
Investigating management approaches in Erbil Province community pharmacies: a qualitative study on challenges and effective practices

Received: 29/06/2025

Accepted: 01/09/2025

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ABSTRACT

Background and Objective: Pharmacies in Erbil Province face numerous challenges, compromising their ability to provide patient-centered, safe, and effective care. This study aimed to identify these challenges in depth and propose evidence-based strategies from developed countries to overcome them.

Methods: In-depth, semi-structured interviews were conducted with 27 pharmacy managers operating in Erbil's urban, semi-urban, and rural areas, using a qualitative, phenomenological approach. Participants were selected through purposive sampling and included managers of both independent and chain pharmacies. Data were analyzed through thematic analysis using Braun and Clarke's six-phase framework, with six themes structured deductively and subthemes emerging inductively from the data.

Results: Six main themes (regulatory compliance, supply chain and inventory management, human resource management, patient service and care, financial viability, and technology adoption) were identified. Participants reported outdated (n=18) and inconsistent regulations (n=13), improper control of drug pricing (n=27) and drug storage (n=10), oversaturation of the pharmacy market (n=6), reliance on manual inventory systems (n=22), shortage of qualified professionals (n=25), high staff turnover (n=14), lack of structured training (n=20), limited patient consultation services (n=19), poor financial tracking (n=19), and low utilization and availability of digital tools (n=25). These challenges were experienced similarly across all pharmacy settings.

Conclusion: The findings highlight the need for comprehensive reform in the Erbil pharmacy sector. Although the challenges are significant, they align with recognized worldwide patterns, suggesting that effective strategies could be adapted to improve pharmacy operations, professional standards, and healthcare outcomes in the region.

Keywords: Pharmacy management, Regulatory compliance, Human resource management, Patient care services, Digital health and operational efficiency

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INTRODUCTION

Community pharmacies are a vital component of primary healthcare delivery, especially in regions with limited access to hospital-based services (1). Pharmacies play a crucial role in providing access to essential medications, and, due to their wide accessibility, are typically the first point of contact for anyone seeking healthcare services (2). However, effective management of these pharmacies remains hindered by several structural challenges, including gaps in regulatory compliance, ineffective supply chains and inventory control systems, human resource constraints, inadequate patient service infrastructure, low financial viability, and limited adoption of technology.

Although Erbil's community pharmacies are vital for promoting public health, their operations have not kept pace with evolving healthcare needs or global management standards. Many continue to rely on outdated regulations, manual record-keeping, unofficial staffing patterns, and unsustainable financial models. Their long-term survival is jeopardized, and these structural deficiencies hamper their capacity to provide consistent, patient-centered care.

Internationally, particularly in developed countries, pharmacy management has evolved through the implementation of structured regulatory frameworks, automated inventory systems, clinical workforce development, and digital health technologies (3-6). These improvements have increased operating efficiency, changed pharmacists' roles, and improved drug safety. However, effective implementation of these approaches in low- and middle-income settings such as Erbil requires careful adaptation to local realities, including infrastructure limitations and financial constraints.

This study examines how adherence to international best practices can help Erbil Province's community pharmacies operate more effectively. The study draws on the lived experiences of 27 community pharmacy managers from urban, semi-urban, and rural areas of Erbil, using a qualitative, phenomenological method. It investigates contextually relevant reform solutions by identifying and analyzing challenges across six core thematic areas: regulatory compliance, inventory control, personnel management, patient care, financial sustainability, and technology adoption.

The primary aim is to propose practical, evidence-based recommendations for improving pharmacy performance in Erbil. These strategies are designed to support regulatory authorities, health policymakers, and pharmacy owners in developing sustainable solutions that strengthen pharmacy operations and improve healthcare outcomes throughout the province.

