



An-Najah National University
Faculty of Graduate Studies

**MEDICINE SHORTAGES: KNOWLEDGE
AND PRACTICES OF COMMUNITY
PHARMACY STAFF IN PALESTINE**

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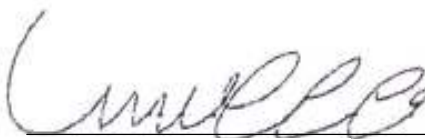
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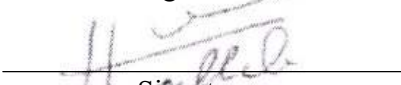
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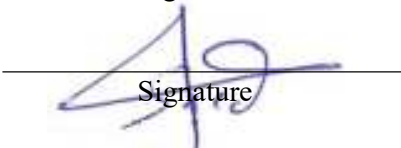
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Dedication

To the souls of the innocent children of Gaza, and to every innocent child across the world, whose silent pain echoes in our hearts and whose innocence must never be forgotten.

To my father, whose unwavering support has been my shelter. Without your faith in me, this journey would not have been possible.

To my mother, my anchor, and my strength, and to my little angel, my daughter Lilia, who both walked beside me through long days of data collection. My sweet Lilia, forgive my absence, my tiredness, and the moments I could not give you. You endured the heat of summer and the crowded streets of the old cities with patience far beyond your age, and your love carried me forward.

To my beloved children, Mohammad and Kinan, who watched this journey unfold with curious eyes and hopeful hearts, counting my achievements as their own. May I always be a source of inspiration and a living example for you.

To my husband, my companion in every step, my strength in moments of doubt, and my constant support.

To my sisters, my friends, and my family, whose love, prayers, and encouragement surrounded me at every stage-this work carries a part of you all.

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Special thanks go to my dear friend **Hala** for sincere care, generous time, gentle guidance, and for walking beside me until this thesis came to life.

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

MEDICINE SHORTAGES: KNOWLEDGE AND PRACTICES OF COMMUNITY PHARMACY STAFF IN PALESTINE

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

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List of Abbreviations

Abbreviation	Meaning
API	Active Pharmaceutical Ingredient
COVID-19	Coronavirus Disease 2019
EAHP	European Association of Hospital Pharmacists
ECDC	European Centre for Disease Prevention and Control
FDA	Food and Drug Administration
GMP	Good Manufacturing Practice
IFDA	Iranian Food and Drug Administration
INN	International Nonproprietary Name
IQR	Interquartile Range
MOH	Ministry of Health
N	Number
NVivo	Qualitative Data Analysis Software (QSR NVivo)
OTC	Over-The-Counter
Pharm-D	Doctor of Pharmacy
Rx	Prescription-only Medicines
SPSS	Statistical Package for the Social Sciences
USP	United States Pharmacopeia
WHO	World Health Organization
%	Percentage

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MEDICINE SHORTAGES: KNOWLEDGE AND PRACTICES OF COMMUNITY PHARMACY STAFF IN PALESTINE

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Abstract

Background: The issue of medicine shortages is severe to health care systems globally, especially in areas where political instability and unstable supply chains are in force. Movement restrictions, pharmaceutical importation control, and continuous economic pressures in Palestine limit healthcare delivery and increase the effects of medicine shortages on community pharmacy practice.

Objectives: The purpose of the study was to examine the understanding, behaviors of community pharmacy employees in Palestine about medicine shortages, and to understand their perceptions of the causes, effects, and strategies to deal with it. Moreover, it aimed at finding evidence-based solutions to help regulatory authorities reduce future crises.

Methods: The descriptive cross-sectional quantitative study with one open-ended question was conducted using a structured self-administered questionnaire that was administered to the staff of the community pharmacies within the Palestinian governorates. Statistically, quantitative data were analyzed by the use of SPSS program, whereas thematic analysis was done with qualitative responses given by open-ended question and validated using NVivo software.

Results: The study found that there was a high incidence of medicine shortage in community pharmacies (92.49%). The findings addressed the study questions and were consistent with the study objectives, as the participants showed excellent overall knowledge (59.60-73.32%), with the significant gaps concerning the processes of the supply chain and regulatory mechanisms (44.00%). In Palestine, community pharmacy personnel reported that medicine shortages have adverse effects on patient adherence (83.68%), treatment continuity, and quality of life (86.79%), and add workload and ethical problems to the pharmacy staff. The frequent coping mechanisms were to

contact more than one supplier, prescribers' referral (55.18%), and alternative therapeutic options (25.62%). The qualitative results highlighted the necessity of better coordination with authorities, as well as the creation of a national early warning system.

Conclusions: There is still an ongoing and multifaceted issue of medicine shortages within the community pharmacy practice in Palestine. The solution to this problem in Palestine must be context-sensitive national strategies to reinforce supply chain management and promote local production. To protect patient safety, it is vital to empower pharmacists by using an explicit protocol of substitution and interprofessional collaboration.

Keywords: Palestine; Medicine shortages; Community pharmacy; Knowledge; Coping Strategies.

Chapter One

Introduction and Theoretical Background

1.1 Background

Medicines availability is an international target among all countries because it plays a significant role in delivering effective, high quality healthcare services (Bigdeli et al., 2015). There is a list of essential medicines that is updated by the World Health Organization (WHO) every two years that acts as a guide for developed and developing countries in formulating their own national lists (World Health Organization, 2023). And there is also a model formulary provided to ensure effective and safe use of these medicines (World Health Organization, 2002). Essential medicines should always be available in adequate amounts, suitable dosage, and in access to the population (World Health Organization, 2017c). Without proper access to medicines, achieving positive healthcare outcomes is impossible (Bigdeli et al., 2015). Many diseases could be prevented or cured if treated properly, thereby reducing complications, costs, and mortality rates (World Health Organization, 2004). Access to medicine, as defined by the WHO, entails the continuous availability and affordability of medicines at public or private health facilities or medicine outlets within one-hour walk of the population (World Health Organization, 2010).

The problem of medicine shortages is a global issue affecting countries with varied income levels (Alsheikh et al., 2021; Bachoolall & Suleman, 2025; Hallal et al., 2025; Juliette & Robin, 2024; Lee et al., 2024; Miljković et al., 2022; Omer, Ali, et al., 2021; Yousefi et al., 2019). The medication shortages problem is increasing in recent years due to many reasons, one of which is the surge of demand for certain medications, particularly during and after the Coronavirus Disease of 2019 “COVID” pandemic (Bachoolall & Suleman, 2025; Omer, Ali, et al., 2021; Parajuli et al., 2022). Additionally, some factories experienced shutdowns due to insufficient workforce or other economic issues (Phuong et al., 2019). Coupled with other factors, the risk of continued shortages is escalating. According to the previous study, medication shortages have significant consequences on the healthcare system and can adversely affect patients’ health and their quality of life.

There are many different definitions and causes of medicine shortages. For example, the Food and Drug Administration “FDA” defines it as “a period when the demand or projected demand for the drug within the United States exceeds the supply of the drug” (Food and Drug Administration, 2019). The WHO provides a definition that encompasses both supply and demand factors. On the supply side, a medicine shortage occurs when the supply is deemed inadequate to meet public health and patient needs. On the demand side, it happens when demand exceeds supply at any point in the supply chain, potentially resulting in a “stock out” (World Health Organization, 2017a), which refers to a complete absence of the required drug for at least for one day at the health facility level (World Health Organization, 2017b). Countries vary in their response to medicine shortages issue. In the case of the United States for example, the FDA closely monitors essential medications shortages and seeks solutions to prevent crises (Food and Drug Administration, 2019).

The Palestinian health system has significant constraints that limit its capacity to respond to public health emergencies because it is highly fragmented and chronically under-resourced (AlKhaldi et al., 2018). Severe socio-economic and humanitarian situations, along with ongoing insecurity and significant restrictions on movement, have extremely affected the healthcare system and health outcomes for the Palestinian population. The limitations on the entry of humanitarian and medical supplies have exacerbated the healthcare system challenges (World Health Organization, 2024). Severe shortages of essential medicine within Palestinian healthcare facilities- particularly in Gaza where shortages exceeded 70%- are shown in the recent reports of the Palestinian Ministry of Health (Palestinian Ministry of Health, 2025). Additionally, by February 2025 (20.27%) which is 120 out of the 592 medicines supplied by the Palestinian Ministry of Health in the West Bank are out of stock (Handicap International, 2025).

Medicine shortages in Gaza lead to several negative consequences on the patients who were forced to rely on ineffective alternative treatments and obtain higher expenses by purchasing medicines from private pharmacies when unavailable at Ministry of Health pharmacies (Daher, 2015). The same report revealed that morbidity and mortality among particular patients with chronic diseases were both increased because there was non-compliance with their treatments. The costs for the Palestinian Ministry of Health

were also raised as shown with the previous report because medicine shortages lead to more referrals to hospitals outside of Gaza. Those raised costs caused delays in treatment and access challenges for patients.

It is crucial to assess the pharmacy staff practices, their level of knowledge, as well as their opinions regarding medicine shortages because they serve as the primary source of information and guidance for the healthcare system and patients. These factors are important in determining the viable solutions and equipping the healthcare authorities with the evidence they require to formulate solid policies of curbing future shortages.

1.2 Problem Statement

Although the international evidence has been increasing, research work on the issue of medicine shortages in an environment where the political instability is prolonged, movement restrictions and weak supply chain are present is scarce. Palestine is a distinctive setting where the healthcare provision is constantly under the pressure of external restrictions, the lack of control over pharmaceutical importation, and the economic pressures. These situations will tend to worsen the shortage of medicines and enhance their effects on the pharmacy activities of communities.

Although it is possible to compare the Palestinian situation with other countries like Lebanon and Iran, Palestine has other structural hindrances pertaining to limited access, importation restrictions and divided regulatory control. Moreover, even though the centralized policy and well-developed communication systems implemented in countries like Australia and South Korea may be applicable to Palestine contextually and due to regulatory limitations to a full extent. In this regard, empirical studies that investigate the problem of medicine shortages in the Palestinian healthcare system, especially at the community pharmacy level, are urgently needed.

1.3 Research Questions

1. What are the levels of knowledge, perceptions, attitudes, and practices of community pharmacy personnel in Palestine regarding medicine shortages?
2. What is the effect of medicine shortage on pharmacy practice, patient care and coping strategies within the Palestinian community pharmacy setting?

1.4 Objectives

The primary aim of the current research is to evaluate knowledge, perceptions, attitudes and experiences of pharmacy personnel in Palestine about medicine shortages and investigate its implications on pharmacy practice and patient care and coping in terms of medicine shortages.

The targeted objectives of the research are as follows:

1. To determine the awareness level of the staff of the Palestinian community in terms of definitions of medicine shortages, its causes, and effects.
2. To determine the perceptions and attitudes of the staff in community pharmacy with regard to medicine shortages and the role they have towards it.
3. To explore the existing practices and coping methods used by community pharmacy personnel in dealing with medicine shortages.
4. To determine context-specific issues and obstacles to the management of medicine shortage in Palestinian community pharmacies.
5. To produce evidence that can be used to inform policy development and enhance interventions to reduce medicine shortages in the Palestinian healthcare system.

1.5 Importance of the Study

The shortage of medicine in Palestine is a major problem because of the political instabilities, economic forces, and structural obstacles currently experienced in healthcare provision. No published studies have thus far conducted a systematic evaluation of the knowledge, perceptions and practices of community pharmacy staff in Palestine as far as medicine shortage is concerned. The gap is critical to consider addressing the context-specific interventions, pharmacy practice, patient care, and continuity of medicine supply. Thus, with the community pharmacy setting in mind, this research aims to produce evidence applicable in policy formulation, pharmacy practice reinforcement, and to provide better management of medicine shortage in the Palestinian healthcare system.

Chapter two

Literature review

2.1 Medicine Shortages in Weak Economies: The Lebanese Crisis

Medicine shortages are a significant problem of health care systems in all countries and have become especially acute in those countries, where the economic and financial crisis is severe. In this respect, a national cross-sectional study was carried out in Lebanon by Hallal et al. (2025) to determine the perceptions, attitudes, and experiences of hospital pharmacists that work in the private sector in Lebanon on the issue of medicine shortages. Another objective of the same research was to investigate the professional and clinical implication of the medicine shortage and coping mechanisms employed by the pharmacists as a reaction to this persistent issue. The research design was a cross-sectional study, and the target population was the hospital pharmacists that were employed in Lebanese hospitals in different regions. The structured, self-administered questionnaire was used to collect data on the sociodemographic and professional features of the participants, frequency, and intensity of medicine shortages, types of the most affected medications, factors perceived to cause shortages, and their effects on patient care and pharmacy practice. The results showed that most pharmacists found the problem of medicine shortage to be severe and chronic and a significant underminer of healthcare delivery and patient safety.

Most frequently affected categories were reported to be medications used in chronic diseases, life-saving treatments, antibiotics, and oncology treatments. The shortage of medicine was reported by pharmacists to cause delays in treatment, greater vulnerability to medication errors, and the frequent change of treatment regimens, including less effective or costly options. Such interruptions exerted more strain on the pharmacists to maintain continuity of care within limited circumstances. Professionally, pharmacists were under more pressure and were psychologically strained by the need to operate under limitations of inventories and, at all times, communicate with physicians, hospital management, suppliers, and patients. A significant number of the respondents pointed out the lack of clear national policies and the lack of coordination between stakeholders, most notably the Ministry of Public Health, drug importers, and healthcare institutions, as the key factors in the continued existence of medicine shortages. Regarding the mitigation strategies, pharmacists have mentioned the use of different short-term

strategies, among them: rationing of available medication, finding therapeutic alternatives, redistribution of stocks at hospital departments, and cooperation with other hospitals as possible. Most people however concurred that these measures were short term and could not adequately deal with the issue in a sustainable manner. The authors concluded that there is a high burden of medicine shortages in the private hospitals in Lebanon and this has a negative impact on the care and quality of patients. The paper notes the extremely important role of hospital pharmacists in managing and alleviating the effects of medicine shortage, and the pressing imperative of effective national policies, tightening pharmaceutical supply chain regulation and institutional assistance in providing permanent access to necessary drugs and protecting patients.

