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Mobile Clinics in the United States and the COVID-19 Pandemic: A Response Strategy Model

Sharon Attipoe-Dorcoo and Rigoberto Delgado

Abstract

Mobile health clinics are critical avenues for reaching under-resourced populations. There are over 2,000 mobile clinics serving 7 million individuals annually. Costs per patient are low compared to stationary clinics. Further, they play a critical role in reducing healthcare access disparities by ensuring healthcare is delivered at the doorstep of patients. However, this model of healthcare delivery is a tool that is rarely considered for dealing with emergencies such as a pandemic. The case of the COVID-19 pandemic illustrates several potential areas where mobile clinic programs can play a critical role. Apart from the role mobile clinics have played in improving COVID-19 testing for under-resourced populations, and the current efforts in expanding their use in vaccinations, there are other proposed initiatives that should be explored. Establishing a comprehensive approach to incorporate mobile clinics in our entire health system, would not only be effective for addressing health outcomes of under-resourced patient populations, but will also contribute to the success of a national pandemic response. Mobile healthcare clinics are a vital part of equitable national healthcare solutions, and it is time to recognize their broader potential, and include them in preparation efforts for current and future health crises.

Keywords: mobile clinics, pandemic, COVID-19, under-resourced, community, healthcare

1. Introduction

In this chapter, we discuss mobile clinics and their importance in healthcare delivery especially during health emergencies such as a pandemic. The COVID-19 pandemic has highlighted the need for creating channels for reaching under-resourced populations in a fast and effective manner. We present the case that mobile clinics, properly equipped, could deliver services to rural and urban communities alike. However, creating an integrated system of mobile clinics is necessary to successfully and sustainably achieve the opportunities which are described in this chapter. We start by providing a thorough description of mobile clinics, highlight cases of selected programs in Southern states of the United States, and finally discuss examples and initiatives to strategically integrate mobile clinics in our healthcare delivery systems to efficiently respond in emergencies.

2. Role of Mobile clinics in health delivery systems

Mobile clinics are vehicles customized with medical equipment to provide health services in communities for different health populations. They are staffed with health professionals to increase health access to populations and enforce disease prevention, as well as improve access to chronic health management at reduced costs [1]. Mobile clinics have also been used to increase healthcare staff and provide specialty equipment such as orthoses and prostheses to disabled patients in Sao Paulo [2]. In situations such as flooding when building facilities were destroyed or individuals were unable to access stationary healthcare facilities, mobile clinics were alternatives to providing adequate medical services as was in the case in Malaysia [3]. These examples illustrate how mobile clinics can provide the healthcare needs of populations similarly to stationary healthcare facilities, and addresses geographical barriers by bringing the care to patients. Additionally, a study on patient satisfaction for preventive services in Saudi Arabia showed that patients were satisfied with the working hours and human resources of the mobile clinics 95% of the time, while in northern Nigeria, [4] there were positive perceptions of mobile clinics by providers, community leaders and patients [5].

Mobile health clinics have been used in the United States to provide healthcare services to the uninsured or individuals lacking geographic access to health [6]. They continue to be longstanding community-based service delivery models that fill gaps in healthcare delivery safety-nets and reach under-resourced populations in both urban and rural areas [1]. Their effectiveness could potentially increase should they be used together with other forms of healthcare services delivery for coordinated health management. There are about 2,000 mobile clinics in the United States serving 7 million at-risk people annually [5, 7]. The mobile clinic model is an efficient avenue for healthcare delivery (\$36 saved from mobile clinic services compared to emergency visits for every \$1 invested in the mobile clinic) [8]. “They work in some places where the economics make sense, and where the technology can survive the bumpy roads” [9].