METHODS

Study Design

This study follows a qualitative, phenomenological research design. The qualitative approach is appropriate as it yields rich, descriptive data on pharmacists' experiences rather than numerical measurements (7), allowing for open-ended inquiry that reveals deeper insights from participants (8). The research proceeded systematically: interviews identified challenges, thematic analysis organized them, a literature review synthesized solutions from developed countries, and a discussion assessed how these solutions could be adapted to Erbil's circumstances. A phenomenological approach was used to examine the perceptions and lived experiences of pharmacy professionals regarding challenges in regulatory compliance, inventory management, human resource management, finance, technology, and patient

services (9). This arrangement fosters methodological consistency, enables extraction of qualitative data on challenges, and situates the findings against literature from developed countries.

Participants and Sampling

A purposive sampling strategy was used to select 27 licensed pharmacists managing more than 100 pharmacies across Erbil Province. The sample size was set at 27 participants based on the concept of data saturation, ensuring that no additional themes would emerge beyond this point (10). Participants qualified as managers or owners of community pharmacies with a minimum of four years of management experience; pharmacists operating hospital-based or polyclinic pharmacies were excluded. Geographic coverage (urban, semi-urban, and rural areas), type of pharmacy (independent vs. chain), and professional experience (ranging from 4 to 19 years) resulted in a diverse sample, ensuring comprehensive representation of pharmacy management practices and challenges across the region.

Data Collection

Depending on participant preference, data were collected through in-depth, semi-structured interviews conducted either face-to-face or via video conference. Interviews were conducted in Kurdish and translated into English for analysis. Each interview lasted between 20 and 45 minutes; audio recordings were transcribed verbatim with participants' consent. Interviews were designed to identify challenges only, deliberately avoiding leading questions or discussion of potential solutions, to preserve objectivity. A pilot interview was conducted to validate the interview guide prior to full-scale data collection (7).

Data Analysis

Thematic analysis was conducted following Braun and Clarke's six-phase approach. The process began with familiarization with the transcripts, followed by generation of initial codes. Six predefined thematic categories (regulatory compliance, supply chain and inventory management, human resource management, patient service and care, financial viability, and technology adoption) were identified using a deductive approach; sub-themes emerged inductively from participants' responses. Manual coding was performed, and responses from different pharmacy settings were compared to ensure analytical consistency (11, 12).

Ethical Considerations

The author obtained ethical approval from the Ministry of Higher Education and Scientific Research Committee of Hawler Medical University before the study began (reference number HMU-ph-E-071112024-304). Each participant gave informed consent. Names and identities were removed from transcripts to ensure privacy, and data was kept securely under researcher-only access. Participants were informed of their right to withdraw at any time, without consequences.

RESULTS

This study analyzed the perspectives of 27 community pharmacy managers in Erbil Province, as detailed in Tables 1–3, to identify key challenges affecting pharmacy management. The findings are organized into six major themes representing interconnected issues across regulatory, operational, financial, patient service, technological, and workforce domains. These themes emerged through thematic analysis of interview transcripts and are presented alongside relevant subthemes and participant quotations.

All themes and subthemes, with examples of participant quotations, are summarized in Table 4.

Table 1. Characteristics of interviewed community pharmacists in Erbil Province (N=27), participants 1–9

#	Code	Location	Pharmacies	Type	Exp.	Age	Degree
1	P1-KHR	Khabat/Rural	1	Independent	13y	36	BSc
2	P2-UCM	City Centre/Urban	1	Independent	9y	32	BSc
3	P3-ELSU	City Centre/Semi-Urban	1	Independent	10y	33	MSc
4	P4-EPU	Erbil Prov./Urban+Semi-Urban	11	Chain	10y	33	BSc
5	P5-CTR	City Centre/Semi-Urban	1	Independent	10y	33	BSc
6	P6-CTU	City Centre/Urban	1	Independent	14y	37	MSc
7	P7-DSU	Daratu/Rural	1	Independent	13y	33	BSc
8	P8-CU	City Centre/Urban	1	Independent	6y	29	BSc
9	P9-EPU	Erbil Prov./Urban+Semi-Urban+Rural	45	Chain	8y	31	BSc

Table 2. Characteristics of interviewed community pharmacists in Erbil Province (N=27), participants 10–18