2.2 Community Staff Knowledge, Perceptions, and Practices Regarding Medicine Shortages: Evidence from the Gulf Region

Although the Lebanese situation underlines how serious the medicine shortages in the hospitals are when the economy is collapsing, other regional and global cases of the same have been reported, bringing to the fore the global nature of the problem, but the context of the pharmacy staff perception and management of shortages at the community level is also of paramount importance, especially in areas where the regulatory and economic frameworks are not the same. Specifically, a number of studies have been devoted to the knowledge and practice of the pharmacy personnel about medication shortage, and the significance of sufficient professional awareness and suitable response measures in alleviating the effects of shortages are emphasized. For example, a cross-sectional study conducted in Saudi Arabia between November 2019 and March 2020 utilized a validated online survey, available in both Arabic and English, to assess pharmacy staff's understanding and responses to medicine shortages (Alsheikh et al., 2021). According to the same study, the survey consisted of four main sections. Firstly, demographic characteristics were collected, followed by an evaluation of participants' knowledge regarding medicine shortages. This section involved rating statements concerning the definition of shortages, as proposed by organizations such as FDA and WHO, as well as factors contributing to shortages, including RECALLs, production discontinuation, shortages of raw material, seasonal increases demand (such as during Hajj season), poor product quality, stop production and other contributing factors. Additionally, the same study reported that participants rated statements

concerning the impact of medicine shortages on pharmacy operations, patient health outcomes, and their quality of life, healthcare costs, and the incidence of medical errors, as well as identifying their sources of information regarding medicine shortages, their self-evaluation of knowledge levels, and their perceived need for training programs related to medicine shortages management. The subsequent section assessed participants' practices, including the frequency of encountering medicine shortages, time taken to resolve the issue, and the types of medicines affected, encompassing both prescription and over-the-counter medications.

The respondents also mentioned how they dealt with shortages including informing the patient about alternative drugs or even seeing whether medicine is available in pharmacies nearby. Lastly, the survey addressed the views and experiences of the participants on the correct reporting systems and possible remedies to the problem of medicine shortage, including the creation of data sharing systems and finding other suppliers. It was identified that the majority of the community pharmacy staff exhibited excellent knowledge and overall appropriate practices in terms of medicine shortages. Nevertheless, significant differences in views and experiences were noted because of the differences in pharmacy policies and the lack of a unified system of national reporting. Such results indicate the role of regulatory frameworks and institutional support in the formation of pharmacy staff responses to medicine shortages.

2.3 Medicine Shortages in Low-and Middle-Income Countries: Community and Hospital Pharmacy Point of Views from Pakistan

The battle of drug shortage is also not exclusive to the low-and middle-income countries, with both hospitals and community-based pharmacies experiencing systemic challenges in different countries.

2.3.1 Insights from the Pakistani Context: A Qualitative Pint of View

In this connection, a qualitative study was carried out in Pakistan (February-May 2021) by Omer, Ali, et al. (2021) to investigate the experiences of community pharmacists with medicine shortages, their management strategies, perceived barriers, and the effects on their profession and practice and possible interventions in the future. The same study indicated that it was achieved by using face-to-face semi-structured interviews that lasted approximately 20 minutes and which were audio-recorded and

complemented by field notes. Then the notes were handed over to the participants to be corrected or provide additional remarks, the audio records were listened more than once, together with the written notes that they made sure that the correct understanding was formulated. The researchers developed a coding table and juxtaposed the answers of the pharmacists to each question, and the similarities were considered significant results. The authors used NVivo to analyze data. The results of the same research also indicated that both chain and independent pharmacies were faced with shortages on a daily basis where some types of medications were more hit than others. Shortages were also reported seasonally especially antibiotics that were used to treat infections of the upper respiratory tract especially during the winter months. Clonazepam was found to be among the most commonly out of stock medicines. Other factors that worsened the situation are drug abuse, self-medication, and panic buying during the COVID pandemic, which resulted in a large number of people storing medicines at home. Moreover, the identical study also reported that pharmacists used different strategies to reduce shortages with some of them being to prevent or postpone stock outs. They were to closely communicate with the distributors to alert them of the imminent shortages, stock more of the high demand medicines without necessarily considering the immediate consumption trends, provide alternative treatment to the patients, inspect medicine stocks in the nearby pharmacies and restricting the number of medicine dispensed per patient so that many can access it. These attempts were met with a number of challenges which included; distributors favoring to supply some chain pharmacies rather than fairly supplying all pharmacies, black market, patients being reluctant to take alternative drugs and the prescribers favoring to write the name of a particular brand because of the promotions and lack of knowledge about the prevailing shortages. These issues not only created a burden of work for pharmacists, but also had a negative impact on their professional reputation. In some instances, patients were unfairly placing blame on pharmacy staff for these problems, and this created tensions- particularly when patients rejected alternatives or partial dispensing.

2.3.2 Quantitative Trends in Pakistani Hospital Pharmacy Settings

To supplement these qualitative findings, in 2020, a cross-sectional survey by Omer, Pan, et al. (2021) was conducted in Pakistan to explore the views of hospital pharmacists on supply issues. This survey showed a disturbing picture: approximately

(81%) of the participants had an impression that the shortage of medicine was a significant issue, and approximately (77%) of the participants regularly encountered this issue on a daily, weekly or monthly basis. Among the main lessons of this quantitative analysis, the lack of an effective early warning system must be mentioned; most pharmacists were only occasionally informed about the imminent shortages, which highlights a serious deficiency in regular communication in the health supply system. The study further reported that shortages most frequently affected oncology medicines (54%), cardiovascular medications (53%), and antimicrobials (42%). Responses regarding the impact of medicine shortages on patient care varied; however, more than half of the participant pharmacists (53%) reported that medicine shortages negatively affected patient care. These impacts included delayed care (58%), cancellations of treatments (30%), treatment failures (29%), and medication errors (26%). Participants were also asked to identify the strategies implemented in their hospitals to minimize the impact of medicine shortages. The majority (72%) reported that they informed prescribers about certain shortages and recommended alternative medications. While only (16%) indicated that they merely informed the prescribers without suggesting alternatives. Additionally (38%) reported attempting to source unavailable medicines from alternative suppliers, whereas only (12%) substituted medications without consulting either the prescriber or the patient. When asked about institutional changes needed to better address medicine shortages, (65%) of participants suggested that establishment of a new communication system to alert healthcare staff about such shortages. Furthermore, (41%) recommended readjusting budget plans, (26%) suggested using alternative sources beyond hospital inventories, and (19%) proposed reassigning staff roles and responsibilities. Overall, the study concluded that early notification of upcoming shortages, and how long they will remain will help to minimize their impact, improved communication strategies, reviewed and updated health policies, and increased financial resources are essential to de-escalate medicine shortage impact on patient care. By integrating both qualitative and quantitative point of views from Pakistan, a clearer picture emerges of medicine shortages as a systemic and chronic crisis. The qualitative and quantitative results of the Pakistani studies combined prove that there is a consistent perception of medicine shortage as a recurrent issue, and that the various methodological approaches both reveal quantifiable effects on patient care, and the experiences of pharmacists.

2.4 Structural and Organizational Determinants of Medicine Shortages in East Asia: The South Korean Experience

A more recent evidence from East Asia further illustrates how structural and organizational factors within pharmaceutical supply chains influence the occurrence and management of medicine shortages at the community's pharmacy level. A cross-sectional study conducted in South Korea in 2022 aimed to identify factors contributing to medicine shortages, their frequency, and the time required to resolve them at the community pharmacy level (Lee et al., 2024). The same study employed an online survey distributed to community pharmacists in Seoul and consisted of seven sections, including the current status of medicine shortages, pharmacy properties, pharmacists' demographics, and advanced knowledge of medicine shortages and their causes, medicine distribution processes, communication with prescribers and patients regarding substitutions or prescription changes, and the increased workload associated with frequent prescription adjustments. The findings from the same previous study demonstrated a significant association between pharmacy properties – particularly purchasing power- and the occurrence of medicine shortages. Larger pharmacies were found to have priority access to medication supplies, placing smaller pharmacies at higher risk of medicine shortages, and limiting equitable patient access to medications. Although the Korean Pharmaceutical association had implemented new policies to regulate medicine distribution and availability, the study further identified persistent disparities related to pharmacy location. Studies show that being close to tertiary hospitals is a type of insurance against drug shortages, and these pharmacies are more resolved-a result that suggests more general systemic disparities in drug availability. Leaving location aside, the information gap is a critical one; pharmacists who get early warning information are defter when it comes to dealing with shortages than those who do not. This highlights that crisis responses are as much about communication with prescribers as they are about supply. This is quite relevant in the Palestinian context, where combination of low demand (you cannot have it, you cannot afford it) and geographical disadvantage can be used against the smaller pharmacies, which forces strong co-operation between wholesalers and end users.

2.5 During Public Health Emergencies, Policy-Driven Responses to Medicine Shortages: Lessons from Australia

To address chronic and massive medicine shortages, a number of countries have instituted policy level measures to maintain the supply of medicine and continuity on patient care. This was the case during the COVID-19 pandemic in Australia. Australia was one of the early adopters of lockdowns, which created immediate logistical challenges; its excessive reliance on air transport meant air freedom restrictions led to major transport gridlock and stockpiles depletion (Medicines Australia, 2021). This was compounded by an unprecedented explosion in demand, which initially increased by 10-30%, but expanded to as much as 300% for certain therapeutic areas by April 2020, depleting the usual three-to-six month buffer stocks.

In such turbulent time, the research by Parajuli et al. (2022) demonstrates the critical role pharmacists play in securing the communities' access to care. In a bid to support these health care professionals, the Australian government made a series of rapid regulatory adjustments (Department of Health and Aged Care, 2020). One measure was the approval of "independent" prescription substitution based on a different dose form or strength, without the usual physician approval. This is not only streamlined patient access but also freed up a much-needed workload for the over-burdened medical workforce. Other measures included hard-and-fast dispensing limits (restricting prescriptions to a one-month supply) and "one-unit" limits on essential over-the-counter medication. These measures are ostensibly aimed at protecting the vulnerable, but they also put pharmacists in an awkward position. Parajuli et al. (2022) note that, as public fear increased, so too did verbal or physical assaults on those working in pharmacies. There was also a distinct "storage divide" in which smaller independent pharmacies experienced more scarcity than larger corporate chains. In a fascinating twist, the crisis encouraged a novel level of community coordination; pharmacies sharing the same districts began sharing opening times and stock levels in an effort to reduce the impact on the public. In conclusion, the Australian experience demonstrates that, while public policy forms the backbone of crisis management, the pharmacist remains the indispensable human being in turning policy into the protection of patients.

2.6 Medicine Shortages during Political and Economic Sanctions: Lessons from Iran

In addition to issues of pandemics and seasonally skewed demand, access to medicines is often determined by geopolitical factors, particularly political instability and economic sanctions. In a study that takes the Palestinian situation as a case study, where the supply chain is inexorably tied to the political situation, it is important to draw on the experiences of other sanctioned countries. Iran is a particularly relevant case study; decades of international sanctions on its nuclear program have crippled the Iranian economy and pharmaceutical supply chain. Reflecting on the Iranian case provides valuable insights into the ways in which institutional and economic factors alter access to essential medicines (Yousefi et al., 2019). Our previous research was published in 2019, it used a scoping review approach to analyze the Iranian policy responses and to assess their effectiveness, with a goal of drawing lessons for other countries in similar situations. Three authors of the previous study searched Scopus, Google Scholar, and PubMed. In addition, a qualitative component was conducted through interviews with key stakeholders from pharmaceutical companies and senior managers at the Iranian Food and Drug administration (IFDA), all of whom had at least has three years of experience and were involved directly in crisis-related-decision-making processes. The qualitative data were coded and analyzed thematically, while quantitative data were extracted from the IFDA's documentations to compare indicators before and after each policy implementation. According to the study, the peak of the crisis occurred in 2012, when new sanctions restricted financial transactions with the Iranian banks and limited international money transfers. These restrictions severely hindered medicine imports and led to widespread shortages. Concurrently, a significant depreciation of the national currency (Nakanishi, 2015) resulted in sharp increases in the prices of both imported and locally manufactured medicines (Cheraghali, 2013). Several essential drugs were discussed in relation to short supply, orphan drugs and vaccines, according to Cheraghali (2013).

The IFDA implemented a multi-faceted policy strategy to address these supply-chain challenges, with a focus on both short-term and long-term solutions. On the procedural front, the IFDA facilitated the swift movement of pharmaceutical goods held up at customs by financial red tape so they could be distributed with little delay.

Legislatively, the IFDA was supported by the Parliament in this regard, by allocating more funding to health insurance programs to protect the vulnerable population from the rising cost of medicines. At the same time, the IFDA promoted local production through targeted deregulation, which included streamlined registration procedures and protectionist measures (such as bans on drug imports containing locally manufactured active ingredients). To better manage the problem, the national early warning system was established and the information from the Drug Information Center and the universities was used in real time to change the IFDA's role from reactive to proactive (Kheirandish et al., 2015). Lists of medicines in shortage were published regularly and shared with pharmaceutical companies. Past consumption data were also used to predict future need and potential shortages (Rachmania & Basri, 2013). Moreover, the study conducted at the IFDA indicated the application of external reference pricing using countries like Greece, Spain, Turkey and the country of origin for the regulation of medication prices, which means that the importer should consider the price in those markets and set the lowest price, which helped to control the inflation in the pharmaceutical market. Overall, The IFDA's strategy focused on the three core pillars: accessibility, availability, and affordability, alongside strengthening local pharmaceutical production. Although some healthcare professionals and patients expressed dissatisfaction – particularly regarding the unavailability of certain branded medicines and the increased administrative workload—the implemented policies demonstrated significant economic resilience and provided a valuable framework for countries experiencing similar political and economic constraints.

2.7 The European Perspective on Medicine Shortages: Hospital Pharmacy Experiences and Patient Care Impact

At the European level, the European Association of Hospital Pharmacists (EAHP) conducted a large-scale survey in 2018 to assess the prevalence of medicine shortages and their impact on hospital pharmacy practices across Europe (Miljković et al., 2019). In the previous survey data were collected between March and June 2018 from hospital pharmacists in multiple European countries. Descriptive statistics, including percentages and mean percentage, then paired sample t-test was used to compare the mean percentages, were used for analysis, and paired sample t-tests were conducted to compare findings with a previous EAHP survey conducted in 2014. According to the

same survey, more than 90% of the respondents reported that medicine shortages negatively affected patient care, while 7% reported no impact and 3% were uncertain. Regarding frequency, 39% of pharmacists experienced shortages weekly, 36% daily, 16% monthly, and 11% occasionally. The proportion of the pharmacists reporting medicine shortages significantly increased from 82.6% in 2014 to 91.8% in 2018 ($P=0.011$). Similarly, the percentage of pharmacists spending more than five hours per week managing shortages from 33.1% in 2014 to 42.0% in 2018 ($P=0.013$). Antimicrobial agents represented the most frequently reported medicine group in shortage, increasing from 57% in 2014 to 77% in 2018. Shortages were also reported for prophylactic medicines from 20% in 2014 to 43% in 2018 and anesthetic agents from 27% in 2014 to 39% in 2018.

Hospital pharmacists used various tactics to counteract the effect when there was a shortage. These comprised of increasing stock levels in case of early warnings, finding alternative suppliers or even from other countries and advising alternative regimens of therapeutic agents in collaboration with prescribers. Nevertheless, a significant number of pharmacists complained about inadequate and timely information on the causes and anticipated time of shortages provided by the drug manufacturing companies. Also, the survey revealed that shortages involved significant time investment as 56 percent of the pharmacists had up to five hours per week, and 13 percent had over 15 hours a week, invested in shortage management. In addition, 43% and 38% strongly and agreed respectively that medicine shortages added to the costs of healthcare. Regarding patient care, 59% of the pharmacists had observed care delays, 31% had observed lower quality of care, 25% had witnessed medication errors, 20% had witnessed prolonged hospital stay, 5% had witnessed readmission as a result of treatment failures and 1% had witnessed mortality as a result of medicine shortages. The respondents always highlighted the importance of better manufacturer reporting, better timelines on how medicine resupply could be done, and management strategies at the national level to combat medicine shortages.

