FINDINGS BRIEF

RURAL & MINORITY
Health Research Center

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Availability of Pharmacies in Minoritized Racial/Ethnic Areas

Key Points:

- Minoritized Areas: ZIP Code Tabulation Areas (ZCTAs) were classified as being a top minoritized place if the proportion of persons in the ZCTA who identified as a specific minoritized racial/ethnic group (MRG) met or exceeded the 95th percentile for the proportion of those residents in all rural or all urban ZCTAs. Top MRG ZCTAs are not necessarily "majority" non-white but rather are at the top of the distribution of all rural or urban ZCTAs.

- Pharmacy services in top MRG ZCTAs: Among rural ZCTAs with high proportions of minoritized racial/ethnic group members, those with high proportions of American Indian/Alaska Native residents had the highest proportion of ZCTAs with no pharmacies (71.1%).

- Pharmacy services in rural ZCTAs in general: More than two-thirds of all rural ZIP Code Tabulation Area (ZCTAs) lack a pharmacy compared to 41% of urban ZCTAs. Access to pharmacies is important for rural, minoritized populations who also have higher prevalence of chronic conditions that may require medications.

The current findings brief is one of a series of reports documenting disparities in geographic access to health services for places that have a relatively high proportion of residents from minoritized racial and ethnic groups (MRG). We use the term "minoritized" to refer to groups that have historically been marginalized by society and government institutions. This wording, rather than the terms "minority" or "minorities," highlights the intentional social, economic, and political discrimination that these populations have experienced. [1] Work from this series has also been adapted into a web visualization[2] and a peer reviewed publication[3], both in *Health Affairs*.

INTRODUCTION

Pharmacies are a critical part of the rural health care infrastructure providing access to needed medications, patient education, and medication counseling.[4] While there are tens of thousands of community pharmacies throughout the country, studies have identified important differences in access across rural and urban geographies. Between 2003 and 2018, 1,231 independently owned rural pharmacies closed resulting in 630 rural ZIP Codes losing their only pharmacy.[5] The institution of Medicare Part D coverage in the mid-2000s provided drug coverage for Medicare beneficiaries, but the reimbursement rates from privately managed Medicare Part D plans made rural communities financially vulnerable especially as many rural pharmacies were out of network for these plans.[6] Studies consistently show that rural communities have less access to pharmacies than do urban communities.[7] Specifically, a recent study showed that 111 non-metropolitan counties have no pharmacies, and more than 300 non-metropolitan counties lack pharmacies that are likely to be able to offer vaccination services.[8] Despite shortfalls in rural pharmacy availability, rural residents are not any more likely than urban residents to use mail order pharmacies further underscoring the need for "brick and mortar" pharmacies in rural areas.[9] The COVID-19 pandemic has underscored the value of pharmacies in administering timely and accessible preventive health care services such as COVID-19 testing and vaccinations.[10]

Even within urban areas, there are disparities in pharmacy availability. Neighborhoods in large metropolitan areas with higher proportions of Black and Hispanic residents have greater odds of being a pharmacy desert and were more likely to have experienced a pharmacy closure between 2007 and 2015.[11,12] However, there is a dearth of studies examining how rural communities with high proportions of minoritized persons may differ from other communities with regards to access to pharmacies. This brief describes differences in access to pharmacies across ZIP Code tabulation areas (ZCTAs). ZCTAs are analyzed based upon the composition of minoritized racial/ethnic group (MRG) populations and rural/urban location. ZCTAs are geographic units that are smaller than counties to allow for more granular examination of access to care.

METHODS

Defining Minoritized Racial/Ethnic Groups (MRG) across Urban and Rural ZIP Code Tabulation Areas (ZCTAs)

ZCTAs (n = 32,670) were first classified as rural or urban using Rural Urban Commuting Area definitions. ZCTAs classified as 1 through 3 are defined as urban, and those classified as 4 through 10 are defined as rural.[13] Given differences in the demographic profile of rural and urban places, rural and urban ZCTAs were examined separately.

ZCTAs were classified as a "top" MRG place if the proportion of persons who identified as a specific MRG in the ZCTA met or exceeded the 95th percentile for the proportion of those residents in all rural or all urban ZCTAs (Table 1, right). Note that

| Table 1. Proportion of residents needed to meet or exceed the 95th percentile,[a] by race/ethnicity and rurality		
	Rural	**Urban**
Non-Hispanic Black	34.4%	49.3%
Hispanic	23.8%	34.1%
Non-Hispanic American Indian/Alaska Native	11.8%	2.2%
Non-Hispanic Asian	2.5%	15.3%
Non-Hispanic White	100%	100%
[a] Percentiles derived from population data obtained from the American Community Survey.		

