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Original Article

Analysis of County-Level Pharmacist and Pharmacy Deserts in Texas

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Abstract

Background: One in eight pharmacies closed between 2009-2015, making pharmacists less accessible. The need for pharmacists in West Texas is particularly important given many counties are Health Professional Shortage Areas and frontier areas.

Objective: This ecological study described the number of pharmacists and community pharmacies in each Texas county indexed to its population and evaluated the percentage of pharmacists in each county who are Texas Tech University Health Sciences Center (TTUHSC)-trained pharmacists.

Methods: We used the United States 2020-2021 Census data to index the number of pharmacists and community pharmacies to county population. Geographic service regions were based on the Texas Health and Human Services (HHS) classifications. Counties in Texas were matched to HHS regions by the Federal Information Processing Standards code. The Texas State Board of Pharmacy License database was used to obtain active license data for pharmacists living in Texas and community pharmacies as of May 31, 2022. We tabulated the number of pharmacists in each county by residential address. County-level pharmacist deserts were defined as counties with <4 pharmacists per 10,000 individuals. The TTUHSC service region is HHS Service Regions 1, 2, 9 and 10.

Results: Two in five counties were classified as county-level pharmacist deserts. The TTUHSC service region included the three service regions with the highest ratios of county-level pharmacist deserts (Region 9: 57%; Region 10: 50%; and Region 1: 46%). TTUHSC-trained pharmacists comprised 44% of all pharmacists in the TTUHSC service region. Cities with TTUHSC campuses had more TTUHSC-trained pharmacists.

Conclusion: West Texas remains underserved regarding the availability of pharmacists. Efforts to increase the number of pharmacists practicing in this region will go a long way to enhance the health of people living in this region.

Background

Pharmacists are often regarded as the most accessible and frequently visited members of the healthcare team.[1] The pharmacist accessibility patients have become accustomed to has become more difficult in recent years, with 1 in 8 pharmacies having to be closed between 2009 and 2015.[2] The need for pharmacists in West Texas is particularly important given that many counties in this region are rural and have been designated by the Health Resources and Services Administration as Health Professional Shortage Areas and frontier areas.[3] Rural populations often have a greater burden of chronic diseases than urban communities and experience significant health disparities due to geographic isolation, low socioeconomic status, and limited access to healthcare resources.[4]

The Texas Tech University Health Sciences Center (TTUHSC) Jerry H. Hodge School of Pharmacy (SOP) was authorized in 1993 to help address the shortage of pharmacists in West Texas to improve the health of counties in this region. Since the SOP accepted its first class in 1996, no investigations have been conducted to evaluate this school's impact on improving pharmacists' availability in the West Texas region. In addition, it is unknown to what degree TTUHSC-trained pharmacists provide care in this area compared to non-TTUHSC pharmacists.

Objective

This ecological study aimed to describe the current status of the number of pharmacists and community pharmacies in each county in Texas indexed to its population. We also evaluated the percentage of all pharmacists in each county who are TTUHSC-trained.

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Methods

Study area and data sources

This ecological study focuses on the state of Texas as a whole and the TTUHSC service area. Consent from pharmacists or pharmacies and Institutional Review Board approval were not needed as the data used for the current study are publicly available. Data for the current study were from the Texas State Board of Pharmacy License database.[5] This database provided information on pharmacists and community pharmacies in each county of Texas. These data were updated as of May 31, 2022. Pharmacists with an active license and a primary residence listed in the state of Texas were extracted from the database for analysis. Information from this database was merged with the U.S Census database (2020-2021) to obtain population data for each county in Texas.[6] For the analysis of community pharmacies, only pharmacies with active licenses were included. Community pharmacies were categorized as community retail chain franchises (community multi) or community independently owned, as reported in the State Board's database.

Geographic service regions were identified based on the Texas Health and Human Service (HHS) classifications (Figure 1).[7] Counties in Texas were matched to HHS regions by the Federal Information Processing Standards code. We tabulated the number of pharmacists in each county by the address of primary residence. The number of pharmacists, community chain pharmacies, and independent community pharmacies were standardized to the

estimated population of the county that they were located in during 2020-2021 and reported as per 10,000 individuals for pharmacists and per 100,000 individuals for pharmacies.