2.8 Antimicrobial Shortages: Clinical Risks and the Threat of Resistance

Antimicrobial shortages present a major threat to global health security, largely because front-line antimicrobial dispensers (community pharmacists) must grapple with the trade-offs between ensuring therapeutic continuity and committing errors. As Gross et

al. (2017) report, this often ends in a substandard outcome, where the delay or use of an unsuitable alternative medicine may inadvertently contribute to the emergence of resistance. This practice, as documented by Shafiq et al. (2021) is not simply a supply chain issue but a public health challenge that adds to the global battle against superbugs. The financial impact is also compounded as providers are often compelled to substitute more expensive products to maintain standard of care (Khumra et al., 2019).

From a patient safety perspective, the dangers are multifold. When a replacement product has a different formulation (e.g. concentration), the risk of medication errors rises, especially if the pharmacokinetics of the new product are not well understood by the health care team. Study by MacDonald et al. (2011) show that such Compromised treatment protocols can result in adverse events, further emphasizing the importance of professional oversight during shortages.

According to the European Association of Hospital Pharmacists (EAHP), the most volatile class of medicines are antimicrobials. When comparing the survey data between 2013 and 2019, there has been a shift in the drug spectrum of scarcity; while broad-spectrum antibiotics such as Amoxicillin and Meropenem were at the forefront of shortages in 2014, in 2018 the crisis switched to Cephalosporins and Piperacillin-Tazobactam across at least 20 European countries (Miljković et al., 2022). Several of the above stock-outs persisted for as long as five years, highlighting the fragility of the supply chain that led to the need for patient transfers.

The management of these shortages has become more complex. Whereas a large proportion of pharmacists (more than 80% in previous years) can initially replace the absence with a generic alternative, this number dropped to 40% in 2019, suggesting that appropriate substitutes are increasingly difficult to find. This places a greater burden on consulting with prescribers and careful patient monitoring, which are often complicated by technological and procedural shortcomings.

This is further highlighted by the European Centre for Disease Prevention and Control (ECDC) (2018) insights: while 80% of health-care professionals know how to use antibiotics, there is an urgent need for clinical guidelines (81%) and local resistance (78%) data to guide decision-making. Finally, the response to antimicrobial shortages is costly. It requires clinical skill, as well as a restructuring-including focused audits and

prescriptions oversight-to preserve therapeutic quality and reduce the lasting consequences of the shortage crisis.

2.9 Impact of Medicine Shortages on Pharmacists' Professional Well-being and Work-Life Balance

Understanding the effect of medicine shortages on the personal and professional well-being of pharmacists is crucial because most of the research addressed the logistical and clinical impacts of medicine shortages, not much was known about this area which became a recent focus of study.

2.9.1 Evidence from Belgium

In 2023, Belgium's Juliette and Robin (2024) study examined this aspect, using semi-structured interviews with 16 community pharmacists to understand the impact of the everyday reality of the profession. Through the use of verbatim transcriptions and software-based thematic analysis (using Provalis Research), the study identified a range of stressors from increasing workloads to the difficult equilibrium between the personal and professional lives.

Operational challenges and the evolving pharmacist role: the previous study highlights that shortage management is not simply a time-consuming administrative burden; it is a temporal drain. The researchers found a chaotic workday where pharmacists were caught in a loop of patient education, seeking alternatives and coordinating with uncooperative wholesalers. This has changed the pharmacist role, compelling them to do more "crisis management" than patient counselling.⁴

The psychological and financial toll: undoubtedly the most haunting consequence was the breakdown of the pharmacist-patient relationship. The same survey noted the increase in patient hostility from verbal aggression to aggressive "panic buying" that also contributes to stock depletion in local pharmacies. Intriguingly, as the crisis has weakened some professional relationships, it has also sometimes strengthened pharmacist's professional self-esteem through collaboration with prescribers-placing the pharmacist at the center of the crisis. Then there is the financial toll; the requirement to purchase from secondary wholesalers at high prices effectively eliminates the pharmacy's margin. In the end, the Belgian case suggests an urgent need for "shortage

management" to be included in the pharmacy curriculum to prepare the next generation for these challenges.

2.9.2 Evidence from South Africa

A qualitative exploratory study conducted in South Africa in 2023, which examined community pharmacists' perceptions and experiences of medicine shortages during the COVID-19 pandemic and other turbulent periods, including natural disasters, electricity outages, and political unrest (Bachoolall & Suleman, 2025). Data were collected through semi-structured interviews using an interview guide adapted from a previous study conducted in Belgium and France in 2015 that examined factors contributing to medicine shortages (Bogaert et al., 2015). Both online and face-to-face interviews were conducted using open-ended questions. Data analysis followed the Framework method, with NVivo 14 used to support coding and thematic analysis. The findings indicated that pharmacists had substantial knowledge of medicine shortages, which occurred frequently and intensified during crisis periods. According to the same study, disruptions to medicine supply chain, combined with increased demand, adversely affected patient healthcare, pharmacist-patient relationships, and pharmacists' workload. Pharmacists frequently attempted to substitute unavailable medicines with generic alternatives; however, not all medicines had suitable alternatives. Furthermore, patient hesitancy toward generic medicines often requires pharmacists to engage in extensive counseling with patients and prescribers or to search nearby pharmacies to find the same prescribed medicine, significantly increasing time demands. In some cases, alternative medicines were not covered by medical schemes-a nonprofit organization that covers healthcare costs including medicine's cost-placing additional financial burdens on patients that had to pay for alternatives. Pharmacists also reported financial strain, as some attempted to mitigate shortages by stockpiling medicines beyond immediate needs. The authors emphasized the importance of improved collaboration, better communication between pharmaceutical companies and distributors, advanced notifications of medicine shortages, and enhanced regulatory frameworks to reduce the negative impact of medicine shortages.

2.10 Global Evidence

The examined literature presents evidence of a pharmaceutical environment that is under tremendous pressure. At the heart of this crisis is the pharmacist, whose role with regard to patient safety has grown with the increasing rate of stock-outs. The gap between policy and practice has been consistent despite a number of efforts to use short-term interventions as demonstrated in these studies. The similarity of the lack of proper communication throughout the supply chain and the lack of common reporting tools imply that until these structural shortcomings are addressed, the responsibility of providing equitable access to medicine will remain disproportionately in the hands of front line healthcare providers.

Although the evidence discussed above offers a critical perspective on the problem of medicine shortages globally, the Palestinian healthcare situation is a rather precarious situation that cannot be categorized within the usual framework. In contrast to the stabilized settings of Australia, or the sheer economic crises of Lebanon, Palestine is governed by a complicated combination of chronic political instability, extreme movement controls and a discontinuous control over pharmaceutical imports. These extrinsic restraints do not simply follow the world trends, but they magnify them and form a compound crisis in which logistical failures are indissolubly connected with political externalities. As a result, the academic and practical need to shift rapidly to go beyond the international generalizations and engage in a local and empirical study is urgent. This study attempts to identify how the frontline providers can maneuver in a system that is typified by structural vulnerability and pervasive ambiguity by specifically addressing the knowledge, attitudes, and coping mechanisms of community pharmacy staff in the Palestinian territories.

Chapter Three

Methodology

3.1 Study Design

This research adopted a descriptive cross-sectional design, by use of a self-administered questionnaire. To include the perspective of community staff with regard to medicine shortage, quantitative structured questions were included in the questionnaire, and one open-ended question was also included. This paper was reported as per the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.

3.2 Study Population

The study population consisted of Palestinian community pharmacy staff working in community pharmacy settings across the West Bank. Pharmacists and technicians working in governmental pharmacies, hospital pharmacies, pharmaceutical companies, agencies, or as medical representatives were excluded from the study.

3.3 Study Sample

According to the Palestinian ministry of health Annual health report for 2024, a total of 6335 pharmacists were practicing pharmacy in the West Bank (Palestinian Ministry of Health, 2025). As there is no official statistic specifying the exact number of pharmacists working exclusively in community pharmacies, the sample size was estimated based on the total number of practicing pharmacies. Using 95% confidence level, the required sample size was calculated to be 363 participants (Calculator Net, 2008-2025). Data were collected using convenience sampling technique. A total of 386 completed questionnaires were successfully collected between June 2024 and November 2025.

3.4 Study Tool and Validation

3.4.1 Study Tool

To reduce misunderstanding and guarantee the clarity of the study, the structured questionnaire was used and was offered in both Arabic and English. The questionnaire was slightly based on an earlier study conducted in Saudi Arabia (Alsheikh et al., 2021) but adjusted to the Palestinian context since some of the questions could not be applied

(e.g., the Hajj season and the Saudi Food and Drug Authority). The last version of the survey had four sections, (a) demographic characteristics; (b) knowledge of medicine shortages, including definitions, contributing factors, and impacts; (c) practices related to medicine shortages, including personal experience, sources of information, type of medicine affected, and management strategies; and (d) experiences and opinions. Responses in the knowledge and practice sections were rated on a five-point Likert scale beginning with strongly agree, agree, not sure, disagree and finally strongly disagree. There were some items that needed one response and the final section had one open-ended question that talked about the proposed solutions to avoid shortages of medicine. The primary research variables were the knowledge, perceptions and practices of the staff on the shortages of medicine, the perceived causes, effects and coping mechanisms.

Participants' knowledge of medicine shortages was assessed using multiple definitions. These included the U.S. Food and Drug Administration (FDA) definition which describes medicine shortages as situations arising from increased demand for medicines or medical supplies (Food and Drug Administration, 2019). Definitions from the World Health Organization (WHO) were also included, addressing both supply and demand perspectives: inadequate drug supply to meet the current or projected patient-level demand and complete absence of a medicine due to stock out, whereby a medicine is considered unavailable for purchase when it cannot be obtained through regular procurement channels, regardless of the underlying cause (World Health Organization, 2017b). In addition, the definition of *a drug on back order* was included, which was adapted from the Saudi study (Alsheikh et al., 2021) and is referring to situations where the medication has been ordered by suppliers or pharmacies but cannot be delivered to temporary unavailability at the manufacturer's level. The rating of each definition used Likert scale. Answers to strongly agree and agree were a sign of good knowledge, not sure was a sign of fair knowledge and disagree and strongly disagree were a sign of poor knowledge, identifying particular areas where professional knowledge could be wanting.

Factors contributing to medicine shortages and their impacts were assessed based on previously published literature (Alsheikh et al., 2021; Bogaert et al., 2015; Food and Drug Administration, 2019; MacDonald et al., 2011; Miljković et al., 2019; Omer, Ali,

et al., 2021; Omer, Pan, et al., 2021; Parajuli et al., 2022; Phuong et al., 2019; Yousefi et al., 2019). These factors were adapted to reflect the Palestinian context. Participants rated each factor and impact using a Likert scale according to its perceived association to medicine shortages in Palestine. The combined proportions of “strongly agree” and “agree” responses were used to determine the relevance of each factor and impact. Participants were also asked whether the Palestinian community staff require training courses on mitigating medicine shortages and to rate their perceived level of knowledge regarding medicine shortages.

Practice-related aspects included whether participants received advance notification of shortages, sources of notification, occurrence of shortages in the previous three months, to select up to five medicine categories affected by shortages (based on the United States Pharmacopeia “USP” Therapeutic Categories Model guidelines (Food and Drug Administration, 2018), and Over The Counter “OTC” drugs list published by the Palestinian Ministry of Health (Palestinian Ministry of Health, 2019)), and management strategies for prescribed medicine shortages adapted from the Saudi study (Alsheikh et al., 2021).

The last section explored participants’ experiences and opinions. Participants indicated whether their pharmacies used an electronic system to monitor low stock levels or medicine shortages by responding to “Yes” or “No.” The final qualitative item explored the community pharmacy staff opinion regarding potential solutions to mitigate medicine shortages.

3.4.2 Validation of the Tool

It was ensured that the survey tool underwent a thorough validation process to ensure that it is linguistically correct and relevant to the context. An expert panel of five community pharmacists, who were above ten years of professional experience, and had a Master degree in pharmacy sciences, was used to evaluate content and face validity. A point-by-point discussion of the questionnaire was led by the panel during a consensus-building meeting to understand its clarity, comprehensiveness, and applicability to the Palestinian pharmaceutical environment. According to their professional comments, a number of changes were made: redundant or duplicative alternatives were merged to avoid confusion. Moreover, the process of translation was performed by the native

Arabic speakers who were bilingual in English to provide the language nuance and precision. The translation in English to Arabic was cross validated to make sure that the intended meaning was carried across both versions hence ruling out the possibility of misinterpretation and making sure that terminology applied was relevant to the local professional environment. As well as the tool's reliability was assessed using Cronbach's Alpha. The obtained value was 0.884 which indicates good internal consistency and acceptable reliability of the tool.

3.5 Sampling Procedure

Multi-modal approach was used as a way to maximize the participation and to include participants from different Governorates (Monzon et al., 2020). The official directory of the Palestinian Pharmaceutical Association (2024) was used to identify the participants. The participation was voluntary and informed consent was received by all the participants following a clear explanation of the study objectives. The same structured questionnaire was applied to all respondents to ensure consistency in the various modes of delivery. The data collection was incorporated in both digital and field-based methods because of the unstable political environment and movement limitations. First, the survey was shared on professional online platforms and social media campaigns. In order to supplement this and guarantee that senior pharmacists or those who had little time to utilize online tools were included, telephone-assisted questionnaires and site visits were carried out by visiting the premises. These tools worked exceptionally well in terms of accessing professionals who did not like using technology or those who had face time limitation in their practice. In every instance, the researcher made sure that the questionnaire questions were displayed in the same format as the online questionnaire in order to retain data integrity. All the responses collected on hard copies or interviews were then converted into a central database where a standardized and complete data set was obtained in all regions.

3.6 Data Analysis

IBM SPSS statistics version 26 was used to analyze the quantitative data. The demographic characteristics, knowledge levels, perceptions, and practices were summarized using descriptive statistics where medians [M], interquartile ranges [IQR], frequencies [N], and percentages [%] were used to summarize the statistics. The open-ended question provided qualitative data that were analyzed through the inductive

thematic analysis. Data familiarization was obtained by reading the responses repeatedly. Significant pieces of text were next recognized and given first codes that depicted some important ideas that were raised by the participants. After the first coding, there were 38 original codes obtained; close codes were clustered into larger groups and narrowed down into nine major themes depending on the similarity of the concepts. The coding scheme was also repeatedly checked and revised so that it could be consistent and clear. Irrelevant, unclear and no meaningful information (e.g., No, I do not know, etc.) responses were not included in the thematic interpretation but recorded as a part of the response characteristics. In order to increase the rigor of the analysis, themes were examined in the context of the whole data in the view of making sure that they were representative of the perspective of the participants. The representative responses were chosen in order to portray every theme. The analytic support tool was NVivo version 15, as it supported the rigor of the thematic analysis, helped to manage data systematically, organize codes, and develop the themes, and it also permitted reviewing and refining the coding framework continuously to achieve consistency across dataset.

