

Health Care Deserts: Identifying Areas of Limited Access in Washington State

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Abstract

Health disparities among both rural and American Indian (AI) populations have been well documented, with both communities experiencing significantly lower health outcomes than urban populations. One of the possible factors affecting negative health outcomes is limited access to healthcare resources. Our research introduces the concept of “healthcare deserts” to describe the gap in healthcare access between urban, rural and AI populations located within Washington State. Using Geographic Information Systems, we identified the shortest network route from every individual parcel located within a Federally Recognized American Indian Reservation, along with every parcel located within a rural small town area, a selection of rural non-Reservation parcels, and a section of urban non-Reservation parcels found within Washington State, excluding Whitman County, to the nearest hospital. We focus on proximity to hospitals based on the following: (1) their ability to provide specialty services for observed and documented chronic health disparities in rural and AI populations; (2) the universal need for emergency medical care; and (3) concerns of equality of access to healthcare.

Methods

Shortest-path network distances between sampled Washington State tax assessor parcels and every non-military hospital in the state were identified using the OD Cost Matrix Analysis option in ArcMap 10.6’s Network Analysis Tool. Distances, measured in both miles and minutes by driving, were measured along Environmental Systems Research Institute’s (Esri) Street Map North America database.

Parcel data came from the Washington State Parcel Database which includes information on all 3,110,282 parcels in the state. From this population we sampled:

- (1) every parcel on all in-state 28 American Indian Reservations (n = 73,060);
- (2) every parcel from every United State Census–defined small town (n = 275,804);
- (3) a random sample of non-reservation rural parcels (n = 76,157); and
- (4) a random sample of non-reservation urban parcels (n=78,946).

Locations for all 118 hospitals in Washington State were provided by the Washington State Department of Health. To account for issues with accessibility, 8 military hospitals and 9 rehabilitation centers were removed from the analysis database. Geospatial data for the American Indian Reservations, rural and urban areas, as well as small town (non-urban Census Designated Places) boundaries were obtained from the US Census data portal.

References

ESRI. (2017). *Street Map North America* [Computer software].

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Washington State Department of Health. (2018). *Hospitals*. Retrieved September, 2018, from: URL (<https://www.doh.wa.gov/DataandStatisticalReports/DataSystems/GeographicalInformationSystem/DownloadableDataSets>)