MRG ZCTAs are not "majority minoritized" places; rather, they are ZCTAs in which the proportion of each group is at the top of the distribution compared to other ZCTAs. The "top 5%"

for any one population group was consistently less than a majority and for some populations was fairly low. "Hispanic" included all persons of Hispanic ethnicity regardless of race. ZCTAs that fell in the top category for more than one MRG population were grouped separately so that categories do not overlap. Thus, the final analysis included seven separate categories within both rural and urban ZCTAs: top ZCTAs for Black, Asian, American Indian/Alaska Native, Hispanic, and multiple MRG populations, non-Hispanic White, and all remaining ZCTAs.

The geographic location of MRG ZCTAs is shown in Figure 1 below. Demographic characteristics of rural and urban ZCTAs by high racial/ethnic group status are presented in the Appendix. Of note, all rural MRG ZCTAs have a higher estimated prevalence for hypertension and diabetes than the corresponding urban MRG ZCTAs.

Figure 1: Geographic distribution of ZCTAs meeting the 95th percentile threshold by racial and ethnic group [a,b]
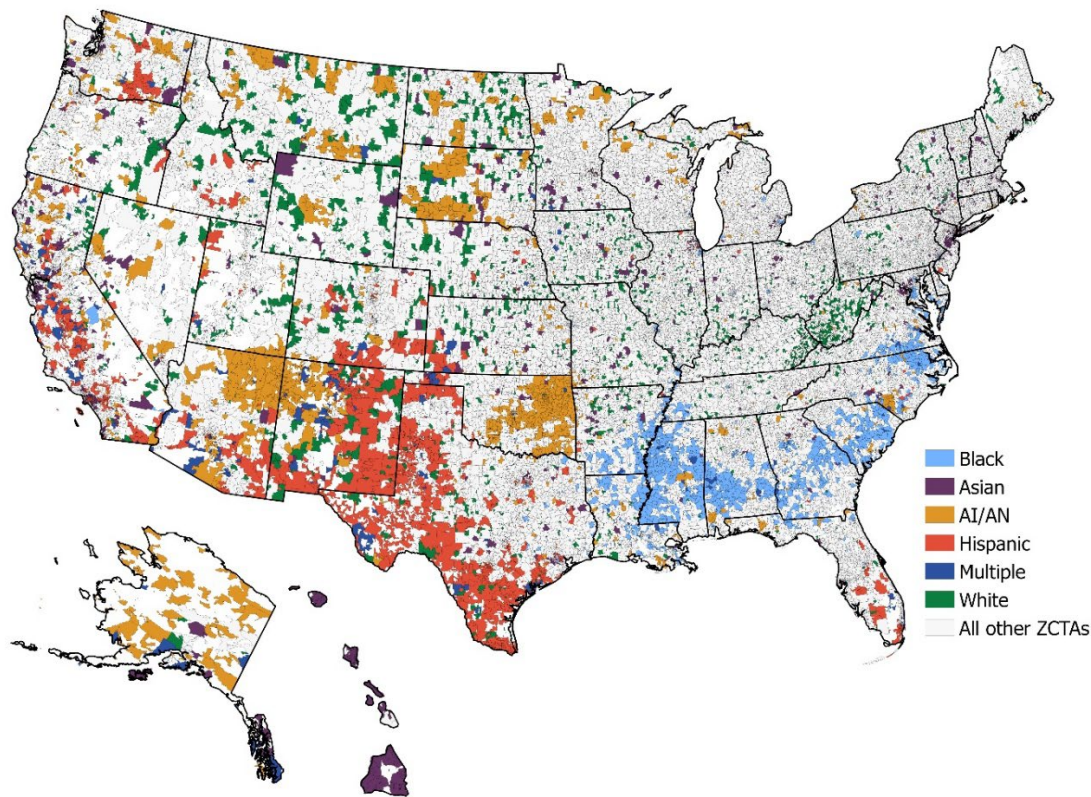
[a] Data from the 2015-2019 American Community Survey [b] This map was adapted from Eberth et al,2022.