3.7 Limitations to the Methodology

Although such a rigid structure has been used, there are a few underlying constraints that need to be taken into consideration to come up with a balanced reading of the findings. The greatest challenge was the unpredictable political environment and the widespread movement restrictions in the Palestinian lands. These outside influences often hindered regular physical access to some areas such as the city of Jenin and the camps around it and around Tulkarm. This compelled the use of hybrid data collection model. Although the continuity of the data was preserved, this adaption might have influenced the geographical balance of the sample unintentionally, potentially under examining the areas with more acute issues of accessibility.

As in any research that involves self-reported measures, the data is prone to either recall bias or social desirability bias. The respondents could have exaggerated their management techniques or under-reported their knowledge gaps to fit the professional standards. Moreover, the “digital fatigue effect and extreme time restrictions on frontline community pharmacy staffs-particularly in peak times of shortage-like added to the lower response rates in certain digital channels, which can limit the overall

generalizability of the findings to the overall pharmaceutical industry nationally. Finally, a few technical outages and communication obstacles during the recruitment stage could have affected the involvement of some demographics. Although these factors were addressed by all possible means in multimodal outreach, they symbolize a systemic nature of field research carried out in a high-pressure and resource-constrained setting.

3.8 Ethical Approval

All aspects of this study were authorized by the Institutional Review Board (IRB) of An-Najah National University (**Appendix C**) in June 2024. The data collected by this study were used for scientific research only and were not used for any purpose other than of this study. Given the professional constraints of community pharmacy workforces, verbal informed consent was secured from all respondents.

Chapter Four

Results

4.1 Demographic characteristics

In this survey, 386 community pharmacy professionals in Palestine were involved, which is a strong data set to analyze. The labor force was also relatively young but experienced with a median age of 34.00 years (IQR = 11.00: (Q1=28, Q3=39)). There was a significant gender distribution with the female practitioners making majority (N=275; 71.24%), almost three times more than their counterparts the male practitioners (N=111; 28.76%), which is also similar to what we have in our pharmacy schools. The most common academic qualification was the Bachelor of Pharmacy degree (N=284; 73.58%). Still, this sample also included a specialized part of the labor force, such as those who have Master's degree in Health, Medical, or Pharmaceutical Sciences (N=57; 14.77%), Pharm-D (N=29; 7.51%), and pharmacy technicians were a smaller proportion (N=16; 4.15%). Regarding seniority, more than 61% of the participants were senior pharmacists, and the contributed median was 10.00 years of work-related experience (IQR = 11.00: (Q1=4, Q3=15)) in our study. The experience level is crucial as it indicates that the responses are based on long-term observations of the Palestinian pharmaceutical supply chain and such data will be one of the foundations of the future research that will compare the variation of the educational and professional levels of the community pharmacy staffs in terms of its relevance to the future changes in knowledge and practices regarding the medicine shortages.

Most of the respondents (N=280; 72.73%) were mainly in independent community pharmacy settings, with the rest (N=106; 27.27%) in chain pharmacy settings. Geographically, the study had wide coverage of the Palestinian territories with Jerusalem (N=99; 25.65%) and Hebron (N=72; 18.65%) having the largest number of respondents, next in line were-Ramallah and Al-Beireh-and Bethlehem. The urban-rural distribution was (N=207; 53.63%) practiced in the city, (N=164; 42.49%) in the village, and (N=15; 3.89%) of the staff were in the refugee camps, which is in accordance with the correlation of the pharmacy density to the population thresholds in every area (See Table 1 to a more detailed breakdown).

Table 1: *Demographic characteristics of the participants*

Variable		Statistics
Gender	Female	275(71.24%)
	Male	111(28.76%)
Age (years)		M [*] =34.00; IQR ^{**} =11.00:(Q1=28.50, Q3=39.50)
Educational level	Pharmacy technician	16(4.15%)
	B-Pharmacy	284(73.58%)
	Pharm D	29(7.51%)
	Master's in health/ medical/ pharmaceutical sciences	57(14.77%)
Professional level	Pharmacy technician	16(4.15%)
	Assistant Pharmacist	131(33.94%)
	Senior Pharmacist	239(61.92%)
Years of experience (years)		M=10.00; IQR=11.00:(Q1=4.50, Q3=15.50)
Pharmacy type	Independent community pharmacy	280(72.73%)
	Community chain pharmacy	106(27.27%)
Pharmacy region	Jericho	7(1.81%)
	Hebron	72(18.65%)
	Jerusalem	99(25.65%)
	Bethlehem	47(12.18%)
	Jenin	15(3.89%)
	Ramallah and Al-Beireh	52(13.47%)
	Salfit	6(1.55%)
	Qalqilya	28(7.25%)
	Tubas	4(1.04%)
	Tulkarm	21(5.44%)
	Nablus	35(9.07%)
Pharmacy location	In a city	207(53.63%)
	In a village	164(42.49%)
	In a camp	15(3.89%)

M^{*} = Median, IQR^{**} = Interquartile Range.

4.2 Perceived Knowledge about Medicine Shortages Definitions

The results showed that there is a significant difference in knowledge levels of pharmacy employees on the definitions of shortage (Table 2). The greatest area of proficiency in definitions associated with patient-level impact and unavailability was shown by respondents to the definitions of “unavailability for purchase” and “inadequate supply” -WHO definitions- where over than (70%) of the sample identified them correctly. Conversely, the level of knowledge about the supply-chain specific terms was much lower; less than half of the participants (N=170; 44.00%) could define the concept of “back order from manufacturers”. This difference shows that there is a gap between clinical/practical knowledge and awareness of supply-chain logistics.

As to the definition of the FDA, the statistics indicated a moderate degree of familiarity relative to that of WHO definitions. Although over 50% of the respondents (N=230; 59.60%) were able to identify shortages as a consequence of increased demand, a significant number-almost (40%)-was in the fair or poor knowledge range. This means that even though most community pharmacy staff understand the concept of demand driven shortages, it is not very clear to the pharmacy employees compared to the direct concept of supply failure. The poorest understanding was noted on the concept of “back order by manufacturers”. In contrast to the higher scores of the clinical definitions, it was only a minority (N=170; 44.00%) of the respondents that were showing good knowledge in the area. Moreover, the level of poor knowledge was found in almost one-third of the staff (N=127; 32.90%), which is the greatest knowledge gap revealed in the survey as far as shortage terminology is concerned.

Table 2: *Perceived knowledge of community pharmacy staff about medicine shortages definitions*

Definition	Good knowledge (%)	Fair knowledge (%)	Poor knowledge (%)
Inadequate drug supply to meet the current or projected demand at patient level (World Health Organization, 2017b)	70.98	13.73	15.29
Increase demand for medicines or medication supplies (Food and Drug Administration, 2019)	59.60	17.90	22.50
Drug is not available for purchase (World Health Organization, 2017b)	73.32	11.14	15.54
Drug is on back order from manufacturers (Alsheikh et al., 2021)	44.00	23.10	32.90

4.3 Perceived Knowledge and the Need for Professional Training

One of the strongest aspects of findings is the difference between the perceived competence of the participants and the need of structural support they stated. Although a considerable part of the workforce (N=163; 42.23%) evaluated their current level of knowledge as being good, a closer examination of the data will show that there was a sense of professional reluctance. More than half of the respondents (N=200; 51.81%) described their knowledge as simply moderate and only a small percentage (N=23; 5.96%) described their knowledge as poor.

In spite of comparatively high self-ratings, the ineffectiveness of the existing training frameworks is agreed by the majority of the participants. Most of them (N=233; 60.36%) explicitly stated that the community pharmacy staff needs specific training courses designed with medicine shortages management and advanced inventory stocking strategies. This group alert is an indication that Palestinian pharmacy staffs are functioning at a conscious incompetence level in terms of complicated supply chain disruptions; they are cognizant of the shortages but do not feel adequately prepared or future-proofed to deal with them by informal experience alone. It is here that a key opportunity is presented to the Palestinian Pharmaceutical Association and academic institution to fill the gap between the classroom theory and the unstable reality of the local medicine market.

4.4 Perceptions of the Factors that Contribute to Medicine Shortages

As shown in (Table 3), participants identified a hierarchical structure of factors contributing to medicine shortages, where upstream supply-chain disruptions were most prominent. Manufacturing issues, specifically the lack of raw materials, emerged as the leading cause, cited by (N=328) nearly (85%) of the sample. This was followed closely by macro-environmental factors, including global demand surges (N=316; 81.87%) and political-induced lockdowns (N=306; 79.27%). In contrast, economic and regulatory factors, such as business issues and market withdrawals, occupied a secondary level of perceived influence (approx. 70-73%). Furthermore, nearly (70%) of participants highlighted the role of logistical and regulatory challenges, while (N=262; 67.88%) pointed to demand-side pressures, such as the misuse or off-label use of high profile medications like Ozempic. Interestingly, issues related to product profitability and market incentives were the least cited contributors and were perceived as less impactful

compared to supply-chain disruptions. Quality-related problems and the low pricing of generic medications were each cited by only (N=213; 55.18%) of the sample. The least frequently reported factor was the lack of financial incentives to produce less profitable drugs, which was identified by fewer than half of the respondents (N=180; 46.63%) as a primary cause of shortages.

The results show a strategic paradox, as the shortage of raw materials was recognized as the main obstacle to the continuity of supplies, whereas the problem of product quality and the local manufacturing breakdown were among the least important ones. The quality concerns or low generic prices were only supported by a small majority of respondents. Such difference shows that the ultimate challenge to pharmaceutical security in Palestine is, in fact, logistical (depending on political forces) and supply-based (depending on the availability of raw materials) rather than technical or the quality of national manufacturing plants.

Table 3: *Perceived factors contributing to medicine shortages among community pharmacy staff (Agree / Strongly Agree)*

Factors that contribute to medicine shortages	Statistics N=386 (100%)
Manufacturing problems (example: lack of raw material)	328 (84.97)
Increase global demand (example: during corona pandemic)	316 (81.87)
Closures and lock down for political reasons	306 (79.27)
Business and economic issues	282 (73.06)
Recalls or withdraws from the market	275 (71.24)
Logistical and regulatory challenges	269 (69.69)
Misuse / abuse / increase off label use (example: Ozempic)	262 (67.88)
Low prices of generic medications	213 (55.18)
Quality problems	213 (55.18)
Lack of incentives to produce less profitable drugs	180 (46.63)

4.5 Perceptions of the Impact of Medicine Shortages

The findings of (Table 4) show that the problem of medicine shortage affects the healthcare ecosystem in the multidimensional way, clinical consequences being the most noticeable. Most of the respondents identified a decrease in patient quality of life (N=335; 86.79%) and a decrease in treatment adherence (N=323; 83.68%) as the first

consequences. Moreover, the shortages were also believed to interfere with the larger healthcare cycle, (N=284; 73.58%) of the staff reporting delays in medical or surgical procedures.

Along with the more direct clinical fallout, the respondents were very conscious of the concealed costs of shortages. More than 70% of the respondents pointed to a twofold cost: the loss of the professional respect of the pharmacy and the increase in the overall healthcare costs. Interestingly, even though it remains an issue in almost 50% of the sample (N=191; 49.48%), the perceived risk of dispensing and administration error was the least commonly reported impact. This lower ranking can imply there are no follow-ups to patients that can reveal those errors with a special consideration of the fact that there is no national computerized system that records all the patient data and medical history.

Table 4: *Perceived impacts of medicine shortages among community pharmacy staff (Agree/ Strongly Agree)*

Impacts of medicine shortages	Statistics N=386 (100%)
Decrease patient quality of life	335(86.79)
Reduce patient's adherence	323(83.68)
Delaying medical or surgical procedures (like: colonoscopy)	284(73.58)
Affect pharmacy's reputation	279(72.28)
Increase healthcare cost	276(71.50)
Increase dispensing and administration errors	191(49.48)

4.6 Navigation Shortages: Prevalence and Communication Gaps

The results highlight the fact that the problem of medicine shortages is no longer a single case but an almost universal professional fact of the Palestinian pharmaceutical staff. A notable (N=357; 92.49%) of surveyed personnel affirmed to having had at least one shortage event in the three months before the study. This prevalence is a high one implying that the pharmacy practice in Palestine is now characterized by a state of constant crisis management, as opposed to routine dispensing.

Although the shortages were systemic, a deep communication gap was found between the frontline practitioners and regulatory bodies. More than half of the respondents

(N=195; 50.52%) indicated that they had zero notifications in the lead-up or through shortages by the authorized organizations. This passivity places the staffs of the community pharmacies in a reactive mode where they have to find out about gaps in supply only when a prescription cannot be filled. This detachment is an indication that the clinical experience of shortages is almost universal, but the administrative response is disjointed and mostly community-based.

4.6.1 Sources of Information

Information pathways as analyzed in (Table 5) reveal a very strong bias towards the informal structures of the private sector compared to the official regulatory structures. The pharmacy employees in Palestine demonstrate a high reliance on commercial entities to provide real-time information on shortages of medicine. A very large proportion (N=348; 90.16%) of the respondents named importers, drug agencies (N=348; 90.16) as their first informants, then followed by wholesalers (N=346; 89.63%) and manufacturing firms (N=333; 86.27%). This implies that information flow is controlled more by the commercial pulse of the supply chain than by coordinated public health alerts. On the other extreme, institutional and international organizations seem to be of secondary-and occasionally peripheral-value in informing frontline workers. Only a small fraction of the participants (N=207; 53.63%) used the Palestinian Ministry of Health as a source, even less used the Palestinian Pharmacist Association (N=148; 38.34%). Moreover, (N=163; 42.23%) of the sample only consulted or global health authorities such as the WHO. The participants cited professional news or social media (N=158; 40.93%) as source of information, and the least popular source of information was professional development channels, including conferences and seminars (N=129; 33.42%). This gap shows a professional isolation in which the pharmacy staffs are compelled to work through the unstable market by information furnished by the very companies that are selling the products instead of being given unbiased and central guidance by a regulating or professional body. Somehow the anger of personally-interviewed staff was felt from this isolation and the absence of the formal guidance.

