antibiotics (38%) were salaried employees, followed by daily wage workers (17%), small company owners or independent contractors (14%), and participants with daily pay (17%). Additionally, 15% of those who used antibiotics were housewives, 10% were students, and the other 7% were categorized as others (i.e., engaged in other occupations or retired). Regarding income, 67% of antibiotic users fell into the middle-income category, while 22% belonged to the lower-income group and 11% to the upper-middle-income category.

  Interviews with participants revealed that the majority of people who use antibiotics try to treat themselves or use some home treatments first (using residue medicines). They would then have access to the neighborhood independent pharmacies. A total of 63 out of 72 users of antibiotics reported purchasing OTC medications either on the advice of a pharmacist at a retail pharmacy or for self-treatment by abusing previous or expired prescriptions. The purpose of this subset of 63 consumers of antibiotics was to obtain over-the-counter (OTC) medication from pharmacies for common and non serious illnesses. Of these consumers, 70% reported self-treatment, 54% reported dependence on pharmacist recommendations, and 45% reported calling for pharmacist's counsel based on an outdated prescription.

  Acetylsalicylic acid, paracetamol, **azithromycin,** propyphenazone +paracetamol, **ofloxacin**, **amoxicillin**, cetirizine, and other OTC medications

for common ailments including fever, headache, and the common cold, were the most popular OTC medications purchased by users of antibiotics.

A number of customers reported similar purchasing patterns for OTC antibiotics.

2.3 Study justification

Antibiotic misuse leads to the spread of resistance and higher rates of infectious disease mortality in both wealthy and poor nations. A poor condition is made worse by behavioral changes and a decrease in the production of new antibiotics (Elmanama & Abdelateef, 2012). Studies have shown that ABR infections are a certainty in Palestine: weak infection control, irrational prescription practices, and easy antibiotic availability are widespread, and previous outbreaks of ABR have been documented (Kanapathipillai et al., 2018). To choose measures to reduce the reasonable use of antibiotics in the community, it is important to understand why and how community pharmacists prescribe antibiotics (Donsamak, 2020).

This study was performed to explore and uncover factors leading to the dispensation of NPAs by community pharmacists in Palestine.

2.4 Aims and objectives of the study

This study examined the variables that affect how respondents dispense NPAs. To choose measures to enhance the rational use of antibiotics in the community, it is important to understand why and how respondents prescribe antibiotics.

We conducted this study to investigate and identify the causes of NPA among respondents. We anticipate that the findings will be useful in developing initiatives to improve the prudent use of antibiotics in Palestinian community pharmacies.

Main objectives of this research:

1) To determine if respondents' proposed provision of antibiotics for URIs, diarrhea, and mild wounds is appropriate.

2) To examine the association between variables pertaining to respondents' prescription of antibiotics and demographic information about the pharmacies where they work, such as the pharmacy's type (independent or chain), accreditation status and geography.
3) To look at the elements that are associated with respondents prescribing antibiotics and their demographic information, such as age, gender, years of experience, position within a pharmacy, and highest degree of education.
4) To look at respondents' perspectives about ABR.
5) To examine the connection between the characteristics that affect how respondents dispense antibiotics and how they feel about ABR.
6) To gather respondents' opinions about prospective developments in the sensible use of antibiotics from community pharmacies.

Chapter three

Methodology

This chapter outlines the broad methodology and basic approaches used to examine the availability and utilization of antibiotics from neighborhood pharmacies in Palestine.

3.1 Study design: a quantitative research method

A quantitative research strategy is a kind of research that uses numerical data collection and mathematically based procedures, particularly statistics, to analyse the data and explain phenomena (Sukamolson, 2007). Experiments and surveys are the two main subcategories of quantitative research (Donsamak, 2020).

To examine pharmacists in Palestine, the researcher would need to visit many pharmacies, which would be expensive and time consuming. Consequently, this kind of quantitative strategy was not employed. Research issues where the researcher needs a wide overview of a particular occurrence or situation, such as the prevalence of the problem, related factors, knowledge, perspectives, and behavior of persons in a sample, are well suited for survey designs (Donsamak, 2020). As a result, survey research is more suited to achieving this study's objectives.

In light of the study topics, this approach was therefore acceptable for gaining a general grasp of community pharmacists' perspectives and the variables affecting their ability to obtain antibiotics from local pharmacies in Palestine. Information about the antibiotic supply from community pharmacists was chosen to be gathered via a cross-sectional survey using a self-administered questionnaire. This method is suitable for comprehending the results, which are the community pharmacists' practices and

beliefs, as well as the traits of the pharmacists and pharmacies connected to the outcome at a certain period.

3.2 Ethical approval

Before launching this study, the proposal was submitted to the Al-Quds University/Faculty of pharmacy research committee for subethical approval (Appendix 1) and to the Al-Quds University graduate studies committee for final ethical approval (Appendix 2). The research was conducted as a requirement for the researcher's Master's in pharmaceutical sciences at Al-Quds University.

3.3 Study tool

A quantitative research method using a cross-sectional survey with a self-completing online questionnaire was used in this study.

3.3.1 Questionnaire source

The questionnaire that was used in this study was developed from the literature (Donsamak, 2020). The questionnaire was available to participants only in the English version.

3.3.2 Questionnaire components

Both closed-ended questions with tick boxes and statements with a Likert scale were included in the study's questionnaire (Appendix 3), as well as open-ended inquiries. Three sections made up the questionnaire:

1. The first section of the questionnaire covers case studies, information about resistance to antibiotics, and strategies for influencing the sensible use of antibiotics.
2. In the second section, participants are asked to provide demographic data regarding their local pharmacy, including its location and kind.
3. In the third section, questions are posed regarding the respondents' history, including his or her age, gender, educational background, job title, and amount of pharmacy experience.

3.3.3 Questionnaire content validity

The content validity of the questionnaire was tested for content validity and reliability and was measured in our setting by Cronbach's alpha. All domains had a value higher than 0.5: for section one, it was 0.7; for section two, it was 0.78; and for section three, it was 0.81. Moreover, five qualified individuals evaluated the questionnaire's content validity and reliability in its original setting.

3.3.4 Pilot study

The purpose of the pilot research was to evaluate the survey's viability, distribution strategy, and practicality of the questionnaire. In addition, the pilot research sought to evaluate the suggested data analysis methods to detect potential issues, verify the language, understanding, and ordering of the questionnaire, identify potential logistical issues, estimate the time required for the study, and identify potential difficulties.

The contents of the questionnaire used for the pilot study (appendix 3) were prescribed previously in section (3.3.2). No information that may be used to identify the respondents was included in the questionnaire. From the questionnaire, it was not possible to determine the respondents' name or pharmacy.

Convenience sampling was used to collect samples from fifteen local pharmacies. They were contacted via email or social network (Facebook) and asked to complete

the survey online by a 'Google forms' link. Then, they were asked to list any topics that were challenging or perplexing. The respondents' feedback led to a small modification of the questionnaire that was to substitute the positions of part 1 of the questionnaire and part 3 by each other to make the questionnaire topics in an ascending manner of intensity. The questionnaire was then again amended in light of the respondents' feedback. The study employed this modified version of the questionnaire.

3.4 Sample frame

Number of pharmacies in Palestinian governorates as they mentioned in the annual health report in 2020 (MOH, 2020):

The governorate	N of pharmacies
Jenin & Tubas	148
Tulkarm	86
Nablus &Salfit	201
Qalqiliya	50
Ramallah & Al Bireh	168
Jericho & Al Aghawr	18
Jerusalem	93
Bethlehem	93
Hebron	244
Total	1,101

An online sample size calculator on the website (http://www.raosoft.com) was used to calculate the sample size with a 5% margin of error, 95% confidence interval and 50% response rate for 1100 pharmacies. In terms of the numbers above, the sample size n and margin of error E are given by:

$$x = Z(^{c}/_{100})^{2} r(100\text{-}r)$$

$$n = {}^{N\,x}/_{((N\text{-}1)E^{2} + x)}$$

$$E = \mathrm{Sqrt}[{}^{(N\,-\,n)x}/_{n(N\text{-}1)}]$$

where N is the population size, r is the fraction of responses that we are interested in, and $Z(c/100)$ is the critical value for the confidence level c.

Approximately **285** was the minimum recommended size needed for our survey; we had soughed and recruited **314**.

3.5 Data collection

The survey was targeted to community pharmacies by announcing via social networks' (Facebook) groups and pages related to community pharmacists in Palestine. The announcement was repeated several times to increase the number of responses. All respondents, whether part- and full-time, who were interested in participating to complete the questionnaire were asked. After multiple announcements, we needed to privately send the online link of the questionnaire to several members of theses social groups, all of whom are pharmacists, to achieve the target sample size. We asked pharmacists to not complete the questionnaire if they had already, done so to prevent double responses from a single pharmacist.

3.6 Data analysis

The online-completed data on the Google forms platform were extracted first as an uncoded Excel sheet. Then, the responses were coded and exported to IBM SPSS version 22 statistics for analysis. Each reply was given a code, which was then put into SPSS. This was left unchanged for data that already had a numerical format (such as age in years or years of experience). The factors were transformed to numbers (e.g., 1 = male, 2 = female), including gender, highest education, role in community

pharmacy, kind of community pharmacy, etc. The replies that are listed initially would be coded as 1, followed by the next two and so on down the page. There were no missing data because the online questionnaire was programmed to assign all questions as obligatorily required for submission of the response of the participant.

The final data from the online surveys were reviewed once again for accuracy. Any numbers that were outside the range of what each variable might possibly be were searched by the researcher. To ensure that the values included in the dataset were within the range of permissible values, the lowest and highest values for the categorical variables (such as gender, highest education, and type of pharmacy) were compared. For continuous variables, the mean value and standard deviation were verified for unexpected values, as well as the value range and extreme values for each variable. Additionally, unusual values for ordinal and interval variables were verified.

All research variables, including respondents' demographic information, were subjected to descriptive statistical, linear regression and binary analysis calculations using IBM SPSS version 22 statistics.

We investigated frequencies and percentages for nominal and ordinal variables. For ordinal and interval variables, means, standard deviations, or medians and interquartile ranges (IQR) were computed.

To determine the variables connected to a practice score, a bivariate analysis was performed. The dependent variable employed for this analysis was the practice score, which was not normally distributed and had an interval level of measurement. Therefore, to evaluate the association between practice score and another variable, the Mann-Whitney U test or Spearman's correlation coefficient was applied. When the independent variable was ordinal, Spearman's correlation coefficient was utilized, and when it was nominal, Mann-Whitney U test was applied.

Chapter four

Data analysis

4.1 Data checking and entry

Online forms were used to collect data, which were then immediately exported from the Google platform as an uncoded Excel sheet and imported as code replies into IBM SPSS Statistics version 22. To confirm the accuracy of the output coded data, approximately 10% of the exported data were cross-checked between SPSS and the Excel sheet. To be input into SPSS, a number code was given to each response. For each variable, the value range and extreme values were examined.

4.2 Quantitative data analysis

All research variables, including respondents' demographic information, were subjected to descriptive statistical, linear regression and binary analysis calculations using IBM SPSS statistics version 22.

We investigated frequencies and percentages for nominal and ordinal variables. For ordinal and interval variables, means, standard deviations, or medians and interquartile ranges (IQR) were computed.

To determine the variables connected to a practice score, a bivariate analysis was performed. The dependent variable employed for this analysis was the practice score, which was not normally distributed and had an interval level of measurement. Therefore, to evaluate the association between practice score and another variable, the Mann-Whitney U test or Spearman's correlation coefficient was applied. When the independent variable was ordinal, Spearman's correlation coefficient was utilized, and when it was nominal, Mann-Whitney U test was applied.

4.2.1 Demographics and characteristics of respondents

From a total of 314 participants, more than two-thirds (64.3%, n=202) were females. Approximately half of the participants (49.7%, n=156) aged 26-30 years. Regarding length of experience in the community pharmacy sector, more than half of the participants (57.3%) had 2-7 years of experience. Bachelor of pharmacy was the major highest education level of participants (71%, n=223) and mainly graduated from local Palestinian universities (88.9%, n=279). Hebron (21.7%, n=68), Ramallah & Al-Bireh (21%, n=66) and Nablus & Salfit (16.9%, n=53) were the locations of more than half of pharmacies and were nearly balanced between existing in urban areas (56.4, n=177) and rural areas (43.6%, n=137). Details are provided in Table 1.

