Abstract

This investigation focuses on determining areas that are underserved by emergency response hospital in Puerto Rico. Using drive time distances from hospitals of 5, 10, and 15 minutes, permutations are created. Once these areas are created, the investigation analyzes the areas found outside of these regions. Further investigation is done on areas of lower accessibility to determining their demographic profiles. The results of the analysis found that 14.07 percent of block groups in Puerto Rico are outside of the service areas totaling at 13.82 of the population. The demographic profiles found areas of potentially high health risks within these underserved areas.

Methodology

The census data acquired for this investigation was downloaded directly from the American Census Bureau data base. The specific census surveys being utilized are the 2019 and 2014 ACS 5 Year Estimates Profile. The data is aggregated at the block group level. Previous investigations looked at variables such as: age, gender, percentage unemployed, population density, amongst others [1]. Additionally, this investigation will look at percentage uninsured and percent population with disability.

Results and Discussion

There are 360 block groups that are completely outside of the 15-minute drive time boundary of any hospital (figure 2). That is equal to 14.07 percent of block groups in Puerto Rico. The largest cluster of block groups outside of any hospital 15-minute drive time perimeter is found in the center of the island. The second largest cluster is found near the Northwestern corner of the island.

Conclusions

This investigation has shown how the use of Network Analysis can be implemented to aid in public health research. Drive time is a strong indicator of accessibility and creating isochrone distances based on a 15-minute drive radius from hospitals highlights areas that do not have access to these facilities. The investigation found 360 block groups that are completely outside of the 15-minute drive time boundary of any hospital, which is equal to 14.07 percent of block groups in Puerto Rico. This percentage is significant especially when considering the total population that lives within those block groups. For individual statistics, such as population and population over 65 years of age, this investigation found that nearly 15 percent of both categories live within those block groups in Puerto Rico.

Using a wide variety of variables chosen by researching previous literature’s investigations into factors that determine areas that need more access to health facilities. Once the data was converted into z-scores, the average for each block group was calculated. Z-scores are a measure of tendency within a dataset, the closer to 0 a z score is the closer to the mean the data point is. This investigation found two general areas, one cluster of block groups on the Northwestern side of the island and another cluster on the Southeastern part of the island. Both clusters had a majority of block groups above an average z score of 0, notably the southeastern region has 68.75 percent above an average z score of 0. This is important to understand because it proves that these areas of lower accessibility are also of high potential risk of needing medical services.

Conclusion

Future work

Future investigations can be conducted using Network Analysis tools to find the most optimal location for hospitals, thus ensuring that accessibility to hospitals in an emergency situation is guaranteed. Additionally, more in-depth analysis can be done on individual block groups of interest instead of looking at the block groups in clusters.

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References