Table 5: *Sources of information on medicine shortages agreed upon by community pharmacy staff (Agree/ Strongly Agree)*

Variable	Statistics N=386 (100%)
Importer or drug agency	348 (90.16)
Drug stores (wholesalers)	346 (89.63)
Manufacturing company	333 (86.27)
Palestinian Ministry of Health	207 (53.63)
WHO	163 (42.23)
Professional news / social media	158 (40.93)
Palestinian Pharmacist Association	148 (38.34)
Conferences / Seminars	129 (33.42)

4.6.2 Categories of Prescribed Only Medications (Rx) Affected by Shortages

Analysis of the prescription-only medications (Rx) most frequently impacted by shortages reveals that chronic and life-sustaining therapeutic classes are the most vulnerable (Table 6). Approximately half of the respondents identified anticonvulsants (N=194; 50.26%) and cardiovascular agents (N=190; 49.22%)-including dyslipidemics, diuretics, and ACEI's as the categories most severely affected. Furthermore, a significant cluster of highs-stakes medications showed substantial instability, with sedatives/hypnotics (N=167; 43.26%) and immunological agents, including vaccines (N=166; 43.01%) reported by more than four-tenths of the sample. While shortages were also notable in specialized treatments such as antiparkinson agents (N=126; 32.64%), respiratory tract agents (N=123; 31.87%), blood modifiers (N=117; 30.31%), and antineoplastics (N=100; 25.91%), acute care medications like antibacterial (N=82; 21.24%) and anti-inflammatory agents (N=76; 19.69%) were perceived as less frequently affected.

These findings indicate that shortages in the Palestinian community pharmacy sector are predominantly concentrated in medications required for long-term management of non-communicable diseases and neurological disorders, where treatment continuity is clinically paramount.

Table 6: *Prescription only medications (Rx) that were most commonly affected by medicine shortages*

Variable	Statistics N=386 (100%)
Anticonvulsants	194 (50.26)
Cardiovascular agents (dyslipidemics / diuretics / ACEIs / ARBs...)	190 (49.22)
Sedatives / Hypnotics	167 (43.26)
Immunological agents (vaccines)	166 (43.01)
Dermatological agents	139 (36.01)
Antiparkinson agents	126 (32.64)
Respiratory tract agents (antileukotriens / bronchodilators / ...)	123 (31.87)
Blood modifiers (anticoagulants / platelet aggregation inhibitors)	117 (30.31)
Antineoplastic	100 (25.91)
Antibacterial	82 (21.24)
Anti-inflammatory agents (glucocorticoids / NSAIDs)	76 (19.69)
Skeletal muscle relaxants	66 (17.10)

4.6.3 Categories of Over-the-Counter Medications Affected by Shortages

Shortages among over-the-counter (OTC) medications were characterized by a high prevalence in lifestyle and supportive therapies (**Table 7**). The most frequently impacted categories were acne treatments (N=161; 41.71%), vitamins and minerals (N=159; 41.19%), and ophthalmic preparations (N=158; 40.93%), all of which were reported by approximately four-tenths of the respondents. Additionally, medications for seasonal and symptomatic relief, such as allergic rhinitis, cold, and influenza preparations were cited as being in shortage by (N=148; 38.34%) of the participants.

A second tier of affected OTC medicines included gastrointestinal and pain management therapies. Nearly quarter of the participants reported shortages in medications for hemorrhoids (N=99; 25.65%), constipation (N=89; 23.06%), dyspepsia/flatulence (N=89; 23.06%), while fever and pain relievers showed a similar shortage rate of (N=88; 22.80%). In contrast, acute localized treatments such as otic preparations (N=83; 21.50%), anti-diarrheal products (N=70; 18.13%), vaginal and dermal mycosis treatments (N=68; 17.62%), and pharyngitis medications (N=31; 8.03%) were among the least affected categories.

These results suggest that while OTC shortages may not always carry the same immediate clinical risk as Rx medications, they represent a significant disruption in the availability of essential micronutrients and primary care treatments for common dermatological and seasonal ailments.

Table 7: *Over the counter medications that were most commonly affected by medicine shortages*

Variable	Statistics N=386 (100%)
Acne OTC medicines	161 (41.71)
Vitamins and Minerals	159 (41.19)
Ophthalmic OTC preparations	158 (40.93)
Allergic rhinitis, cold and influenza OTC medicines	148 (38.34)
Hemorrhoids OTC medicines	99 (25.65)
Anti-constipation	89 (23.06)
Dyspepsia / flatulence medicines	89 (23.06)
Fever, headache, joint, and muscle pain relievers	88 (22.80)
Otic OTC preparations	83 (21.50)
Anti-diarrheal	70 (18.13)
Hyperacidity OTC medicines	70 (18.13)
Vaginal and dermal mycosis OTC medicines	68 (17.62)
Pharyngitis OTC medicines	31 (8.03)
Anti-head lice	30 (7.77)

4.6.4 Professional Practices in Response to Prescribed Medicine Shortages

When faced with a shortage of prescribed medication, community pharmacy staff predominantly adopted physician-centered approach (Table 8). More than half of the respondents (N=213; 55.18%) reported referring patients back to their physician to seek a therapeutic alternative. Meanwhile, direct intervention by the pharmacy staff were less common, with only (N=99; 25.65%) of participants suggesting an alternative medication themselves.

A smaller proportion of the sample focused on patient redirection, with (N=61; 15.80%) advising patients to seek the medication at another pharmacy. A small number of staff members (N=13; 3.37%) recommended the patients to visit the same pharmacy again

later, which indicates that the shortages are viewed as chronic or unforeseeable instead of temporary logistics delays. The findings indicate that there is a reserved practice among pharmacy workers whose priority is medical consultation rather than autonomous therapeutic replacement in handling stock-outs.

Table 8: *Community staff practice in case of prescribed medicine shortage*

Variable	Statistics N=386 (100%)
Refer the patient to him / her physician to change the medicine	213 (55.18)
Suggest an alternative medication	99 (25.65)
Advise the patient to go to another pharmacy	61 (15.80)
Advise the patient to come back to the pharmacy later	13 (3.37)

4.7 Qualitative Insights: A Strategic Roadmap from the Frontline

In addition to the quantitative measures, the research aimed to measure the lived experience and professional foresight of the pharmacy staff by using an open-ended question. The qualitative data, which was subjected to NVivo 15 followed an inductive thematic analysis, produced 38 granular codes that were then merged into nine central themes (Table 9). Such discoveries are not simply a catalogue of solutions; these discoveries are a multidimensional roadmap in the period of chronic instability of the Palestinian pharmaceutical market. It is also interesting to note that almost 60% of the respondents already use electronic inventory systems before proceeding to the themes. The technological foundation offers a rich environment to the most eminent thematic demand, which is the shift of manual monitoring to Early Warning Systems. The thematic synthesis revealed three key areas of intervention on the systemic resilience, including institutional, professional, and geopolitical.

1. Structural and Regulatory Reforms

The proposed solutions lie on the necessity of a paradigm shift in supply chain governance. Participants emphasized that the process of strengthening the supply chain is possible only after breaking the monopolies and simplifying the registration procedures which are often cumbersome. The statistics imply that the pharmacy staffs are not perceiving the Ministry of Health as a regulator, but rather as a strategic sentinel

that is supposed to foresee the crises by evaluating national consumption and strategic reserve and replace reactive management with proactive management.

2. Clinical Sovereignty and Digital Integration

The most common feeling among the employees was the necessity to empower the clinical role of the pharmacist by providing therapeutic flexibility. Through their support of International Nonproprietary Name prescribing and generic substitution, participants are hoping that the healthcare system can avoid certain brand shortages. But they cleverly pointed out that this needs “social and professional buy-in” so the educational campaigns would be required to bring physician prescribing habits in line with patient expectations. The Early Warning Systems required were almost unanimously demanded, technologically. The computerized alerts that the participants referred to, reflect a wish to have a digital safety net to avoid the stock-out shock by activating at the minimum stock levels.

3. Resilience Paradox: Political Reality vs. Local Production

The results show that there was a great collective desire to be pharmaceutically self-reliant. Local manufacturing as well as procurement of raw materials were considered to be crucial in the reduction of reliance on imports. However, there is an ugly truth that accompanies this professional optimism. The last theme-Political and Economic Constraints-is used as a negative backdrop. Participants directly associated the effectiveness of any local mitigation strategy with the extrinsic occupation-related obstructions and delays in shipment that define the Palestinian experience. This means that internal logistics (such as buffer stocks and rationing) are vital but survival strategies in a limited geopolitical environment.

Table 9: *Thematic Analysis of Suggested Solutions to Prevent Medicine Shortages*

Main theme	Codes	Representative responses (examples)
Strengthening Medicine Supply Chain and Importation	Diversifying import sources; Facilitating registration and import procedures; Avoiding monopoly; Early importation of alternatives	“Diversifying sources of import from different countries.” / “Facilitating medicine registration and import procedures.”
Availability of Therapeutic Alternatives	Generic substitution; Prescribing by INN; patient and physician education; Local alternatives	“Encouraging prescribing by scientific name.” / “Educating patients to accept alternatives.”
Inventory Management and Strategic Stockpiling	Buffer stock; Strategic reserve; Demand forecasting; Rationing during shortages	“Maintaining sufficient stock of frequently unavailable medicines.” / “Dispensing for one month only during shortages.”
Early Warning Systems and Digital Solutions	Electronic inventory systems; Shortage alerts; National platforms; Minimum stock alarms	“A computerized system that gives alerts when stock reaches minimum level.”
Regulatory and Ministry of Health Role	Market monitoring; National consumption assessment; Emergency approvals; Strategic reserve	“The ministry of Health should anticipate shortages and act before they occur.”
Local Pharmaceutical Manufacturing	Supporting local productions; Securing raw materials; Expanding production lines	“Encouraging local pharmaceutical manufacturing to reduce dependency on imports.”
Interprofessional Collaboration	Pharmacist-Physician coordination; Supplier communication; Syndicate involvement	“Improving communication between pharmacists and physicians regarding shortages.”
Rational Use of Medicines	Restricting off-label use; Preventing over-dispensing; Prioritizing essential medicines	“Using medicines only for their approved indications.”
Political and Economic Constraints	Occupation-related barriers; Shipment delays; Economic instability	“Shortages are largely due to political and logistical constraints beyond control.”

Chapter Five

Discussions

This research is a pioneer empirical research on shortages of medicine as viewed by community pharmacy staff in Palestine. Combining the results of quantitative sections with the insights gained through qualitative section from an open-ended question, the study provides a profound insight into the knowledge, perceptions, practices, and experiences of pharmacy staff members in regards to medicine shortages in the context of a politically and economically limited healthcare system.

5.1 Overview of Key Findings

The results show that the level of medicine shortages is very high in community pharmacies in Palestine and the majority of them reported shortages in the last three months. Demonstration of the general good knowledge of common and practical definitions of medicine shortages was observed among the community pharmacy staff, but gaps were seen in more complex concepts that are related to the supply chain. The participants pointed out various interrelated causes of shortages such as manufacturing issues, higher global demand, political shutdowns, and economic limitations. The shortage of medicine was seen as having a significant impact on the quality of life of patients, their compliance with treatment, expenditure in healthcare, and the pharmaceutical image. The pharmacy staff responded by having coping strategies which were more reactive and informal as there were no centralized reporting systems and coordinated national policies. Qualitative results also supported the necessity of reforming regulations, early warning systems, diversifying the sources of imports, and enhancing the collaboration of different professionals.

5.2 Knowledge of Medicine Shortages

The findings indicate that the community pharmacy personnel in Palestine have a clinically-based perception of medicine deficiencies. The high familiarity with WHO definitions means that the main priority of pharmacists is the availability of medication at the point of care in this case. Such a patient-focused perspective is not surprising, with pharmacists being in the front line and observing the immediate impact of shortages on continuity of treatment.

Regarding the definition provided by FDA, according to which medicine shortages are viewed as a result of the high demand on medicines or medication stocks, the community pharmacy personnel have a fair idea of their demand-based shortages. They understand that a shortage can be caused not only by the disturbance of supply but also by the abrupt rise in the number of users, e.g., in the period of seasonal illnesses, outbreaks, or shifts in the prescribing practice. But relative to WHO definitions that focus on the medicine unavailability, the knowledge of the FDA demand-side views as a cause of shortages seems to be less than the knowledge of the visible failures of supply. This implies that the pharmacy personnel have the feeling of passive users of the output of the supply chain. Lacking proper equipment to predict the demand or even having the national consumption statistics, the staff in a pharmacy is only interested in the tangible presence of the medicine on the shelves and is unable to predict the occurrence of shortages. The same has been found in other studies done by This observation is consistent with studies by Alsheikh et al. (2021) and Omer, Ali, et al. (2021), where pharmacists were more likely to blame supply interruptions as opposed to demand escalation. Nevertheless, the general trend shows that the pharmacy employees are more likely to learn about the occurrence of the shortage of medicines based on their first-hand experience with their patients. Such experiential attitudes could be the reason behind the relatively high level of awareness of WHO definitions and the relatively low awareness of concepts which demand a larger systems level perspective, such as demand forecasting and supply-chain dynamics. In Palestinian setting, the unstable demand due to epidemiological fluctuations, travel bans, and limited access to health care facilities could only complicate the determination of demand-driven shortages, which is why the enhancement of the pharmacists' knowledge in this field should be emphasized.

The large gap in the knowledge of the concepts of “back order” implies a decoupling between the community pharmacy practices with the manufacturing stage of the industry. This observation suggests that the pharmacy personnel are not usually in touch with preceding phases of the supply chain, as they are not informed of the shortages till the very last moments of the purchase process. Due to the absence of transparency and centralized distribution channel where middlemen (importers and wholesalers) are the main source of information, this gap is probably increased in the Palestinian pharmaceutical industry. As a result, pharmacy employees are likely to believe that a

lack is a local delivery issue instead of a manufacturing delay. This is not a very systemic view, which is consistent with the results provided by the EAHP survey (2018), where the authors indicated that the absence of communication between manufacturers and frontline dispensers usually leads to a reactionary response to medicine stock-outs (Miljković et al., 2019). The solution to this gap would involve not just improved education, but also combined digital solutions that would give the staff of the pharmacy real-time updates of the status of the manufacturing side.

Although the absence of technical knowledge of formal definitions including those suggested by the WHO or the FDA does not always indicate a shortage in clinical competence or dispensing abilities of a pharmacy staff, it does indicate a vast void in supply-chain literacy. The measurement of these levels of knowledge is crucial as a standardized terminology is the basis of a unified national response to a lack of medicine. In the absence of a common language between frontline community workers and health officials, reporting systems may also be unpredictable, which results in incorrect data gathering and slow actions. Moreover, the ability to empower the pharmacy staff to have a greater knowledge of the drivers on the demand side and the challenges encountered in upstream manufacturing (e.g., back orders) will change the role of these staff members to be more active in inventory management rather than passive victims of stock-outs. This information is invaluable to the creation of an efficient Early Warning System within the Palestinian environment; this information will enable pharmacy personnel to discern between a momentary logistics delay and permanent shortage and therefore give patients more consistent advice and curb the panic usually caused by the unavailability of medicines.

5.3 Perceived Knowledge and the Need for Professional Training

The results indicate a delicate connection between self-evaluation of pharmacy staffs and their working requirements. Although gaps in knowledge were identified in regard to technical definitions, a large percentage of participants rated their overall knowledge as good or moderate. Nevertheless, this perceived competence did not exclude the strong intentions to continue education as most of them said that they needed more training on how to address medicine shortages and stocking.

