Evaluating The Hub and Spoke Model in Washington State

Introduction

Opioid misuse or overdose in the United States is one of the most challenging public health issues for health professionals. It requires innovative scientific solutions and frameworks. Opioids are substances that work in the nervous system of the body or in a specific receptor in the brain to lessen the intensity of the pain (CDC, 2018). Therefore, it is hard for addicted people to resist the drug.

In Washington State, the estimated deaths involving opioid overdose were at a rate of 9.4 in 2018. In a study by Kroelinger and colleagues, the authors report that "Lack of access to clinical and social services, potential stigma or discrimination, and lack of resources for the provision of services, including screening and treatment, have impacted the health of these populations" (Kroelinger et al., 2020). Despite the effort to combat the opioid crisis, the lack of access to services and treatment centers remains a threat to the wellbeing of people in the U.S, including Washington State because some of the most vulnerable individuals do not get the care they need. Therefore, to successfully address the issue of the opioid epidemic, more treatment centers or services need to be in the vulnerable communities. These services or treatment centers will increase the access of individuals with opioid use disorder (OUD). One way to improve access to the services is to implement the Hub and Spoke networks.

A Hub is an opioid treatment provider that can initiate medication for individuals with OUD, and the Spokes are primary care providers. They can help individuals with OUD after treatment. One of the ideas behind the Hub and Spoke model is to expand the treatment networks and increase access to services for individuals with OUD. Thus, the model can address the lack of access to the treatments for individuals in hard to reach locations and improve their health outcomes.

As part of the Washington State response to the opioid epidemic, a research team from Brandeis University evaluating the Hub and Spoke model to expand access to services, such as networks for opioid treatment centers throughout the State of Washington. The research team is led by Sharon Reif, a senior scientist and deputy director of Brandeis University. In this project, I will use query and buffering methods to map the location of the treatment networks and the Hubs and Spokes across the Washington State regarding death rates in 2017. Therefore, a descriptive map will be created in order to evaluate the Hub and Spoke model in Washington State.

Methods

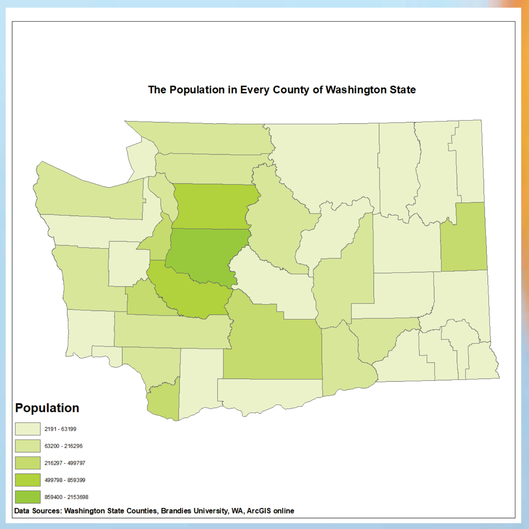
The research team at Brandeis University collected the datasets of opioid treatment networks (OTN), Hubs and Spokes, death rates, and death counts due to overdose in 2017. The county shapefile of Washington State was downloaded from the website of Washington State Geospatial Hub.

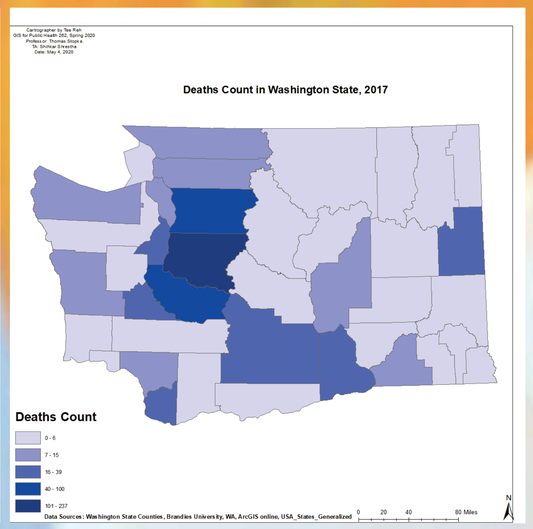
The Excel format of the OTN and Hub and Spoke datasets, which required the ready-to-use geocoding online system, was provided by World Geocoding Service and used to geocode the datasets. The death rate related to overdose was joined with the county shapefile. I used the query and geocoding methods to show which counties of the Washington State had higher or lower death rates and counts related to an overdose. Then, the OTN locations' map was created. The initiation and medication sites in the OTN dataset were used to create the 5, 10, and 15 miles of multiple rings to show the proximity access of individuals surrounding the networks. Finally, a map showing where the locations of the Hub and Spoke networks was created using the queries method. Since there are many Hubs and Spokes, they were distinguished by the color. For instance, if the Hub and Spoke belonged to the same network, they were colored with the same colors. In conclusion, all these descriptive maps were created using the query, buffering, and geocoding in the 10.7 version of ArcMap software.