Table 2 (next page) provides data on the variations of designated MRG areas by age and socioeconomic characteristics across rural and urban geographies. Rural ZCTAs with high proportions of Hispanic population have the lowest median proportion of residents 65 and older among rural ZCTAs (16.5%) while rural ZCTAs with high proportions of Asian populations have the highest proportion of residents over 65 (19.78%). Among rural ZCTAs, those with high proportions of Black residents have the lowest median household income ($29,756) and the highest mean proportion of the population living below 200% of the federal poverty line (51.7%). Additionally, rural ZCTAs with high proportions of Black or African American persons had the

highest proportion of mean uninsured (12.6%) and unemployed (8.9%). Across all groupings, generally speaking, rural ZCTAs were less affluent than their urban counterparts.

Table 2. Distribution of ZCTAs in the top 5th percentile for minoritized racial/ethnic group population by rurality and racial/ethnic group (2015-2019 American Community Survey)

Racial/ethnic group categories:	Urban ZCTAs		Rural ZCTAs		Total, all ZCTAs	
Minoritized groups	n	%	n	%	n	%
Hispanic*	755	4.2	594	4.0	1,349	4.1
NH* American Indian/Alaska Native.	825	4.6	668	4.5	1,493	4.6
NH* Asian	851	4.8	622	4.2	1,473	4.5
NH* Black	874	4.9	709	4.8	1,583	4.9
> 1 MRG	127	0.7	156	1.1	283	0.9
Non-minoritized						
NH* White	1,203	6.8	2,177	14.6	3,380	10.3
All other ZCTAs (excludes NH White)	13,160	74.0	9,949	66.9	23,109	70.7
Total	17,795	100.0	14,875	100.0	32,670	100.0

Note: Percentiles derived from population data obtained from the 2015-2019 American Community Survey. More than 5% of ZCTAs in both urban and rural areas had 100% white populations; all such ZCTAs were classified as high NH white ZCTAs.
*Hispanic includes all racial identities. All other racial/ethnic groups classified as "Non-Hispanic."

How we studied pharmacy locations

We obtained data from the USDA's Service Area Map Datasets' Healthcare facilities file which includes the location of pharmacies in 2018 (https://www.usda.gov/reconnect/service-area-map-datasets).[14] The Healthcare Facilities dataset came from Homeland Infrastructure Foundation-Level Data (HIFLD) as updated October 2018 and includes hospitals, nursing homes, pharmacies, urgent care facilities, and veteran's health administration medical facilities. These datasets were previously used to determine eligibility for USDA Re-Connect broadband programming. We examined excluded pharmacies affiliated with the Veteran's Health Administration, military bases, and prisons as these would not be accessible to the general population.

We calculated median values of ACS estimates across rural-urban and ZCTA in the top 5th percentile. Pharmacy data obtained from the USDA's Service Area Map contained geographic location XY coordinate data. Using ArcGIS Pro v2.8, we created point locations from each pharmacy's XY coordinates. Using a spatial join, pharmacy location data was matched to its coinciding ZCTA to determine the number of unique pharmacy locations within each ZCTA. Population data from the most recent 5-year estimate of the American Community Survey was used to determine the density of pharmacies by ZCTA standardized per 10,000 residents. We calculated measures of central tendency and dispersion of pharmacy density across rural-urban designation and MRG type.

FINDINGS

Access to Pharmacies across Rural and Urban ZCTAs and MRG Areas

Figure 2 shows the density of pharmacies per 10,000 persons across ZCTAs in the United States. The mean density of pharmacies per 10,000 persons was 1.50 across all ZCTAs. Rural ZCTAs had a mean density of 1.2 pharmacies per 10,000 persons compared to 1.7 per 10,000 in urban ZCTAs (Table 3, next page). Rural Hispanic ZCTAs had the lowest density of pharmacies (0.9 per 10,000) across rural-urban and MRG designation. Pharmacy density was higher among all urban ZCTAs regardless of MRG status compared to their corresponding rural ZCTAs.