Table 1: Main demographics and characteristics of respondents

Sample characteristics		**N**	**%**
Gender	Male	112	35.7%
	Female	202	64.3%
Age	Up to 25	53	16.9%
	26-30	156	49.7%
	31-35	49	15.6%
	36-40	31	9.9%
	41 and above	25	8.0%
Length of your experience working in the community pharmacy sector	less than 2	28	8.9%
	2-4	88	28.0%
	5-7	92	29.3%
	8-10	51	16.2%
	11 and above	55	17.5%
Highest education	Diploma (assistant pharmacist)	29	9.2%
	Bachelor of pharmacy	223	71.0%
	Master of pharmacy	20	6.4%
	Pharm.D	42	13.4%
	Palestine	279	88.9%

Graduation origin	Jordan	32	10.2%
	other	3	1.0%
Type of the pharmacy	Independent pharmacy	291	92.7%
	Chain pharmacy	23	7.3%
accreditation status of pharmacy	Yes	311	99.0%
	No	3	1.0%
pharmacy location	Jenin & Tubas	40	12.7%
	Nablus & Salfit	53	16.9%
	Tulkarm	20	6.4%
	Qalqiliya	11	3.5%
	Jericho & Al-ghawr	5	1.6%
	Ramallah & Al-Bireh	66	21.0%
	Jerusalem	27	8.6%
	Bethlehem	24	7.6%
	Hebron	68	21.7%
pharmacy area	urban	177	56.4%
	rural	137	43.6%
near competitive pharmacy	No	143	45.5%
	Yes	171	54.5%
near competitive non-pharmacy	No	231	73.6%
	Yes	83	26.4%

4.2.2 Recommendations to supply antibiotics based on case scenarios

Recommendations of respondents to give antibiotics or not regarding the nine case scenarios are reported in Table 2. Approximately 74.5% (n=234/314) of respondents suggested case C, which belongs to the URTIs group, to give antibiotics as the highest "yes" answered case. On the other hand, case D, which belongs to the diarrhea group, was the most common case suggested to not be given antibiotics by the pharmacists (94.6%, n=297/314).

Table 2: Respondents' recommendations to supply antibiotics: case scenarios

Case- scenarios	No		Yes		Total	
	N	%	N	%	N	%
A) 6-year-old boy, weight 20 kg, presenting with a sore throat for 2 days accompanied by mild fever, productive cough with thick and colored discharge. There are no other symptoms.	129	41.1%	185	58.9%	314	**100%**
B) 14-year-old girl presenting with sore throat for 2 days, accompanied by high grade fever, no cough, no runny nose or any other symptoms. She is not pregnant or breast-feeding and has are no other symptoms.	181	57.6%	133	42.4%	314	**100%**
C) 43-year-old man with a severe sore throat for 2 days accompanied by high grade fever, tender lymph nodes, pus on tonsils but no cough. There are no other symptoms.	80	25.5%	234	74.5%	314	**100%**
D) 70-year-old woman with watery stool 3 times within the last 12 hours, no fever and no other symptoms. There are no signs of dehydration.	297	94.6%	17	5.4%	314	**100%**
E) 30-year-old-woman with diarrhea with blood visible in stools since yesterday evening, accompanied with high grade fever, and abdominal cramps. She is not pregnant or breast-feeding and has are no other symptoms.	198	63.1%	116	36.9%	314	**100%**
F) 3-year-old-boy, weight 15 kg, with watery stool 4 times within the last 10 hours accompanied by mild fever, nausea and mild abdominal pain. There is no sign of dehydration and there are no other	264	84.1%	50	15.9%	314	**100%**

symptoms.						
G) 35-year-old-man who had a motorcycle accident (about 15 minutes earlier) with many minor, superficial scratches on the left arm and left leg.	267	85.0%	47	15.0%	314	**100%**
H) 7-year-old-girl who has a fresh, thin, shallow cut wound on left index finger about 1 cm long, which happened approximately 30 minutes earlier.	269	85.7%	45	14.3%	314	**100%**
I) 50-year-old man who has a shallow wound on the right calf, approximately 1 cm in diameter. He had a cut wound by barbed wire approximately 4 days ago. The skin surrounding the wound has become red, swollen and sore, and with pus. The patient confirmed that he had a recent tetanus vaccination booster.	126	40.1%	188	59.9%	314	**100%**

4.2.3 Distribution of antibiotics provided by community pharmacists among cases

The distribution of antibiotics provided by respondents among case scenarios is shown in figures 1-9. Regarding URI cases (A, B and C scenarios), in scenario A, azithromycin (26.8%, N = 84) was the most suggested antibiotic, followed by amoxicillin, amox-clav and cefdinir in descending order (Figure 1). In case scenario B, amox-clav, amoxicillin and azithromycin (13.4%, 13.4%, and 13.1%), respectively, were suggested equally by the respondents (Figure 2). In scenario C, amox-clav (57.6%, N = 181) was strongly recommended by more than half of the respondents (Figure 3). With respect to all URTI cases (A, B and C), Amox-clav was the most frequently mentioned antibiotic by the respondents, up to 254 times.

Regarding diarrhea cases (D, E and F), although the antibiotic recommendations were relatively low, metronidazole was significantly the most suggested antibiotic by respondents in all three cases, with a total of 142 frequencies (Figures 4, 5 and 6).

In the wound cases (G, H and I), every scenario showed different preferences for antibiotics suggested by the respondents. In scenario G, antibiotic recommendations were relatively low, and cefalexin (5.1%, N = 16) was the most mentioned antibiotic (Figure 7). In scenario H, the ampicillin/flucloxacillin combination (5.7%, N = 18) was the most recommended antibiotic (Figure 8). Finally, in case I, amox-clav was the most preferred antibiotic (19.7%, N = 62) (Figure 9).

Fig. 1: Relative distribution of antibiotics provided by respondents in scenario A

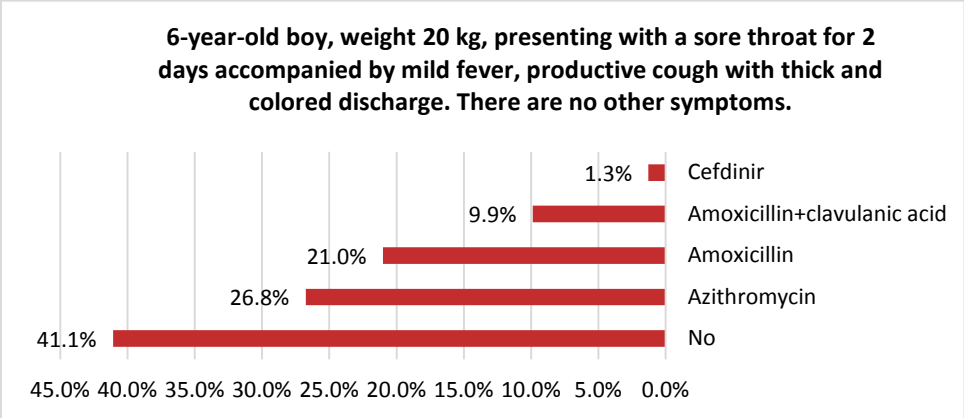


Fig. 2: Relative distribution of antibiotics provided by respondents in scenario B

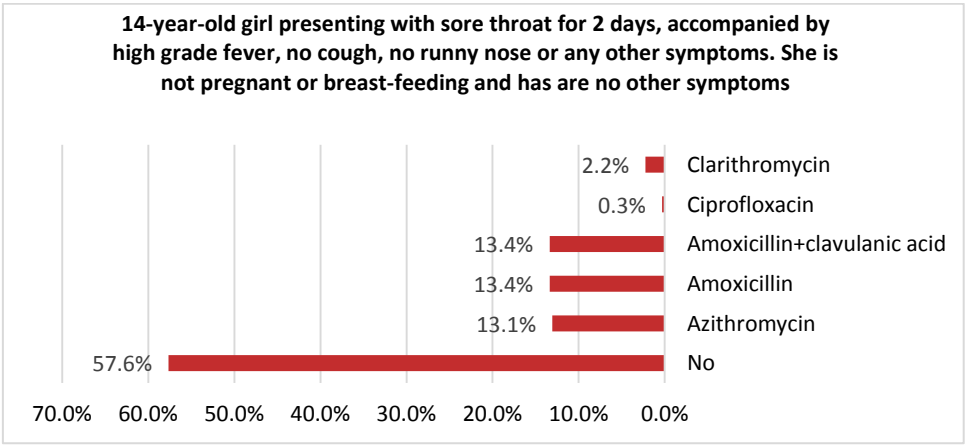


Fig. 3: Relative distribution of antibiotics provided by respondents in scenario C

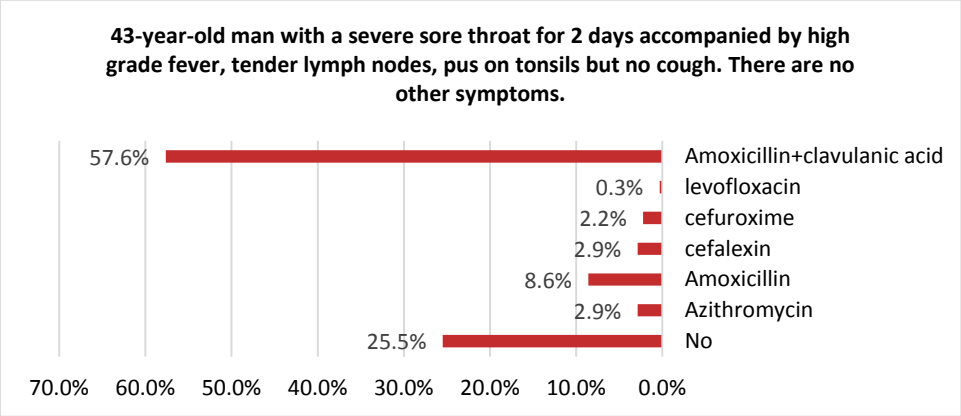


Fig. 4: Relative distribution of antibiotics provided by respondents in scenario D

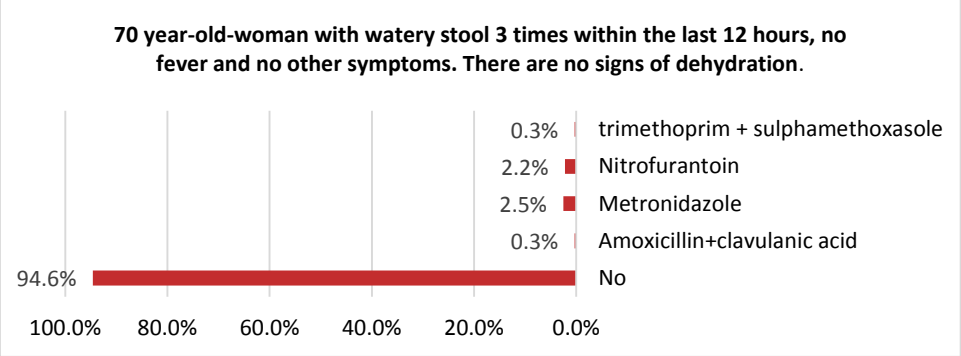


Fig. 5: Relative distribution of antibiotics provided by respondents in scenario E

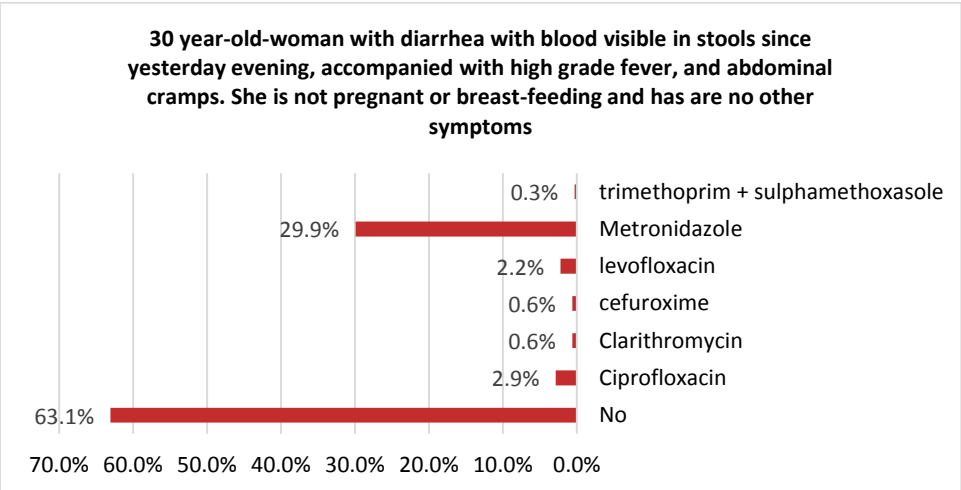


Fig. 6: Relative distribution of antibiotics provided by respondents in scenario F