3. Geographic distribution of Mobile clinic programs in the United States

A self-reported survey was sent to representatives of mobile clinics who were either clinic managers, providers, or directors in Texas, Florida, North Carolina,

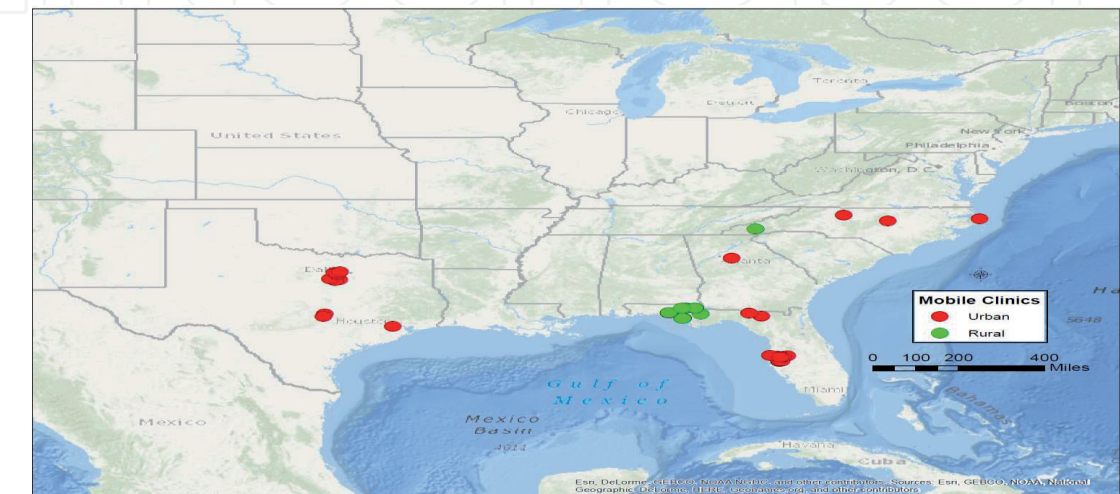


Figure 1. National map with Mobile clinics in TX, FL, NC, GA.

and Georgia [10]. There were a total of 49 mobile clinics that were operated by 15 organizations across all four states. **Figure 1** illustrates the overall distribution of the mobile clinics across the states in the surveyed programs. Florida had six rural

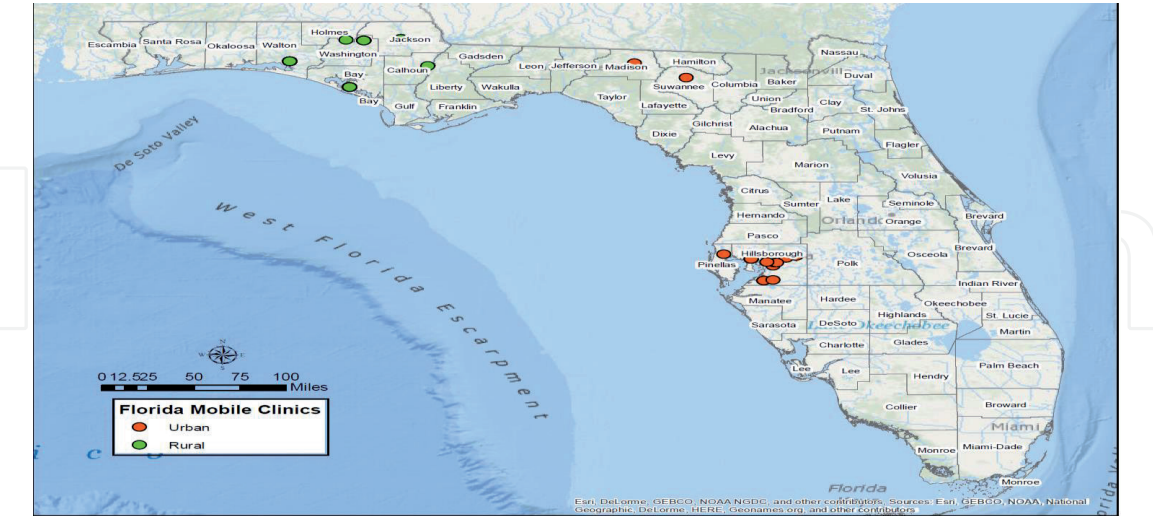


Figure 2.
Map of FL with Mobile clinics in urban and rural locations.

