

**THE RISE OF “PHARMACY DESERTS”: THE IMPACT OF RETAIL DRUGSTORE CLOSURES ON VULNERABLE POPULATIONS AND MEDICATION ACCESSIBILITY****PALLAM NARAYANA SWAMY***Department of Pharmacy Practice, Jagans College of Pharmacy, Nellore.*\*Corresponding Author  
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Article History: Received: 14 Mar 2026, Revised: 26 Mar 2026, Accepted: 03 May 2026

**Abstract:** The growing phenomenon of “pharmacy deserts” has emerged as a significant public health concern in many countries, particularly within economically disadvantaged and medically underserved communities. Pharmacy deserts refer to geographic regions where residents experience limited or absent access to community pharmacies and essential pharmaceutical services. Recent waves of national retail drugstore closures have intensified healthcare disparities by reducing access to prescription medications, vaccination services, chronic disease management, medication counseling, and preventive healthcare support. Large retail pharmacy chains have increasingly closed outlets due to financial pressures, changing consumer behaviors, competition from online pharmacies, reimbursement challenges, workforce shortages, and evolving healthcare economics. The consequences of pharmacy closures disproportionately affect vulnerable populations including elderly individuals, low-income families, racial and ethnic minorities, rural communities, uninsured populations, and patients with chronic illnesses. Reduced access to nearby pharmacies contributes to medication non-adherence, delayed treatment initiation, worsening chronic disease outcomes, increased emergency department visits, and higher hospitalization rates. Transportation barriers and digital health inequalities further intensify healthcare access limitations among socially disadvantaged populations. Pharmacists continue to play essential roles in addressing medication accessibility challenges through telepharmacy services, mobile pharmacy programs, medication therapy management, patient counseling, vaccination campaigns, and collaborative healthcare initiatives. Technological advancements including mail-order pharmacy systems, digital health platforms, and telemedicine services provide potential solutions to improve pharmaceutical care delivery in underserved regions. Despite emerging innovations, major concerns remain regarding healthcare inequities, regulatory limitations, workforce shortages, reimbursement policies, and sustainability of community pharmacy services. This manuscript explores the causes, epidemiology, social determinants, pharmacist interventions, healthcare consequences, emerging technologies, policy implications, and future strategies associated with the rise of pharmacy deserts and declining medication accessibility among vulnerable populations.

**Keywords:** *Pharmacy deserts; Community pharmacy closures; Medication accessibility; Vulnerable populations; Telepharmacy; Pharmaceutical care; Health disparities; Medication adherence; Public health; Retail pharmacy.*

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**I. INTRODUCTION**

Community pharmacies represent one of the most accessible healthcare resources worldwide and serve critical roles in medication dispensing, chronic disease management, vaccination delivery, preventive healthcare, patient education, and public health promotion [1]. Pharmacists frequently function as the first point of healthcare contact for many individuals, especially among populations with limited access to hospitals and primary care providers. Over recent decades, retail pharmacies have expanded beyond traditional dispensing activities to include clinical services such as immunization programs, medication therapy management, health screenings, and chronic

disease counseling [2]. However, recent waves of national retail pharmacy closures have created growing concerns regarding medication accessibility and healthcare equity. Major pharmacy chains across multiple countries have reduced the number of operating stores due to financial instability, declining reimbursement rates, increased operational costs, changing market competition, workforce shortages, and expansion of digital pharmacy services [3]. These closures have disproportionately affected economically disadvantaged neighborhoods and rural communities, contributing to the emergence of “pharmacy deserts.” The term “pharmacy desert” describes geographic areas where residents experience limited