Figure 2. Number of Pharmacies per 10,000 residents, 2018.
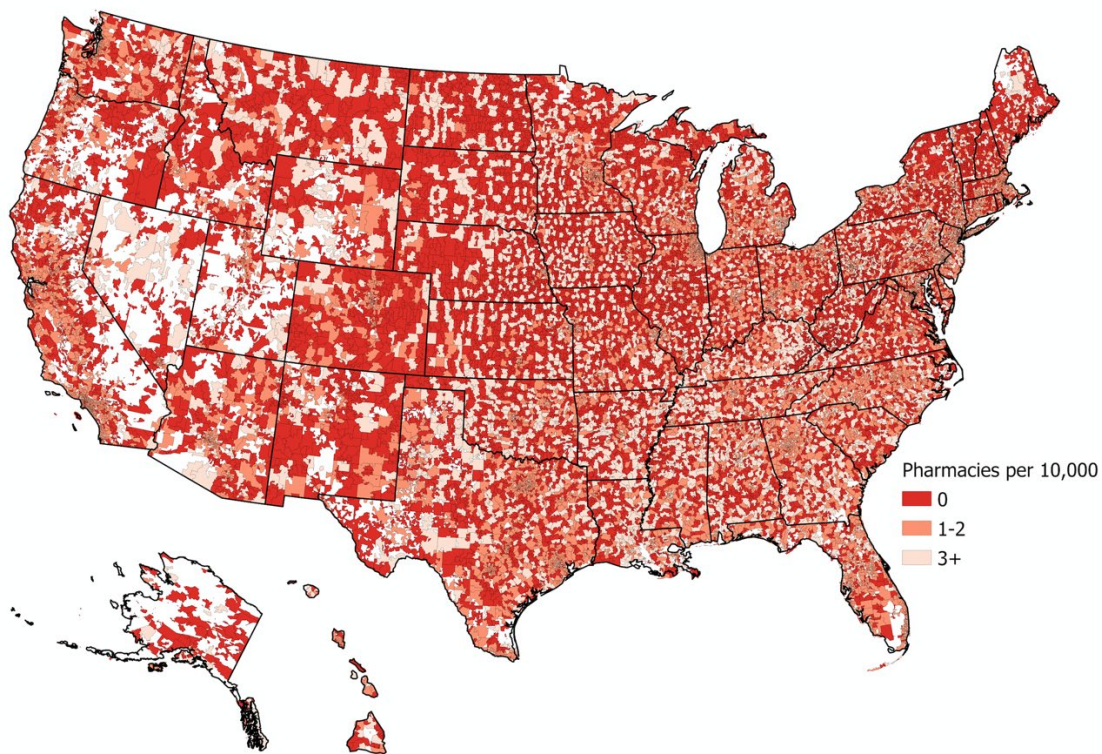

Figure 3 (next page) documents pharmacy availability by rurality and MRG ZCTA status. For each MRG category a higher proportion of rural ZCTAs lack a pharmacy than urban ZCTAs. The greatest rural-urban difference were identified among Hispanic and Asian ZCTAs (32 and 51 percentage point differences, respectively). While rural non-MRG ZCTAs had the highest proportion of ZCTAs without a pharmacy, rural AI/AN ZCTAs had the highest proportion of ZCTAs with no pharmacy (71.1%) among MRG ZCTAs.

Table 3. Number of pharmacies per 10,000 persons by ZCTA rurality and minoritized racial/ethnic group (MRG) category, 2018

	Rural		Urban	
	Number of Pharmacies per 10,000 person			
	Mean (SD)	Median	Mean (SD)	Median
All	1.2 (4.4)	0	1.7 (17.3)	1
Black/African American	1.8 (3.9)	0	3.4 (48.3)	1
Hispanic/Latino	0.9 (1.6)	0	1.4 (3.7)	1
American Indian/Alaska Native	1.7 (5.1)	0	1.2 (2.2)	0
Asian	1.4 (4.6)	0	2.2 (4.0)	0
Multiple Groups	1.1 (1.9)	0	1.5 (3.3)	1
White	0.5 (5.2)	0	2.1 (49.6)	0
Areas without Highly Represented Groups	1.4 (4.4)	0	1.6 (4.9)	1