#	Code	Location	Pharmacies	Type	Exp.	Age	Degree
10	P10-PRR	Pirzin/Rural	3	Independent	4y	27	BSc
11	P11-CCSU	City Centre/Semi-Urban	1	Independent	10y	33	BSc
12	P12-KR	Koye/Rural	1	Independent	8y	31	BSc
13	P13-EPU	Erbil Prov./Urban+Semi-Urban+Rural	10	Chain	15y	38	BSc
14	P14-USU	Urban/Semi-Urban	2	Independent	9y	32	BSc
15	P15-SU	Semi-Urban	1	Independent	16y	39	BSc
16	P16-UR	Urban/Rural	2	Independent	4y	27	BSc
17	P17-UR	Urban/Rural	2	Independent	19y	42	BSc
18	P18-UR	Urban/Rural	2	Independent	10y	33	MSc

Table 3. Characteristics of interviewed community pharmacists in Erbil Province (N=27), participants 19–27

#	Code	Location	Pharmacies	Type	Exp.	Age	Degree
19	P19-UR	City Centre/Urban	1	Independent	13y	36	BSc
20	P20-UR	City Centre/Semi-Urban	1	Independent	13y	36	BSc
21	P21-UR	Khabat/Rural	1	Independent	9y	32	BSc
22	P22-UR	City Centre/Urban	4	Chain	14y	37	BSc
23	P23-UR	City Centre/Urban	1	Independent	15y	38	BSc
24	P24-SR	Bnaslawia-Semi-Urban/Rural	2	Independent	11y	34	BSc
25	P25-SU	Urban/Semi-Urban	2	Independent	10y	33	BSc
26	P26-UR	Urban/Rural	2	Independent	11y	34	BSc
27	P27-SR	Soran/Rural	2	Independent	9y	32	MSc

All participants are qualified pharmacists (BSc or MSc) serving as owner or primary manager of their pharmacy(s).

Theme 1: Regulatory Compliance

Many participants reported regulatory instability as the primary obstacle to effective pharmacy management. About 22% of respondents stated that the presence of too many pharmacies and pharmaceutical companies had destabilized the market, leading to an excessive supply of certain medications and difficulties controlling inventory.

“There are too many pharmaceutical companies. For example, when we want to order a PPI like omeprazole, there are more than 65 companies offering this product, which makes it difficult for us to manage our inventory effectively” (P25-SU).

Frequent policy modifications were criticized by 48% of respondents, who noted that inconsistent updates made compliance challenging. Additionally, 67% of participants emphasized that some regulations are outdated, some dating back more than a century.

“The regulations have remained unchanged since 1951, originally derived from British laws dating back to 1920, meaning they have been in place for over 105 years. They do not align with the current pharmaceutical landscape” (P19-UR).

Furthermore, 70% of participants noted insufficient enforcement of rules, and 37% raised concerns about lack of control over drug storage, reporting that regulatory authorities do not guarantee 24-hour electricity or monitor temperature controls, hindering drug safety. Finally, all participants described uncontrolled drug pricing as a pervasive challenge, emphasizing that inconsistent pricing led to price-driven competition that compromised profitability and patient trust.

“Uncontrolled drug pricing is the biggest issue in this sector. Some pharmacies sell products below cost, which is not rational. In most countries, drug prices are standardized across all

pharmacies. If pricing were controlled, we could improve our services, but unfortunately, here, pharmacies operate just like markets” (P15-SU).

Theme 2: Supply Chain and Inventory Management

Participants raised concerns about supply chain inefficiencies and manual inventory systems, which impact pharmacy performance and drug availability. Data showed that 81% of pharmacists reported frequent errors, delays, and resource mismanagement resulting from manual inventory tracking, which is prone to human error and time-consuming, relying on handwritten notes and phone-call ordering.

“Right now, we rely on manual tracking, which is one of the biggest challenges we face. If any product is out of stock, we write it in a notebook, and the next day, we conduct procurement by telephone. This process increases the risk of errors and inefficiencies in stock management” (P18-UR).