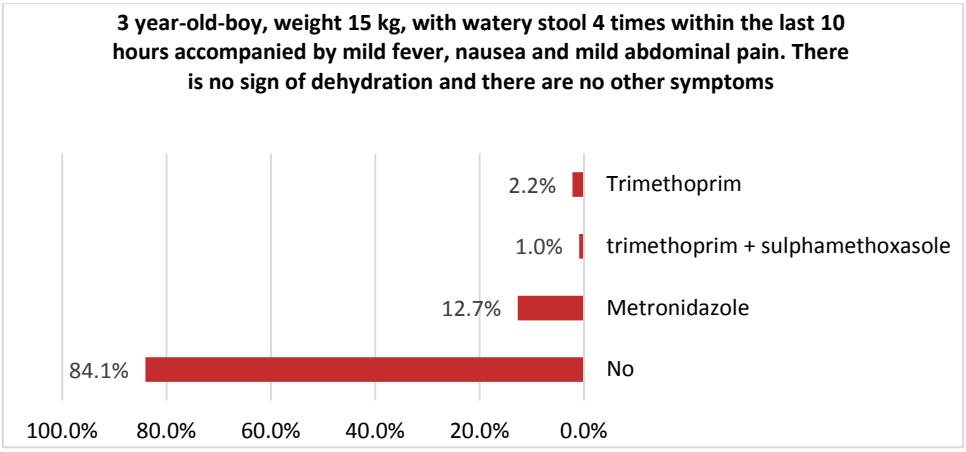


Fig. 7: Relative distribution of antibiotics provided by respondents in scenario G

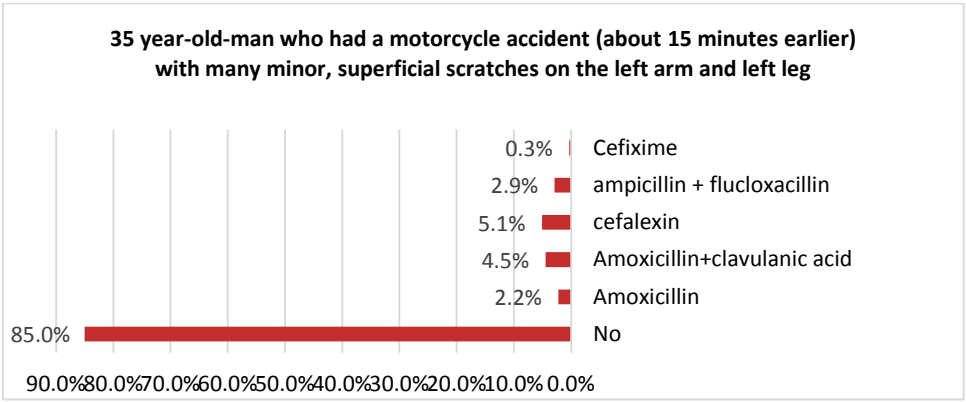


Fig. 8: Relative distribution of antibiotics provided by respondents in Scenario H

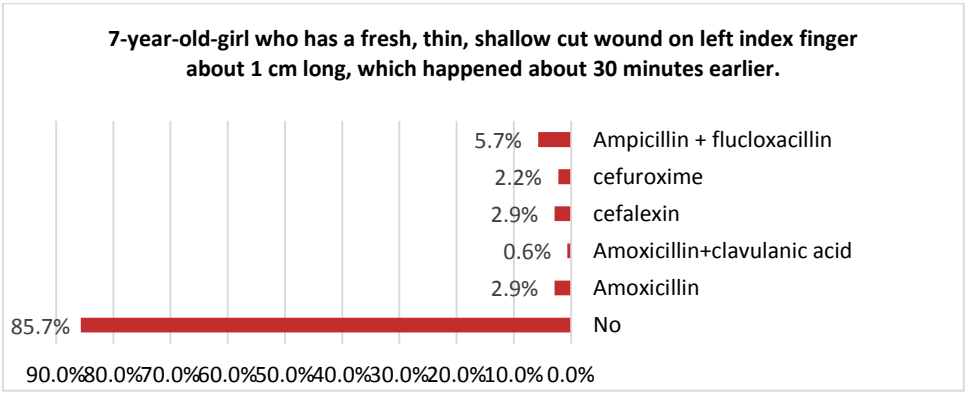
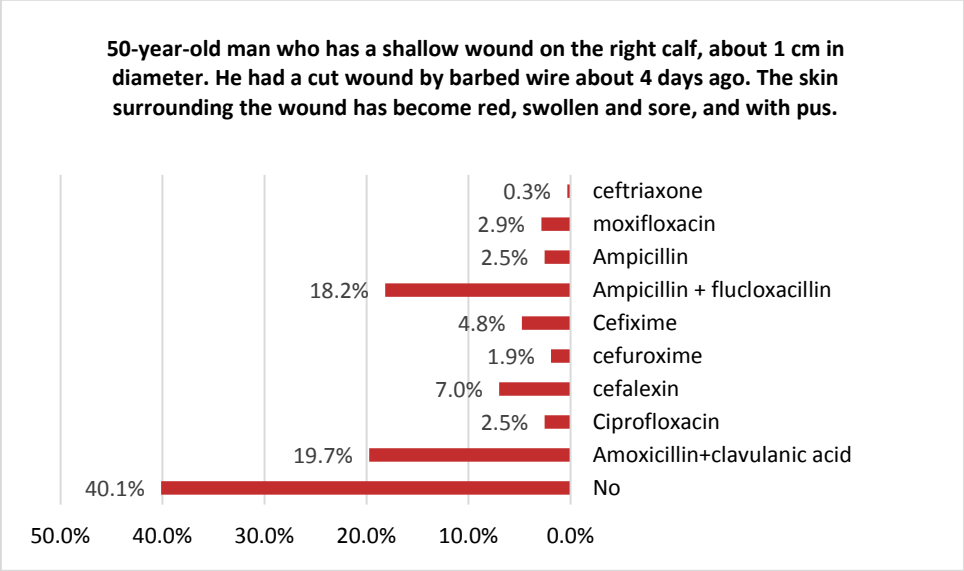


Fig. 9: Relative distribution of antibiotics provided by respondents in scenario I



4.2.4 Practice score of participants regarding case scenarios

The appropriateness of suggested antibiotic treatments provided by respondents was taken into account when calculating the practice scores. To determine the variables determining the appropriateness of antibiotic dispensing, the scores were employed as a dependent variable. In accordance with international guidelines, correct answers were determined. Then, we assigned a numerical value of "1" to correct responses. On the other hand, incorrect responses receive a "0" response.

The "No" option was awarded 1 point for scenarios "a," "d," "f," "g," and "h," when antibiotics were not advised per the practice guidelines. For scenarios "c," "e," and I a value of "1" was simultaneously assigned to a correct antibiotic regimen answer. The overall practice score varied from 0 (indicating poor practice) to 9 (indicating good practice). The practice score for each condition ranged from 0 to 3. In subsequent analyses, the practice score will be employed as a dependent variable and henceforth referred to as the PRACTICE variable.

4.2.5 Supplying inappropriate antibiotics by respondents

Upper respiratory infection (URI), diarrhea, and wounds were the three major categories of illnesses included in part 1 of the questionnaire. Three scenarios were created for each of the three conditions, with only one of the three (one for each condition) certainly necessitating the administration of an antibiotic in accordance with recommendations (international guideline). To determine the factors impacting respondents' readiness to supply antibiotics, responses to these case scenarios were utilized to gauge their inclination to do so.

The two case scenarios where an antibiotic was less likely to be helpful for each condition-scenarios "a" and "b" for URI conditions, scenarios "d" and "f" for diarrhea conditions, and scenarios "g" and "h" for wound conditions—were used to assess the willingness to provide inappropriate antibiotics, the dependent variable. Based on their reactions to each scenario, the participants were split into two groups: those who were less and more inclined to provide unnecessary antibiotics.

The participants who did not propose antibiotics for any of the conditions (where antibiotic supply was not advised) would be placed in the "less likely to supply improper antibiotics" category when determining the readiness to supply antibiotics. On the other hand, those respondents would be classified as "more likely to supply inappropriate medicines" if they had advised antibiotics for at least one scenario of each ailment (Table 3). The Supply Variable will be used from now on to refer to this variable.

Table 3: appropriateness of supplying antibiotics by respondents among case scenarios

Case- scenarios	More likely to supply		Less likely to supply		Total	
	N	%	N	%	N	%
A) 6-year-old boy, weight 20 kg, presenting with a sore throat for 2 days accompanied by mild fever, productive cough with thick and colored discharge. There are no other symptoms.	185	58.9%	129	41.1%	314	100%

B) 14-year-old girl presenting with sore throat for 2 days, accompanied by high grade fever, no cough, no runny nose or any other symptoms. She is not pregnant or breast-feeding and has are no other symptoms.	49	15.6%	265	84.4%	314	100%
C) 43-year-old man with a severe sore throat for 2 days accompanied by high grade fever, tender lymph nodes, pus on tonsils but no cough. There are no other symptoms.	26	8.3%	288	91.7%	314	100%
D) 70-year-old woman with watery stool 3 times within the last 12 hours, no fever and no other symptoms. There are no signs of dehydration.	17	5.4%	297	94.6%	314	100%
E) 30-year-old-woman with diarrhea with blood visible in stools since yesterday evening, accompanied with high grade fever, and abdominal cramps. She is not pregnant or breast-feeding and has are no other symptoms.	107	34.1%	207	65.9%	314	100%
F) 3-year-old-boy, weight 15 kg, with watery stool 4 times within the last 10 hours accompanied by mild fever, nausea and mild abdominal pain. There is no sign of dehydration and there are no other symptoms.	50	15.9%	264	84.1%	314	100%
G) 35-year-old-man who had a motorcycle accident (approximately 15 minutes earlier) with many minor, superficial scratches on the left arm and left leg.	47	15.0%	267	85.0%	314	100%
H) 7-year-old-girl who has a fresh, thin, shallow cut wound on left index finger approximately 1 cm long, which happened approximately 30 minutes earlier	45	14.3%	269	85.7%	314	100%
I) 50-year-old man who has a shallow wound on the right calf, approximately 1 cm in diameter. He had a cut wound by barbed wire approximately 4 days ago. The skin surrounding the wound has become red, swollen and sore, and with pus. The patient confirmed that he had a recent tetanus vaccination booster.	56	17.8%	258	82.2%	314	100%

Table 4: appropriateness of supplying antibiotics by respondents: summary

SUPPLY	Number of participants (%)					
	URI cases		Diarrhea cases		Wound cases	
	N	**%**	**N**	**%**	**N**	**%**
More likely to supply	24	7.6%	9	2.9%	23	7.3%
Less likely to supply	290	92.4%	305	97.1%	291	92.7%

4.2.6 Association between demographic data and supplying inappropriate antibiotics

A Mann- Whitney U test was performed to test the relationship between age or length of experience in community pharmacies and willingness to supply inappropriate antibiotics (SUPPLY). A significant correlation was found between the age variable and the three conditions, (p value <0.05), and a significant correlation was found between the Length of experience variable and the **Wound cases** (p value <0.05) (Table 5).

Table 5: Mann-Whitney U analysis for determining the demographic data correlated to the supply antibiotics

Test Statistics	URI cases		Diarrhea cases		Wound cases	
	Age	Length of experience	Age	Length of experience	Age	Length of experience
Mann-Whitney U	2170.50	2888.0	621.0	1284.0	2420.0	2106.50
Wilcoxon W	2470.50	3188.0	666.0	47949.0	44906.0	44592.50
Z	-3.075-	-1.389-	-2.810-	-.331-	-2.218-	-2.967-
p value	.002	.165	.005	.741	.027	.003

With respect to URI cases, employees and full-time pharmacists (p value= 0.047), morning shift workers (p value=0.033) and bachelor of pharmacy degree holders (p value=0.044) were more likely to supply inappropriate antibiotics. Additionally, the existence of near a type 1 competitor pharmacy 201-300 meters away (p value=0.035) and the existence of a non type 1 competitor (e.g., grocery) 201-300 meters away (p value=≤0.001) were associated with inappropriate antibiotic supply (table 6a).

