

ABSTRACT

Substance use disorders have increasingly become a significant public health burden and a safety issue throughout the United States. This epidemic is now contributing to a rise in heroin use as well as a rise in Hepatitis C Virus (HCV) and Human Immunodeficiency Virus (HIV) outbreaks by the use of new drug delivery systems (National Institute of Drug Abuse, 2017). To address the spatial accessibility available health resources for the community, we developed a health resource inventory for Web and mobile App devices for the Grand Forks, ND area. The aim of this study is to using smart based applications, state-of-the-art technologies, and communication-based applications within the context of smart cities to design real-time health resources inventory that integrate medical information and treatment facilities that ensures fast, accurate and consistent healthcare information across the community. This real-time application can be used by Health and human services to identify the right services that meet their health needs and safeguard that the best treatment and assistance is provided.

INTRODUCTION

The enrichment of life in a community starts with the health of the community. The consequences of substance use take an enormous toll on our nation. The consequences of substance use take an enormous toll on our nation. The combined healthcare, crime-related, and productivity costs of substance use exceed \$700 billion a year (NIH, 2017), but the dollar amount does not approximate the overwhelming human cost of substance use disorders (National Institute of Drug Abuse, 2017).

The prevalence of substance use disorders have been recognized as a significant public health burden and safety emergency issue throughout the United States (U.S.) in recent years (Hedegaard H, 2017). As of 2016, the average life expectancy in the U.S. has decreased for the second consecutive year (Reidhead, 2018). Substance use related deaths, particularly deaths caused by overdoses are now the leading cause of accidental death in the U.S. (ASAM, 2016), with more than 115 individuals dying of an overdose on opioids every day (NIH, 2018).

From 1999 to 2015, overdose death rates, sales and substance use disorder treatment admissions related to prescription and non-prescription opioid use were observed to concurrently increase (ASAM, 2016). According to Centers for Disease Control and Prevention (CDC) (2017), drug overdose deaths in the United States in 2015 (16.3 per 100,000) was more than 2.5 times the rate in 1999 (6.1 per 100,000). The combination of big data and Internet of Things (IoT) is guiding local communities in achieving the goal of building intelligent communities, and advances in computing have shown that ICT holds remarkable potential for assessing, monitoring, understanding, probing, and planning (Bibri 2018), by making the society smart

Application of real-time GIS for community health resource inventory in the era of big data for a resilient and smart substance abuse management system



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METHODS

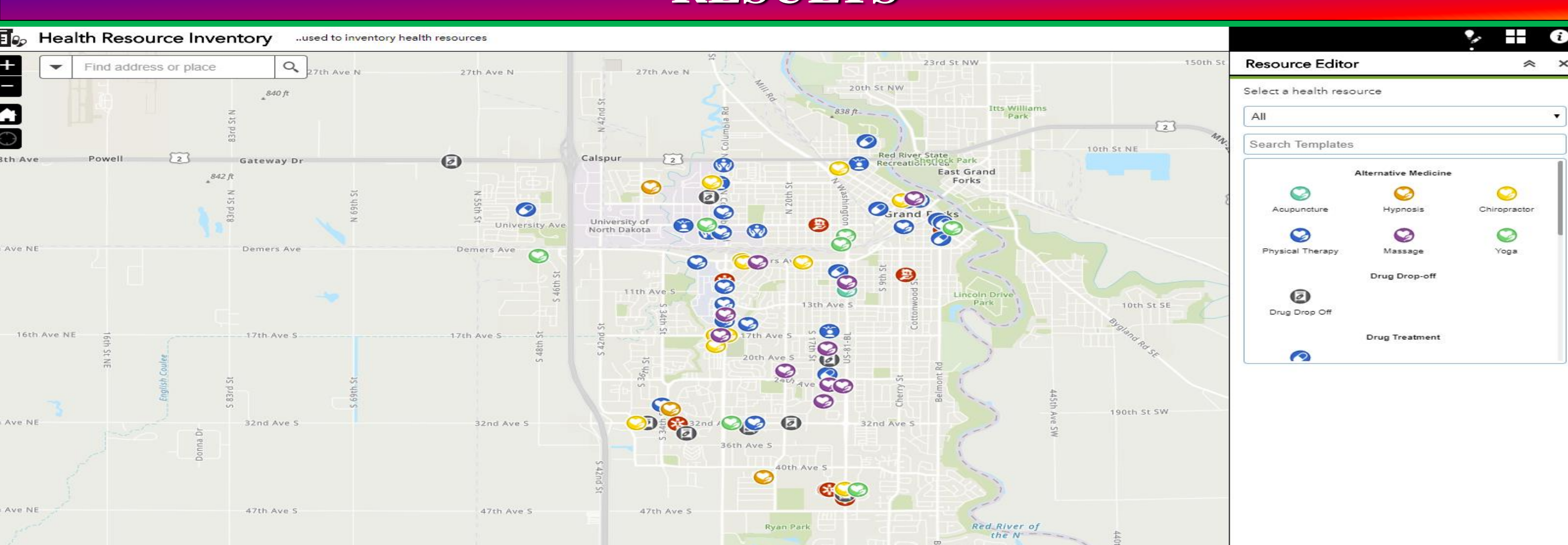
Smart Health: Client Care Team & Communities Using web app builder to deploy Health



As the world changes more rapidly, the demand for up to-date information for resource management, environment monitoring, planning are increasing exponentially. The healthcare sector has generated a vast quantity of data in the past decade (Chen et al., 2012, Demirhan, 2013), with rapid worldwide population growth creating changes in how health services are made accessible to a majority of the population. With practical tools, both professionals and the general public can quickly have access to data and make treatment decisions based on available data and services offered. Ease of access to data results in a faster rate at which an epidemic can be cured and prevented from spreading, thanks to spatial intelligent gadgets associated with dashboards that aid in monitoring services provided in the community.