In addition, 89% of participants highlighted that drug shortages resulting from inadequate supply chain coordination are common, especially for chronic disease drugs. These shortages may lead to overstocking, financial losses, an increased risk of expired goods, and patients having to search multiple locations for essential treatments.

“There is a lot of shortage, which forces us to stock up significantly to overcome this issue. However, this can lead to an increase in expired medications and requires a lot of investment” (P7-DSU).

Theme 3: Human Resource Management

Participants frequently highlighted human resource issues, particularly staffing shortages, employee turnover, and the absence of organized workforce development mechanisms. A total of 96% of

pharmacists reported concerns about the shortage of qualified staff, particularly in rural or underserved areas; nearly 85% cited difficulty recruiting skilled pharmacists and staff as a related challenge.

“Finding skilled pharmacists and staff is difficult because most prefer working for companies rather than pharmacies due to higher income and fewer working hours, leaving a limited number of pharmacists available” (P22-UR).

More than half (50%) of respondents also highlighted significant employee turnover, describing a cycle in which employees gain expertise only to leave for less demanding or higher-paying jobs. Furthermore, 85% of participants acknowledged relying more on personal experience than on formal expertise in human resource management, and 74% admitted they do not offer organized training courses for employees; most training is unstructured and intermittent, focused more on product promotion events than systematic development.

“No, I don't provide structured training programs. If there is a conference or an event held by the company, I just tell them to attend” (P6-CTU).

These findings indicate a significant need for capacity-building in HR management, the establishment of continuing education programs, and the adoption of retention methods to enhance employee stability and service quality across Erbil's community pharmacies.

Theme 4: Patient Service and Care

Participants described how limited infrastructure and staffing constrain the quality of patient-facing services. About 52% reported that cramped pharmacy spaces hinder private consultations and

screenings, limiting their ability to provide confidential advice.

“Lack of space in my pharmacy limits private consultations and affects the quality of service we can provide” (P7-DSU).

The large majority (89%) described inadequate patient education and engagement, often compounded by a lack of collaboration from other healthcare providers.

“Yes, patient education is a big issue. Sometimes, when we refer patients to a physician, they respond by saying that we don't know anything” (P5-CTR).

About 52% linked the shortage of trained professionals directly to reduced patient care quality, and 70% described the scope of pharmacy services as limited largely to dispensing, restricting their capacity to provide broader healthcare support.

“The scope of pharmacy services is limited beyond medication dispensing, restricting the ability to provide additional healthcare support” (P3-ELSU).

Theme 5: Financial Viability

Financial instability emerged as one of the main limitations on pharmacy operations. All participants stated that patients' economic pressures directly affected their income and service performance, with many patients finding it difficult to afford medications and requesting cheaper, lower-quality alternatives.

“Customers are struggling financially, and this directly affects pharmacy sales. Many patients now request cheaper alternatives or delay purchasing their medications” (P7-DSU).

Additionally, 96% of participants cited high operating expenses — including utilities, rent, wages, and licenses — as limiting business sustainability. A further 70% acknowledged lacking fundamental accounting or budgeting knowledge, working without daily financial tracking or well-defined strategies.

“We just use recording on papers, and actually, we don't have any knowledge daily about where we are financially” (P3-ELSU).

Moreover, 67% of pharmacists cited insufficient investment capacity as a long-term obstacle to growth.

Theme 6: Adoption of Technology

Technology adoption remains minimal in Erbil's community pharmacies: 78% of participants pointed to infrastructure and financial barriers to digital transformation.

“Implementing the technology requires additional staff, which increases expenses” (P19-UR).

Furthermore, 93% highlighted a lack of system integration — specifically the lack of connection

between healthcare practitioners and pharmacists, and across healthcare more broadly. Integration with national health data platforms was described as a crucial strategy for improving service delivery.

“Integrating the healthcare system with all pharmacies would lead to better coordination and more effective pharmacy operations. The lack of integration is a major challenge; each pharmacy currently has its own system and pricing structure, creating a fragmented and inefficient environment” (P25-SU).