This knowledge-confidence gap outlines a professional consciousness of pharmacy employees on the complexity inherent in managing shortages; they know that the daily acquisition of experimental knowledge is not enough to help them maneuver the systemic issues of the supply chain. This is in line with international findings, such as those by Juliette and Robin (2024), which have cited on-going professional development as essential in ensuring that pharmacy personnel is equipped with the most current skills in shortage predicting, proactive replacement processes, and crisis-level effectiveness in communicating with patients. Such training is necessary in the volatile Palestinian environment to change pharmacists into active dispensers to strong healthcare providers who can reduce the effects of shortage on patient care. These findings strongly suggest the incorporation of structured supply-chain management and inventory logistics into undergraduate curricula and continued professional development programs.

5.4 Perceived Causes of Medicine Shortages

The genesis of medicine shortages in the Palestinian healthcare ecosystem is not merely a logistical failure; it is the byproduct of a precarious intersection between global manufacturing vulnerabilities and a unique, localized landscape of geopolitical disruption. According to our findings, manufacturing-related problems, specifically the lack of active pharmaceutical ingredients (APIs) around the world, are perceived by the community pharmacy staff as the main driver of the instability of the market. This is not a unique perception. It is consistent with a bigger international agreement, as recorded by the Food and Drug Administration (2019) and Phuong et al. (2019), that the contemporary dependence on global suppliers poses a precarious balance in the provision of medicine. The effects of the collapse of one manufacturing node in the global chain are experienced most immediately in the peripheral markets such as Palestine where the just-in-time model of delivery provides no buffer against unexpected supply shocks.

Nevertheless, the factor that separates the Palestinian experience among other world trends-which is evident in Europe or Australia (Bachoolall & Suleman, 2025; Parajuli et al., 2022)-is the overwhelming influence of geopolitical restrictions. Political closures do not merely represent a logistical detail; they are, to almost four-fifths of our respondents, a fundamental impediment to the right to health. This information

complements the WHO reports in the West Bank (World Health Organization, 2024) and repeats the historical records of the necessary shortage of drugs by Handicap International (2025) and Daher (2015). Here, the scarcity is mediated through limited border crossings and delayed importation licenses, which puts the situation in a parallel with the Iranian one during the times of maximum international sanctions (Yousefi et al., 2019). In both scenarios, the scarcity is not technically just a supply-chain shortage but is deliberately enabled and pushed by financial constraints, inflexibility in regulations, and a deep sense of inability to control the acquisition of foreign currency. The recent intimidations on the suspension of transactions with Palestinian banks, may also contribute to the further destabilization of the pharmaceutical market, interfering with the payment system, restricting access to foreign currency, and deteriorating contractual relations with international suppliers. These economic limitations can impede the acquisition of raw materials by local producers and slow down or block the importation of finished pharmaceutical products, which further exacerbates the problem of medicine shortages-a phenomenon that resonates with the political aspects of the concept of unilateralism in other regimes that have been sanctioned (Nakanishi, 2015).

The fact that the promotion of local pharmaceutical synthesis in Palestine might seem counterproductive at first sight as the absence of raw materials was determined as the main reason of shortages. Nonetheless, the results of the survey also give a valuable insight: the quality issues were not one of the leading causes of shortages, which means that the locally manufactured medicines are fairly trusted and can be deemed as meeting the acceptable quality standards. This implies that enhancing local synthesis-if in combination with the policies that guarantee the access to raw materials-is a plausible resilience strategy and not merely a route to self-sufficiency. The equitable access to the necessary medicines will need a system of collective action, as suggested by Bigdeli et al. (2015) and the World Health Organization (2004), which incorporates the supporting domestic production to decrease reliance on unstable import channels. In order to be successful, upstream interventions are needed when it comes to securing the raw materials of the local manufacturers, and not a singular focus on production capacity. These are the diversification of suppliers of the API (Shafiq et al., 2021), the creation of secured banking and payment systems on the pharmaceutical raw material, the maintenance of the buffer stocks of the essential API and the flexibilities of the regulations to the alternative formulations and suppliers just as the adaptive policies

taken by the IFDA (Yousefi et al., 2019). These would enable local manufacturers to continue production despite political or logistical interruptions, which would enhance medicine supply at the community pharmacy level.

The consequences to the practice of community pharmacy are significant. Misuse, abuse and off-label use of medicines-increased demand of Ozempic- were also frequently reported as shortages. This fact is a drawback of a rising global trend whereby medicines that were once used to treat certain ailments are becoming low in supply because of increased or inappropriate occurrence as observed in both the high- and middle-income countries (Juliette & Robin, 2024). Equally, as seen in the time of the COVID-19 pandemic, an increase in demand due to the assumptions about the possible therapeutic effect of hydroxychloroquine (Plaquenil) led to a shortage and limited access among patients with rheumatoid arthritis (Parajuli et al., 2022). It could be the irrational hoarding of Plaquenil during the COVID-19 pandemic, or the ongoing weight-loss trend, but the outcome remains the same: the most vulnerable patients become disenfranchised. The incorporation of community pharmacies within the national shortage surveillance systems, pharmacists with substitution powers and real-time medicine availability information would increase their capacity to reduce the shortage effects on patients. From the another side of view, drug profitability in certain cases might be a cause for a drug shortage, the registration procedure and costs may become a reason for the drug to be out of stock or even out of the market, because it may not be financially rewarded by the drug agency which may lead to stop importing certain medications. Taken altogether, the results highlight that the medicine shortages in Palestine are caused by a complicated interplay of the global manufacturing reliance, the unstable demand, the political and financial restrictions, and regulatory issues.

A single or reactive method is evidently not enough to move through the maze of challenges that this study has identified, so the response framework of this study suggests a multi-layered approach (Figure 1). This model acknowledges that the reduction of medicine shortages in a politically restricted setting such as Palestine needs a comprehensive intervention that touches on the entire pharmaceutical life cycle. The presented framework is built around the three levels strategy-upstream, midstream, and downstream-designed to shift the Palestinian healthcare industry out of a condition of vulnerability to that of calculated resilience. Upstream plans aim to ensure access to raw

materials and funds (Yousefi et al., 2019), intermediate measures assist in local production and regulation (Bigdeli et al., 2015; World Health Organization, 2004), and downstream measures enhance pharmacy involvement of community in shortages monitoring and demand (Parajuli et al., 2022), all of which enhance continuity of patient care.



Figure 1: Policy framework to mitigate medicine shortages in politically constrained settings

The framework has Supply Security, at the basic level, as a priority by using upstream interventions. The main bottleneck of the Palestinian supply chain, as evidenced by the results, is often the fact that it is impossible to find raw materials and ensure stable financial sources. This level is based on diversification of suppliers of APS and excipients to prevent the monopoly trap that has been observed among participants. Besides, the creation of secure banking and foreign currency channels is not only an economic suggestion but a medical need due to the unstable geopolitical environment. Absence of these financial cushions will bring down even the most effective logistics. The most important part of this level is the development of strategic national stockpiles that present a much-needed buffer in the event of sudden border closures and importation delays that define the Palestinian experience.

Midstream of the framework changes to Manufacturing and Regulation. This study clearly mandates the motivation of local pharmaceutical synthesis. But to achieve

success of local manufacturing, it has to be backed by a regulatory environment that is neither too strict nor too nimble. This level suggests expedited approval procedures of therapeutic alternatives and considerable flexibility of regulations to enable quick adaptation to crisis situations. Through the development of a strong domestic production base, Palestine can start to uncouple its key healthcare demands with the ambiguities of international importation pathways, and hence increase its pharmaceutical sovereignty.

Last but not least, the Community Pharmacy Practice is the downstream tier that provides the last most important connection with the patient. The framework proposes the shift of the role of the pharmacist to an active manager of clinical workers instead of a passive dispenser. Through this, real-time shortage reporting frameworks and standardized therapeutic substitution guidelines are to be put in place that enable pharmacists make evidence-based choices when the first-line drugs are not available. Enhancing the downstream involvement in demand management and patient counselling would significantly enhance the continuity of care and alleviate the panic that has widely spread among the population because of the medicine shortage. In the end, the benefits of this combined strategy are threefold: a measurable decrease in the number of shortages of medicines, patient safety ensured by high-quality substitutes, and a stable healthcare system that will withstand political or economic crises. This framework underlines that pharmaceutical security in Palestine is much more than a logistical conundrum; it is a dynamic, intricate interplay between global supply chains, local regulatory control and the long-term necessity of political and financial stability.

5.5 Impact of Medicine Shortages on Patients and Pharmacy Practice

The results of this research give a disheartening insight into the fact that medicine shortages in Palestine are no longer a matter of logistical inconveniences but a major contributor to unfavorable clinical outcomes and health care system-wide stress, it is only natural to suggest that the first victim of medicine disappearance in the shelf is the quality of life of a patient. We have found that the rates of decreased treatment adherence are very high, which is highly supported by the Saudi study (Alsheikh et al., 2021), a survey conducted by the EAHP of Miljković et al. (2019), and the report of the World Health Organization (2017a). Under such circumstances, the lack of necessary therapy is not a vacuum situation; it provokes the effect of symptom relapse, the

development of the disease, and the overall feeling of anxiety in the patient. Medicine shortages serve as a second stressor in Palestinian territories, which have an already fragmented healthcare environment due to movement restrictions and political instability (AlKhaldi et al., 2018; World Health Organization, 2024). They put patients in a blind-alley-either to take a sub-optimal treatment, or in most of the tragic instances, to stop treatment altogether (Daher, 2015; Food and Drug Administration, 2019; Phuong et al., 2019).

It does not only affect chronic outpatient care. We discovered a substantial indication of delays in medical and surgical procedures, which were an expression of a downstream clinical failure. It could be a delayed colonoscopy or delayed elective operation, but the reason is often the unavailability of required anesthetic agent or pre-procedural drugs. The failure is similar to those recorded in Pakistan and Europe (Hughes et al., 2015; McLaughlin et al., 2013; Omer, Pan, et al., 2021; Pulcini et al., 2017). These disruptions are not merely a scheduling problem but lead to increased patient pain and, more importantly, a loss of opportunity to detect a problem in its early stages or save lives (AlKhaldi et al., 2018).

Medicine shortages are reputational toxin in the light of profession. Patients do not have the systemic vision to accuse the global supply chain or political shutdowns, but rather they correlate an empty shelf with bad service at the pharmacy service (World Health Organization, 2017a). This reputational damage may result in pharmacy switching, strained pharmacist-patient relationships (Alefian et al., 2016; Omer, Ali, et al., 2021), and increased workload due to repeated patient inquiries and complaints (Alefian et al., 2016; Bachoolall & Suleman, 2025; Hallal et al., 2025; Lee et al., 2024; Omer, Ali, et al., 2021). Additionally, shortages contribute to higher healthcare costs through the use of more expensive alternatives (Alefian et al., 2016; Alsheikh et al., 2021; Juliette & Robin, 2024; Miljković et al., 2019; Yousefi et al., 2019), emergency procurement (Daher, 2015), increased dispensing time (Bachoolall & Suleman, 2025; Juliette & Robin, 2024), and, in some cases, avoidable hospital visits or disease complications resulting from suboptimal therapy (Daher, 2015; Food and Drug Administration, 2019; Miljković et al., 2019).

Although fewer than half of participants acknowledged an increased risk of dispensing or administration errors, medicine shortages remain an important and often under

recognized contributor to medication errors in the community pharmacy setting (MacDonald et al., 2011). Qualitative evidence and work experience indicate that shortages often result in complicated medication replacements, misunderstanding of dosing, and unsuitable therapeutic duplication, all of which contribute to the possibility of patient harm. The lack of formal reporting mechanisms in community settings often mask the true scale of the risk. We see this clearly in the case of pediatric patients, where dosing precision is a matter of life and death. During practice I notice several errors related to pediatric dosing, one of them is when a liquid formulation (e.g. Gabapentin) vanishes, caregivers are often forced to “improvise” by manipulating capsule contents to approximate the desired dose. These practices lack precision and introduce variability, ending up with overdosing or underdosing. Another example is when certain liquid formulations vanish but they do have alternatives with the same active ingredient but with different concentration (e.g. 5mg/5ml vs. 5mg/1ml), without proper counseling, some caregivers give their children 5 times higher dose than the required one.

Medication errors are not inclusive for pediatrics only, the reliance on temporary “29C” import permits—each permission is for six months only for a restricted quantity of the drug—further complicates the picture. As an example, frequent shortages of commonly used medicines—such as Betahistine—forced patients to take alternative medications, elderly patients who cannot read foreign languages may struggle to distinguish between same medicines with different box colors. As well as, some of the patients were transferred to Cinnarizine—different medicine for the same indication—and when their original medicine is back, they continue to take Cinnarizine along with their medicine. These replacements result in treatment duplication, polypharmacy that is not required, and an increased risk of adverse drug events. This is no longer a recommendation, but a necessity to patient safety, to strengthen the pharmacy staff in their training on therapeutic substitution, and to ensure the creation of clear and national, or nationalized, “Crisis Guidelines” particularly in the high-risk and pediatric medicines.

All in all, these complex outcomes indicate that the problem of medicine shortages is a systemic danger to the sustainability of healthcare in Palestine. To deal with them, it is not enough to deal with the logistics but to create a coordinated clinical response, where patient safety became the priority and pharmacy employees were given the legal and best possible means to handle demand in an effective and ethical manner.

5.6 Practices and Coping Strategies in Community Pharmacies

The inquiry shows there is an alarming lack of connection between the sheer amount of crisis and the infrastructure that was meant to handle the crisis. The problem of medicine shortages in Palestine is almost universal but it is not discussed on the official level. Although nearly all the participants had to deal with stock-outs during the last three months before the study, only a half of them have been notified about them. This cannot be classified as a logistical failure; it is a system failure that compels the pharmacists to recognize shortages at the point of dispensing instead of the predictive early-warning mechanism. In this way, informal reliance on personal experience reflects shortcomings that have been reported in Europe, as well as in the Middle East (Alefian et al., 2016; Miljković et al., 2019; World Health Organization, 2017a), because the lack of official alerts will always disadvantage the position of the pharmacist to obtain an alternative and engage in proactive counseling (Miljković et al., 2019; Omer, Pan, et al., 2021).

The staff at community pharmacy is presently working in an information vacuum. We find that the informants most frequently used are importers, wholesalers and manufacturers, which results in an overwhelming dependence on them as the main source of information, thus forming the supply-driven flow of information which is not clinical but commercial in nature. These sources give up to date information but put the practitioner in a subordinate reactive role. In sharp contrast, the contact with the official agencies such as the Palestinian Ministry of Health or WHO is minimal. This asymmetry is an indicator of a very important gap in the institutional governance. Experience of nations with well-established operating structures, including South Korea, demonstrates that the transition to coordinated systems of notification, led by institutions, can significantly decrease the time and patient-imposing effects of shortages (Lee et al., 2024). In the absence of such a transition in Palestine, the healthcare system will continue to be in a crisis-response, as opposed to crisis-prevention cycle.