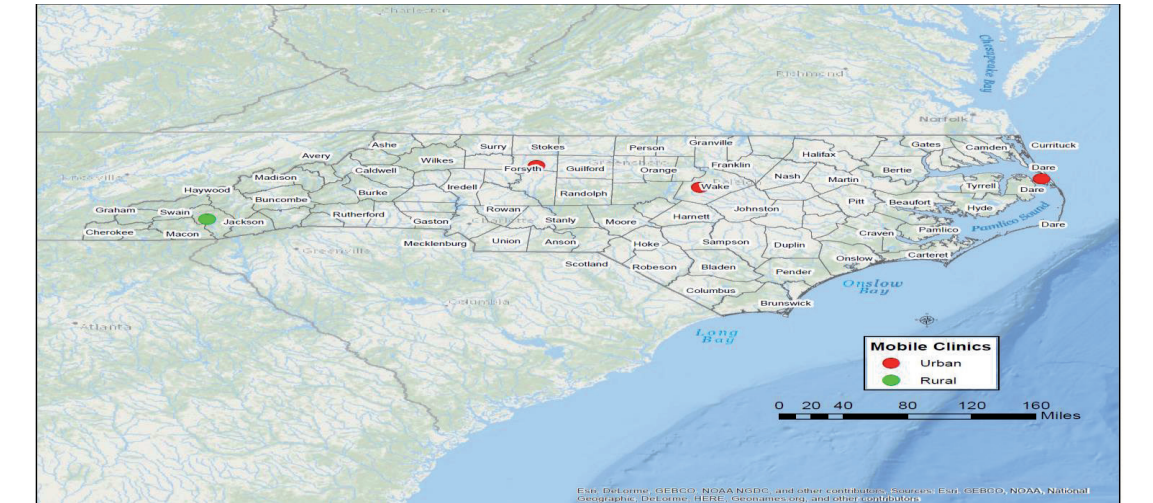


Figure 3.
Map of NC with Mobile clinics in urban and rural locations.

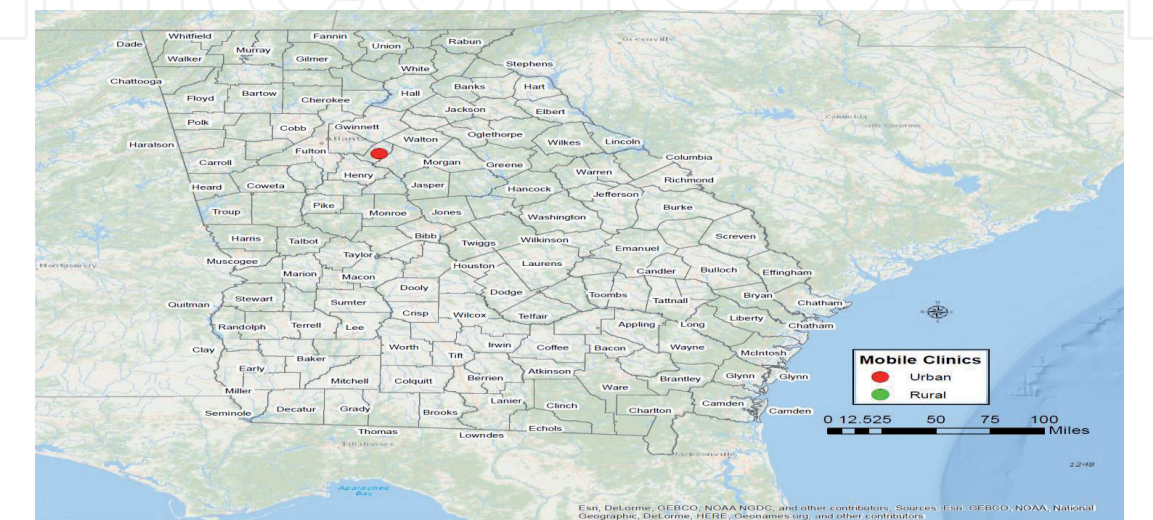


Figure 4.
Map of GA with Mobile clinics in urban location.