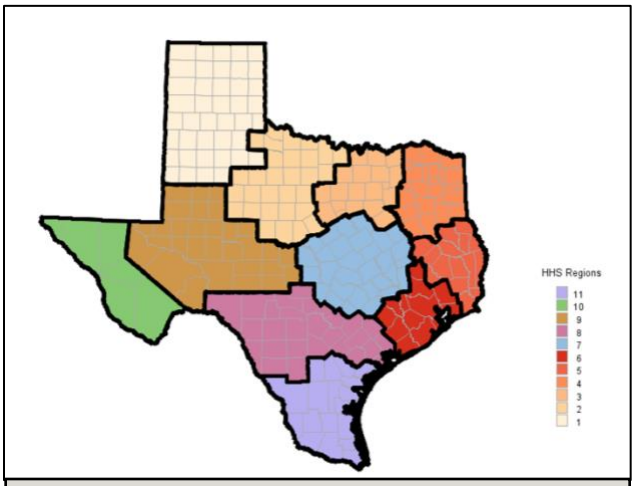

Figure 1. HHS regions, Texas

In secondary analyses, we stratified the pharmacists by pharmacy school graduates. For this, we calculated the number of TTUHSC-trained pharmacists in each county and divided this by the total number of pharmacists per county.

County-level pharmacist deserts were defined as counties with less than 4 pharmacists per 10,000 individuals. The industry standard for physicians, which is 2,500 patients per physician, which translates to 4 physicians per 10,000 patients, was adopted in defining county-level pharmacist deserts.[8] For the analysis of community pharmacies, we defined a county-level pharmacy desert as an area with one community pharmacy per 100,000 individuals.

Statistical analysis

Descriptive data were reported as frequencies and percentages. To visualize the geographic distribution of the number of pharmacists (per 10,000 individuals), community chain pharmacies (per 100,000 individuals), and independent community pharmacies (per 100,000 individuals) across regions and counties, county-level maps were generated. Maps were color-coded to represent a prior categorization for the number of pharmacists, community chain pharmacies, and independent community pharmacies. SAS version 9.4 (SAS Institute Inc) was used to generate the maps.

Results

All pharmacists by county analysis

About two in five counties (41%) in Texas were designated as a county-level pharmacist desert. Seven out of ten (69.2%) counties with two pharmacists or less per 10,000 individuals were in the TTUHSC service regions (1, 2, 9, and 10). However, there was still variation within service regions regarding the number of pharmacists per 10,000 individuals. The three service regions with the highest percentage of county-level pharmacist desserts were in Texas Tech service regions, 57% in Region 9, 50% in Region 10, and 46% and Region 1 *(*Figure 2*)*.

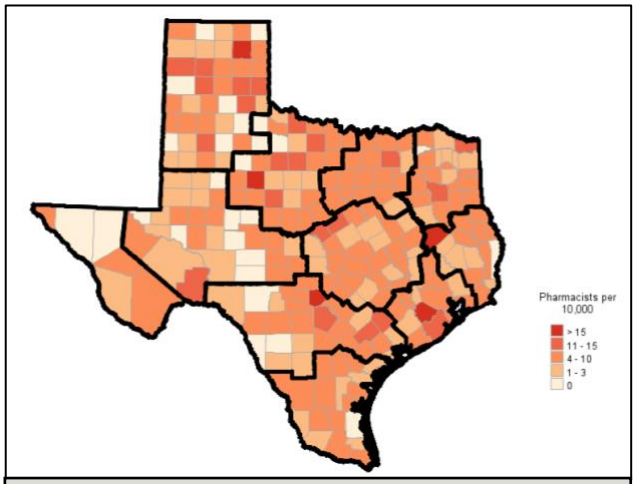

Figure 2. Pharmacists per 10,000 populations by HHS regions, Texas

TTUHSC-trained pharmacist analysis

All of the service regions in Texas were served by TTUHSC-trained pharmacists *(Figure 3)*. About half (48%) of counties in the TTUHSC service regions were served by TTUHSC-trained pharmacists. TTUHSC-trained pharmacists made up 44% of all pharmacists in service region 1, 27% of pharmacists in service region 2, and 19% of pharmacists in service region 9. The percentages of TTUHSC-trained pharmacists in the TTUHSC service regions were higher than any other service regions in the state. As expected, there were a large number of TTUHSC-trained pharmacists in counties in or bordering cities with campuses for the SOP, namely Dallas, Lubbock, Amarillo, and Abilene.