The unusually high rates of recent shortages underscore the chronic and endemic nature of medicine shortages as opposed to the disrupted events. This has been in line with the international evidence that shows shortages have become a structural issue in the pharmaceutical supply chain, especially in the region that depends on imports, and is

susceptible to logistical and regulatory barriers constraints (Food and Drug Administration, 2019; Omer, Pan, et al., 2021). Regular shortages put a strain on the functioning of the community pharmacies and undermine continuity of care, particularly to patients under long-term therapy.

The categories impacted by these shortages constitute a direct attack on the security of public health. It is especially disastrous that stock-outs are so high in anticonvulsants and cardiovascular agents, which are listed by WHO as essential medicines (World Health Organization, 2023). The disruption in the supply of these drugs does not only inconvenience a patient, but it poses life-threatening complications such as acute cardiac events or status epilepticus. This inability to provide continuity of care in non-communicable diseases is long term symptom of supply failure (Daher, 2015; Palestinian Ministry of Health, 2025).

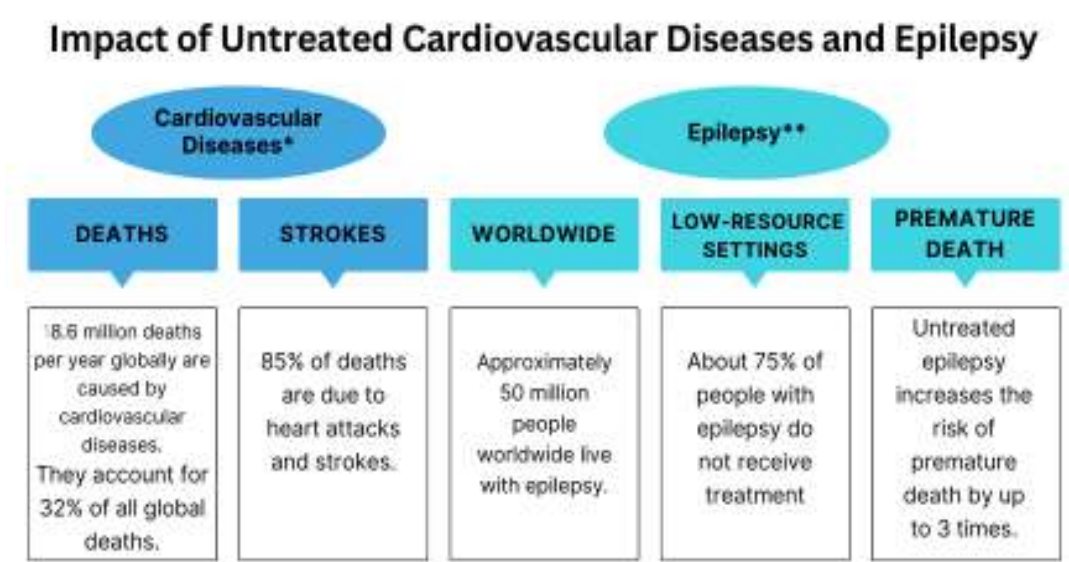


Figure2: *Impact of Untreated Cardiovascular Diseases and Epilepsy*

* (Roth et al., 2020) ** (World Health Organization, 2019)

The situation is more dramatic in the immunological sector. Conflict and supply disruption in Gaza Strip has exposed more than 16,000 children to no routine vaccination (United Nations Children’s Fund, 2023), and coverage rates are significantly lower than the level needed to prevent outbreak of preventable diseases such as polio (World Health Organization, 2025). Moreover, the lack of antineoplastic, anticoagulants, and antiparkinson agents adds an aspect of clinical severity which

proves hard to exaggerate. Oncology medicine shortages as reported by other countries compel clinics to resort to the use of toxic or less effective drugs (Becker et al., 2013; Kehl et al., 2015), which results in more medication errors, delays in treatment (Goldsack et al., 2014; McBride et al., 2013; Salazar E. et al., 2015), and-most importantly-progression of disease and death (Kehl et al., 2015; McBride et al., 2013).

Even the non-availability of the OTC products like acne treatments or vitamins has a high systemic cost. Although they are commonly considered as less essential, their lack of them interferes with primary care and self-management, as well as stimulating the overuse of physicians and the demand to more expensive prescription treatment. This demand-shift is an unnecessary burden to a healthcare budget that is already exhausted (Food and Drug Administration, 2019; World Health Organization, 2017a).

In case of a lack of prescription medicine the default Palestinian reaction is conservative: send the patient back to the doctor. On the one hand, this safeguards the prescriber authority but on the other hand, it paralyses the system. Regulatory frameworks that allow pharmacist-led substitution have been very effective in continuum of care in Australia and Europe (Department of Health and Aged Care, 2020; Miljković et al., 2019). The hesitation in Palestine is not incompetence, it is in lawlessness. The lack of clearly defined legal systems and the lack of a standardized set of substitution procedures are the most significant impediments to the more active pharmacist role (Miljković et al., 2019; World Health Organization, 2017a), and reduce the consequences of such deficits on patient care (Food and Drug Administration, 2019). The mere suggestion to a patient to go to another pharmacy is a diminishing-returns approach in a systemic shortage, which may only result in more patients being frustrated and inequitably treated as reported by the World Health Organization (2017a).

Finally, the Palestinian community pharmacy needs not only a better inventory but also a structural development. The only route to resilience is strengthening of national policies to aid therapeutic substitution with the help of clear documentation standards and professional training. It is time to go beyond coping and a system that supports patient safety by actively, empowering, and institutionally-backing pharmaceutical care.

5.7 Integration of Qualitative Findings

The qualitative information that was collected in this research does not shadow the quantitative information, but rather gives life to it, which is a deep, humanistic interpretation of the systemic fragility that characterizes the Palestinian pharmaceutical environment. Participants did not simply guess when they came up with solutions. They naturally were compatible with global best practices. The fact that it is a direct response to the structural weaknesses of our supply chain is evident in the appeal to diversify the sources of imports and simplify the registration procedures (AlKhaldi et al., 2018; Daher, 2015; World Health Organization, 2024), e.g. Diversification is no longer a choice of convenience as a strategy in the economy in an environment where importation tracks are constantly exposed to random political shutdowns; it is a life-saving strategy of continuity in healthcare. This is in accordance with the world record that dependence on a small pool of suppliers is the leading antecedent of disastrous shortages within import-dependent areas (Miljković et al., 2019; Phuong et al., 2019).

The agreement on the introduction of International Nonproprietary Names prescribing and the expansion of therapeutic substitution is an indication that a desperate urgency is necessary in an attempt to close the gap between rigidity in regulations and clinical necessity. Nevertheless, there is still a strong force of resistance. It is a mental obstacle. Physicians and patients tend to mistrust generic bioequivalence on a subconscious level—a phenomenon that is also reflected by the international data where generics are stigmatized as insecure substitutes ” (Alefan et al., 2016; Bachoolall & Suleman, 2025; Juliette & Robin, 2024). The solution to this will not come automatically with new laws. It requires vigorous campaigns of public education and professional training to repackage generics as therapeutic equivalents that are reliable, a transition that the WHO defines as primal in securing equal access to medicine in the developing countries (World Health Organization, 2004).

The most futuristic need might be the one of the transition towards data-driven crisis management with Early Warning Systems. We are now in the crisis of information fragmentation. The pharmacists have no option, but to be informed by the commercial wholesalers instead of official, neutral alerts. This a reactive, precarious position. Since already 59.59% of pharmacies in Palestine use electronic inventory tools, the jump into a centralized national platform is not a logical but a technically achievable step. It

would be simpler to scale these existing systems to a single notification system to achieve the type of centralized coordination that is observed in adaptive models in South Korea, Australia, and Iran where real-time awareness of the stock level is the foundation of shortage prevention (Lee et al., 2024; Parajuli et al., 2022; Yousefi et al., 2019).

Lastly, the constant appeal to encourage the local production of pharmaceuticals is an indication of an advanced level of realization of our structural reliance on imports. The Iranian model is a very impressive example, even in the conditions of painful experiences of procurement of raw materials, it demonstrates that national production can be a sovereign cushion against external supply shocks and against geopolitical instability (Kheirandish et al., 2015; Yousefi et al., 2019). The resilience is achieved as a country achieves its own sovereign inputs (Colvill et al., 2021). However, we should be realistic. There is a geopolitical ceiling that is continuously limiting these local interventions. Any effective mitigation, as shown in the Proposed Framework (**Figure 1**), has to be context-sensitive and integrates upstream-based financial protection with midstream-based manufacturing guidance coupled with a newly acquired downstream clinical freedom of the pharmacy staff.

To sum up, the qualitative results confirm that Palestinian pharmacists have the strategic foresight that can be used to revamp the system. Their suggestions are not independent; it is a localized reflection of international directions, adjusted to survive the specifics of the politically constrained reality.

Chapter Six

Conclusions and Recommendations

6.1 Conclusions

The shortages in medicine are a long-term and complex issue in the pharmacies of the Palestinian community, which is caused by supply disruptions on the international level and complicated by political, economic, and regulatory limitations locally. The results confirm the association between the study variables and indicate that in general, the community pharmacy staff have a good knowledge, awareness and professional judgment of the medicine shortage but work in the system of limited institutional support and regulatory constraints.

In line with the study objectives, it was established that medicine shortages had a strong negative effect on patient care and pharmacy practice in the form of reduced quality of life and adherence to treatment, medical care delays, workload, reputation, and increased healthcare expenses. As a reaction, pharmacy personnel developed various coping mechanisms, which can be seen as a sign of their flexibility and key to shortage mitigation. Nevertheless, such attempts are usually limited because of the lack of systematic early warning systems, protocols of clear substitution, and national policies.

In general, the medicine shortages in Palestine have to be managed with a combination of context-specific national strategies that enhance the oversight of supply chains, facilitate transparency and communication, as well as empower local pharmacists to be involved in mitigation of the shortages while protecting patient safety and continuity of care. As well as future studies regarding the issue should examine various pharmacy settings in Palestine.

6.2 Implications for Policy and Practice

The findings underline that shortages management gaps are quite significant and that shortages are very high and the use of official notification systems is not adequate. We has no control over what we do not measure without measuring. On the policy level, the Palestinian Ministry of Health is urgently needed to implement a centralized national system of reporting and early warning of medicine shortages to allow planning to be proactive and coordinate the response. Enhancing regulatory control, enhancing supply

chain transparency, and simplifying emergency approval procedures can help to enhance the resilience of the supply chain. Because of the common deficit of medicine in chronic and high-risk conditions, the national consumption prediction and strategic stockpiling must be given the priority. Favoring domestic production can also help decrease the dependence on imports in the long run.

The regulatory limitations and lack of formal substitution protocols in the form of physician referrals are the leading causes of the dominance of the latter at the practice level. Continuity of care may be enhanced by the creation of explicit national principles regarding the pharmacist-led therapeutic substitution in times of shortages, without compromising patient safety. Specific training interventions are required to prepare community pharmacy new personnel with skills in shortage management, therapeutic substitution, and communicating with patients are necessary in order to decrease medication errors. Increased pharmacist-prescribers collaboration and rational use of medicine can also help reduce the effects of shortages on patient care.

6.3 Strengths and Limitations

It is the first thorough evaluation of the medicine shortage in Palestinian community pharmacies and the use of open-ended question enriches the understanding and interpretation of results. Still, there are a number of limitations that need to be noted. The timing of the study which was during Gaza war, geographical imbalances, and using hybrid method of data collection can introduce bias. The use of self-report data can contribute to recall and social desirability bias. Moreover, the long time frame of the data collection process caused by political limitations and low cooperation can also have been a source of additional bias. In spite of these limitations, the sample size is quite large and the introduction of qualitative insights enhances the strength and contribution of the study.

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Appendices

Appendix A

The Arabic form questionnaire

أخي/ أختي الصيدلاني/ة - المساعد / ة المشارك/ة: أنا طالبة ماجستير صيدلة مجتمعية / كلية الدراسات العليا /جامعة النجاح الوطنية يسرني أن أدعوك إلى المشاركة في بحثي المتعلق بنقص الأدوية ومعرفة وممارسة كادر صيدلة المجتمع الفلسطيني بالموضوع.

أؤكد بأن كافة المعلومات التي سوف يتم جمعها منك هي لأغراض البحث العلمي فقط، وسوف يتم الحفاظ على السرية التامة وعدم استخدام هذه المعلومات لأغراض أخرى.

لك كامل الحرية والإرادة في المشاركة في هذا البحث ولك الحق في اخذ الوقت الكافي للتفكير في المشاركة من عدمها وسؤالي عما تراه مناسباً والتحدث لاي شخص او جهة عن هذا البحث.

كما يمكنك الاستفسار عن اي جزء يتعلق في البحث الان او فيما بعد وإذا كانت هناك كلمات او اجزاء غير مفهومة بإمكانك سؤالي وستجد/ين الوقت والإجابة الكافيتين.

معرفة وممارسة كادر صيدليات المجتمع الفلسطيني في مجال نقص (انقطاع) الأدوية

يتكون الاستبيان من 4 أقسام منها اختيار من متعدد أو التقييم حسب الرأي بدءاً ب "أوافق بشدة"، "أوافق"، "غير متأكد"، "أعارض"، أو "أعارض بشدة"، أو كتابة الرأي. القسم الأول لقياس التوزيع الديموغرافي، القسم الثاني لقياس المعرفة في موضوع نقص (انقطاع) الأدوية، القسم الثالث لقياس الممارسة فيما يتعلق بموضوع نقص (انقطاع) الأدوية والقسم الرابع لقياس التجربة وكتابة الرأي في موضوع نقص (انقطاع) الأدوية.