Figure 3: Number of Pharmacies per 10,000 Population by Rurality and Racial/Ethnic Groups, 2018
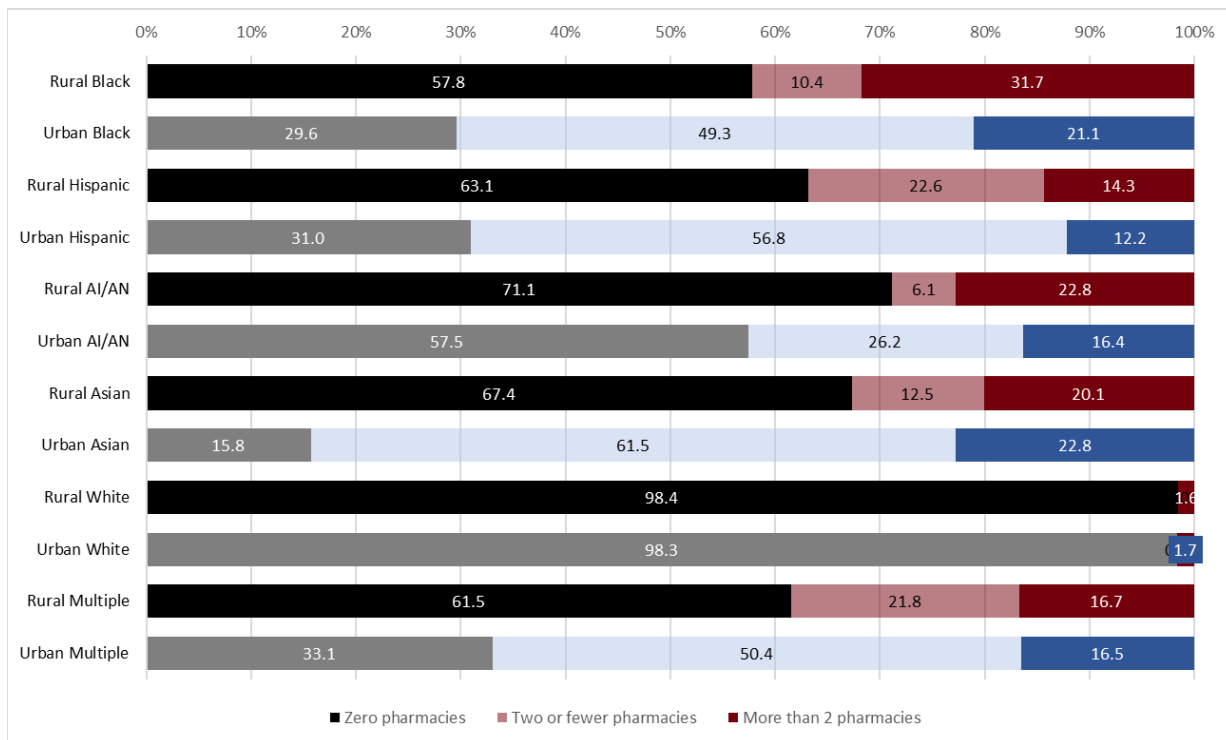
The geographic distribution of urban and rural MRG ZCTAs that lack any pharmacy is illustrated in Figure 4 below. Each panel represents a different MRG type. Areas in dark blue show rural ZCTAs with no pharmacy, and areas in magenta show urban ZCTAs with no pharmacy. For top Black, Hispanic, and AI/AN ZCTA concentrations of 0 pharmacy ZTCAs match overall settlement patterns with locations in the South and West. Top rural A/PI ZCTAs are broadly dispersed across the U.S.