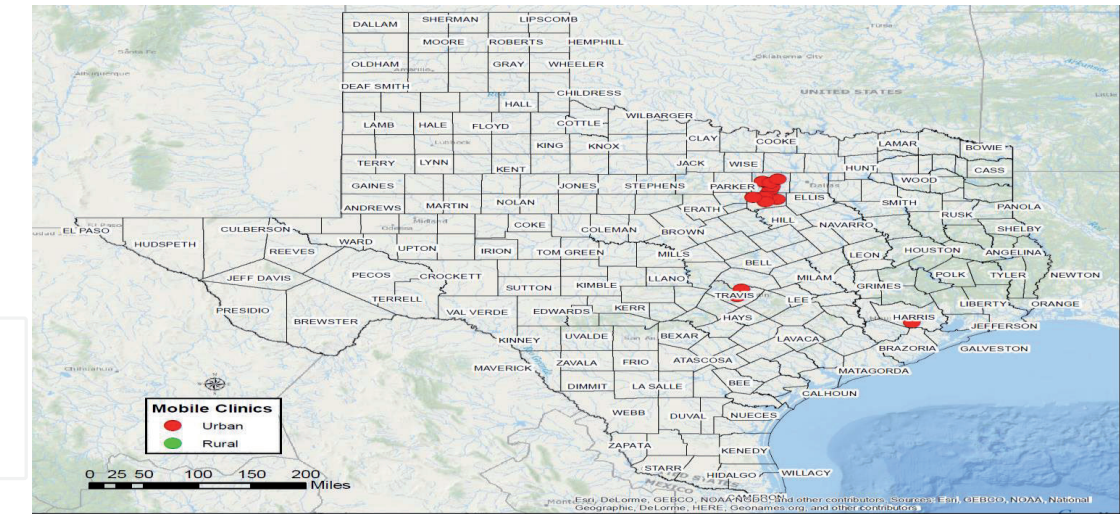


Figure 5.
Map of TX with Mobile clinics in urban location.

and 12 urban locations (**Figure 2**); North Carolina had three urban and one rural (**Figure 3**); Georgia and Texas had all clinics in urban locations, **Figure 4** and **Figure 5** respectively. Reasons provided by the mobile clinic representatives as to how they choose their respective locations varied across the different states and the types of healthcare delivery strata (dental, dental/preventive, preventive care, primary care/preventive, and mammography/primary care/preventive). Some of the reasons mentioned included using results from hotspot mapping, and community needs assessments [10].

4. Costs of operating Mobile clinic programs

Planning a mobile clinic program requires several stakeholders in both the private and public sectors [11] therefore the costs and complexities of running mobile clinics should not be underestimated [12]. Costs include recurrent costs (variable costs of running the mobile clinic such as maintenance, repair, fuel, and compensation for the healthcare providers who provide services in the mobile clinics), as well as capital costs such as the acquisition costs of equipment, and vehicle [13]. Brazil, for example, has a sustainable 8-year mobile clinic program integrating the community, government, and private sectors [14] as a way to ensure the sustainability of the program. Mobile clinic outreach programs can be complex and expensive; however, these complexities can be mediated by public policy or resource planning [15]. Acquiring mobile clinics and delivering healthcare services is therefore an effort that needs careful planning and assessment, as well as consideration of outcomes and how performance would be evaluated [16].