العمر:

الجنس

() ذكر () أنثى

المستوى التعليمي

() دبلوم مساعد صيدلي () بكالوريوس صيدلة

() دكتور صيدلة () ماجستير في العلوم الصيدلانية / الطبية / الصحية

المستوى المهني

() مساعد صيدلي (دبلوم صيدلة) () صيدلاني مساعد

() صيدلاني مسؤول

عدد سنوات الخبرة:

نوع الصيدلية

() صيدلية مجتمع خاصة () سلسلة صيدليات مجتمع

المحافظة:

موقع الصيدلية:

() في مركز المدينة () في القرية او في ضواحي المدينة

() في المخيم

المعرفة

حسب رأيك، ما هو الوصف المناسب لمفهوم (تعريف) نقص / انقطاع الأدوية

التعريف	أعراض بشدة	أعراض متأكد	غير متأكد	أوافق بشدة
عدم كفاية العرض من الأدوية لتلبية الطلب الحالي أو المتوقع بالنسبة للمريض				
زيادة الطلب على الأدوية والمستلزمات الطبية				
الدواء غير متوفر للشراء				
استرجاع الدواء من السوق من قبل الشركة المصنعة				

برأيك أي من هذه العوامل يمكن أن يؤدي الى نقص (انقطاع) الأدوية

العوامل	أعراض بشدة	أعراض متأكد	غير متأكد	أوافق بشدة
استرجاع أو سحب الأدوية من السوق				
المصاعب اللوجستية والقانونية في إيصال الدواء للصيديات				
مشاكل التصنيع (مثل نقص المواد الخام)				
مشاكل في جودة تصنيع الأدوية				
مصاعب اقتصادية أو إدارية للمصنع أو المستورد				

					عدم وجود حوافز لإنتاج الدواء بسبب عدم جدوى الربح
					زيادة الطلب العالمي (مثلاً أثناء جائحة كورونا)
					عمليات الإغلاق لأسباب سياسية أو أمنية
					إساءة استخدام / تعاطي الأدوية / استخدام الأدوية لغير الهدف المرخص (مثل: (OZEMPIC
					توفر الأدوية الجنيسة (البدايل التجارية) بأسعار منافسة

برأيك، كيف تصف كل جملة من الجمل التالية حول تأثير نقص الأدوية

التأثير	أعراض بشدة	أعراض غير متأكد	أوافق بشدة	أوافق بشدة
يؤثر سلباً على حياة المريض				
تؤثر على سمعة الصيدلية				
يؤثر سلباً على التزام المريض بالأدوية				
يؤثر سلباً على تكلفة الرعاية الصحية للمريض				
تأخير الإجراءات الطبية أو الجراحية مثل تنظير القولون				
يؤدي إلى زيادة في الأخطاء الخاصة بصرف وإعطاء الأدوية				

برأيك، هل يحتاج صيادلة المجتمع إلى دورات تدريبية حول كيفية التعامل مع نقص الأدوية وحجم مخزون الأدوية؟

() نعم () لا () ربما

ما مدى تقييمك لمدى معرفتك وتصورك لموضوع نقص (انقطاع) الأدوية؟

() جيدة (4-5) () معتدلة (2-3) () ضعيفة (0-1)

الممارسة

هل تلقيت إشعار بالماضي حول نقص (انقطاع) الأدوية من أي جهة رسمية؟

() نعم () لا

هل واجهت مشكلة نقص (انقطاع) الأدوية في الأشهر الثلاثة الماضية؟

() نعم () لا

مصادر المعلومات الخاصة بنقص (انقطاع) الأدوية

أعراض بشدة	أعراض متأكد	أوافق بشدة	المصدر
			وزارة الصحة الفلسطينية
			منظمة الصحة العالمية
			الأخبار من المصادر الرسمية أو وسائل التواصل الاجتماعي
			المؤتمرات / الندوات
			مستودعات الأدوية
			المستورد أو وكيل الدواء
			الشركات المصنعة
			نقابة الصيادلة

برأيك، ما هي الأدوية (الملزمة بوصفة طبيب) والتي تكرر نقصها (انقطاعها)؟ (اختر 5 على الأكثر)

- () Anticonvulsants () Antineoplastic
- () Anti-inflammatory agents (glucocorticoids / NSAIDs)
- () Antiparkinson agents () Antibacterial
- () Blood modifiers (anticoagulants/ platelet aggregation inhibitors)
- () Cardiovascular agents (dyslipidemics, diuretics, ACEIs, ARBs,...)
- () Dermatological agents () Immunological agents (vaccines)
- () Respiratory tract agents (antileukotriens / bronchodilators/...)
- () Skeletal muscle relaxants () Sedatives / hypnotics

برأيك، ما هي الأدوية (التي تُصرف دون وصفة طبية) والتي تكرر نقصها (انقطاعها)؟ (اختر 5 على الأكثر)

- () Acne OTC medicines
- () Allergic rhinitis, cold and influenza OTC medicines
- () Anti-diarrheal () Anti-constipation
- () Dyspepsia / flatulence medicines () Otic OTC preparations

- () Fever, headache, joint and muscle pain relievers
- () Hemorrhoids OTC medicines () Anti-head lice
- () Hyperacidity OTC medicines () Pharyngitis OTC medicines
- () Ophthalmic OTC preparations () Vitamins and minerals
- () Vaginal and dermal mycosis OTC medicines

عندما يحدث نقص (انقطاع) في الأدوية المتعلقة بالأدوية الملزمة بوصفة طبيب، ماذا تفعل؟

() أنصح المريض /ة بالعودة الى الصيدلية لاحقاً

() أنصح المريض /ة بالذهاب الى صيدلية أخرى

() أقوم بإحالة المريض /ة الى الطبيب لتغيير الدواء

() أقترح دواء بديل

الخبرة والرأي

للتحقق من نقص حجم المخزون او نقص الأدوية في الصيدلية الخاصة بك. هل لديك نظام جرد آلي /
الالكتروني؟

() نعم () لا () ربما

هل يمكنك ذكر بعض الحلول لمنع نقص (انقطاع) الأدوية؟

Appendix B

The English form of the questionnaire

Knowledge and Practices of Palestinian Community Pharmacy Staff on Medicine Shortages

The survey consisted of four parts, including demographic characteristics, knowledge, opinion, and practice. Participants will be asked to rate some statements on a Likert scale, starting from “strongly disagree,” “disagree,” “not sure,” “agree,” and “strongly agree” and to answer some other questions or choose one choice according to their opinion.

Age: _____

Gender:

() Male () Female

Educational Level

() Pharmacy technician (Diploma) () B-pharmacy

() Pharm D () Master's in health/ medical / pharmaceutical sciences

Professional Level

() Pharmacy technician () Assistant Pharmacist

() Senior Pharmacist

Years of Experience: _____

Pharmacy Type

() Independent community pharmacy

() Community chain pharmacy

Pharmacy region: _____

Pharmacy location

() In a city () In a village

() In a refugee camp

Knowledge

In your opinion, what is the best description of medicine shortages?

Definition	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
Inadequate drug supply to meet the current or projected demand at the patient level					
Increase demand for medicines or medication supplies					
Drug is not available for purchase					
Drug is on back order from manufacturers					

In your opinion which of these factors will contribute to medicine shortages

Factors	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
Recalls or withdraw from the markets					
Logistical and regulatory challenges					
Manufacturing problems (ex. lack of raw material)					
Quality problems					
Business and Economic Issues					
Lack of incentives to produce less profitable drugs					
Increased global demand (ex. during Corona pandemic)					
closures and lock down for political reasons					
Misuse/abuse medications/ Increase off label use (ex. Ozempic)					
Low prices of generic medications					

In your opinion, how does each sentence describe the impact of medicine shortages?

impacts	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
Decrease patient quality of life					
Affect pharmacy's reputation					
Reduce patient's adherence					

Increase healthcare cost					
Delaying medical or surgical procedure like colonoscopy					
Increase dispensing and administration errors					

In your opinion, do community pharmacists need training courses about dealing with medicine shortages and medicine stocking?

() Yes () No () Not sure

How do you report your perceived knowledge toward medicine shortages?

() Good (4-5) () Fair (2-3) () Poor (0-1)

Practice

Did you receive any notification about medicine shortages from any authorized organization?

() Yes () No

Did you Have medicine shortages in past 3 months?

() Yes () No

Sources of Information of medicine shortages

Sources	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
Palestinian Ministry of Health					
WHO					
Professional news / Social media					
Conferences / Seminars					
Drug stores (wholesalers)					
Importer or drug agency					
Manufacturing company					
Palestinian Pharmacist Association					

In your opinion, what are the prescription-only medications (Rx) that were most commonly affected by medicine shortages? (Max. choose 5)

() Anticonvulsants () Antineoplastic

() Anti-inflammatory agents (glucocorticoids / NSAIDS)

() Antiparkinson agents () Antibacterial

() Blood modifiers (anticoagulants/ platelet aggregation inhibitors)

- () Cardiovascular agents (dyslipidemics, diuretics, ACEIs, ARBs,...)
- () Dermatological agents () Immunological agents (vaccines)
- () Respiratory tract agents (antileukotriens / bronchodilators/...)
- () Skeletal muscle relaxants () Sedatives / hypnotics

In your opinion, what are over-the counter medications (OTC) that were most commonly affected by medicine shortages? (Max. choose 5)

- () Acne OTC medicines
- () Allergic rhinitis, cold and influenza OTC medicines
- () Anti-diarrheal () Anti-constipation
- () Dyspepsia / flatulence medicines () Otic OTC preparations
- () Fever, headache, joint and muscle pain relievers
- () Hemorrhoids OTC medicines () Anti-head lice
- () Hyperacidity OTC medicines () Pharyngitis OTC medicines
- () Ophthalmic OTC preparations () Vitamins and minerals
- () Vaginal and dermal mycosis OTC medicines

When a medicine shortage concerning a prescription medication occurs you will:

- () Advise her/him to come back to the pharmacy later
- () Advise her/him to go to another pharmacy
- () Refer her/him to their physicians to change the drug
- () Suggest an alternative medication

Experience and Opinion

For checking for low stock or medicine shortages in your pharmacy. Do you have an Automated/Electronic Inventory System?

- () Yes () No

Can you mention some solutions to prevent medicine shortages?

Appendix C

IRB approval letter

An-Najah National University Faculty of Medicine & Health Sciences Institutional Review Board		جامعة النجاح الوطنية كلية الطب وعلوم الصحة لجنة اخلاقي البحث العلمي
Ref: Mas. June. 2024/6		
IRB Approval Letter		
Title of Research:		
Medicine's Shortage: Knowledge and Practice of Community Pharmacy Staff in Palestine.		
Submitted by: Mariam Mohammad Ahmad Najdi		
Supervisor: Waleed Sweileh		
Approved: 4th June. 2024		
Your Study Title "Medicine's Shortage: Knowledge and Practice of Community Pharmacy Staff in Palestine." reviewed by An-Najah National University IRB committee and was approved on 4th June. 2024		
 Hasan Fitian, MD IRB Committee Chairman		
Nablus - P.O Box :7 or 707 Tel (970) (09) 2342902/4/7/8/14 Fax/mile (970) (09) 2342910 E-mail : IRB@najah.edu		

Appendix D

STROBE Checklist (Cross-sectional Study)

	Item No	Recommendation	Location in thesis
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	Abstract
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Abstract
Introduction			
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	Introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	Introduction / objectives
Methods			
Study design	4	Present key elements of study design early in the paper	Methodology- Study Design
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methodology- Study Population / Procedures
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	Methodology – Study Population
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Methodology – Study Tool
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Methodology – Study Tool
Bias	9	Describe any efforts to address potential sources of bias	Methodology – Analysis Plan
Study size	10	Explain how the study size was arrived at	Methodology – Study Sample
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Methodology – Analysis Plan
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	Methodology – Analysis Plan
		(b) Describe any methods used to examine subgroups and interactions	
		(c) Explain how missing data were addressed	
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—e.g. numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed	Results
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (e.g. demographic, clinical, social) and information on exposures and potential confounders	Results- Demographics
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	Results
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Results
		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—e.g. analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarize key results with reference to study objectives	Discussion
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Discussion – Limitations
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Discussion
Generalizability	21	Discuss the generalizability (external validity) of the study results	Discussion
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	



جامعة النجاح الوطنية
كلية الدراسات العليا

نقص الأدوية: معرفة وممارسة كادر صيادلة المجتمع الفلسطيني

إعداد

مريم محمد أحمد نجدي

إشراف

أ. د. وليد صويلح

قُدِّمت هذه الرسالة استكمالاً لمتطلبات الحصول على درجة الماجستير في الصيدلة المجتمعية،
بكلية الدراسات العليا في جامعة النجاح الوطنية في نابلس، فلسطين.

نقص الأدوية: معرفة وممارسة كادر صيادلة المجتمع الفلسطيني

إعداد

مريم محمد أحمد نجدي

إشراف

أ. د. وليد صويلح

الملخص

الخلفية: يشكل نقص الأدوية تحدياً رئيسياً لأنظمة الرعاية الصحية عالمياً، ولا سيما في المناطق المتأثرة بعدم الاستقرار السياسي، وقيود الحركة، وهشاشة سلاسل التوريد. وتمثل فلسطين سياقاً فريداً، إذ يُقَدِّم الرعاية الصحية فيها بعوامل خارجية، وبمحدودية السيطرة على استيراد المستحضرات الصيدلانية، إضافة إلى الضغوط الاقتصادية المستمرة، مما يفاقم نقص الأدوية ويعزز من تأثيرها على ممارسات الصيدلة المجتمعية.

الأهداف: هدفت هذه الدراسة إلى تقييم مستوى المعرفة والتصورات والممارسات لدى الكوادر الصيدلانية العاملة في الصيدليات المجتمعية في فلسطين فيما يتعلق بنقص الأدوية، واستكشاف الأسباب المتصورة، والآثار المترتبة، واستراتيجيات التكيف المتبعة. علاوة على ذلك، سعت الدراسة إلى تحديد حلول قائمة على الأدلة لدعم السلطات التنظيمية في التخفيف من حدة الأزمات المستقبلية.

المنهجية: أُجريت دراسة مقطعية اعتمدت على المنهجين الكمي والنوعي، من خلال استبيان منظم ذاتي التعبئة وُرِّعَ على العاملين في الصيدليات المجتمعية في مختلف المحافظات الشمالية الفلسطينية. جرى تحليل البيانات الكمية باستخدام برنامج (SPSS)، في حين خضعت إجابات الأسئلة المفتوحة لتحليل موضوعي نوعي.

النتائج: أظهرت النتائج ارتفاع معدل نقص الأدوية في الصيدليات المجتمعية. كما دعمت النتائج الفرضيات البديلة المقترحة، حيث أظهر المشاركون مستوى جيّداً من المعرفة، مع وجود فجوات تتعلق

بسلاسل التوريد والآليات التنظيمية. وأفاد المشاركون بأن نقص الأدوية يؤثر سلباً على التزام المرضى بالعلاج واستمراريته وجودة حياتهم، فضلاً عن زيادة عبء العمل والتحديات الأخلاقية التي يواجهها العاملون في الصيدليات. شملت أكثر استراتيجيات التكيف شيوعاً التواصل مع عدد أكبر من الموردين، والتوصية ببدائل علاجية، وإحالة المرضى إلى الأطباء. كما أكدت النتائج النوعية على الحاجة إلى تحسين التنسيق مع السلطات الرسمية وإنشاء نظام وطني للإنذار المبكر.

الخلاصة: يمثل نقص الأدوية تحدياً مستمراً ومعقداً لممارسة الصيدلة المجتمعية في فلسطين. ويتطلب التصدي لهذه المشكلة اعتماد استراتيجيات وطنية مراعية للسياق المحلي لتعزيز الرقابة على سلاسل التوريد ودعم التصنيع الدوائي المحلي. كما يعد تمكين الصيادلة من خلال بروتوكولات استبدال واضحة وتعاون بين المهنيين الصحيين أمراً ضرورياً لضمان سلامة المرضى واستمرارية الرعاية.

الكلمات المفتاحية: فلسطين؛ نقص الأدوية؛ الصيدلة المجتمعية؛ المعرفة؛ استراتيجيات التكيف.