Figure 4. Rural and Urban ZCTAs with Zero Pharmacies by MRG Type
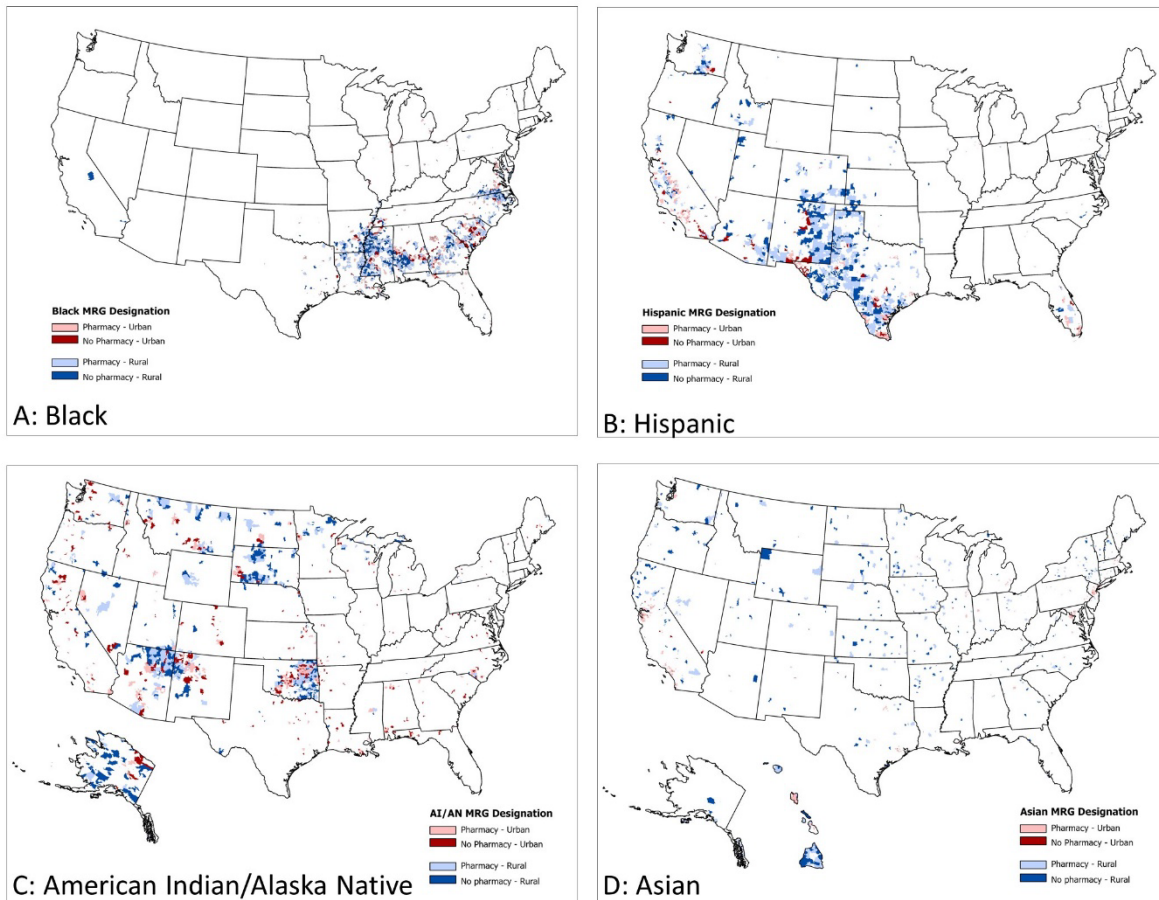
Footnote: Referent group includes ZCTAs that did not qualify for the 95% percentile for any minoritized racial/ethnic group. ZCTAs included in the above analysis met the 95th percentile criteria for each racial/ethnic group.

CONCLUSIONS

We examined the availability of pharmacies across rural and urban ZCTAs with high proportions of MRGs. Rural Black ZCTAs tended to experience more socioeconomic deprivation. This deprivation includes higher rates of insurance and a higher proportion living below 200% of the federal poverty line, as well as, higher estimated prevalence of hypertension and diabetes both of which are managed through medication.[15] Across all MRG categories, rural ZCTAs had less access to pharmacies than similar urban ZCTAs. A higher proportion of rural than urban ZCTAs had no pharmacies, and rural ZCTAs had lower mean and median numbers of pharmacies per 10,000

population. Across rural ZCTAs, more than half of all ZCTAs had no pharmacy including more than two-thirds of rural ZCTAs with high proportions of AI/AN residents.

For some health care services, such as cancer specialists, there tend to be reduced availability of providers in areas where there are high proportions of rural AI/AN populations or in the rural south where there are higher proportions of Black and Hispanic residents.[16] However, ZCTAs falling into the top category for NH White populations were most likely to lack pharmacies. This may be due to the concentration of these ZCTAs in low population density states with more isolated, rural, white populations. A county-level analysis from Kaiser Health News showed that counties with no pharmacy or one pharmacy tend to be in the Midwest and West where there are higher proportions of white populations.[17] This corresponds to our ZCTA-level findings that indicate poorer availability of pharmacies in rural areas with high proportions of white populations.

Among rural ZCTAs falling into the 95th percentile for MRG representation, AI/AN ZCTAs had the worst access to pharmacies. This is of particular concern as two-thirds of rural AI/AN populations have at least one chronic condition such as asthma, diabetes, coronary artery disease, and hypertension. These are all conditions that may need to be managed with medications.[18] The estimated prevalence of both hypertension and diabetes is higher in AI/AN ZCTAs than in the referent category (See Table A-1, Appendix). Similarly, more than half of all top rural Black ZCTAs lack a pharmacy despite the higher prevalence of chronic conditions in this population.[18] Ready access to medications to manage chronic conditions is critical to ensure the health of minoritized communities.