Table 6a: Association between demographic data and supplying inappropriate antibiotic in URI cases

Demographic data		**supplying inappropriate antibiotics -URI case**				
		More likely		**Less likely**		**P value**
		Count	%	Count	%	
Your role at the pharmacy	Owner and full-time pharmacist	1	1.6%	60	98.4%	0.047
	Owner and part-time pharmacist	0	0.0%	16	100.0%	
	Employee and full-time pharmacist	15	12.1%	109	87.9%	
	Employee and part-time pharmacist	8	7.1%	105	92.9%	
Working Shift	morning	14	10.9%	114	89.1%	0.033
	Evening	8	9.3%	78	90.7%	
	Both	2	2.0%	98	98.0%	
Gender	Male	10	8.9%	102	91.1%	0.523
	Female	14	6.9%	188	93.1%	
Highest education	Diploma (assistant pharmacist)	1	3.4%	28	96.6%	0.044
	Bachelor of pharmacy	23	10.3%	200	89.7%	
	Master of pharmacy	0	0.0%	20	100.0%	
	Pharm.D	0	0.0%	42	100.0%	
Graduation origin	Palestine	22	7.9%	257	92.1%	0.836
	Jordan	2	6.3%	30	93.8%	
	other	0	0.0%	3	100.0%	

Demographic data		supplying inappropriate antibiotics -URI case				
		More likely		Less likely		P
Type of your pharmacy	Independent pharmacy	23	7.9%	268	92.1%	0.836
	Chain pharmacy	1	4.3%	22	95.7%	
Accredited pharmacy	Yes	24	7.7%	287	92.3%	0.617
	No	0	0.0%	3	100.0%	
Pharmacy location	Jenin & Tubas	6	15.0%	34	85.0%	0.082
	Nablus & Salfit	4	7.5%	49	92.5%	
	Tulkarm	0	0.0%	20	100.0%	
	Qalqiliya	0	0.0%	11	100.0%	
	Jericho & Al-ghawr	2	40.0%	3	60.0%	
	Ramallah & Al-Bireh	3	4.5%	63	95.5%	
	Jerusalem	2	7.4%	25	92.6%	
	Bethlehem	2	8.3%	22	91.7%	
	Hebron	5	7.4%	63	92.6%	
Your pharmacy area:	urban	15	8.5%	162	91.5%	0.529
	rural	9	6.6%	128	93.4%	
Is there any competitor Type I pharmacy closed to this pharmacy?	No	15	10.5%	128	89.5%	0.035
	Up to 100 meter	1	1.5%	65	98.5%	
	101-200	5	11.4%	39	88.6%	
	201-300	2	28.6%	5	71.4%	
	301 and above	1	3.2%	30	96.8%	
The presence of a competing non-Type I pharmacy nearby	No	15	6.5%	216	93.5%	0.000
	Up to 100 meter	0	0.0%	19	100.0%	
	101-200	1	5.9%	16	94.1%	
	201-300	6	42.9%	8	57.1%	
	301 and above	2	10.5%	17	89.5%	

With respect to diarrhea cases, employees and part-time pharmacists (p value= 0.035), evening shift workers (p value=0.023), male pharmacists (p value=≤0.001) and pharmacy workers in rural areas (p=0.001) were more likely to supply

inappropriate antibiotics. Additionally, the existence of a near type 1 competitor pharmacy 201-300 meters away (p value=0.001) and the existence of a non type 1 competitor (e.g., grocery) 201-300 meters away (p value=≤0.001) were associated with inappropriate antibiotic supply (table 6b).

Table 6b: Association between demographic data and supplying inappropriate antibiotics-Diarrhea cases

Demographic data		supplying inappropriate antibiotics-Diarrhea case				
		More likely		Less likely		P value
		Count	%	Count	%	
Your role at the pharmacy	Owner and full-time pharmacist	2	3.3%	59	96.7%	0.035
	Owner and part-time pharmacist	0	0.0%	16	100.0%	
	Employee and full-time pharmacist	0	0.0%	124	100.0%	
	Employee and part-time pharmacist	7	6.2%	106	93.8%	
Working Shift	morning	0	0.0%	128	100.0%	0.023
	Evening	7	8.1%	79	91.9%	
	Both	2	2.0%	98	98.0%	
Gender	Male	9	8.0%	103	92.0%	0.000
	Female	0	0.0%	202	100.0%	
Highest education	Diploma (assistant pharmacist)	0	0.0%	29	100.0%	0.286
	Bachelor of pharmacy	9	4.0%	214	96.0%	
	Master of pharmacy	0	0.0%	20	100.0%	
	Pharm.D	0	0.0%	42	100.0%	
Graduation origin	Palestine	9	3.2%	270	96.8%	0.559
	Jordan	0	0.0%	32	100.0%	
	other	0	0.0%	3	100.0%	
Type of your pharmacy	Independent pharmacy	9	3.1%	282	96.9%	0.392
	Chain pharmacy	0	0.0%	23	100.0%	

Demographic data		supplying inappropriate antibiotics-Diarrhea case				
		More likely		Less likely		P value
		Count	%	Count	%	
Accredited pharmacy	Yes	9	2.9%	302	97.1%	0.765
	No	0	0.0%	3	100.0%	
Pharmacy location	Jenin & Tubas	0	0.0%	40	100.0%	0.148
	Nablus & Salfit	1	1.9%	52	98.1%	
	Tulkarm	0	0.0%	20	100.0%	
	Qalqiliya	0	0.0%	11	100.0%	
	Jericho & Al-ghawr	0	0.0%	5	100.0%	
	Ramallah & Al-Bireh	2	3.0%	64	97.0%	
	Jerusalem	3	11.1%	24	88.9%	
	Bethlehem	2	8.3%	22	91.7%	
	Hebron	1	1.5%	67	98.5%	
Pharmacy area	urban	0	0.0%	177	100.0%	0.001
	rural	9	6.6%	128	93.4%	
Is there any competitor Type I pharmacy closed to this pharmacy?	No	0	0.0%	143	100.0%	0.001
	Up to 100 meter	1	1.5%	65	98.5%	
	101-200	5	11.4%	39	88.6%	
	201-300	1	14.3%	6	85.7%	
	301 and above	2	6.5%	29	93.5%	
The presence of a competing non-Type I pharmacy nearby	No	0	0.0%	231	100.0%	0.000
	Up to 100 meter	0	0.0%	19	100.0%	
	101-200	1	5.9%	16	94.1%	
	201-300	5	35.7%	9	64.3%	
	301 and above	2	10.5%	17	89.5%	

With respect to wound cases, owners and full-time pharmacists (p value= 0.03), both shift workers (p value=≤0.001), male pharmacists (p=0.002), bachelor of pharmacy degree holders (p value=0.018) and those working in chain pharmacy (p=≤0.001) were more likely to supply inappropriate antibiotics. Additionally, the existence of a near type 1 competitor pharmacy 201-300 meters away (p

value=≤0.001) and the existence of a non type 1 competitor (e.g., grocery) 301 meters and above away (p value=≤0.001) were associated with inappropriate antibiotic supply (table 6c).

Table 6c: Association between demographic data and supplying inappropriate antibiotics-wound cases

Demographic data		supplying inappropriate antibiotics-Wound cases				
		More likely		Less likely		P value
		Count	%	Count	%	
Your role at the pharmacy	Owner and full-time pharmacist	8	13.1%	53	86.9%	0.030
	Owner and part-time pharmacist	0	0.0%	16	100.0%	
	Employee and full-time pharmacist	14	11.3%	110	88.7%	
	Employee and part-time pharmacist	1	0.9%	112	99.1%	
Working Shift	morning	8	6.3%	120	93.8%	0.000
	Evening	0	0.0%	86	100.0%	
	Both	15	15.0%	85	85.0%	
Gender	Male	15	13.4%	97	86.6%	0.002
	Female	8	4.0%	194	96.0%	
Highest education	Diploma (assistant pharmacist)	0	0.0%	29	100.0%	0.018
	Bachelor of pharmacy	23	10.3%	200	89.7%	
	Master of pharmacy	0	0.0%	20	100.0%	
	Pharm.D	0	0.0%	42	100.0%	
Graduation origin	Palestine	18	6.5%	261	93.5%	0.150
	Jordan	5	15.6%	27	84.4%	
	other	0	0.0%	3	100.0%	
Type of your pharmacy	Independent pharmacy	9	3.1%	282	96.9%	0.000
	Chain pharmacy	14	60.9%	9	39.1%	

Demographic data		supplying inappropriate antibiotics-Wound cases				
		More likely		Less likely		P value
		Count	%	Count	%	
Accreditation status of pharmacy	Yes	23	7.4%	288	92.6%	0.625
	No	0	0.0%	3	100.0%	
Pharmacy location	Jenin & Tubas	3	7.5%	37	92.5%	0.600
	Nablus & Salfit	3	5.7%	50	94.3%	
	Tulkarm	0	0.0%	20	100.0%	
	Qalqiliya	1	9.1%	10	90.9%	
	Jericho & Al-ghawr	0	0.0%	5	100.0%	
	Ramallah & Al-Bireh	6	9.1%	60	90.9%	
	Jerusalem	2	7.4%	25	92.6%	
	Bethlehem	0	0.0%	24	100.0%	
	Hebron	8	11.8%	60	88.2%	
Pharmacy area	urban	16	9.0%	161	91.0%	0.185
	rural	7	5.1%	130	94.9%	
Near competitive pharmacy	No	7	4.9%	136	95.1%	0.000
	Up to 100 meter	0	0.0%	66	100.0%	
	101-200	1	2.3%	43	97.7%	
	201-300	5	71.4%	2	28.6%	
	301 and above	4	12.9%	27	87.1%	
Near competitive non pharmacy	No	8	3.5%	223	96.5%	0.000
	Up to 100 meter	0	0.0%	19	100.0%	
	101-200	0	0.0%	17	100.0%	
	201-300	5	35.7%	9	64.3%	
	301 and above	10	52.6%	9	47.4%	

4.2.7 Logistic regression predicting likelihood of factors reporting supplying inappropriate antibiotics

Based on a logistic regression model, we found that the following variables predict inappropriate antibiotic supply for URI cases: When the age variable is increased by one unit, the odds ratio (less likely for inappropriate antibiotic supply) increases by approximately 4.8 times. When the experience variable is increased by one unit, the odds ratio (less likely to provide inappropriate antibiotics) increases by approximately 0.25. In contrast, other variables (factors) did not significantly predict willingness to provide antibiotics in URI cases (Table 7a).

Table 7a: Logistic regression predicting likelihood of factors reporting supplying inappropriate antibiotics-URI cases

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI	
							L	U
Gender/Female	-0.098	0.714	0.019	1	0.891	0.907	0.444	1.351
Age	1.570	0.478	10.762	1	0.001	4.805	2.354	7.159
Experience	-1.402	0.474	8.762	1	0.003	0.246	0.121	0.367
Highest education/ Pharm.D			9.700	3	0.21			
Diploma (assistant pharmacist)	-18.515	4544.631	0.000	1	0.997	0.000	0.000	0.000
Bachelor of pharmacy	-22.466	4544.631	0.000	1	0.996	0.000	0.000	0.000
Master of pharmacy	-2.973	8757.634	0.000	1	1.000	0.051	0.025	0.076
Type of your pharmacy(1)	-1.820	1.561	1.359	1	0.244	0.162	0.079	0.241
Pharmacy location/Hebron			9.243	8	0.322			
Jenin & Tubas	-2.007	0.941	4.548	1	0.033	0.134	0.066	0.200
Nablus & Salfit	0.217	0.893	0.059	1	0.808	1.242	0.609	1.851
Tulkarm	19.560	7410.669	0.000	1	0.998	31252707.484	.000	.
Qalqiliya	16.350	9589.341	0.000	1	0.999	12614612.081	.000	.
Jericho & Al-ghawr	-2.334	1.528	2.331	1	0.127	0.097	0.048	0.145
Ramallah & Al-Bireh	0.059	0.967	0.004	1	0.951	1.061	0.520	1.581
Jerusalem	-0.052	1.302	0.002	1	0.968	0.949	0.465	1.414
Bethlehem	0.569	1.252	0.206	1	0.650	1.766	0.865	2.631
Your pharmacy area/rural	-1.056	0.886	1.422	1	0.233	0.348	0.171	0.519
Near competitive pharmacy/ No	-0.001	1.412	10.598	4	0.031	1.999	0.980	2.979
Constant	-7.545	4544.641	0.000	1	0.999	0.001		

As mentioned in table 7b, age and highest education, were significant predictors of supplying inappropriate antibiotics for Diarrhea cases by respondents.