Additionally, 70% of participants said they still depend on manual processes even where digital tools are available, and 93% said they used technology minimally, primarily for basic purposes such as checking quotations or viewing pricing.

“No, we just use the system for checking the list of purchasing quotations” (P10-PRR).

These results indicate that the combination of limited digital literacy, inadequate IT infrastructure, and poor system integration collectively prevents pharmacies from realizing the benefits of digital health technologies.

Table 4. Summary of thematic findings on pharmacy management challenges in Erbil

Theme	Subtheme	No. (%)	Example participant
1. Regulatory	Excessive pharmacies/companies strain stability	6 (22%)	P25-SU
	Frequent regulatory changes	13 (48%)	P13-EPU
	Lack of oversight of drug storage	10 (37%)	P1-KHR
	Outdated rules	18 (67%)	P19-UR
	Uncontrolled drug pricing	27 (100%)	P15-SU
	Weak enforcement	19 (70%)	P19-UR

Theme	Subtheme	No. (%)	Example participant
2. Supply chain	Manual inventory tracking	22 (81%)	P18-UR
	Medication shortages	24 (89%)	P7-DSU
3. Human resources	Recruitment difficulty	23 (85%)	P5-CTR
	High turnover	14 (52%)	P18-UR
	HR knowledge gaps	23 (85%)	P1-KHR
	Lack of structured training	20 (74%)	P6-CTU
	Shortage of qualified professionals	25 (93%)	P2-UCM
4. Patient service	Cramped spaces limit consultations	14 (52%)	P7-DSU
	Inadequate patient education	24 (89%)	P5-CTR
	Insufficient trained professionals	14 (52%)	P18-UR
	Limited scope of services	19 (70%)	P3-ELSU
5. Financial viability	Economic pressures on patients	27 (100%)	P12-KR
	High operational costs	26 (96%)	P21-UR
	Lack of financial awareness	19 (70%)	P3-ELSU
	Limited investment capacity	18 (67%)	P11-CCSU
6. Technology	Financial/infrastructural barriers	21 (78%)	P19-UR
	Lack of healthcare system integration	18 (67%)	P25-SU
	Reliance on manual processes	19 (70%)	P25-SU
	Limited digital tool integration	25 (93%)	P10-PRR

Participant quotations corresponding to each subtheme are provided in the Results narrative above. Percentages are of N=27; small rounding differences from the Abstract (e.g., 93% vs. 96% for shortage of qualified professionals) reflect that fractions of 27 do not divide evenly — $25/27 = 92.6\%$ ($\approx 93\%$), so this has been standardized to 93% throughout.

DISCUSSION

This study identified a complex and extensively linked set of issues affecting the management of community pharmacies in Erbil Province, including regulatory instability, poor inventory management, human resource constraints, limited patient services, poor financial management, and poor technological integration. Participants consistently described the regulatory environment as disorganized and outdated, with some laws dating back to the early 20th century, leading to confusion and inconsistency in implementation. Frequent changes in pharmacy rules complicate compliance and business planning. The lack of organized, consultative policy-making has produced regulations that lack grounding in the reality of modern pharmacy operations, undermining pharmacies' strategic direction and impeding long-term investment and innovation.

By contrast, countries like the United Kingdom have adopted multi-year frameworks, such as the Community Pharmacy Contractual Framework (2019–2024), which provides consistent service expectations, defined financial support, and regulatory clarity to support the sector's growth (4). Similarly, the Pharmacy Guild of Australia has negotiated long-term agreements, including the 8th Community Pharmacy Agreement (2024–2029), which provides financial stability and enables pharmacies to plan services and expand healthcare programs over several years, supporting both economic viability and improved patient care (13). The absence of a comparable long-term plan for Erbil keeps pharmacists in a state of uncertainty.