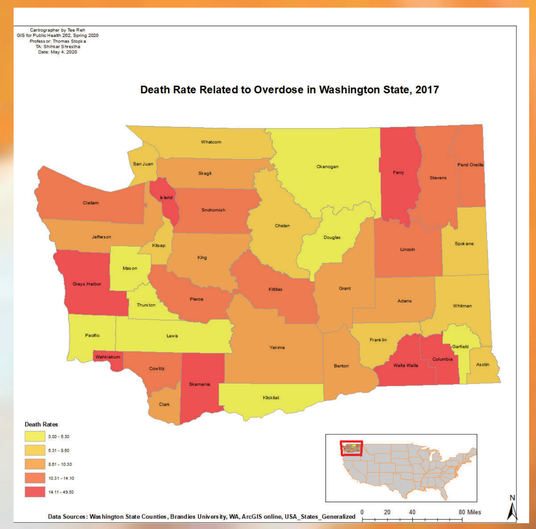
Results

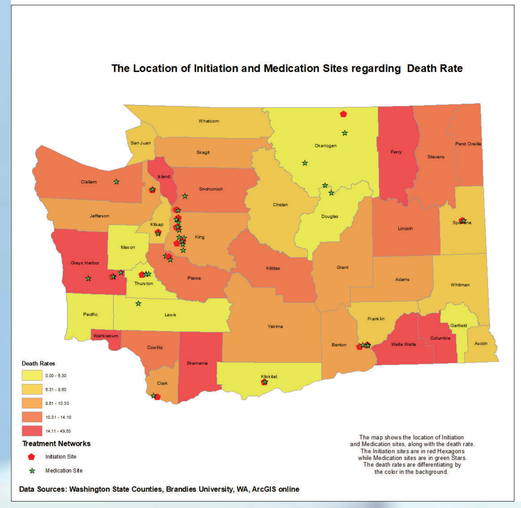
In the first map on the bottom-left of the poster, the death rates were highest in the counties of Island, Gray Harbor, Ferry, Walla Walla, Columbia, Skamania, and Wahkiakum, which are displayin in darker colors. The county of Island, which has the highest death rate, fortunately, was closer to counties that had many OTN and Hub and Spoke sites. For other counties with high death rates, such as Wahkiakum, Ferry, Skamania, and Columbia, the treatment networks sites were far from them. The second map, on the top-middle of the poster, demonstrates the number of deaths related to an overdose in Washington State, 2017. King County and its surrounding counties have recorded the highest number of deaths in the year of 2017 between 101 and 237. It is where most of the ONT sites and Hubs and Spokes are located.

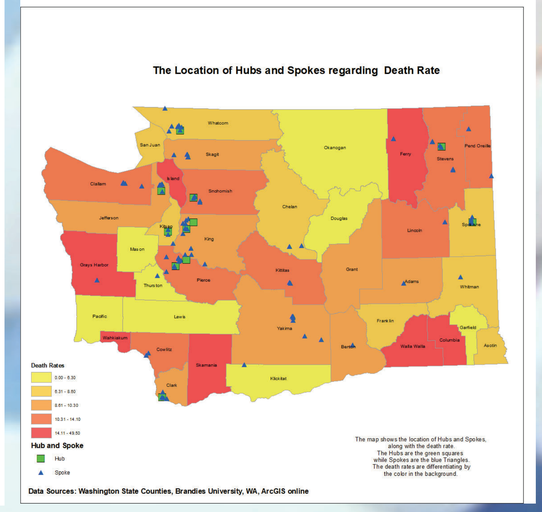
The third map, on the top-right in the poster, shows where the OTN sites were located related to death rates. As the map shows, most of the sites are located where the highest death rate related overdose occurred in the year of 2017. Then, the last map on the poster is the multiple buffering for each of the OTN. The second map, the bottom right of the poster, shows the location of the Hubs and Spokes in the Washington State. Many of the Hubs and Spokes are clustering around King County and nearby counties, which show the highest number of deaths. These counties also have the highest population, as shown in the first map, on the top left of the poster.