Table 7b: Logistic regression predicting likelihood of factors reporting supplying inappropriate antibiotics-Diarrhea case

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI	
							L	U
Gender/Female	0.088	0.513	0.030	1	0.864	1.092	0.535	1.627
Age	0.377	0.163	5.334	1	0.021	1.458	0.714	2.172
Experience	-0.342	0.177	3.750	1	0.053	0.710	0.348	1.058
Highest education/ Pharm.D			12.833	3	0.005			
Diploma (assistant pharmacist)	1.199	1.313	0.835	1	0.361	3.317	1.625	4.942
Bachelor of pharmacy	-2.038	0.937	4.725	1	0.030	0.130	0.064	0.194
Master of pharmacy	-3.180	1.139	7.792	1	0.005	0.042	0.021	0.063
Type of your pharmacy(1)	-19.888	7846.016	0.000	1	0.998	0.000	0.000	0.000
Pharmacy location/Hebron			8.696	8	0.369			
Jenin & Tubas	0.939	1.183	0.630	1	0.427	2.557	1.253	3.810
Nablus & Salfit	0.444	0.856	0.269	1	0.604	1.559	0.764	2.323
Tulkarm	-0.589	1.006	0.343	1	0.558	0.555	0.272	0.827
Qalqiliya	-1.588	1.118	2.015	1	0.156	0.204	0.100	0.304
Jericho & Al-ghawr	-1.084	1.327	0.666	1	0.414	0.338	0.166	0.504
Ramallah & Al-Bireh	-0.746	0.706	1.118	1	0.290	0.474	0.232	0.706
Jerusalem	-1.028	0.848	1.470	1	0.225	0.358	0.175	0.533
Bethlehem	-1.234	0.892	1.914	1	0.167	0.291	0.143	0.434
Your pharmacy area/rural	1.523	0.552	7.623	1	0.006	4.588	2.248	6.836
Near competitive pharmacy/ No	-1.870	1.768	1.119	1	0.290	0.154	0.075	0.229
Constant	-1.930	0.909	4.506	1	0.034	0.145		

The variables that included in the logistic regression in table 7c were to identify if it was possible to predict supplying inappropriate antibiotics by respondents. None of these were found to be significant predictors of supplying inappropriate antibiotic for **Wound** cases according to the logistic regression analysis.

Table 7c: Logistic regression predicting likelihood of factors reporting supplying inappropriate antibiotics-Wound case

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI	
							L	U
Gender/Female	-0.086	1.734	0.002	1	0.961	0.918	0.450	1.368
Age	0.407	0.326	1.561	1	0.212	1.502	0.736	2.238
Experience	-1.011	0.530	3.644	1	0.056	0.364	0.178	0.542
Highest education/ Pharm.D			0.000	3	1.000			
Diploma (assistant pharmacist)	-34.384	8116.130	0.000	1	0.997	0.000	0.000	0.000
Bachelor of pharmacy	-15.826	4360.767	0.000	1	0.997	0.000	0.000	0.000
Master of pharmacy	-4.745	6278.852	0.000	1	0.999	0.009	0.004	0.013
Type of your pharmacy(1)	45.418	2951.834	0.000	1	0.988	5307242	.000	.
Pharmacy location/Hebron			1.164	8	0.997	26654856	.0000	.
Jenin & Tubas	0.662	2.180	0.092	1	0.761	1.939	0.950	2.889
Nablus & Salfit	2.268	2.307	0.967	1	0.326	9.665	4.736	14.401
Tulkarm	60.011	6951.474	0.000	1	0.993	1.2	0.588	1.788
Qalqiliya	43.881	2951.835	0.000	1	0.988	1.5	0.735	2.235
Jericho & Al-ghawr	-11.751	11001.462	0.000	1	0.999	0.000	0.000	0.000
Ramallah & Al-Bireh	0.043	2.112	0.000	1	0.984	1.044	0.512	1.556
Jerusalem	12.933	1683.700	0.000	1	0.994	413695.439	.000	.
Bethlehem	30.707	5100.605	0.000	1	0.995	236545635.2	.0000	.
Your pharmacy area/rural	-5.550	3.950	1.975	1	0.160	0.004	0.002	0.006
Near competitive pharmacy/ No	11.779	1721.490	0.000	1	0.995	130541.412	.0000	.
Constant	-29.624	5265.900	0.000	1	0.996	0.000		

Based on a logistic regression model, we found that the following variable predicts inappropriate antibiotic supply at the level of **all cases**: When the gender variable is female, the odds ratio of (less likely for inappropriate antibiotic supply)

increases by approximately 8 times than of males. In contrast, other variables (factors) did not significantly predict willingness to provide antibiotics in all cases (Table 7d).

Table 7d: Logistic regression predicting likelihood of factors reporting supplying inappropriate antibiotics-all cases

Variable	B	S.E.	Wald	df	Sig.	Exp(B)	95% CI	
							L	U
Gender/Female	2.075	0.455	20.775	1	0.000	7.962	3.901	11.863
Age	-0.077	0.083	0.861	1	0.354	0.926	0.454	1.380
Experience	0.090	0.098	0.841	1	0.359	1.094	0.536	1.630
Highest education/ Pharm.D			4.942	3	0.176			
Diploma (assistant pharmacist)	20.138	7105.392	0.000	1	0.998	557040034.884	0.00	.
Bachelor of pharmacy	-0.574	0.553	1.079	1	0.299	0.563	0.276	0.839
Master of pharmacy	-1.732	0.799	4.699	1	0.030	0.177	0.087	0.264
Type of your pharmacy(1)	-19.776	7332.545	0.000	1	0.998	0.000	0.000	0.000
Pharmacy location/Hebron			7.984	8	0.435			
Jenin & Tubas	-0.029	0.695	0.002	1	0.966	0.971	0.476	1.447
Nablus & Salfit	-0.812	0.616	1.737	1	0.188	0.444	0.218	0.662
Tulkarm	-1.266	0.792	2.555	1	0.110	0.282	0.138	0.420
Qalqiliya	-1.367	0.952	2.062	1	0.151	0.255	0.125	0.380
Jericho & Al-ghawr	0.136	1.338	0.010	1	0.919	1.146	0.562	1.708
Ramallah & Al-Bireh	-1.209	0.578	4.367	1	0.037	0.299	0.147	0.446
Jerusalem	-0.942	0.758	1.544	1	0.214	0.390	0.191	0.581
Bethlehem	-1.115	0.776	2.064	1	0.151	0.328	0.161	0.489
Your pharmacy area/rural	0.246	0.422	0.340	1	0.560	1.279	0.627	1.906
Near competitive pharmacy/ No	-2.200	0.803	7.501	1	0.006	0.111	0.054	0.165
Constant	-2.200	0.803	7.501	1	0.006	0.111		

The values of the variance inflation coefficients (VIF), which amounted to less than 2.5 for the four independent variables, indicate that there is no problem of multi linearity among the variables of the regression model (table 8).

The standard multiple regression method was used from linear regression analysis, to examine the presence of the effect of independent variables on the dependent variable, and through the ANOVA results table to test the significance of

the regression, we note that the p-value ≤ 0.01, and therefore we conclude that there is a statistically significant effect of the variables (role at the pharmacy, working Shift , gender, highest education, graduation origin, type of the pharmacy, accreditation status of pharmacy, pharmacy location, pharmacy area, near competitive pharmacy, near competitive non pharmacy) on the PRACTICE variable at the level of $\alpha \leq 0.05$.

We also note that the values of the correlation coefficient R have reached (0.527), which is a value that is considered to be of medium strength. The coefficient of determination R2 reached 0.278, which means that the explanatory independent variables (gender, highest education, type of the pharmacy and pharmacy location) were able to explain 27.8% of the changes in PRACTICE.

Table 8: Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Co-linearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	6.620	1.101		6.015	.000		
Role at the pharmacy	.002	.084	.001	.026	.979	.719	1.391
Working Shift	-.184	.107	-.098	-1.718	.087	.734	1.363
Gender	.738	.185	.223	3.997	.000	.767	1.303
Highest education	.403	.105	.202	3.849	.000	.866	1.155
Graduation origin	-.460	.239	-.103	-1.921	.056	.836	1.195
Type of the pharmacy	-.867	.342	-.142	-2.536	.012	.758	1.320
accreditation status of pharmacy	.889	.883	.055	1.007	.315	.815	1.227
pharmacy location	-.073	.027	-.135	-2.697	.007	.960	1.042
pharmacy area	-.016	.168	-.005	-.094	.925	.865	1.155
near competitive pharmacy	-.179	.163	-.056	-1.103	.271	.917	1.090
near competitive non pharmacy	-.707	.197	-.197	-3.594	.000	.800	1.251

a. Dependent Variable: PRACTICE

4.2.8 Perceptions and views of respondents toward antibiotic supply and ABR

It is clear that most respondents believe that ABR is a serious problem in the community. Most of them declared they do not supply antibiotics when they are in doubt regarding the type of patient infection or when they are unsure which is the appropriate antibiotic for the patient case and only should be given when clinically needed and not driven by commercial pressure. More than 80% believe that community pharmacies play an essential role in ABR management and do not like the attitude of keeping antibiotics in houses. Further details about respondents' perceptions of antibiotic supply and ABR are given in table 9.

Table 9: Perceptions and views of respondents toward antibiotic supply and ABR

Item	Strongly disagree		disagree		neutral		agree		strongly agree		Median
	1		2		3		4		5		
	N	%	N	%	N	%	N	%	N	%	
Antibiotic resistance is an important problem in the hospital setting but not a problem in the community.											
	157	50.0%	64	20.4 %	25	8.0%	16	5.1%	52	16.6%	2
If I am unsure whether or not a patient has a bacterial infection, I will supply an antibiotic just in case it is.											
	150	47.8%	106	33.8 %	34	10.8%	21	6.7%	3	1.0%	2
If I am in doubt which antibiotic is best for a patient, I will supply a newer one, just in case.											
	147	46.8%	100	31.8 %	19	6.1%	32	10.2 %	16	5.1%	2
It is important for pharmacists to only supply antibiotics when clinically needed, and not be driven by commercial pressures.											
	16	5.1%	14	4.5%	38	12.1%	86	27.4 %	160	51.0%	5
When the pharmacy is busy, I am more likely to supply antibiotics if a customer asks specifically for an antibiotic, compared to when the pharmacy is quiet.											
	66	21.0%	98	31.2 %	109	34.7%	36	11.5 %	5	1.6%	2
I am happy to supply an antibiotic without further questioning if a patient requests one by name.											
	105	33.4%	105	33.4 %	59	18.8%	42	13.4 %	3	1.0%	2
Antibiotic resistance is an important problem in the community setting.											

	15	4.8%	9	2.9%	21	6.7%	60	19.1 %	20 9	66.6%	5
I supply antibiotics only if I am certain that a patient has a bacterial infection.											
	15	4.8%	53	16.9 %	53	16.9%	95	30.3 %	98	31.2%	4
Community pharmacists have an important role to play to reduce the problem of antibiotic resistance											
	0	0.0%	22	7.0%	27	8.6%	106	33.8 %	15 9	50.6%	5
It is good practice for patients to keep a supply of antibiotics at home in case they need them.											
	158	50.3%	98	31.2 %	39	12.4%	16	5.1%	3	1.0%	1

4.2.9 Views of respondents on methods to improve the suitable use of antibiotics in the Palestinian population

Participants were questioned about their goals for enhancing proper antibiotic usage in the community pharmacy setting in Palestine in Question (3\part 1) of the survey.

The top three strategies cited by respondents were supplying them with routinely updated clinical practice standards for treating infectious illnesses (strategy "f", 88.2%), educating pharmacy students on appropriate antibiotic usage, including antimicrobial resistance (strategy "e", 85%) and patient education by pharmacists in community pharmacies at the time medicines are supplied to patients (strategy "a", 82.8%). On the other hand, it was noted that the lowest priority plan to reduce unwarranted use of antibiotics was to reclassify all antibiotics as prescription-only drugs (Strategy "g"). Table 10 displays respondents' opinions on the techniques for improving antibiotic usage in terms of priority.