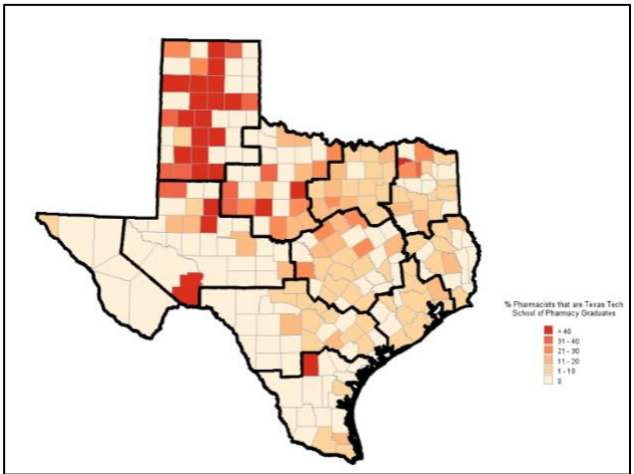

Figure 3. Percentage of Pharmacists that are Texas Tech School of Pharmacy Graduates by HHS regions, Texas

Community pharmacy analysis

Almost one in three (31%) Texas counties have no retail chain pharmacies (Figure 4). The majority of these counties (77%) are within West Texas service regions. Seventy-three percent of counties without a retail chain have one or more independent community pharmacies who are serving the area at a rate greater than 10 pharmacies per 100,000 residents (Figure 5). However, many counties in Texas are only served by one (18%) or two (13%) community pharmacies. Six percent of Texas counties don't have any retail chain or independent community pharmacies. The majority of the 107 counties in the TTUHSC service regions (1, 2, 9, and 10) have zero (12%), one (32%), or two (20%) community pharmacies.

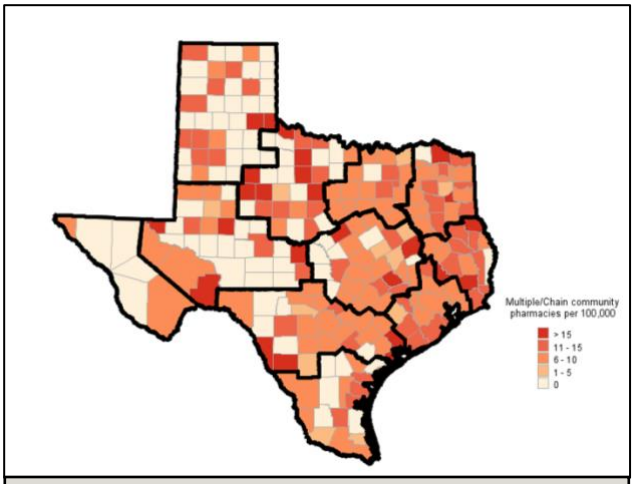

Figure 4. Multiple Chain/community pharmacies by 100,000 populations by HHS regions, Texas

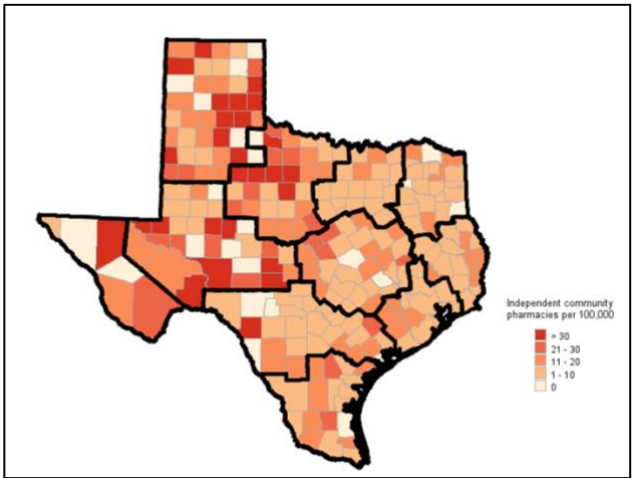

Figure 5. Independent community pharmacies per 100,000 populations by HHS regions, Texas

Discussion

Many counties in Texas are rural and have been designated by the Health Resources and Services Administration as Health Professional Shortage Areas and frontier areas.[3] Our findings expand on defining the extent of health disparities regarding pharmacist access in Texas. West Texas remains primarily underserved, except in counties with large cities such as Amarillo and Lubbock. Numerous TTUHSC-trained pharmacists have chosen to work in West Texas and help address this issue, but many of such trained pharmacists also choose to practice in major cities near TTUHSC SOP campuses. This finding means that there is still work to do to address the disparities in pharmacist access for less populated counties in West Texas.