A survey [10] based on the accounting documentation of the mobile clinics in each of the stratified service types: dental, dental/preventive, preventive care, primary care/preventive, and mammography/primary care/preventive was conducted. The findings highlighted in a recent publication [17] showed the highest averages of annual operating costs for dental and dental/preventive services ranging (\$2.3–\$2.5 million) and preventive and primary care/preventive between \$479,000 and \$822,000. Mammography/primary care/preventive had the lowest annual average of \$300,000. The largest overall cost line item was labor costs, followed by depreciation and then maintenance costs. Largest percentage of labor costs of more than 90% of total costs was in preventive and primary care/preventive. Dental and dental/preventive labor costs represented 80%, while mammography/primary care/

preventive had 65%. The highest percentage for depreciation costs was for mammography/primary care/preventive with (25%), followed by dental and dental/preventive (13%), and preventive and primary care/preventive services at 5% [17]. The variation in depreciation costs was attributable to the differences in the type of capital equipment used by each of the stratified service types. For example, mammography's 25% likely corresponded to the expensive screening equipment. The percent of total costs attributable to maintenance was 10% for mammography/primary care/preventive, followed by dental and dental/preventive with 7%, and preventive and primary care/preventive at 3% [17].

The estimated cost per patient visit was analyzed using the reported annual patient visits from survey responses. Average annual operating cost per patient visit ranged from \$243 in preventive services to \$65 for mammography/primary care/preventive delivery services. While the cost per patient visit for dental services (\$123) was considerably lower than dental/preventive services (\$225), preventive services had an average cost per patient visit of \$243, suggesting an overall high cost for prevention programs [17].

5. Role of Mobile clinic programs in healthcare disparities

The COVID-19 pandemic has exacerbated existing limitations of our health systems when confronted with the unexpected emergence of major diseases and highlighted the prevailing disparities in the healthcare delivery system. Populations affected in such situations tend to be the poor [18]. Mobile healthcare delivery programs play an important role in effectively supporting under-resourced populations during pandemics, and do so in a cost-effective manner [1]. Harvard Medical School's Family Van is an excellent example, offering blood pressure screenings, and other chronic disease management services [19]. These screenings decrease the risk of heart disease and stroke, and other chronic conditions which if left untreated can result in negative health outcomes and further increase health disparities.

Mobile clinics are adaptive and have the capability to help address emergencies in both an innovative and timely fashion [20]. As long-standing community-based healthcare delivery avenues, they play a critical role in addressing healthcare access barriers that exacerbate healthcare disparities. For example, representatives from a clinic in North Carolina highlighted challenges around equitable access to healthcare that the population of farmworkers they serve, face. "The idea of having those responsible for meeting the economic need of providing food for individuals in the nation, have difficulty with accessing healthcare, is unimaginable". The ways in which the mobile clinic has proven resourceful to the farmworkers is by providing healthcare at minimal costs, and partnering with stationary clinics to ensure a continuum of care [10].

6. Decision tool for Mobile clinics deployment

Results from the survey conducted by Attipoe-Dorcoo et al. [10], also indicated that counties in North Carolina and Florida experienced varying degrees of additive effects from the provision of primary and preventive care via mobile clinic providers. Mobile clinics in these counties were influential in delivering critical primary and preventive healthcare services to under-resourced populations. A mobile clinic primary care service index was constructed taking into account miles traveled by the mobile clinic, speed of the mobile clinic, number of primary care providers per mobile clinic program, number of primary care providers available in a primary

care service area (PCSA), and the total population in a PCSA [21]. The index provides a valuable unit of measure to enable program managers of primary care mobile clinics to allocate their resources accordingly based on either a goal to extend their level of influence, which can be a metric to share with funders, or identify other potential areas of need to establish influence. Geographic areas with the greatest need can be identified via the lowest index, and resources can be allocated either as additional providers or mobile clinics to ensure the health needs of populations are met [21].

The findings from Attipoe-Dorcoo et al. [10] also highlighted that only one mobile clinic organization was identified in three counties in North Carolina and a similar situation was observed for rural counties in Florida as well. Anecdotally mobile clinic representatives constantly advocate for more mobile clinic access in rural areas, however, the challenges of implementing such efforts are yet to be overcome nationally. The index could be a tool that is leveraged to help provide the needed geographic metric needed in operational decision-making to ensure efficient allocation of resources [21].