Table 10: The priorities for the methods to improve antibiotic usage in the population in Palestine, according to respondents

(1-Not a priority, 2-low priority, 3-medium priority, 4-high priority, 5-very high priority)

items	**1** **N (%)**	**2** **N (%)**	**3** **N (%)**	**4** **N (%)**	**5** **N (%)**
Patient education by pharmacists in community pharmacies at the time medicines are supplied to patients.	**8 (2.5)**	**15 (4.8)**	**31 (9.9)**	**138 (43.9)**	**122 (38.9)**
Raising awareness of rational antibiotic use, including antimicrobial resistance, among the public through media such as TV, radio and social media.	**15 (4.8)**	**8 (2.5)**	**35 (11.1)**	**109 (34.7)**	**147 (46.8)**
Educational programs of rational antibiotic use, including antimicrobial resistance, directed at the public.	**8 (2.5)**	**16 (5.1)**	**63 (20.1)**	**118 (37.6)**	**109 (34.7)**
Raising awareness of rational antibiotic use, including antimicrobial resistance, among community pharmacists.	**0 (0)**	**1 (0.3)**	**47 (15)**	**143 (45.5)**	**123 (39.2)**
Raising awareness of rational antibiotic use, including antimicrobial resistance, among pharmacy students.	**1 (0.3)**	**21 (6.7)**	**25 (8)**	**78 (24.8)**	**198 (60.2)**
Providing regularly updated clinical practice guidelines to community pharmacies on the treatment of infectious diseases	**8 (2.5)**	**14 (4.5)**	**15 (4.8)**	**71 (22.6)**	**206 (65.6)**
Reclassification of all antibiotics as prescription-only	**11 (3.5)**	**37 (11.8)**	**82 (26.1)**	**114 (36.3)**	**70 (22.3)**
Enforcement of regulations which prohibit supply of antibiotics from non pharmacies, and by non pharmacists	**8 (2.5)**	**15 (4.8)**	**46 (14.6)**	**116 (36.9)**	**129 (41.1)**
Providing monetary incentives for community pharmacies to be involved in antibiotic use campaigns	**2 (0.6)**	**29 (9.2)**	**74 (23.6)**	**133 (42.4)**	**76 (24.2)**

Chapter five

Discussion & conclusion

The important conclusions from this master's thesis are reviewed in this chapter's last section, along with how they connect to the general goals and the body of literature. The advantages and disadvantages are highlighted. Furthermore, the implications of the findings for improving sensible antibiotic usage in Palestinian community pharmacies are discussed. Both recommendations for future research and the researcher's views on the study are included.

5.1 Introduction

Anecdotal evidence revealed that Palestinians abuse and misuse antibiotics, and that they are incorrectly administered by community pharmacies. To create successful interventions to promote the proper supply and usage of antibiotics across the nation, it is crucial to comprehend community pharmacists' behavior towards antibiotic supply and the contributing variables to these behaviors.

The purpose of the study was to assess how well respondents were supplying antibiotics for simple wounds, URIs and diarrhea. The study's primary goal was to investigate how respondents feel about the variables that affect their ability to supply patients with antibiotics as well as how to encourage more responsible antibiotic usage and to help guide the creation of evidence-based measures to encourage proper antibiotic supply from community pharmacies.

5.2 Respondents' appropriateness and the variables that affected their decision to prescribe antibiotics

Nine case- scenarios, including three URI cases, three instances of diarrhea, and three cases of wounds, were used to assess whether respondents should be giving antibiotics. For more than a quarter of all URI instances (27.6%), unsuitable antibiotic regimens were advised according to the guidelines. Typically, URI is self-limiting, necessitating no need for antibiotics. A simulated client study in China found that pharmacists prescribed antibiotics in a significant number of instances, 88.4% (130/147 patients) for acute cough (Shi et al., 2020). Additionally, 70.1% (n=1690) of pharmacies in another simulated client study investigation of 2411 pharmacies in China reported dispensing antibiotics for acute adult URIs (Chang et al., 2019). Furthermore, a Sri Lankan study revealed that 43% (26/60 pharmacies) of pharmacy employees provided antibiotics for severe sore throats (Zawahir et al., 2019). Moreover, in 98.3% (234/238) of pharmacy visits for viral URIs, antibiotics were given, according to a study conducted in Egypt (Abdelaziz et al., 2019).

All of these studies revealed a greater prevalence of improper antibiotic administration for URIs than that discovered in the current investigation. This may be because antibiotics were frequently provided by people other than pharmacists in earlier trials. There was also talk of client pressure to provide antibiotics. In this study, all participants were licensed pharmacists, and without any patient pressure, the advice to provide antibiotics was based only on the patients' disclosed clinical complaints.

Coamoxiclav, amoxicillin, and azithromycin were the three most often suggested improper medicines for URIs by respondents in this survey. The development of antibiotic resistance to these molecules might have a profound effect on population health.

The majority (81.5%) of antibiotic regimens suggested for episodes of diarrhea were appropriate in treating the condition. In particular, 15.9% of pharmacists recommended antibiotics for toddlers who had watery diarrhea and a fever. According to a 2008 study, 48.9% (47/96) of community pharmacists in southern Thailand, provided antibiotics to a child with viral diarrhea (Saengcharoen & Lerkiatbundit,

2010). While antibiotics were given inappropriately to a 14-month-old boy with watery diarrhea and no signs of a bacterial infection by 68.1% (62/91) of community pharmacists, according to a simulated client study in Thailand in 2014, there was a higher rate of providing antibiotics for nonbacterial infections in childhood diarrhea (Jaisue et al., 2017).

The current Palestinian study revealed a lower rate of pediatric diarrhea antibiotic supply than the two Thai studies. This may be because their research employed fictitious clients, but the current study made use of a self-administered questionnaire where respondents could have over reported desired behaviors. The propensity of pharmacists to provide antibiotics for children with diarrhea may be influenced by their belief that antibiotics have a quicker impact and can shorten the duration of diarrhea in children (Saengcharoen & Lerkiatbundit, 2010).

A lack of current understanding regarding patient evaluation and antibiotic treatments may be the cause of the improper prescribed antibiotic therapies for the case vignettes in this study. A cross-sectional survey study in Iran (Foroughinia & Zarei, 2016), found that 60.3% of the 90 pharmacists had inadequate knowledge of how to apply medications used to treat children's diarrhea; the authors also noted that the pharmacists' inability to fully assess the patient's issue and the patients' condition could result in inaccurate diagnosis and inappropriate recommendations.

Age and years of experience of respondents were shown to be associated with the proper antibiotic supply in this investigation. Antibiotics would be more properly supplied by elderly pharmacists and pharmacists with more expertise in community pharmacies. Similarly, a study performed in the United Arab Emirates (Abasaeed et al., 2013), revealed a significantly significant relationship between the practice of administering antibiotics by pharmacists and their age ($p=0.001$). With more years of expertise as a pharmacist, a rise in NPA dispensing was seen. This could be related to the experience role in community pharmacy practice that would make pharmacists more precise and rational in supplying proper antibiotics with advancing experience work years.

Additionally, we found that female pharmacists tend less to supply inappropriate antibiotics. In a study in Thailand (Donsamak, 2020), gender was shown to be significant ($p < 0.01$) between those more and less likely to administer inappropriate

antibiotics and male pharmacists were more likely to provide inappropriate antibiotics for patients (27.3%) than female pharmacists (15.0%, N = 33/187). Similarly, in a study performed in the United Arab Emirates (Abasaeed et al., 2013), the results revealed a significant relationship between the practice of administering antibiotics by pharmacists and gender (p=0.001). Compared to female pharmacists, men deal with inappropriate NPAs more frequently. This may indicate that female pharmacists are more precise, wise and cautious in supplying antibiotics to patients, while male pharmacists tend to be more impulsive, audacious and less rational in supplying such medicines.

5.3 Proposed approaches to enhance the rational use of antibiotics

A diversified approach is needed to try and limit the inappropriate usage of antibiotics. Most participants in this research agreed that increasing the public's, community pharmacists', and health professionals' awareness of antibiotic usage in Palestine should be a top priority.

5.3.1 Approaches related to the public

A major factor in reducing improper antibiotic usage has been observed to be public awareness and knowledge about antibiotic use and ABR. The WHO advises increasing public knowledge and comprehension of ABR through successful public communication campaigns that speak to various audiences in the fields of human health, animal health, and agricultural practice (Donsamak, 2020). In this survey, several respondents advocated public education and awareness-raising regarding antibiotic usage and ABR as top strategies for combating the problem. Initiating public education programs to educate patients on the ideal usage of antibiotics was accepted, as in other nations (Llor & Bjerrum, 2014). Patients with lower and moderate educational levels should pay particular attention to this since they are more prone to attempt to self-medicate with antibiotics (Jorgji et al., 2014). Increasing awareness of the abuse of antibiotics and changing attitudes about antibiotic use

among the general public might also help reduce the unwarranted supply of antibiotics (Abujheisha et al., 2017).

Many media outlets were suggested for educating the public, including television, social media, booklets or pamphlets, as well as education given by medical practitioners during consultations. The inclusion of such programs in school curriculum was also advised. These results support the WHO recommendation that antimicrobial use and resistance be taught in schools to increase public comprehension and awareness of the issues and to deliver accurate and timely information to the public through the media. These initiatives will aid in raising public knowledge of and comprehension of antibiotic resistance (Donsamak, 2020). The general public should be informed, according to pharmacists in Qatar, through a variety of channels, including the media, public awareness campaigns, routine counseling and education in the community, and pharmacies (Black et al., 2014). The present study recommends many educational initiatives aimed at the general public to increase awareness and usage of antibiotics, which is similar to earlier literature recommendations.

5.3.2 Approaches related to community pharmacists

The public frequently consults community pharmacies as their initial point of contact when experiencing health issues. Community pharmacists are responsible for providing treatments for minor illnesses, providing patient counseling, and limiting inappropriate medication use. Hence, by treating specific bacterial diseases appropriately and counseling patients to guarantee proper use of antibiotics, community pharmacists may play significant roles in improving rational use of antibiotics (Donsamak, 2020). Supply behaviors are likely to be influenced by community pharmacists' knowledge, attitudes, and views regarding antibiotic usage and resistance. According to signs derived from clinical practice, it has been proposed that the attitude and expertise of healthcare providers impact the quality of antibiotic prescriptions and supplies (Machowska & Stålsby Lundborg, 2019).

The results of this investigation showed that many respondents lacked a current understanding of antibiotic usage and antimicrobial susceptibility.

Healthcare workers' usage of antibiotics has been linked directly to lifelong learning or persistent professional education (PPE). It is the individual pharmacist's obligation to stay current, grow, and pick up new information and skills to maintain their professional competency during the course of their careers. For instance, starting in 2014, several nations, including Thailand, required PPE for pharmacists renewing their licenses. For PPE credits, adequate and pertinent training on ABR and antibiotic therapy should be offered. To increase the proper use of antibiotics, it was also recommended that community pharmacists receive updated practice guidelines. Other research in Albania and Egypt revealed similar outcomes as well (Gebretekle & Serbessa, 2016; Zakaa El-din et al., 2019).

The usage of antibiotics should be discussed more appropriately with community pharmacists. Community pharmacists must be encouraged by giving them access to patient education materials about proper antibiotic use and ABR.

5.3.3 Approaches related to organizations and the government

In Chile and South Korea, stringent enforcement of prohibitions on the availability of antibiotics over-the-counter has been found to be beneficial in lowering NPA usage (Bavestrello et al., 2002; Park et al., 2005).

To promote the wise use of antibiotics in Palestine, it is crucial that laws prohibiting the illogical provision of antibiotics by community pharmacists be more strictly enforced. Several research participants made this suggestion. A recent study in Saudi Arabia (Al-Tannir et al., 2020) found that the supply of antibiotics from pharmacies was successfully decreased by stricter enforcement of the rules that forbid the provision of antibiotics.