access to nearby pharmacies capable of providing essential medications and pharmaceutical services [4]. Similar to food deserts, pharmacy deserts disproportionately affect vulnerable populations including elderly individuals, racial minorities, low-income households, uninsured patients, disabled individuals, and people living in medically underserved areas. Lack of nearby pharmacies may force individuals to travel long distances for medications, delay prescription refills, or discontinue essential therapies entirely. Medication inaccessibility resulting from pharmacy closures has significant implications for public health outcomes. Studies demonstrate that reduced pharmacy access contributes to poor medication adherence, uncontrolled chronic illnesses, increased hospital admissions, preventable complications, and elevated healthcare expenditures [5]. The burden becomes particularly severe among patients requiring long-term therapies for hypertension, diabetes mellitus, cardiovascular diseases, asthma, psychiatric illnesses, and infectious diseases. Technological advancements such as telepharmacy, online prescription systems, mail-order pharmacies, and mobile healthcare services offer potential alternatives for underserved communities [6]. Pharmacists also remain essential contributors in reducing healthcare disparities through patient counseling, medication therapy management, community outreach, and collaborative care programs. Despite increasing awareness, substantial challenges persist regarding healthcare infrastructure, policy implementation, transportation barriers, digital inequities, workforce limitations, and reimbursement systems [7]. This manuscript explores the epidemiology, causes, social consequences, pharmacist interventions, emerging technologies, policy implications, and future opportunities associated with the rise of pharmacy deserts and declining local medication access.

## **2. EPIDEMIOLOGY AND GROWING PREVALENCE OF PHARMACY DESERTS**

The emergence of pharmacy deserts has become increasingly evident within both urban and rural healthcare systems. Research demonstrates that thousands of retail pharmacy locations have closed globally over the past decade due to shifting economic pressures and healthcare market restructuring [8]. In the United States, major national chains including CVS, Walgreens, and Rite Aid announced large-scale store closures affecting underserved communities disproportionately. Similar trends have been observed across Europe, Asia, and developing healthcare systems where independent community pharmacies face financial instability and operational challenges. Urban pharmacy deserts often occur in low-income neighborhoods characterized by high poverty rates, limited healthcare infrastructure, racial disparities, and reduced investment in commercial healthcare services [9]. Rural regions experience additional challenges due to geographic isolation, low population density,

transportation limitations, and shortages of healthcare professionals. Elderly populations living in remote communities frequently experience significant barriers to medication access following local pharmacy closures. Several studies demonstrate that minority populations experience disproportionately higher rates of pharmacy closures compared to affluent communities [10]. Neighborhoods with lower socioeconomic status often face reduced access to healthcare services, fewer primary care providers, and limited transportation systems, further worsening healthcare inequities. Public health researchers increasingly recognize pharmacy accessibility as a major social determinant of health. The COVID-19 pandemic further exposed vulnerabilities within community pharmacy systems. Increased healthcare demands, workforce burnout, medication shortages, and financial disruptions accelerated pharmacy closures in several regions [11]. Simultaneously, pharmacies played essential roles in vaccination programs, public health communication, and emergency medication distribution during the pandemic, emphasizing their importance within healthcare systems.

## **3. CAUSES OF RETAIL DRUGSTORE CLOSURES**

The rise of pharmacy deserts is closely linked to complex economic, technological, and healthcare system factors. Financial pressures remain among the most significant causes of retail pharmacy closures. Declining reimbursement rates from insurance providers and pharmacy benefit managers have substantially reduced pharmacy profitability [12]. Independent pharmacies often struggle to compete with large retail chains and online pharmaceutical services offering discounted pricing and home delivery systems. Changes in consumer behavior also contribute to declining foot traffic within traditional pharmacies. Increasing utilization of e-commerce platforms, mail-order prescription services, and digital healthcare applications has transformed medication purchasing patterns [13]. Many consumers now prefer online prescription refills and home delivery systems due to convenience and reduced transportation requirements. Workforce shortages represent another important factor contributing to pharmacy closures. Pharmacists and pharmacy technicians increasingly report burnout, excessive workloads, staffing limitations, and declining job satisfaction [14]. Rural and underserved communities frequently experience greater difficulty recruiting healthcare professionals, resulting in reduced pharmacy operating hours and eventual closures. Operational expenses including rent, utilities, security systems, inventory management, and labor costs have increased significantly in recent years. Inflation and supply chain disruptions have further intensified financial challenges for community pharmacies [15]. Pharmacies located in economically disadvantaged neighborhoods may experience higher theft rates, lower prescription volumes, and reduced

commercial sustainability. Healthcare consolidation and corporate restructuring strategies have also contributed to retail pharmacy closures. Large pharmacy chains increasingly optimize operations by concentrating services within high-profit locations while reducing investment in underserved communities [16]. Consequently, vulnerable populations frequently experience loss of local healthcare resources.