Acknowledgments

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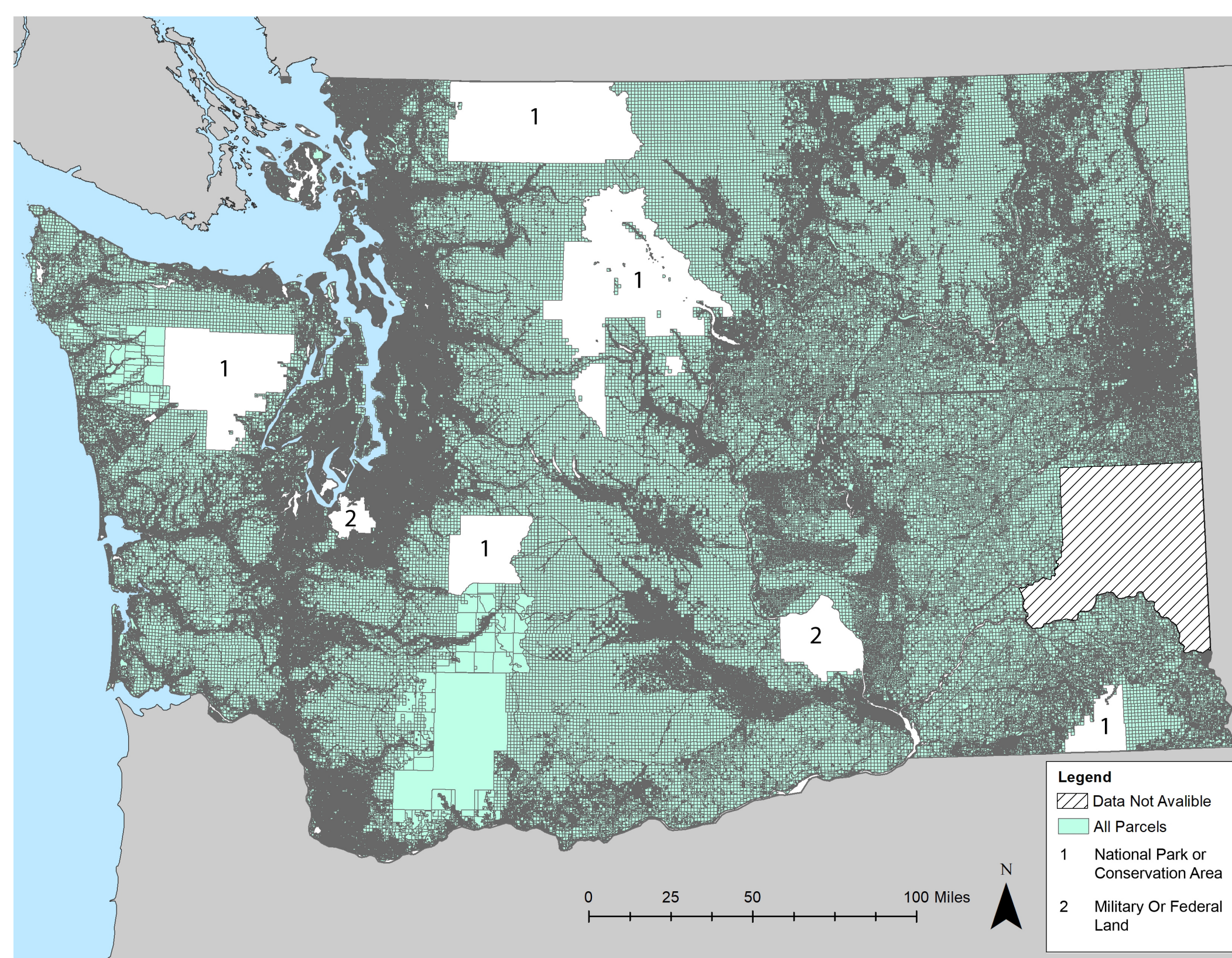


Figure 1: All Parcels within the Washington State Parcel Database and areas where parcel data is either not available or does not exist

Table 1: Descriptive Statistics for all sample areas

	n	%	Min	Med	IQR	Mean	SD	Max	Min	Med	IQR	Mean	SD	Max
Reservation Parcels														
Rural	39285	53.8%	> 1	14.5	21.04	21.52	14.95	76.34	> 1	26.01	38.49	38.82	30.4	550.69
Urban	33775	46.2%	> 1	5.16	4.3	6.84	4.85	45.03	> 1	9.12	6.6	11.59	7.83	89.33
Total	73060	100.0%	> 1	10.51	11.84	14.74	13.59	76.34	> 1	18.03	19.82	26.23	26.64	550.69
Non-Reservation Parcels														
Rural	329595	80.6%	> 1	14.2	14.43	15.5	10.47	107.2	> 1	23.98	24.67	30.69	47.22	2950.3
Urban	79423	19.4%	> 1	4.29	4.58	5.45	4.7	39.76	> 1	7.57	7.49	9.21	7.3	104.01
Total	409018	100.0%	> 1	11.43	14.96	13.55	10.41	107.2	> 1	19.03	25.32	26.52	43.35	2950.3
Small Town Parcels														
Not Small Town	206274	42.8%	> 1	7.64	11.01	11.41	11.01	107.2	> 1	12.86	18.59	21.05	33.89	2940.2
Small Town	275804	57.2%	> 1	14.21	14.88	15.46	10.59	87.67	> 1	23.96	25.63	30.54	45.58	2950.3
Full Sample	482078	100.0%	> 1	11.3	14.74	13.73	10.96	107.2	> 1	18.92	25.01	26.48	41.26	2950.3