Another approach to decrease antibiotic usage is to reclassify antibiotics. The majority of respondents in this research did not believe that making all antibiotics prescription-only medications was a high priority plan to increase the use of

antibiotics in Palestine. In a similar manner, a different survey (Sumpradit et al., 2012) discovered that while just 5% of community pharmacists supported the plan, the majority of doctors at private medical clinics (77%) agreed with it. Additionally, 74% of doctors and 36% of community pharmacists felt that some antibiotics should be categorized as prescription-only drugs. This might be explained by the fact that making antibiotics a prescription-only medication would weaken the business. Over half of pharmacists in a different study conducted in Cairo, Egypt, (Zakaa El-din et al., 2019) agreed that banning the selling of antibiotics without a prescription would hurt the pharmacy's sales and profitability.

According to a study conducted in Greece, the new limits on fluoroquinolone prescriptions were successful in lowering the supply of ciprofloxacin available from community pharmacies; however they did not completely eliminate it (Plachouras et al., 2010). Following all, to limit the distribution/supply of antibiotics in Palestine, both the reinforcement of current laws and the revision of laws and regulations surrounding antibiotic usage should be taken into consideration. These methods could lessen the improper use of antibiotics obtained from community pharmacies and healthcare facilities.

ABR is also significantly influenced by doctors' excessive antibiotic prescriptions, particularly those from private clinics and hospitals. This could operate as a motivating factor for community pharmacists to provide patients who ask for the same antibiotics that a private clinic or hospital previously gave them for the same symptoms. According to a survey of parents in Pakistan, the most frequent justification for getting NPA for their children's upper respiratory infections was that their doctors had previously recommended the same medications (Siddiqui et al., 2014). Therefore, altering how doctors prescribe antibiotics may help to decrease both the overuse of these drugs and the supply they obtain from community pharmacies.

Hence, ABR is related to all healthcare professionals, including community pharmacists and doctors. Therefore, everyone from all fields should become involved in the effort to solve the problem. Instead of concentrating on community pharmacists at community pharmacies, the same messages about enhancing antibiotic usage should be distributed throughout the whole system, including physicians, nurses, private medical clinics, private nurse clinics, and private hospitals.

5.4 Implications for profession, practice and policy

Based on the results of this study, the following interventions should be created and put into practice to enhance the proper supply and use of antibiotics.

5.4.1 National antibiotic guidelines

To improve the use of antibiotics by medical practitioners, it was proposed that national treatment guidelines be established, updated, and made more widely available (Donsamak, 2020). In Palestine, to date, there are no antibiotic guidelines for healthcare professionals including community pharmacists. Pharmacists need to be made aware of the availability of new recommendations and that they must be widely distributed. Guidelines should also contain useful diagnostic criteria to aid community pharmacists in evaluating patients. Then, it may be possible for mobile applications to provide antibiotic guidelines and criteria for diagnosis for the most prevalent infectious diseases that present in pharmacies (such as URIs, diarrhea, and simple wounds); however, further research is necessary before this can be said to be possible.

5.4.2 Persistent pharmacy education (PPE)

In numerous studies, persistent professional education has been recommended as a means of enhancing appropriate treatment (Gebretekle & Serbessa, 2016; Laing & Hogerzeil, 2001; Sakeena et al., 2018). It could be crucial to educate community pharmacists on preventing improper antibiotic usage. However, there are few workshops, training sessions, seminars, or papers about managing infectious diseases in community pharmacies. Hence, ongoing training initiatives focused on the management of infectious diseases in community pharmacies are required to support the appropriate delivery of antibiotics.

All community pharmacists should have the chance to take part in educational activities that assist in enhancing community pharmacists' understanding of the proper use of antibiotics, even though pharmacists with greater experience should benefit more from such instruction. The overuse of antibiotics, notably broad-spectrum antibiotics, should be the focus of educational initiatives, and community pharmacists should receive the most recent antibiotic recommendations in accordance with federal antibiotic guidelines. Training in communication skills might help community pharmacists make decisions more easily and be better equipped to turn down requests for antibiotics. This may be connected to offering patients educational resources that they may utilize in consultations and support community pharmacists in patient education. For example, certain pharmacies in Thailand were given a mirror displaying side-by-side images of a common bacterial and viral throat illness. This tool was designed to assist customers who requested antibiotics in examining their throats in the mirror and determining if they believed medicines were necessary.

5.4.3 General public awareness and knowledge

The improper use of antibiotics may be influenced by the general public's ignorance and lack of understanding of ABR and antibiotics. A key tactic for changing the prevalent pattern of antibiotic use is public education. The WHO recommends raising national awareness of antibiotic resistance through public education campaigns (Donsamak, 2020).

The general population has to be educated about the distinctions between bacterial and viral infections, anti-inflammatory medications, and antibiotics, as well as the fact that viral infections and nonbacterial inflammation do not need to be treated with antibiotics. The drawbacks of incorrect antibiotic use must also be known by people. They must also be urged to speak with and/or receive proper education from other medical specialists before utilizing antibiotics.

National campaigns with relevant core themes conveyed in an understandable way should be launched, using the strength of mass media including television, radio, and social media. Additionally, including lessons on antibiotic use and resistance in

school curricula may help students learn more and become more informed, which might ultimately lead to better long-term antibiotic usage. However, the effectiveness of these approaches has not yet been assessed.

5.4.4 Reinforcement and Revision of regulations and laws

Antibiotic access should be controlled by reviewing and enforcing pertinent laws and regulations, and developing new ones as necessary to guarantee that antibiotics are administered legitimately. To lessen the supply of antibiotics obtained illegally, it was thought vital to take into account the repercussions or penalties for breaking the law (Abdelaziz et al., 2019). One strategy to address ABR in Palestine may be to improve control of antimicrobial distribution by reclassifying specific antimicrobials and ensuring efficient law enforcement. The laws regarding this subject have not, however, been amended.

5.5 Study limitations

First, the main limitation of this research was that participants were concentrated from the middle governorates of the west bank (Ramallah, Jerusalem and Jericho); in other words, the highest percentage of (participated pharmacies\potential pharmacies) ratio was in these areas because these areas are near the researcher residence and workplace, so pharmacies are well known and easily accessed by the researcher. It is unclear if this may imbalance the results with respect to differences in the practice, views, experience and behaviors of pharmacists in each governorate.

Second, recall bias (Raphael, 1987) may have occurred over the course of respondents' responses, under- or over reporting opinions in comparison to their actual behavior, especially if those opinions were based on less recent experiences. Moreover, People may have over reported desirable behaviors or viewpoints or underreported unfavorable behaviors or viewpoints as a result of social desirability bias (Grimm, 2010). Comparing the results of this survey to anecdotal beliefs in

Palestine about the supply of NPA from community pharmacies, a lower than predicted rate of antibiotic supply for cases had been seen; it is possible that social desirability bias is at work here.

Third, it is important to acknowledge that this study is of a cross-sectional nature, which renders it impossible to determine causal relationships between variables.

Fourth, the sample utilized in this study was acquired through non-probability convenience sampling, thereby limiting the generalizability of the findings to other populations.

Fifth, it is worth noting that relying solely on data from the middle governorates of the West Bank (specifically Ramallah, Jerusalem, and Jericho) may restrict the external validity, or generalizability, of the results. Additionally, the implementation of a convenient sampling method has the potential to introduce subjective selection bias.

Sixth, the questionnaire was only available to participants in English language only and no translation was provided. This may impede understanding the questionnaire contents in some participants graduated from other Asian countries.

Seventh, since we announced the survey multiple times to increase number of responses, we asked participants not to complete the questionnaire if they did previously to prevent duplications, but we cannot guarantee this because of the nature of online data collection method that was used.

Lastly, it is important to acknowledge the potential bias in the study due to the exclusion of impoverished communities, who might not have had the means to participate. The survey was restricted to individuals with Internet access, consequently raising concerns about its ability to present a comprehensive depiction of Palestinian community pharmacies.

5.6 Conclusion

With the use of a cross-sectional survey, this study has effectively demonstrated that community pharmacists' provision of antibiotics is not always appropriate and is impacted by clinical circumstances as well as their knowledge and awareness of antibiotics and ABR. These results could be improved by a plan to enhance the proper supply and use of antibiotic aimed at policymakers and healthcare professionals. According to the report, some major areas of concentration include the following:

- To ensure that community pharmacists have sufficient, current knowledge of antibiotics and symptomatic treatment and that they are aware of and take action on the clinical guidelines for the supply of antibiotic use, it is important to increase knowledge and awareness about appropriate antibiotic treatment and ABR. Community pharmacies should be given enough instruction, educational resources, and patient education aids.

- Enforce current drug laws strictly regarding the distribution of antibiotics by licensed healthcare practitioners, explore reclassifying relevant drugs, and put in place suitable regulatory and healthcare mechanisms to regulate the distribution of antibiotics.

- Increasing public understanding and awareness of antibiotics, their proper usage, and the negative effects of overusing them. This might alter public perceptions of antibiotic use and lower patients' expectations for antibiotics.

The increase in the proper supply of antibiotics from community pharmacists in Palestine should be supported by the development and implementation of a variety of public, professional, and regulatory measures to enhance antibiotic supply and promote knowledge of ABR.

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Appendix 1: Sub ethical approval letter

Al-Quds University

Faculty of Pharmacy

Abu-Dies, Jerusalem

بسم الله الرحمن الرحيم

جامعة القدس

كلية الصيدلة

أبوديس – القدس

Research Ethics Subcommittee of Faculty of Pharmacy
Letter of approval

Nov. 28, 2021
Ref. No.: Res/4/2021

Dear Applicants, **(Dr. Maher Khdour, Mr. Yazan Nofal)**

Program: **Pharmaceutical sciences**

The Research Ethics subcommittee of Faculty of Health Professions has recently reviewed your proposal entitled **"Investigate Factors That Influence Dispensing Non- Prescription Antibiotics From Community Pharmacies In West Bank, Palestine"** submitted by **(Dr. Maher Khdour, Mr. Yazan Nofal)**
Your proposal is deemed to meet the requirements of research ethics at Al-Quds University, but further assessment is required by the Central Research Ethics Committee of Al-Quds University. We wish you all best for the conduct of the project.

Maysa Nabulsi
Research Ethics Subcommittee
Faculty of Pharmacy
CC: File
CC: Committee members

Appendix 2: Ethical committee approval letter

Al-Quds University
Jerusalem
Deanship of Scientific Research

بسم الله الرحمن الرحيم

جامعة القدس
القدس
عمادة البحث العلمي

Research Ethics Committee
Committee's Decision Letter

Date: Jan 4th, 2023

Ref No: 266/REC/2023

Dears Prof. Maher Khdour, Mr. Yazan Nofal,

Thank you for submitting your application for research ethics approval. After reviewing your application entitled "Investigate Factors That Influence Dispensing Non- Prescription Antibiotics from Community Pharmacies in West Bank, Palestine", the Research Ethics Committee confirms that your application is in accordance with the research ethics guidelines at Al-Quds University.

We would appreciate receiving a copy of your final research report/ publication.

Thank you again and wish you a productive research that serves the best interests of your subjects.

PS: This letter will be valid for two years.

Sincerely,

Suheir Ereqat, PhD
Associate Professor of Molecular Biology

Research Ethics Committee Chair

Cc. Prof. Imad Abu Kishek - President
Cc. Members of the committee
Cc. file

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Appendix 3: Questionnaire review

Questionnaire for community pharmacists' views and practices towards antibiotic usage and antibiotic resistance

This survey asks about your opinions on antibiotic use in community pharmacies. Your responses will be useful to raise appropriate antibiotic use in the communities.

Notes for completion:
- Taking part in the **survey** is **voluntary.**
- A pharmacist who works at the pharmacy, please complete the questionnaire.
- The questionnaire should take **approximately fifteen minutes to complete**.
- All data collected in this survey will be analysed and reported in an overview without identifiable data.
- Please complete this survey and submit to be returned to the researcher**.**

Part 1: Views regarding antibiotic supply and antimicrobial resistance

1. **Based on your experiences, would you recommend antibiotic treatment for the following cases?**

(Note: For each scenario below, the patient or caregiver presents at your pharmacy with the specified symptoms and does **not** ask for a specific medicine. Please assume that they can afford the cost of medicines. In each case the person with symptoms has no co morbidity or undiagnosed underlying disease, uses **no** other medication and has **no** history of drug allergy or intolerance).

Please complete the information in the spaces provided if you would provide an antibiotic in the circumstances described. Please tick no if you would not recommend an antibiotic:

A. 6-year-old boy, weight 20 kg, presenting with a sore throat for 2 days accompanied by mild fever, productive cough with thick and colored discharge. There are no other symptoms.
□ No
□ Yes, drug ……. Dose ……mg……. times\day, for ….Day(s).