This insufficient regulatory basis directly contributes to the oversaturation of pharmacies and pharmaceutical companies across Erbil Province. Participants pointed out that there are no strict regulations governing licensing, allowing

several pharmacies to operate within the same radius and pharmaceutical companies to expand without control, destabilizing the market, complicating inventory and supply chain management, and intensifying competition in ways that reduce profit margins. Furthermore, the lack of price control systems allows each pharmacy to set its own prescription drug pricing, creating customer uncertainty and damaging public trust, particularly where patients pay significantly different prices for the same medication at nearby pharmacies. Through demographic and geographic licensing policies — such as mandating a minimum distance between pharmacies and restricting new licenses based on population thresholds — countries like Spain and Italy manage market saturation (14, 15). To keep the market from fragmenting, developed countries also regulate and control the access, approval, and distribution of pharmaceutical companies, issuing licenses under strict market-entry criteria (16). These rules promote both accessibility and market equilibrium. Rules such as external reference pricing and fixed markups, routinely adjusted in response to stakeholder input, also help control medication prices in mature systems, guaranteeing pricing equity and helping stabilize pharmaceutical income (17).

Another significant issue was storage control. Many pharmacies reported inconsistent power supply, which can degrade temperature-sensitive drugs; some even described relying on multiple backup generators. In high-income countries, regulatory bodies such as Health Canada and the European Medicines Agency implement mandatory temperature-tracking systems and require pharmacies to meet infrastructure criteria before licensing (18, 19). Because of these infrastructure and enforcement gaps, Erbil's pharmacies remain susceptible to drug deterioration and patient harm. Safety and compliance would be much improved by

a national initiative to implement Good Storage Practices (GSP) and support cold-chain infrastructure for essential medicines.

From an operational perspective, the most common challenge was reliance on manual inventory systems. Participants described managing procurement using handwritten logs and phone orders — processes that waste staff time and introduce errors. Such outdated processes make demand forecasting nearly impossible, leading to overstocking, regular stockouts, and excessive expired goods. Globally, the shift to computerized inventory control has been a primary driver of pharmacy effectiveness; AI-powered forecasting systems, for example, are used to analyze consumption trends and alert users to replenishment needs in real time, maximizing procurement efficiency (20). Together with just-in-time inventory systems and centralized distribution hubs, these technologies reduce waste and improve availability. Erbil's pharmacies remain largely excluded from such developments, primarily due to cost, limited technological knowledge, and inadequate regulatory support.

Human resource management was another key area of concern. Many of Erbil's pharmacists run their businesses without professional HR knowledge, relying on personal experience for hiring, training, and staff evaluation. This approach has led to uneven employment practices, poorly defined job roles, and limited career progression opportunities — all of which contribute to employee turnover. The shortage of qualified pharmacists is particularly severe in rural areas, where low salaries and poor infrastructure discourage professionals from accepting or retaining positions. Many participants described a recurring cycle of training new hires who then leave for better opportunities, raising running costs

and disrupting workflow. Developed countries have addressed these challenges through multifaceted strategies: the UK's NHS Leadership Academy trains pharmacy managers in HR, leadership, and organizational behavior, while Canadian provinces offer mandatory training to community pharmacy managers through regional colleges (21, 22), an approach echoed by findings from Erbil itself, where facilitators and barriers to continuing professional development among healthcare providers — including pharmacists — have similarly been shown to shape workforce readiness (23). Many systems also offer professional promotion pathways, housing allowances, and financial incentives for rural postings; with support from the regional syndicate and the Ministry of Health, similar approaches could be tested in Erbil to enhance workforce retention and professionalism.

Workforce challenges directly affect the quality of patient services. As participants noted, the lack of private consultation spaces, limited staffing, and minimal patient education activities restrict pharmacists to the role of mere dispensers — a pattern consistent with a recent Erbil-based study, which found that while patients were generally satisfied with pharmacist knowledge and communication, collaboration with other healthcare providers and issue resolution remained weak points (24). By contrast, in developed systems, pharmacists serve a broader public health function, combining community pharmacy work with medication therapy management (MTM), vaccinations, and even prescription writing under cooperative practice agreements for chronic disease management. These approaches help make pharmacies a primary point of access for patients' healthcare, improving clinical outcomes and patient adherence (25, 26), while also generating new revenue streams for pharmacies. Another significant challenge affecting both workforce and

patient care is the shortage of pharmacist professionals, which developed countries often address through organized postgraduate training and expanded responsibilities for pharmacy technicians; such investments enhance pharmacists' clinical skills and confidence, facilitating more patient-centered consultations. Programs like England's Pharmacy Integration Fund contribute to this kind of growth by enhancing clinical skills, workforce capacity, and service quality (6).