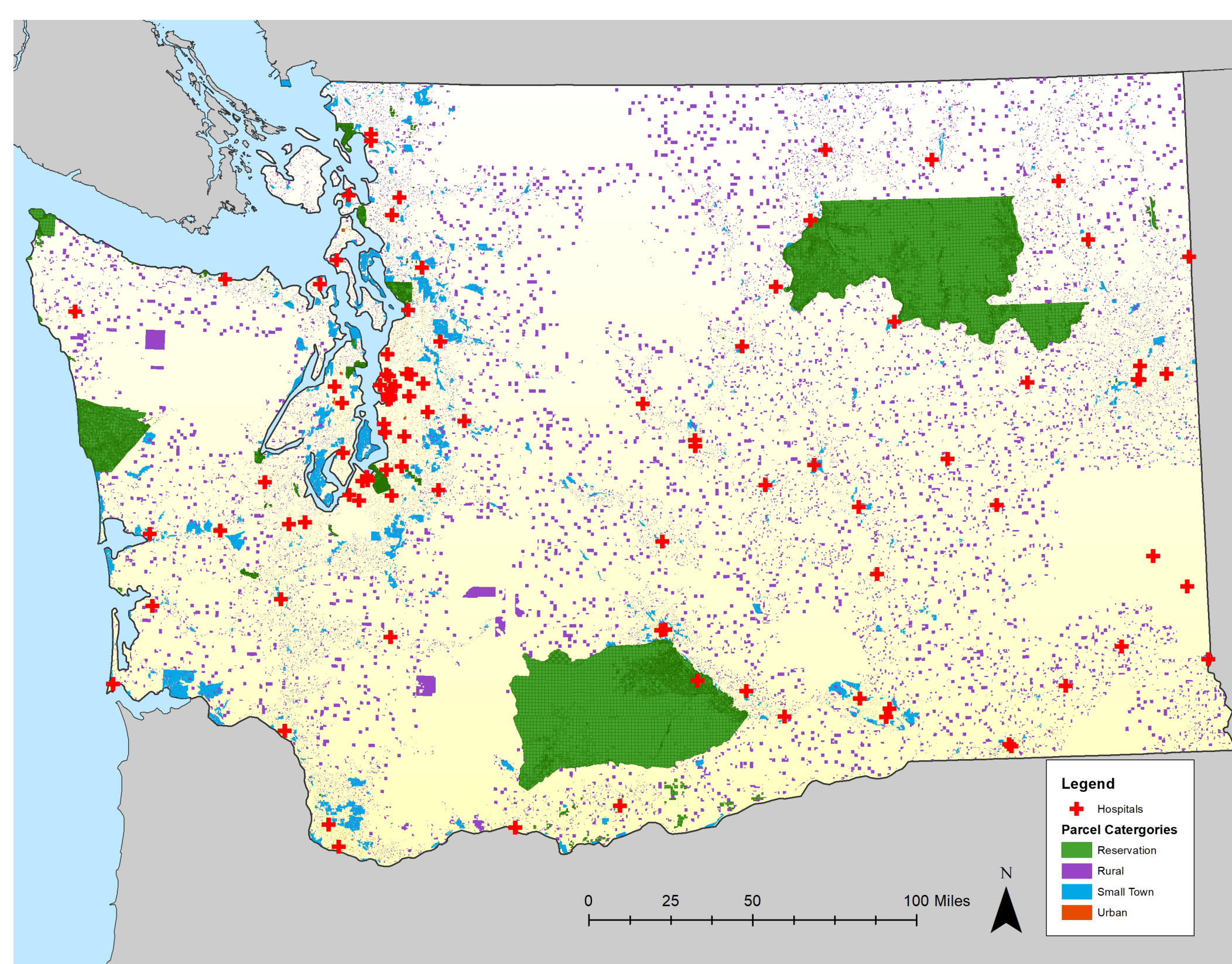


Figure 2: Hospitals, Reservation, Rural, Small Town, and Urban samples as used within this study