B. 14-year-old girl presenting with sore throat for 2 days, accompanied by high grade fever, no cough, no runny nose or any other symptoms. She is not pregnant or breast-feeding and has are no other symptoms.
□ No

□Yes, Drug……. dose…..….mg…… times/day, for.....day(s).

C. 43-year-old man with a severe sore throat for 2 days accompanied by high grade fever, tender lymph nodes, pus on tonsils but no cough. There are no other symptoms.
□ No
□ Yes, Drug……. dose…….mg…… times/day, for.....day(s).

D. 70-year-old-woman with watery stool 3 times within the last 12 hours, no fever and no other symptoms. There are no signs of dehydration.
□ No
□ Yes, Drug……. dose…….mg…… times/day, for.....day(s).

E. 30-year-old-woman with diarrhea with blood visible in stools since yesterday evening, accompanied with high grade fever, and abdominal cramps. She is not pregnant or breast-feeding and has are no other symptoms.
□ No
□ Yes, Drug……. dose…….mg…… times/day, for.....day(s).

F. 3-year-old-boy, weight 15 kg, with watery stool 4 times within the last 10 hours accompanied by mild fever, nausea and mild abdominal pain. There is no sign of dehydration and there are no other symptoms.
□ No
□ Yes, Drug……. dose…….mg…… times/day, for.....day(s).

G. 35-year-old-man who had a motorcycle accident (approximately 15 minutes earlier) with many minor, superficial scratches on the left arm and left leg.
□ No
□ Yes, Drug……. dose…….mg…… times/day, for.....day(s).

H. 7-year-old-girl who has a fresh, thin, shallow cut wound on left index finger approximately 1 cm long, which happened about 30 minutes earlier.
□ No
□Yes, Drug……. dose…….mg……. times/day, for.....day(s)

I. 50-year-old man who has a shallow wound on the right calf, approximately 1 cm in diameter. He had a cut wound by barbed wire approximately 4 days ago. The skin surrounding the wound has become red, swollen and sore, and with pus. The patient confirmed that he had a recent tetanus vaccination booster.
□No
□ Yes, Drug……. Dose...….mg…… times/day, for.....day(s).

2. **Based on your experience, please check the box that most closely relates to your views for each statement (a-r) in the table below.**

(1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree)

	1	2	3	4	5
a. Antibiotic resistance is an important problem in the hospital setting but not a problem in the community.					
b. If I am unsure whether or not a patient has a bacterial infection, I will supply an antibiotic just in case it is.					
c. If I am in doubt which antibiotic is best for a patient, I will supply a newer one, just in case.					
d. It is important for pharmacists to only supply antibiotics when clinically needed, and not be driven by commercial pressures.					
e. When the pharmacy is busy, I am more likely to supply antibiotics if a customer asks specifically for an antibiotic, compared to when the pharmacy is quiet.					
f. I am happy to supply an antibiotic without further questioning if a patient requests one by name.					
g. Antibiotic resistance is an important problem in the community setting.					
h. I supply antibiotics **only** if I am certain that a patient has a bacterial infection.					
i. Community pharmacists have an important role to play to reduce the problem of antibiotic resistance.					
j. It is good practice for patients to keep a supply of antibiotics at home in case they need them.					

3. For each statement below please check the box that most closely matches your view regarding its **priority** as a strategy to improve appropriate antibiotic use in the community pharmacy setting in Palestine.

(1-Not a priority, 2-low priority, 3-medium priority, 4-high priority, 5-very high priority)

items	**1**	**2**	**3**	**4**	**5**
a. Patient education by pharmacists in community pharmacies at the time medicines are supplied to patients.					
b. Raising awareness of rational antibiotic use, including antimicrobial resistance, among the public through media such as TV, radio and social media.					
c. Educational programs of rational antibiotic use, including antimicrobial resistance, directed at the public.					
d. Raising awareness of rational antibiotic use, including antimicrobial resistance, among community pharmacists.					
e. Raising awareness of rational antibiotic use, including antimicrobial resistance, among pharmacy students.					
f. Providing regularly updated clinical practice guidelines to community pharmacies on the treatment of infectious diseases					
g. Reclassification of all antibiotics as prescription-only					
h. Enforcement of regulations which prohibit supply of antibiotics from non pharmacies, and by non pharmacists					
i. Providing monetary incentives for community pharmacies to be involved in antibiotic use campaigns					

Part 2: Demographic data of the pharmacy

Please check the box-(es) or fill in the blank that most closely relates to this pharmacy. If you work for more than one pharmacy, please provide responses relating to the pharmacy to which this questionnaire has been sent.

1. Type of your pharmacy:

□ Independent pharmacy

□ Chain pharmacy

2. Is your pharmacy an accredited pharmacy?

□ No

□ Yes

3. Your pharmacy location (City): …….….. □urban □rural

4. Is there any competitor Type I pharmacy close to this pharmacy?

□ No

□ yes, please specify the distance from your pharmacy to the nearest one ……meters.

5. Is there any competitor non-Type I pharmacy that sells antibiotics (e.g., Type II pharmacy, grocery store) close to this pharmacy?

□ No

□ yes, please specify the distance from your pharmacy to the nearest one ……meters.

Part 3: Demographic data of the participant

Please check the box-(es) or fill in the blank that most related with you.

1. Your role at the pharmacy

□ Owner and full-time pharmacist
□ Owner and part-time pharmacist
□ Employee and full-time pharmacist
□ Employee and part-time pharmacist

2. Working Shift:

□ morning □ evening □ both

3. Gender

□ Male □ Female

4. Age…… Years-old

5. Length of your experience working in the community pharmacy sector……..Years.

6. Highest education

□ Diploma (assistant pharmacist)
□ Bachelor of pharmacy
□ Master of pharmacy
□ Pharm. D
□ other, please specify……

7. Graduation origin

□ Palestine
□ Jordan
□ other, please specify …….

******Thank you for completing this questionnaire******

تقصّي العوامل التي تؤثر على صرف المضادات الحيوية بدون وصفة طبية من الصيدليات المجتمعية في الضفة الغربية، فلسطين

اسم الطالب : يزن نائل عارف نوفل

المشرف الدكتور ماهر خضور

الملخص

الأهداف والخلفية: تعتبر مقاومة المضادات الحيوية واحدة من أكثر المشاكل خطورة فيما يتعلق بصحة الإنسان ، حيث لم تعد العديد من مسببات الأمراض حساسة لمضادات الميكروبات الحالية ولا تزال لديها القدرة على التسبب في العدوى .تقتل الأمراض المعدية البكتيرية الرئيسية أكثر من 11 مليون شخص كل عام .كانت أهداف هذه الدراسة هي تحديد ما إذا كانت المضادات الحيوية الذي اقترحها المستجيبون لحالات التهاب المجاري التنفسية العليا والإسهال والجروح الخفيفة مناسبًا ، وفحص الارتباط بين المتغيرات المتعلقة باقتراحات المستجيبين والمعلومات الديموغرافية عن الصيدليات التي يعملون فيها ، مثل نوع الصيدلية (مستقلة أو متسلسلة) ، الجغرافيا ، والنظر في العناصر المرتبطة بالمستجيبين الذين يصفون المضادات الحيوية ومعلوماتهم الديموغرافية ، مثل العمر والجنس وسنوات الخبرة والوظيفة داخل الصيدلية وأعلى درجة تعليم .بالإضافة إلى ذلك ، هدفت الدراسة إلى فحص وجهات نظر المستجيبين حول موضوع مقاومة المضادات الحيوية والعلاقة بين الخصائص التي تؤثر على كيفية توزيع المستجيبين للمضادات الحيوية وكيف يشعرون تجاهه .علاوة على ذلك ، هدفت الدراسة إلى جمع آراء المستجيبين حول التطورات المستقبلية في الاستخدام الرشيد للمضادات الحيوية من الصيدليات المجتمعية .تم فحص كل هذه المجالات لاختيار التدابير لزيادة الاستخدام المنطقي للمضادات الحيوية في المجتمع .

المنهجية: تم استخدام ما مجموعه 314 مستجيبًا في هذه الدراسة من خلال طريقة البحث الكمي باستخدام مسح مقطعي مع استبيان عبر الإنترنت يتم إكماله ذاتيًا .تم تطوير الاستبيان من دراسات أخرى سابقة ، ودمج كل من الأسئلة المغلقة مع مربعات الاختيار والبيانات مع مقياس (ليكرت) بالإضافة إلى الاستفسارات المفتوحة .يتكون الاستبيان من ثلاثة أقسام: يغطي القسم الأول من الاستبيان دراسات الحالة ، ومعلومات حول مقاومة المضادات الحيوية ، واستراتيجيات التأثير على الاستخدام المعقول للمضادات الحيوية .في القسم الثاني ، يُطلب من المستجيبين تقديم بيانات ديموغرافية تتعلق بالصيدلية المحلية ، بما في ذلك موقعها ونوعها .في القسم الثالث ، يتم طرح أسئلة تتعلق بتاريخ المستجيبين ، بما في ذلك العمر والجنس والخلفية التعليمية والمسمى الوظيفي ومقدار الخبرة في الصيدلة .تم اختبار الاستبيان للتحقق من صحة المحتوى وموثوقيته وتم قياسه في إطارنا بواسطة (ألفا كرونباخ) .تم بعد ذلك تصدير البيانات التي تم جمعها عبر الإنترنت باستخدام نماذج (Google) إلى الإصدار 22 من (IBM SPSS) لتقييمها وتحليلها فيما يتعلق بالميل إلى توفير مضادات حيوية غير مناسبة والعوامل المرتبطة بها.

النتائج: وفقًا للدراسة ، كان أعلى معدل للإمداد غير المناسب بالمضادات الحيوية بشكل خاص لـحالات التهاب المجاري التنفسية .كان الموظفون والصيادلة العاملون بدوام كامل (القيمة الاحتمالية=0.047) ، وعمال الوردية الصباحية (القيمة الاحتمالية=0.033) وحاملو شهادة البكالوريوس في الصيدلة (القيمة الاحتمالية=0.044) أكثر عرضة لتزويد المضادات الحيوية غير المناسبة. بالإضافة إلى ذلك ، عند زيادة متغير العمر بوحدة واحدة ، انخفض العرض غير المناسب للمضادات الحيوية بنحو 4.8 مرة ، وعندما تمت زيادة متغير الخبرة بمقدار وحدة واحدة ، انخفض صرف المضادات الحيوية غير الملائمة بنحو 0.25 وفقًا لتحليل الانحدار اللوجستي .فيما يتعلق بحالات الإسهال, الصيادلة الموظفون بدوام جزئي (القيمة الاحتمالية = 0.035) والعاملين في الورديات المسائية (القيمة الاحتمالية = 0.023) والصيادلة الذكور (القيمة الاحتمالية = ≥0.001) وعمال الصيدلة في المناطق القروية (القيمة الاحتمالية = ≥0.001) كانوا أكثر عرضة لتزويد المضادات الحيوية غير المناسبة .فيما يتعلق بحالات الجروح, الصيادلة المالكين بدوام كامل (قيمة الاحتمال = 0.03) ، كلا العاملين في الوردية (قيمة الاحتمال = ≥0.001) ، والصيادلة الذكور (القيمة الاحتمالية = 0.002) ، وبكالوريوس الصيدلة (قيمة الاحتمال = 0.018) والعاملين في الصيدليات المتسلسلة (القيمة الاحتمالية = ≥0.001) كانوا أكثر عرضة لتزويد المضادات الحيوية غير المناسبة .أظهر الانحدار اللوجستي لجميع الحالات مجتمعة أنه عندما يكون المتغير الجنس أنثى ، فإن كمية المضادات الحيوية غير الملائمة تقل بحوالي 8 مرات مقارنة بالذكور.

الخلاصة: أظهرت هذه الدراسة بشكل فعال أن توفير المستجيبين للمضادات الحيوية ليس مناسبًا دائمًا ويتأثر بالظروف السريرية والعوامل الديموغرافية بالإضافة إلى معرفتهم ووعيهم بالمضادات الحيوية و مقاومتها. تشير هذه النتائج إلى الحاجة إلى خطة لتعزيز الإمداد والاستخدام المناسبين للمضادات الحيوية ، تستهدف صانعي السياسات والمتخصصين في الرعاية الصحية.