A Behavioral Economics Approach to Improving Pharmacy Access in Food and Health Deserts

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Abstract:

Pharmacies are a critical entry point to the United States health care system, but access to them is not equitable. National geospatial work shows that nearly 15.8 million people, or 4.7 percent of the U.S. population, live in pharmacy deserts that are both low income and low access (Wittenauer et al., 2024). In these areas, residents often travel long distances to reach a pharmacy, and many tracts have no pharmacy located in them at all, which limits access to medications, vaccinations, and pharmacist provided services. Pharmacy deserts tend to have higher proportions of people with lower income, lower educational attainment, no health insurance, limited English proficiency, ambulatory disabilities, and racial or ethnic minority status, indicating that access gaps reinforce existing inequities (Wittenauer et al., 2024).

This paper uses a behavioral economics framework to propose targeted, low cost interventions to improve pharmacy access and utilization in communities that also face food and health resource shortages. Drawing on evidence about the national distribution of pharmacies and pharmacy deserts (Wittenauer et al., 2024; Qato et al., 2017), the paper conceptually models how default refill enrollment, telepharmacy, reminder nudges, and modest financial incentives could increase pharmacy use and medication adherence. These interventions rely on predictable patterns of human decision making, such as present bias, status quo bias, and loss aversion, to make engagement with pharmacy services easier and more intuitive. While structural solutions like preventing pharmacy closures and incentivizing new sites are still essential, the analysis suggests that behavioral interventions can help close access gaps in the short term in communities where building new infrastructure is slow or difficult.

Keywords: Behavioral economics, pharmacy deserts, pharmacy access, telepharmacy, nudges, health disparities, medication adherence

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1. Introduction

Community pharmacies are a crucial component of health care infrastructure in the United States. Nearly seven in ten adults ages 40 to 79 take at least one prescription drug, and about one in five adults take five or more, which means that reliable pharmacy access is central to everyday health management (Hales et al., 2019).

Citation: Aashrith Tatineni, Bhavik Kanumuri, A Behavioral Economics Approach to Improving Pharmacy Access in Food and Health Deserts, *International Journal of Current Business and Social Sciences*. *ISSN- 2312-5985, 11 (6), 93-97, (2025).*

In addition to dispensing medications, pharmacies provide immunizations, contraception services, opioid and addiction treatment support, and counseling about medications and chronic conditions (Shen & Peterson, 2019; Wittenauer et al., 2024). During the COVID 19 pandemic, pharmacies administered a large share of vaccines and provided essential health products, underscoring their role as front line access points (Wittenauer et al., 2024).

However, access to pharmacies is not evenly distributed. Wittenauer et al. (2024) defined "pharmacy deserts" as census tracts that are both low income and low access to pharmacies and mapped these areas across all 50 states and the District of Columbia. They estimated that 15.82 million people, or 4.7 percent of the U.S. population, live in pharmacy deserts and that 4,421 of 4,679 pharmacy desert tracts, or 94.5 percent, contain no pharmacy at all (Wittenauer et al., 2024). These deserts are most common in urban and rural tracts rather than suburban ones and are more likely to have higher poverty rates, lower median household incomes, and more residents relying on public insurance or lacking coverage altogether (Wittenauer et al., 2024).

Pharmacy deserts also overlap with populations that face multiple barriers to care. Wittenauer et al. (2024) found that pharmacy desert tracts have higher proportions of residents with a high school education or less, more people who speak English "not well" or "not at all," and higher rates of ambulatory disability compared to non-desert tracts. Racial and ethnic disparities are visible as well: the proportion of non-Hispanic White residents is lower in pharmacy deserts, while the proportions of non-Hispanic Black, American Indian or Alaska Native, and Hispanic residents are higher (Wittenauer et al., 2024). Earlier national work by Qato et al. (2017) also documented that pharmacies in low income or minority neighborhoods are more likely to close, which can further deepen disparities in access and continuity of care over time.

At a national level, pharmacies often appear highly accessible when viewed in aggregate. For example, Qato et al. (2017) observed that most Americans live relatively close to a community pharmacy, and overall pharmacy availability remained fairly stable between 2007 and 2015. Yet these averages hide pockets of severe under access, including areas where residents must travel long distances and where pharmacies are sparse or absent (Qato et al., 2017; Wittenauer et al., 2024). When pharmacy deserts overlap with food deserts and medically underserved areas, residents face compounded barriers to obtaining healthy food, primary care, and medications.

Behavioral economics offers a complementary lens for addressing these disparities. Many barriers to using pharmacy services stem not only from infrastructure and cost but also from predictable patterns in human behavior. Present bias leads people to focus on immediate costs, like travel time or copayments, more than on long term health benefits. Status quo bias causes individuals to stick with existing habits, such as inconsistent refilling or relying on emergency care, even when better routines are available. Loss aversion can shape how people react to potential health losses or missed doses. By designing interventions that work with these tendencies instead of against them, policy makers and health systems can make it easier for residents of pharmacy deserts to access services that already exist and to adhere to essential treatments.