Rural ZCTAs have less access to pharmacies than their urban counterparts. While there was not a notable disparity among MRG ZCTAs compared to rural areas with large white populations, it is imperative for residents of rural MRG ZCTAs to have ready access to medications especially for those groups with a higher prevalence of chronic conditions necessitating maintenance medications.

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APPENDIX

Methodology

Data Sources

Data on the racial/ethnic composition of ZCTAs and their socioeconomic characteristics were obtained from the U.S. Census Bureau's American Community Survey (ACS) 2015-2019 five-year estimates.[20]

Data on pharmacies were obtained from the USDA's Service Area Map Datasets' Healthcare facilities file which includes the location of pharmacies in 2018. [14] The Healthcare Facilities dataset came from Homeland Infrastructure Foundation-Level Data (HIFLD) as updated October 2018. Included are hospitals, nursing homes, pharmacies, urgent care facilities, and veteran's health administration medical facilities. These datasets were previously used to determine eligibility for USDA Re-Connect broadband programming. We examined data on pharmacies excluding pharmacies affiliated with the Veteran's Health Administration, military bases, and prisons as these would not be accessible to the general population.

The estimated adult prevalence of hypertension and diabetes was drawn from the CDC Places data set which uses statistical modeling to estimate disease prevalence at the ZCTA level. [15]

Key Definitions

Rurality was defined using the ZIP approximated Rural Urban Commuting Area (RUCA) codes.[13] Specifically, ZCTAs were assigned the RUCA code for the matching ZIP even if additional ZIP codes were included in the creation of the ZCTA boundary. Those ZCTAs with a ZIP matched RUCA code of 1-3 were designated as urban while those with a RUCA code of 4-10 were designated as rural. This corresponds to the Office of Management and Budget distinction between metropolitan and non-metropolitan areas.

The Uniform Data System (UDS) Mapper was used to identify the corresponding ZCTA for each ZIP code. [20] The UDS Mapper is a mapping tool operated primarily by data from the Uniform Data System to analyze the service area of health centers. Since the U.S. Census Bureau does not release an official crosswalk between ZIP Codes and ZCTAs, the UDS Mapper was used to identify ZCTAs using patient data that was matched from the Uniform Data System. Each ZCTA code was added to the dataset using a left join via ZIP codes. Since there were multiple ZIP codes for some ZCTA codes, unique CMS Certification Numbers (CCNs) were counted for each ZCTA code. The procedure worked well as there were no ZIP codes used for multiple ZCTA codes.

Minoritized racial and ethnic groups

To classify ZCTAs as high MRG ZCTAs we used the national 95th percentile of each minoritized racial/ethnic groups population proportion stratified by rural/urban status (See Table 1 in the brief for each MRG threshold). Specifically, we ranked all rural and urban ZCTAs based on the proportion of residents in each of the following MRGs: Black/African American, Hispanic/Latino, American Indian/Alaska Native, Asian and then identified ZCTAs with proportions higher or equal to the national 95th percentile in each racial and ethnic group. For ZCTAs that fell into multiple MRG groups, we categorized them into a separate stratum. In addition, among ZCTAs that did not have a high proportion (> 95th percentile) of MRG residents, we identified those that had 100% non-Hispanic Whites to distinguish ZCTAs with all Whites from ZCTAs without high representation of any one racial and ethnic group.

Demographic characteristics of top MRG ZCTAs

Top MRG ZCTAs could differ from other ZCTAs in the U.S. on characteristics that affect both demand for and local ability to support and retain pharmacies services. To provide context for our pharmacy availability results, we compared MRG ZCTAs defined as those in the 95th percentile for the proportion of each group to all other ZCTAs (labeled "all other;" Appendix-1).