Financial status is another key obstacle to sustainable pharmacy operations. Many participants reported having no long-term financial planning, standardized accounting systems, or formal budgeting methods. Low access to capital investment, combined with high operating expenses — especially rent, utilities, staff salaries, and inventory procurement — markedly hindered their ability to extend services or modernize infrastructure. Many pharmacists admitted depending on informal income tracking with no systematic knowledge of their profit margins or financial performance. This fragmented financial management jeopardizes operational stability and limits the sector's ability to invest in workforce development, infrastructure, or technology. By contrast, pharmacies in developed countries operate under disciplined financial systems backed by incentive-based government funding, third-party reimbursement programs, and pricing policies. Through indexed dispensing fees, co-payment caps, and additional payments for specific services, Australia's Pharmaceutical Benefits Scheme (PBS) enables pharmacies to ensure affordable access to medicines while maintaining financial viability (13). To address these financial gaps in Erbil, targeted interventions — including financial literacy training for pharmacy owners, microfinance programs, minimum capital or investment requirements for

establishing a community pharmacy through stricter licensing, patient-focused economic protections, and tax relief for pharmacy reinvestment — could improve both financial sustainability and service quality, helping pharmacies evolve into more advanced healthcare providers, as seen in developed countries (27, 29).

Finally, Erbil's pharmacies still show poor integration of digital technologies. Although some systems had been installed, many were used only for viewing price lists or printing receipts. Obstacles included staff inexperience, lack of system integration with healthcare facilities, and installation and maintenance costs. Internationally, countries such as the United Kingdom have incorporated pharmacies into national eHealth systems, enabling real-time prescribing, automatic interaction checks, and secure access to patient histories — improving safety and coordination (30, 31). Introducing standardized, government-subsidized pharmacy management software, along with mandatory digital training modules, would be an essential first step toward digital transformation in Erbil, as has been done in developed countries (30-32).

In sum, the challenges facing community pharmacies in Erbil are both wide-ranging and deeply systemic, together constituting a closely interlinked network of causality, analyzed here using the fishbone (Ishikawa) strategy, as shown in Figure 1 (33).

Six prominent “bones” — regulatory compliance, inventory and supply chains, human resources, patient care and service, financial viability, and technology integration — organize the difficulties, illustrating how each domain contributes to the overarching problem of poor pharmacy performance and sustainability in Erbil. This structure makes clear that effective interventions

must be multi-dimensional: addressing technology adoption, for example, would have little effect if finances were not stabilized or staff competency improved, just as enhancing rules without implementing them or aligning them with operational reality has little value.

Directions for Future Research

- Assessing the long-term impact of management practice adoption on care quality in community pharmacies, to understand how management changes affect patient outcomes, service delivery, and operational efficiency.
- Comparative studies between pharmacies in the Kurdistan Region and other regions with

similar healthcare challenges, to identify best practices.

- Studies focused on regulatory reforms to enhance compliance and service quality.
- Examining the effectiveness of financial literacy programs and access to funding for pharmacy owners.
- Research on the involvement of pharmacy professionals in shaping the policies that affect their practice.

By addressing these areas, scholars and practitioners can contribute to the development of a more effective and sustainable pharmacy sector in the Kurdistan Region, ultimately enhancing the quality of care and patient outcomes.