This paper argues that behavioral interventions such as default enrollment in medication refill programs, telepharmacy for remote consultations and prescription management, reminder systems for chronic disease care, and small financial incentives for adherence can improve pharmacy access and use in underserved communities. These approaches are relatively low cost, scalable, and can be deployed more quickly than building new brick and mortar pharmacies. The following sections describe the data context from pharmacy desert research, explain relevant behavioral economics principles, and outline how these interventions could be applied in food and health deserts to help close equity gaps in the short term.

2. Methods

This study is a conceptual analysis that integrates existing national evidence on pharmacy deserts and pharmacy availability with core concepts from behavioral economics. Rather than collecting new primary data, it draws on key

findings from Wittenauer et al. (2024), Qato et al. (2017), and related federal survey work to construct a framework for behavioral interventions in pharmacy deserts.

Pharmacy Desert Data

Wittenauer et al. (2024) conducted a cross sectional geospatial study using pharmacy address data from the National Council for Prescription Drug Programs and population and sociodemographic data from the 2020 Decennial Census and the 2017–2021 five year American Community Survey. They applied a widely used definition of pharmacy deserts that combines a low income criterion with a low access criterion. Low income tracts were those with either 20 percent or more of the population living below the federal poverty level or a median household income below 80 percent of the nearest metropolitan area (Wittenauer et al., 2024). Low access tracts were those where at least 33 percent of residents lived beyond set distance thresholds from a pharmacy, with the threshold varying by urban, suburban, and rural classification (Wittenauer et al., 2024).

Using these criteria, Wittenauer et al. (2024) identified 4,679 pharmacy desert census tracts out of 84,414 and estimated that 15.82 million people live in these areas. They also reported that most pharmacy deserts have no pharmacies at all and that only 294 of 60,475 community pharmacies nationwide were located in pharmacy desert tracts, or about 0.5 percent (Wittenauer et al., 2024). Their work further characterized the social and demographic features of these tracts, including education, insurance coverage, disability, and race and ethnicity.

Pharmacy Availability and Use Data

To place pharmacy deserts within the broader landscape of pharmacy access, this analysis also uses findings from Qato et al. (2017), who examined the availability of pharmacies in the United States between 2007 and 2015. They reported that while the total number of pharmacies grew modestly, availability and pharmacy types varied by region and neighborhood characteristics, with closures more likely in low income and rural communities (Qato et al., 2017). These patterns help explain why pharmacy deserts form and persist even when national averages suggest high overall access.

Prescription drug use patterns are informed by work such as Hales et al. (2019), who reported that nearly seven in ten adults ages 40 to 79 in the United States and Canada use at least one prescription drug and one in five use five or more. These figures demonstrate how essential pharmacy access is for ongoing management of chronic diseases and support the idea that gaps in pharmacy access could translate directly into medication nonadherence and worsened health outcomes (Hales et al., 2019).

Behavioral Economics Literature

Behavioral economics concepts applied in this paper build on work that has documented how present bias, status quo bias, and loss aversion affect health behaviors. Thaler and Sunstein (2008), for example, popularized the idea of "nudges," small changes in choice architecture that make beneficial behaviors easier without removing freedom of choice. Health focused applications have shown that reminders, default options, and framing of choices can increase preventive care uptake and medication adherence, especially when tailored to common decision making biases (Thaler & Sunstein, 2008).

Using these sources as a foundation, this paper conceptually models the potential impact of four classes of behavioral interventions in pharmacy deserts: default prescription refill enrollment, telepharmacy services, reminder nudges, and modest financial incentives for adherence. Each intervention is linked to specific behavioral mechanisms and discussed in relation to the characteristics of pharmacy desert communities described by Wittenauer et al. (2024).

3. Results

Although this analysis does not present new statistical estimates, it combines existing evidence to highlight several key patterns that inform behavioral policy design. First, Wittenauer et al. (2024) found that pharmacy deserts exist in all 50 states and the District of Columbia and account for 4.7 percent of the U.S. population, or 15.82 million

people. These tracts are more likely to have no pharmacies, higher poverty rates, lower median household incomes, and higher proportions of residents with no health insurance or public insurance compared to non desert tracts (Wittenauer et al., 2024). This suggests that any intervention must address both geographic and financial barriers when targeting pharmacy deserts.

Second, pharmacy desert communities have higher proportions of residents who report speaking English "not well" or "not at all" and higher rates of ambulatory disability (Wittenauer et al., 2024). These characteristics imply that language access and mobility constraints should be central considerations in intervention design. For instance, telepharmacy services that include multilingual support and accessible technology could reduce the need for long travel while still connecting residents to pharmacist counseling and refills.