- Across both rural and urban ZCTAs, the proportion of the population that is age 65 or older is significantly lower in MRG ZCTAs than in "all other" ZCTAs while that same proportion is higher in top NH white ZCTAs. A younger population base might have less need for pharmacy services.
- High proportions of uninsured persons within a population can reduce the willingness of providers to locate in or serve the area. The proportion of the population lacking health insurance was higher among most MRG ZCTAs than the "all other" group. High A/PI and high White ZCTAs had lower rates for uninsurance.
- The prevalence of conditions controlled through medication can affect the need for pharmacy services. We looked at two such conditions, hypertension (high blood pressure) and diabetes. Across all population categories, the rural prevalence of these conditions was higher than the urban prevalence. Within rural ZCTAs, the estimated adult prevalence of hypertension and diabetes was highest in areas in the top category for NH Black residents (45.3% and 17.3%, respectively, versus referent values of 36.2% and 12.1%).
- We examined vehicle availability within the household as an indicator of residents' ability to leave home for medications particularly in rural places.
  - Within rural MRG ZCTAs, ZCTAs in the top group for AI/AN, Black, and multiple MRG population had higher proportions of households that lacked a vehicle. The top A/PI ZCTAs did not differ from the "all other" group while top White ZCTAs had lower proportions of households without a vehicle.
  - The top AI/AN ZCTAs were the only group for which the proportion of households without a vehicle was significantly higher among rural than among urban ZCTAs (rural 19.0%, urban 5.8%).
- Community poverty can make an area unattractive for health care providers of all kinds because persons who are uninsured or whose care is funded by lower-paying insurers such as Medicaid offer lower payment for the provider. The proportion of households with incomes at or below 200% of the Federal Poverty Level were higher among MRG ZCTAs than the "all other" group for all except high A/PI ZCTAs.

Even within the "minoritized population" category, rural ZCTAs can experience disadvantages when compared to urban ZCTAs in the same population group. With some exceptions noted in the table, ALL rural metrics differ significantly in a direction of greater disadvantage than the corresponding values for urban MRG ZCTAs.

Table A-1. Characteristics of Top MRG ZCTAs when compared to all other ZCTAs by rurality[1] in percents (Population and household data from the 2015-2019 American Community Survey; estimated disease prevalence from CDC Places tool)

	Personal Characteristics				Household Characteristics	
	Demographic:		Estimated prevalence of:			
	Residents over 65	Lack Health Insurance	High Blood Pressure	Diabetes	Lack vehicle	At or Below 200% FPL
Rural ZCTAs (14,875)	%	%	%	%	%	%
>1 MRG (156)	16.6 ***	15.6 ***	34.9 **	13.7 ***	11.6 ***	45.0 ***
Hispanic (594)	17.2 ***	15.1 ***	34.3 ***	13.7 ***	5.2	45.4 ***
NH Am. Ind./AK Nat. (668)	16.6 ***	20.5 ***	37.0 ***	15.0 ***	19.0 ***	49.5 ***
NH Asian (622)	20.5 **	7.4 **	32.6 ***	11.0 ***	4.7	32.8 *
NH Black (709)	19.3 ***	12.6 ***	45.3 ***	17.3 ***	10.5 ***	51.6 ***
NH White (2,177)	26.2 ***	7.5 ***	37.5 ***	12.8 ***	4.2 **	35.2 *
All other ZCTAs (9,949)	21.7	8.4	36.2	12.1	4.8	34.4
Urban ZCTAs (17,795)	%	%	%	%	%	%
>1 MRG (127)	12.3 ***	14.6 ***	30.6 **	13.3 **	11.5 ***	49.3 ***
Hispanic (755)	12.1 ***	17 ***	30.7 ***	13.5 ***	10.5 ***	48.1 ***
NH Am. Ind./ AK Nat. (825)	17.4	11.2 ***	34 ***	11.7 ***	5.8	36.7 ***
NH Asian (851)	14.0 ***	5.3 ***	25.3 ***	8.6 ***	12.1 ***	21.6 ***
NH Black (874)	15.0 ***	11.3 ***	42.4 ***	16.5 ***	17.8 ***	49.00 ***
NH White (1,203)	23.9 ***	6.6 **	36.5 ***	12.2 ***	5.1 *	31.80 ***
Referent ZCTAs (13,160)	17.7	7.2	32.2	10.4	5.6	27.10

[1] Note: With the exception of lack of health insurance and lack of a vehicle in >1 MRG rural, ZCTAs, ALL rural values differ significantly from the corresponding urban value.

[2] NH = Non-Hispanic [3] Statistical indicators: Group differs from Referent ZCTA within either all rural or all urban ZCTAs. * = p < .05; ** = p < .01; *** p < .001

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