#### **4. HEALTHCARE CONSEQUENCES OF PHARMACY DESERTS**

Pharmacy closures produce substantial consequences for individual patients and public health systems. Medication non-adherence represents one of the most significant outcomes associated with limited pharmacy access. Patients experiencing transportation barriers or long travel distances may delay prescription refills or discontinue essential medications altogether [17]. Chronic disease management becomes increasingly difficult within pharmacy deserts. Patients with diabetes, hypertension, cardiovascular diseases, asthma, epilepsy, and psychiatric disorders often require frequent medication adjustments, monitoring, and counseling. Reduced pharmacy accessibility limits opportunities for pharmacist intervention and therapeutic optimization [18]. Healthcare disparities become more pronounced among socially disadvantaged populations. Elderly individuals, disabled patients, uninsured populations, and low-income households frequently lack reliable transportation systems necessary for accessing distant pharmacies [19]. Consequently, vulnerable communities experience increased risks of preventable complications and hospitalizations. Reduced access to vaccination services also represents a major public health concern. Community pharmacies have become essential providers of influenza vaccines, COVID-19 immunizations, and preventive healthcare campaigns [20]. Closure of neighborhood pharmacies decreases vaccination accessibility and may contribute to lower immunization rates. Emergency department utilization often increases within communities experiencing pharmacy closures. Patients unable to access medications or pharmacist counseling may seek emergency medical services for preventable conditions [21]. This increases healthcare expenditures and places additional strain on hospital systems. Mental health outcomes may also worsen in pharmacy deserts. Interruptions in psychiatric medication access increase risks of treatment discontinuation, relapse, hospitalization, and suicide-related complications [22]. Pharmacists frequently provide essential support for medication adherence and patient reassurance within mental healthcare systems.

#### **5. PHARMACIST INTERVENTIONS AND COMMUNITY SUPPORT STRATEGIES**

Pharmacists remain central contributors in addressing healthcare disparities associated with pharmacy deserts. Medication therapy management services

allow pharmacists to optimize therapeutic regimens, identify medication-related problems, and improve patient adherence [23]. Community outreach programs enable pharmacists to educate patients regarding medication safety, chronic disease management, and preventive healthcare practices. Telepharmacy has emerged as an important solution for underserved communities. Telepharmacy systems utilize digital communication technologies to provide remote medication counseling, prescription verification, and clinical support services [24]. Rural healthcare facilities increasingly adopt telepharmacy models to compensate for workforce shortages and geographic barriers. Mobile pharmacy services represent another innovative strategy for improving medication access. Mobile healthcare vans equipped with pharmaceutical services provide medications, vaccinations, and chronic disease management within remote communities [25]. These programs are particularly valuable during public health emergencies and natural disasters.

Pharmacists also collaborate with physicians, nurses, public health organizations, and community leaders to improve healthcare accessibility. Interdisciplinary care models support medication adherence, chronic disease prevention, and patient-centered healthcare delivery [26]. Digital health technologies including smartphone applications, electronic prescription systems, medication reminder platforms, and remote monitoring tools further support pharmaceutical care continuity [27]. Pharmacists frequently guide patients in utilizing these technologies effectively. Medication synchronization programs and home delivery systems have expanded significantly in response to pharmacy access challenges. These services reduce transportation barriers and improve continuity of care for patients with chronic illnesses [28].

#### **6. TELEPHARMACY AND DIGITAL HEALTHCARE TRANSFORMATION**

Technological advancements have significantly influenced pharmaceutical care delivery within underserved communities. Telepharmacy systems allow pharmacists to provide medication counseling, prescription review, therapeutic monitoring, and patient education remotely [29]. Video conferencing platforms and secure digital communication tools facilitate pharmacist-patient interactions across geographic barriers. Mail-order pharmacy systems have become increasingly common within modern healthcare systems. These services improve medication accessibility for patients unable to travel to physical pharmacies regularly [30]. Automated dispensing systems and centralized pharmaceutical distribution centers support efficient medication delivery. Artificial intelligence and machine learning technologies increasingly support medication management systems. AI-assisted platforms can identify medication adherence patterns, predict adverse drug reactions, and optimize prescription workflows [31]. These technologies may improve healthcare efficiency while reducing

pharmacist workload burdens. Despite technological progress, digital inequities remain important barriers to healthcare accessibility. Elderly individuals, low-income populations, and rural communities may experience limited internet connectivity, reduced digital literacy, and inadequate access to electronic devices [32]. Consequently, telehealth expansion alone may not fully eliminate healthcare disparities associated with pharmacy deserts.