Third, racial and ethnic disparities are pronounced. Wittenauer et al. (2024) reported that the proportion of non-Hispanic White residents is lower in pharmacy deserts, while the proportions of non-Hispanic Black, American Indian or Alaska Native, and Hispanic residents are higher than in non-desert tracts. Past work has linked the distribution of pharmacies to historical practices such as redlining and demonstrated that pharmacy closures are more likely in low income and minority neighborhoods (Qato et al., 2017). This means that pharmacy deserts are not only geographic phenomena but also reflections of structural racism and long term disinvestment in certain communities.

Fourth, despite these gaps, national pharmacy availability remains high at a broad scale. Qato et al. (2017) showed that most Americans live relatively close to a pharmacy, and many pharmacies offer services beyond dispensing. Combined with the prescription use patterns documented by Hales et al. (2019), this supports the idea that pharmacies could serve as effective hubs for behavioral interventions if designed to reach underserved groups.

Within this context, behavioral economics offers a way to structure interventions to increase pharmacy access and use. Default enrollment in automatic refill programs could counteract forgetfulness and present bias by making timely refills the path of least resistance. Telepharmacy services could reduce travel burdens in tracts with no pharmacies, especially if integrated with community organizations or mobile clinics. Reminder nudges, such as text messages or phone calls timed around refill dates, can help residents with multiple life demands remember to pick up or receive medications. Modest financial incentives, framed in terms of avoiding losses in earned rewards or discounts, could help offset transportation costs or time away from work, particularly for low income residents.

4. Discussion

The evidence on pharmacy deserts and pharmacy availability points to both structural and behavioral barriers that limit access to essential medications and services. Structurally, many pharmacy desert tracts have no pharmacies, are low income, and have higher shares of residents with limited English proficiency, public insurance, or disabilities (Wittenauer et al., 2024). These conditions make it costlier and difficult to obtain prescriptions and to use pharmacist delivered services such as vaccinations or chronic disease management. Behaviorally, residents must decide day by day whether to invest time and resources in traveling to distant pharmacies, scheduling appointments, and maintaining complex medication regimens.

Behavioral economics helps explain why, even when services exist somewhere within a reasonable distance, they may not be fully used. Present bias can lead residents to delay refills because the immediate effort of arranging transportation and paying a copay feels more salient than the future risk of worsened disease. Status quo bias can keep people in patterns of sporadic medication use or reliance on emergency departments. Loss aversion can be harnessed to motivate adherence by emphasizing the potential loss of health progress or benefits when doses are missed.

Default enrollment in refill and synchronization programs is one practical application. Instead of requiring patients to sign up actively, health plans and pharmacies serving or near pharmacy deserts could automatically enroll eligible patients in monthly refill scheduling, with the option to opt out. This would reduce decision friction and make

consistent medication supply the standard pattern. For residents with transportation barriers, pairing default refills with delivery or community pick up points could further reduce costs of access.

Telepharmacy offers another avenue, particularly in rural pharmacy deserts and in urban tracts with high mobility challenges. Remote consultations, medication therapy management, and prescription renewals can be provided by pharmacists via video or phone, reducing the need for in person visits while maintaining a trusted point of contact. For people with limited English proficiency, telepharmacy platforms can include interpreter services or bilingual staff, which can make counseling and education more effective.

Reminder nudges are relatively low cost and can be tailored to local context. Text messages or automated calls that highlight upcoming refill dates, link adherence to personal goals, or remind patients of potential health losses if medication is stopped can help overcome present bias. These reminders can be scheduled at times that fit community routines, such as evenings or weekends, and can be coordinated with primary care or community health worker outreach.

Financial incentives can help address both behavioral and economic barriers. For example, small gift cards or account credits contingent on picking up chronic disease medications on time could help offset transportation costs and use loss aversion by allowing patients to "keep" accumulated rewards as long as they remain adherent. Because pharmacy desert tracts have higher levels of poverty and uninsurance, careful design would be needed to ensure that incentives are meaningful but not coercive and are integrated with broader efforts to improve affordability.

These behavioral strategies do not replace the need for structural reforms. Wittenauer et al. (2024) emphasize that policies to prevent pharmacy closures, support independent pharmacies in underserved neighborhoods, and create new service access points, such as mobile clinics and expanded scopes of practice, are critical. Qato et al. (2017) similarly point to reimbursement, pharmacy benefit manager practices, and other financial pressures that influence where pharmacies open and close. Behavioral interventions work best when they are layered onto policies that stabilize or improve the underlying network of pharmacies and health services.

5. Acknowledgements

This paper was inspired by published work on pharmacy deserts and behavioral economics. The author thanks the researchers whose analyses of pharmacy locations, access, and health equity provided the foundation for this conceptual model of behavioral interventions.

6. References

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