In an attempt to make the community healthier, offer greater access, efficient care, and increase the availability of health resources, we configured a Health Resource Inventory that can be used by health and human services for an inventory of alternative medicine, drug drop off, drug treatment, health and human services, homeless services, hospitals and clinics, and mental health services in the community. The app is configured to work both on the web, and mobile devices can also be used as a remedy for substance use and mental health resource inventory. This inventory of health resources uses Web AppBuilder by ArcGIS, which provides a foundation for location-based application accessibility. This application can be used by the general public to locate health and human services in a designated area (Esri, 2018). A second health resource inventory devoted for substance abuse care App include the locations of substance abuse treatment facilities, drug drop-off locators, mental health facilities, and homeless/emergency shelter services.

RESULTS

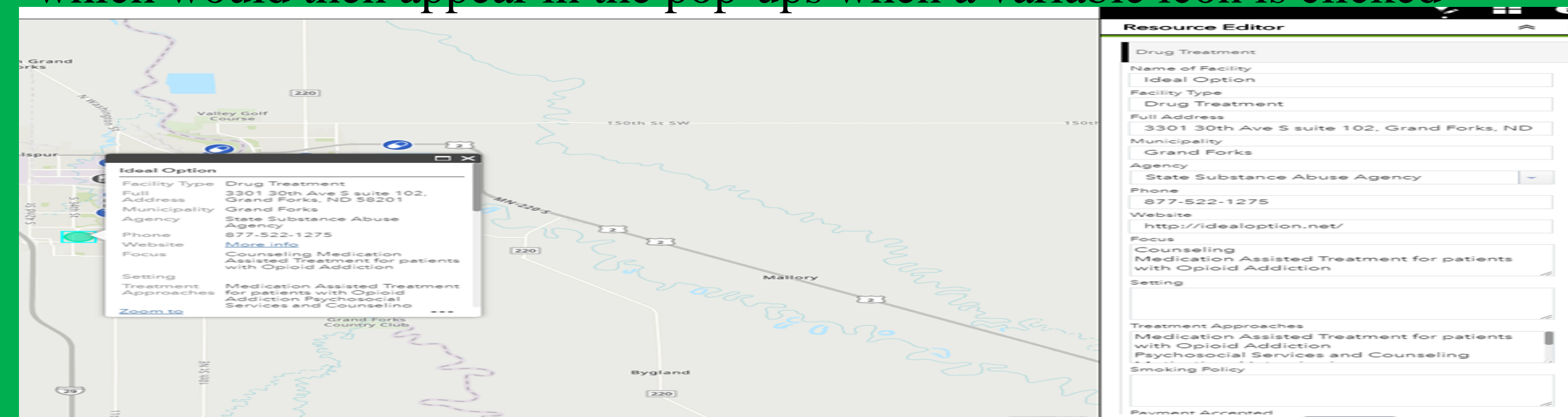


Locations of substance abuse treatment facilities, drug drop-off locators, mental health facilities, and homeless/ emergency shelter services icons.

<http://nodak.maps.arcgis.com/apps/webappviewer/index.html?id=f0c3bb7ce6f7490493c549a4e5513fa4>

RESULTS

Within each variable, a subset of additional information could be added, which would then appear in the pop-ups when a variable icon is clicked



Substance use health resource inventory app - additional information in pop-ups
<http://nodak.maps.arcgis.com/apps/webappviewer/index.html?id=f0c3bb7ce6f7490493c549a4e5513fa4>

This health inventory allows the health department and community to have real-time access to health-related facilities and allows patients to quickly and efficiently pick the facilities that meet their health needs. The results show the potential impact of spatial accessibility to the identified resources (e.g., substance use treatment facilities, prescription drug-drop offs, mental health facilities and homelessness service) and how would they affect an individual's willingness to access these readily available resources within specific demographic areas. The tool is also tailored to allow the general public and the department of human services to crowdsource information for resource managers and the general public on the location of health-related facilities. The local government can also use this information for a quick count of available services in the community. This reliable means of data transfer results in smart management and service, and can help solve the problem of regional development inequality. By integrating data sharing and visualization for the general public, a service-oriented government that promotes stability and harmony can be built (Nam & Pardo, 2011, De Jong et al., 2015).

CONCLUSIONS

Substance use disorders have increasingly become a significant public health burden and a safety issue throughout the United States. Although the potential relationship between spatial accessibility of resource utilization is relatively new, the introduction of Geographic Information Systems (GIS) has now given researchers a broader range of spatial tools to assist in the analysis of individual health and behavior in their proximal environments.

The environmental framework of substance use disorder is beyond complex, and requires a multilevel and ecological perspective, and access to substance use disorder services is a multidimensional issue in itself. We show the significance of information technology in facilitating and shaping decision making in urban centers, and how the use of an integrated system can increase accessibility of information to better show how their cities work, allowing stakeholders to efficiently micro-manage the urban system with real-time information.

Acknowledgement

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