## **7. SOCIAL DETERMINANTS AND VULNERABLE POPULATIONS**

Pharmacy deserts are closely associated with broader social determinants of health including poverty, education, housing instability, transportation access, and healthcare infrastructure [33]. Communities experiencing economic deprivation frequently lack healthcare investment and pharmaceutical services. Racial and ethnic minority populations often experience disproportionately limited healthcare access due to structural inequities and historical disinvestment [34]. Studies demonstrate that predominantly minority neighborhoods experience higher rates of pharmacy closures and reduced healthcare resources compared to affluent communities. Elderly individuals remain particularly vulnerable to pharmacy access limitations due to mobility restrictions, chronic illnesses, and dependence on prescription medications [35]. Patients with disabilities also experience significant barriers when transportation systems and healthcare facilities are inaccessible. Homeless populations and uninsured individuals face additional difficulties obtaining medications consistently. Financial limitations may prevent utilization of online pharmacy services or transportation alternatives [36]. Public health interventions must therefore address broader socioeconomic inequities alongside pharmaceutical accessibility.

## **8. POLICY IMPLICATIONS AND HEALTHCARE REFORM**

Healthcare policymakers increasingly recognize pharmacy accessibility as a critical public health issue. Regulatory reforms aimed at improving reimbursement systems, supporting independent pharmacies, and expanding telepharmacy services may help reduce healthcare disparities [37]. Government programs supporting rural healthcare infrastructure and workforce recruitment are essential for maintaining pharmaceutical services within underserved communities. Incentive programs encouraging pharmacists to practice in rural and low-income areas may improve healthcare accessibility [38]. Expansion of Medicaid programs and healthcare insurance coverage also influence medication accessibility and pharmacy sustainability. Public-private partnerships may further strengthen pharmaceutical care delivery systems. Investment in transportation systems, broadband internet infrastructure, and digital health education

remains necessary for maximizing telepharmacy effectiveness [39]. Policymakers must ensure equitable access to emerging healthcare technologies across diverse populations.

## **9. FUTURE PERSPECTIVES AND EMERGING OPPORTUNITIES**

The future of pharmaceutical care will likely involve greater integration of digital technologies, telehealth systems, artificial intelligence, and decentralized healthcare delivery models. Community pharmacies may increasingly evolve into multifunctional healthcare centers providing preventive care, chronic disease management, and digital health services [40]. Artificial intelligence may improve medication adherence monitoring, prescription optimization, and public health surveillance. Wearable technologies and remote patient monitoring systems could further strengthen pharmacist-led chronic disease management. Expansion of pharmacist prescribing authority and collaborative practice agreements may improve healthcare accessibility within underserved communities. Public health agencies and healthcare organizations must continue prioritizing equitable pharmaceutical care access and sustainable healthcare infrastructure development.

## **10. CONCLUSION**

The rise of pharmacy deserts represents a major public health challenge with significant implications for medication accessibility, healthcare equity, chronic disease management, and patient outcomes. National retail drugstore closures disproportionately affect vulnerable populations including low-income communities, racial minorities, elderly individuals, rural residents, and patients with chronic illnesses. Reduced pharmacy access contributes to medication non-adherence, preventable complications, increased hospitalization rates, and worsening healthcare disparities. Pharmacists continue to play critical roles in mitigating these challenges through telepharmacy services, medication therapy management, patient counseling, mobile healthcare programs, and interdisciplinary collaboration. Emerging digital health technologies, mail-order systems, and AI-assisted pharmaceutical care models provide promising opportunities to improve healthcare accessibility. Despite technological advancements, substantial barriers remain regarding reimbursement systems, workforce shortages, digital inequities, transportation limitations, and healthcare infrastructure disparities. Continued policy reform, healthcare investment, community engagement, and interdisciplinary collaboration will remain essential for addressing pharmacy deserts and ensuring equitable medication access for vulnerable populations worldwide.

## **11. FUNDING**

Nil

**12. INFORM CONSENT AND ETHICAL STATEMENT**

Not applicable

**13. ACKNOWLEDGEMENT**

Not Declared

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