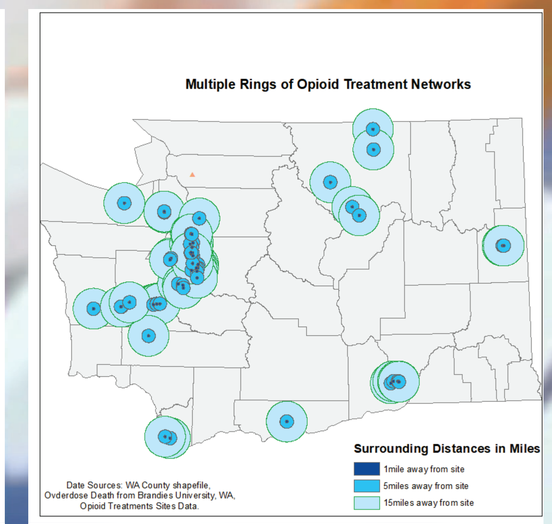












Discussion

Overall, the networks of opioid treatment sites and Hubs and Spokes are located where numbers and rates of death related to overdose occurred in the year of 2017. Nevertheless, a few of the places that are also among the highest rates of death due to overdose do not have or only have one or two Hubs and Spokes and OTN sites, such as Gray Harbor, Wahkiakum, Skamania, and Columbia counties. So, if more Treatment Networks could move to serve those places, the death rates and numbers related opioid overdose could decrease or be reduced. Since it was my first time creating using ArcMap to create a GIS map, I faced many challenges and limitations, such as where to look and download relevant shapefiles and more. But, these descriptive maps could give the future researcher and policymakers information about where in the Washington state should they focus on helping the OUD people.

Conclusion

The purpose of this project is to evaluate the Hub and Spoke model by mapping the locations of the opioid treatment networks such as ONT, Hub, and Spoke in the state of Washington. For example, the locations of these networks of OTN or Hub and Spoke in the places where the most vulnerable individuals of opioid overdose live. In order to answer the question, six maps were created to show which counties had the highest death rate and death number in 2017, along with where the OTN sites and Hubs and Spokes are located. In conclusion, most OTN sites and Hubs and Spokes are located around the King and other counties, where the death rates were among the highest in 2017 and also had the highest population. However, counties, such as Wahkiakum and others, also recorded among the high death rates but with only a few treatment sites. So, if the opioid treatment networks, such as initiation, medication, Hub and Spoke, could be implemented there, the lack of access to services for OUD could be addressed.

References

1. Kroelinger, C. D. et al. (2020). "Implementing a Learning Collaborative Framework for States Working to Improve Outcomes for Vulnerable Populations: The Opioid Use Disorder, Maternal Outcomes, and Neonatal Abstinence Syndrome Initiative Learning Community." Journal of Women's Health.
2. Connery, H. S. (2015). "Medication-Assisted Treatment of Opioid Use Disorder: Review of the Evidence and Future Directions." Harvard Review of Psychiatry 23(2): 63-75.
3. Dahlby, L., and T. Kerr (2020). "PTSD and opioid use: implications for intervention and policy." Substance Abuse Treatment, Prevention, and Policy 15(1): 22.
4. Nuzzi, R. et al. (2020). "The Hub-and-Spoke Management of Glaucoma." Frontiers in neuroscience 14: 180-180.
5. Miele, G. M., et al. (2020). "Implementation of the hub and spoke model for opioid use disorders in California: Rationale, design, and anticipated impact." Journal of Substance Abuse Treatment 108: 20-25.
6. Griffin, P. M. (2020). "Engineering Approaches for Addressing Opioid Use Disorder in the Community." Annual Review of Biomedical Engineering.
7. Darfler, K., et al. (2020). "Preliminary results of the evaluation of the California Hub and Spoke Program." Journal of Substance Abuse Treatment 108: 26-32.
8. Rosenblatt, R. A., et al. (2015). "Geographic and specialty distribution of U.S. physicians trained to treat opioid use disorder." The Annals of Family Medicine 13(1): 23-26.
9. Reif, S., et al. (2020). "The Washington State Hub and Spoke Model to increase access to medication treatment for opioid use disorders." Journal of Substance Abuse Treatment 108: 33-39.
10. Haight, S. C., et al. (2018). "Opioid use disorder documented at delivery hospitalization—the United States, 1999–2014." Morbidity and Mortality Weekly Report 67(31): 845.
11. Wickramatilake, S., et al. (2017). "How states are tackling the opioid crisis." Public Health Reports 132(2): 171-179.
12. Stopka, T. J., et al. (2019). "The opioid epidemic in rural northern New England: An approach to epidemiologic, policy, and legal surveillance." Preventive medicine, 128: 105740.
13. W.A. County Boundaries. (2020). Retrieved from http://geo.wa.gov/datasets/wadnr::wa-county-boundaries

Data Sources: Washington Sate GIS hub, County shapefile,
Brandies University: Opioid Overdoes 2017,
Opioid Treatment Networks, Hub&Spoke
ArcGIS Online: Ready to use services

Cartographer by Tee Reh|GIS for Public Health, 262|May 2, 2020|
Created using ArcMap 10.7.1 version
NAD 1983 StatePlane Washington south FIPs 4602 | Projection: Lambert Conformal Conic

Tufts