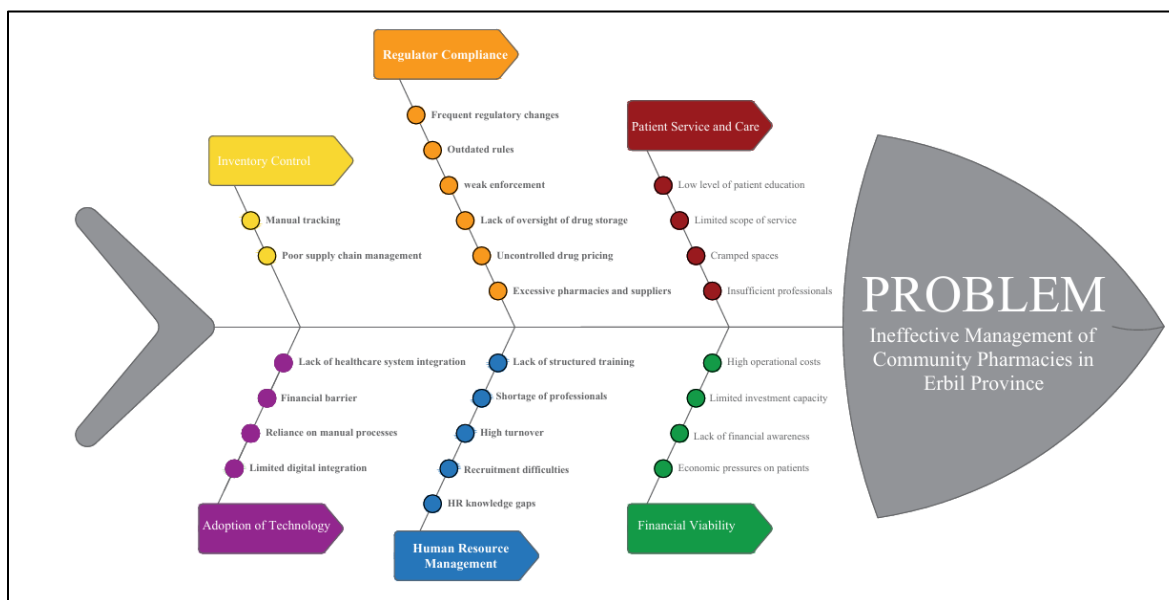


Figure 1. Ishikawa (fishbone) diagram showing the causes of ineffective management of community pharmacies in Erbil

CONCLUSION

This study identifies six interconnected challenges affecting community pharmacy management in Erbil Province: regulatory compliance, inventory control, human resources, patient services, financial instability, and technology adoption. Interviews with 27 managers revealed reliance on manual systems, weak regulation, limited HR structures, and minimal digital integration, all contributing to underperformance in both clinical and operational terms. International experience, however, shows that solutions such as policy reform, real-time inventory systems, structured professional development, digital prescribing, and financial training can strengthen community pharmacies. For Erbil, coordinated reform by regulators, professional bodies, academic institutions, and pharmacy owners is essential to modernize infrastructure, empower professionals, and ensure patient-centered care.

Limitations

While this study provides insightful analysis of the challenges in managing community pharmacies in Erbil, several limitations should be noted.

First, results may be specific to Erbil Province and might not be immediately applicable to other areas without further confirmation; this research provides a foundation for expanding the work to other regions in future. Second, there is limited diversity among participants regarding professional role: while the study interviewed pharmacy managers, it did not capture viewpoints from other important stakeholders, including pharmacy assistants, patients, regulatory authorities, and policymakers, which limits how fully the ecosystem of pharmacy operations can be captured, particularly for topics such as human resource management, regulatory enforcement, and patient care services, where other stakeholders may hold

different views. Third, the study was conducted within a specific time period; Iraq's pharmacy sector is prone to rapid political, financial, and regulatory change, so some findings may become outdated as the sectoral environment shifts — for instance, through future government initiatives on drug pricing, pharmacy licensure, or digitalization. A final limitation concerns translation: every interview was conducted in Kurdish and later translated into English for presentation and analysis, and this process may have introduced subtle shifts in tone, emphasis, or cultural nuance.

FUNDING

The authors declare that no funds, grants, or other support were received during the preparation of this manuscript.

COMPETING INTEREST

The authors declare that they have no competing interests.

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