7. Examples and opportunities for improved pandemic responses with Mobile clinics

A recently published commentary shared the findings of a webinar co-hosted by the Harvard Medical School's Family Van together with the Mobile Healthcare Association to gain an understanding of the current state of efforts by the clinics, discuss best practices, and exchange ideas [20]. Several mobile clinics in the United States offered services to different populations during the early stages of the COVID-19 pandemic, and still continue to do so. Examples highlighted in the commentary include the Parkland Health and Hospital System, which had staging areas at COVID-19 testing sites, or triage locations in the parking lots near hospital emergency departments. Another was a federally qualified health clinic in Austin, Texas, conducting outdoor testing. Nurses at the clinic triaged patients in their vehicles and not the mobile van, and then patients drove around to a doctor to get tested. Finally, Cincinnati Children's used the mobile clinic to test employees using an algorithm for employees to call a centralized number for a referral [20]. Mobile clinics are an essential aspect of our healthcare delivery system with innovative and adaptable approaches to problem-solving. Mobile clinic programs repurposed their operations to serve other dire needs of their patient populations, and communities. For example, the Harvard Medical School's Family Van hosted call-in hours, contacted clients directly, and distributed handouts put together with the COVID-19 Health Literacy Project [22]. The vans for the Vision to Learn program were used to take food and household supplies to seniors in East Los Angeles in a partnership with the Weingart East Los Angeles YMCA, University of Southern California Keck School of Medicine, Adventist Health White Memorial, and the American Heart Association. Other programs also used their vans to distribute food, and supplies to families in public housing [20].

In order to efficiently leverage the adaptable and community-based approach to healthcare delivery that mobile clinics provide, especially as an avenue to improve pandemic responses, there is a need to consider moving beyond the grant-based model of funding to create sustainable mobile clinic programs [20]. We need to be asking health policy questions about how we can leverage innovation in mobile healthcare delivery to help enhance efforts to narrow the widening gap in disparities that have resulted from this pandemic. For example, mobile clinics can be used in case management approaches similar to the model used by Uber Technologies,

where mobile clinics can be requested on-demand to address localized and contextualized needs in areas where there are increases in reported cases of health conditions during a pandemic.

Additionally, as part of the National Emergency Preparedness Strategy, mobile clinics can play a pivotal role in the deployment of health resources to areas with the direst need. The model can serve to provide trained medical professionals, the use of the actual vehicles for triage and isolation units, temporary housing, and sourcing additional medical equipment. Integrating mobile health clinics in our national healthcare delivery systems in a comprehensive way will create an existing structure of collaboration with stationary facilities, and an innovative infrastructure that aims to address the underlying disparities in healthcare access and geographic barriers to care. With the evidence around costs, their geographical influence, and populations served, healthcare policies and funding models that support mobile clinic programs and their integration in our healthcare delivery systems will ensure improved responses during pandemics and other health crises.

National funding programs that expand the use of technology can also provide the opportunity to establish close collaborative involvement with other stakeholders in the healthcare system. As the nation grapples with logistical challenges and other gaps in current vaccination efforts, more critical attention needs to be given to the long-standing community model of healthcare delivery with mobile clinics, and their capability to refer and navigate patients in a comprehensive real-time manner. This will not only support the success of current efforts in response to combating the COVID-19 pandemic but other potential future pandemics in an equitable fashion.

8. Conclusions

Mobile clinics are both effective and efficient in ensuring populations have access to equitable healthcare. They have been shown to be a sound complement to stationary clinics. In order to better leverage, their critical role in addressing health disparities that have dramatically worsened throughout the COVID-19 pandemic, significant shifts in healthcare reimbursement policies will need to occur. With national efforts to combat health disparities by addressing social determinants of health, there is now more than ever the need to consider cohesive funding for mobile health clinics, as well as a comprehensive approach to incorporating mobile clinics in our entire health system. These efforts will not only be effective for improving health outcomes of under-resourced populations but will also play a role in contributing to the success of the current national pandemic response, and future health crises.

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