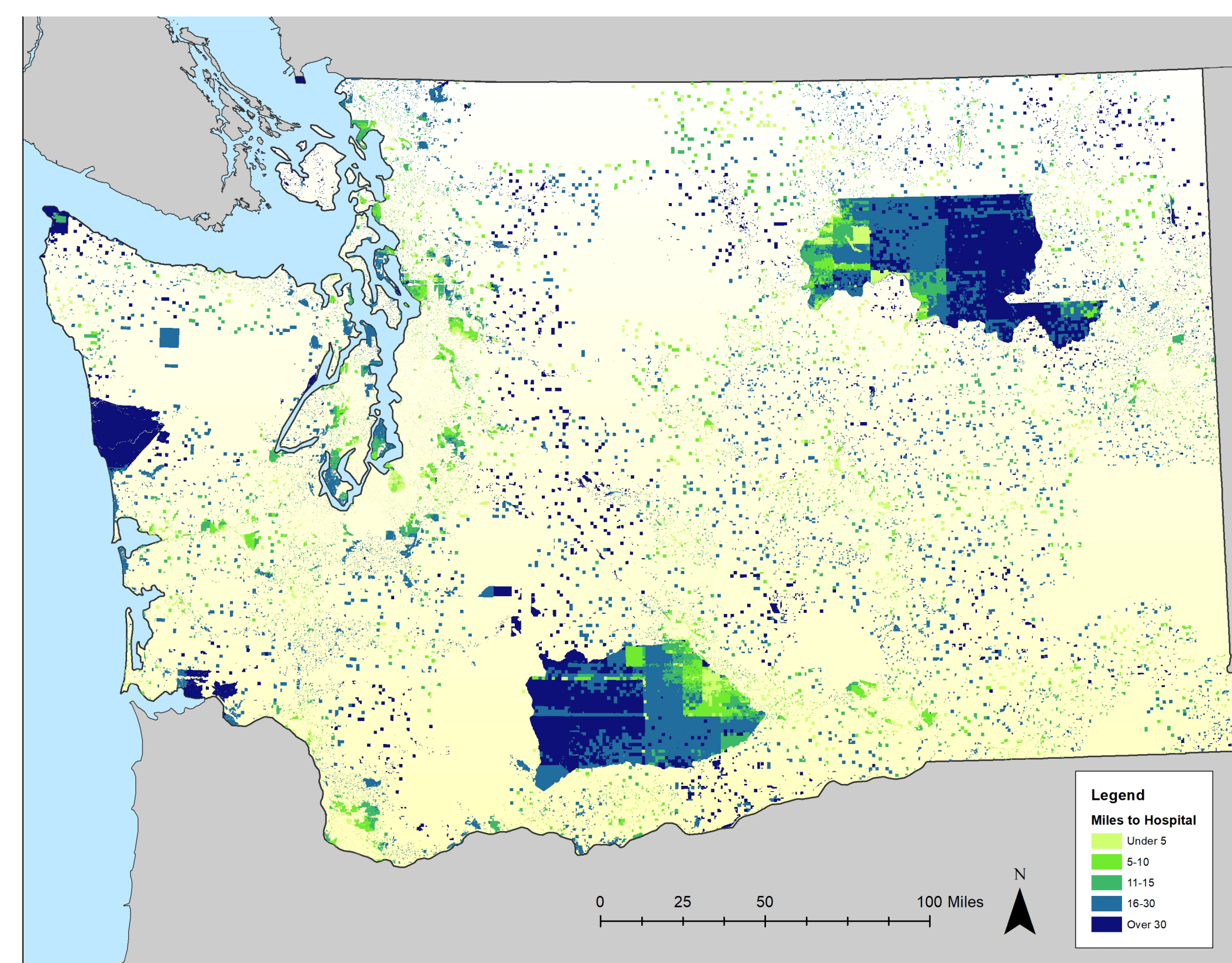


Figure 3: Miles to nearest hospital from each individual parcel used in this study

Results

The final sample consisted of 482,078 parcels and 101 hospitals. The median distance between each parcel and the nearest hospital was 11.3 miles (18.92 minutes). The sample’s rural parcels had a median distance of 14.2 miles (23.98 minutes). For urban parcels the distance was 4.29 miles (7.57 minutes) and for the small town parcels, 14.21 miles (23.96 minutes). Comparatively, reservation parcels had a median distance of 10.51 miles (18.03 minutes).

The reservation parcels were almost evenly split between urban and rural parcels (46.2% urban). Rural reservation parcels had a median distance of 14.5 miles (26.01 minutes) while the urban reservation parcels had a median distance of 5.16 miles (9.12 minutes).