This study's results are consistent with previous findings where there were significant urban-rural disparities regarding pharmacy deserts.[9] Retail chain pharmacies are seen less in areas with low population density. Numerous West Texas counties have a low population density and do not have a chain retail pharmacy. West Texas counties with low populations are primarily served by independent community pharmacies. These rural areas do not have the same access to healthcare options as urban areas, including retail pharmacies.
Rural populations experience significant health disparities due to geographic isolation, low socioeconomic status, and limited access to healthcare resources.[4] People living in rural communities are at higher risk of dying from cardiovascular disease, cancer, and chronic respiratory disease than their urban counterparts.[10] Mortality rates are continuously rising as populations do not have access to local hospitals and pharmacies.[11,12] West Texans have a significant increase in the risk of worse health outcomes due to the lack of healthcare workers.

In primary care health professional shortage areas of Texas, it is estimated that 3,500 patients are managed per physician, while the industry standard is 2,500 patients per physician.[8,13] Pharmacists could help patients in these physician shortage areas, as the medication experts, to manage medications for chronic diseases. However, our findings point to the fact that more pharmacists are also needed to practice in rural areas. Reimbursement opportunities for expanded cognitive services are likely needed to incentive pharmacists to play an active role in addressing the inadequate number of healthcare professionals available in rural areas. Pharmacists being compensated for practicing with an expanded scope of pharmacy practice is critical to improving health outcomes.

This study has some limitations. One limitation of this study is that the number of pharmacists per county was estimated by the pharmacist's primary address as opposed to the addresses of the pharmacies they worked at. Uploading pharmacist employer information is up to the discretion of each pharmacist, and many pharmacists choose not to disclose this information in the database that was used for the current study. Some pharmacists do travel to different counties to work. However, the likelihood that a pharmacist will travel to a different service region to work is likely low. Therefore, any error in estimating the number of pharmacists practicing in a different county is minimal. Another limitation of this study is that the population per county varies widely across Texas, which could cause a very high ratio of pharmacies per 100,000 individuals in sparsely populated counties. For example, a county with a

population of 10,000 people with one pharmacy would have a ratio of 10 pharmacies per 100,000 individuals.

Additionally, we utilized a modified county-level definition of pharmacist and pharmacy deserts that has not been validated in the literature. We chose to use the rate of 1 pharmacist per 2,500 individuals to define pharmacy deserts; however, it is likely that this ratio may have to be adjusted to have a pharmacist for fewer individuals to provide adequate care.[14] The number we used provided a very conservative estimate, whereas the use of stricter thresholds would have shown an even greater disparity of pharmacist access in Texas. Other studies have primarily evaluated pharmacy deserts on the basis of physical distance (i.e., mileage) from a person's home address to the pharmacy.[9,15] A two-step floating catchment adjusting mileage cut points based on spatial distributions have recently been evaluated as a potential alternative approach to assess pharmacy deserts.[16] Each of these approaches, including ours, has limitations. Our approach would most likely ignore pharmacy deserts in urban areas, however, urban areas were not the focus of our analysis.

While our definition of a county-level pharmacist desert was based on previous standards, we used what we considered to be an educated guess regarding the number of community pharmacies needed for 100,000 individuals. Only one county with at least one retail pharmacy was classified as a county-level pharmacy desert using our definition. This likely represents an underestimation on our part of how many pharmacies are needed to meet the health care needs of a community, as the next lowest county rate was greater than seven community pharmacies per 100,000 individuals.

Conclusion

There is still a great need for pharmacists in West Texas. TTUHSC SOP graduates represent 44% of the pharmacist workforce in West Texas. However, more incentives are needed to attract healthcare personnel, particularly pharmacists, to practice in this area and address the healthcare disparities of the TTUHSC region.

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