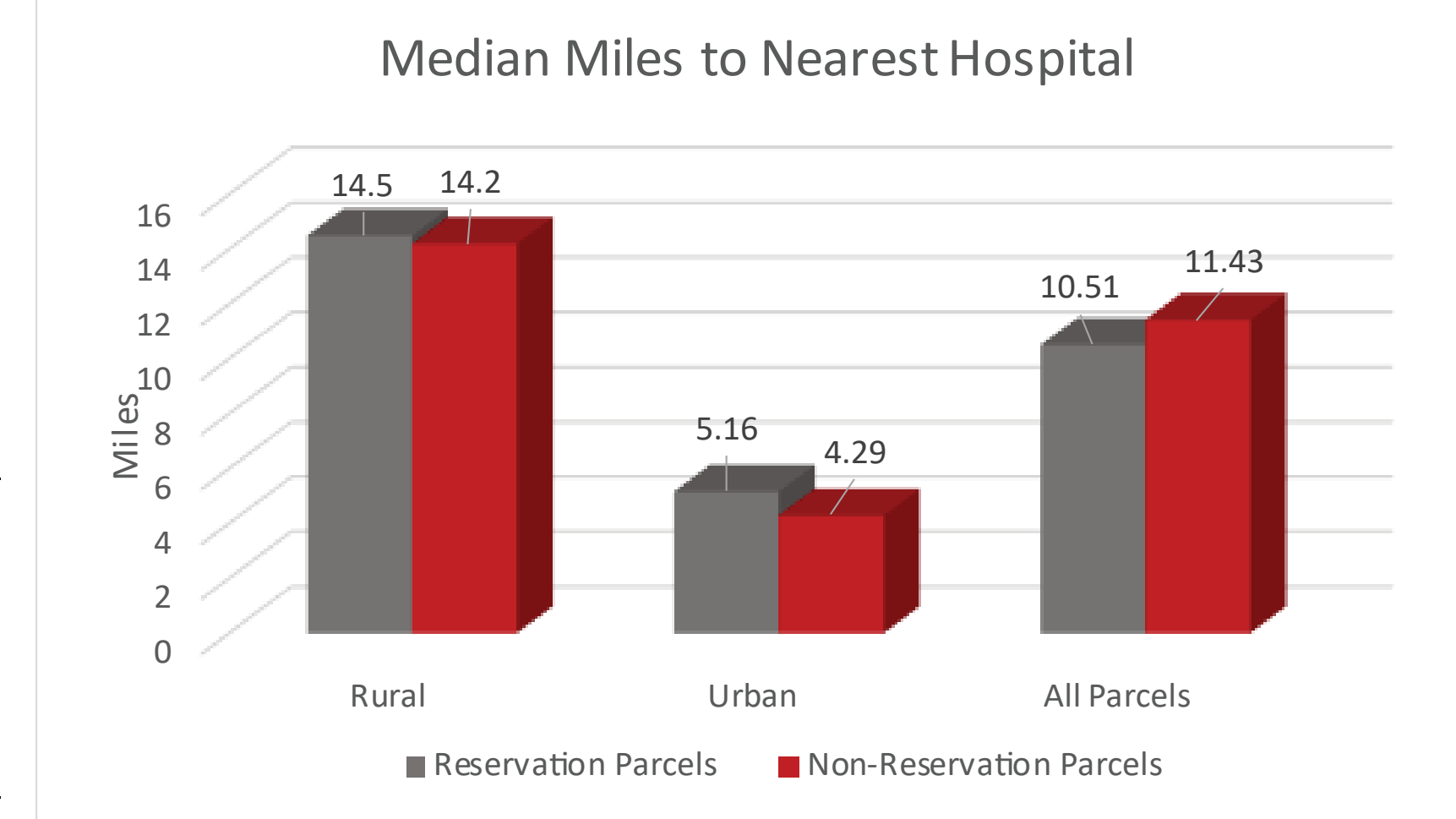


Figure 5: Median Miles to Nearest Hospital

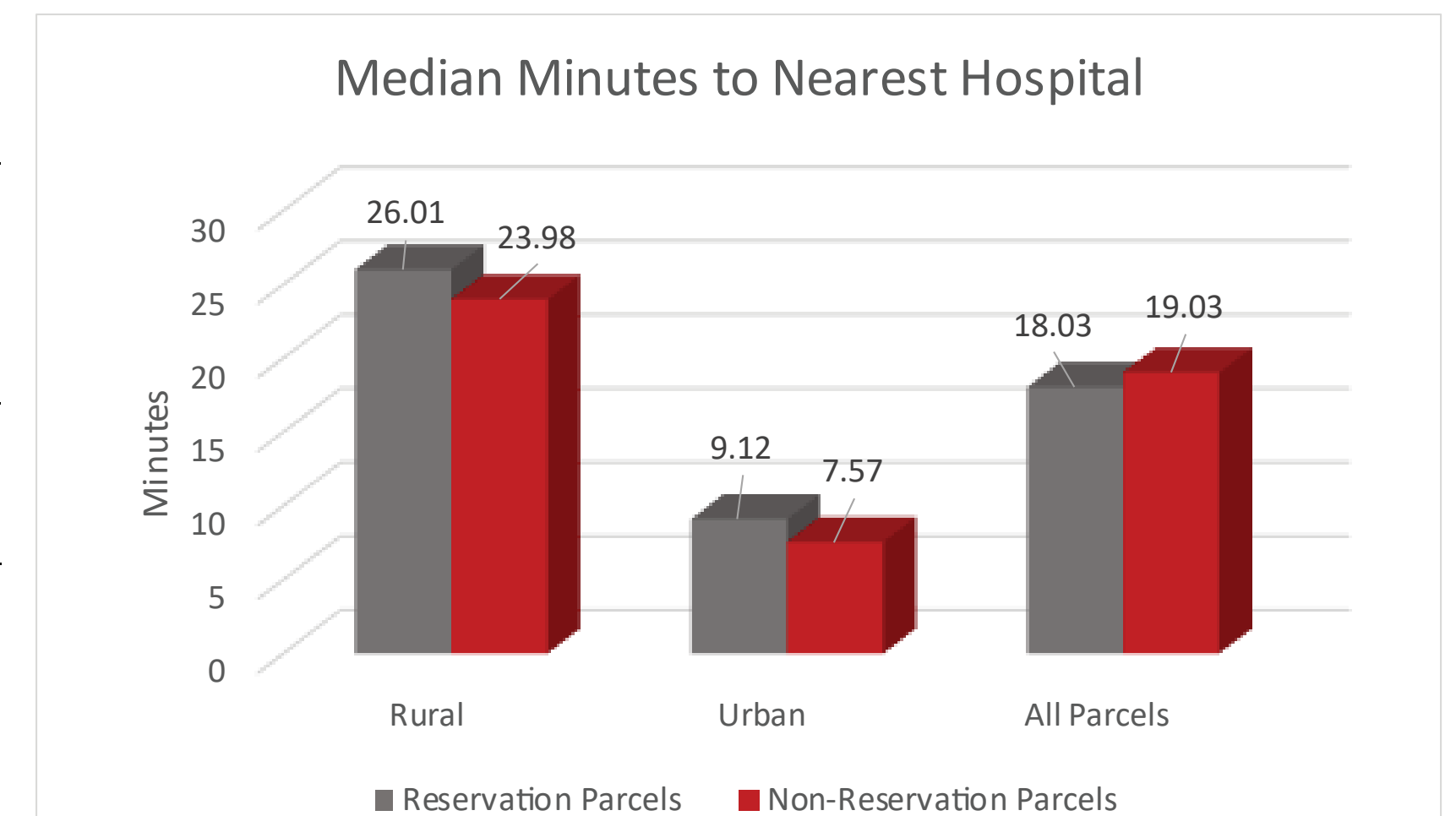


Figure 6: Median Minutes to Nearest Hospital

Discussion/Conclusions

Rural parcels on reservations and those off reservations had very similar levels of locational hospital accessibility. These levels were also similar to those of small town parcels, with all three having median mileages within half a mile of each other and median drive times within 3 minutes of each other. Urban parcels, whether they were on-reservation or off were likewise similar. The data suggest that an urban/rural distinction is more indicative of parcel distance to hospitals than whether a parcel is located on a federally recognized American Indian Reservation.