

# Physical accessibility, availability, financial affordability, and acceptability of mobile health clinics in remote areas of Saudi Arabia

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## ABSTRACT

**Introduction:** Access to primary healthcare (PHC) services is a significant concern, especially for those living in remote areas. Mobile health clinics (MHCs) are a model widely used to enhance access to healthcare in rural areas. In Saudi Arabia, the Ministry of Health has launched mobile clinics to facilitate access to PHC and increase access to healthcare. This study aims to assess the accessibility of MHCs in rural areas of Saudi Arabia measuring four dimensions of access from the patient's perspective: physical accessibility, availability, financial affordability, and acceptability. **Methods:** A quantitative cross-sectional survey in the form of an interviewer-administered questionnaire was performed on patients who attended mobile clinics between August and October 2020. All these people have been targeted to be interviewed as a nonprobability sample. Data was collected through a survey filled out by the interviewer. **Results:** Five hundred participants were interviewed in nine mobile clinics in the nine cities of the Kingdom. The majority were men (82.4%) and from Makkah city (13.6%) and 94.2% of the participants were Saudi nationals. In total, 98.3% of the respondents were satisfied with the overall mobile clinic services and 11.4% of the participants had difficulties with the mobile clinics' work schedules. There was a positive correlation between access to mobile clinics and satisfaction. **Conclusions:** The mobile clinics in rural and remote areas in Saudi Arabia during the study period were accessible to the respondents and met patient satisfaction. Most participants accept the work schedule for mobile clinics. However, it requires further improvements to meet all access dimensions of the study.

**Keywords:** Acceptability, accessibility, affordability, availability, mobile health clinics, primary health care

## Introduction

The "Health for all (HFA)" was a strategic objective of primary healthcare (PHC) since the "Alma Ata" declaration in 1978. Forty years later, the second mega-conference on PHC in "Astana" city came out with universal health coverage (UHC). It stressed that health services must be offered wherever people live to comply with the PHC concept.

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Saudi Arabia is a vast area of more than two million square kilometers with scattered population settlements in remote and hard-to-reach areas. The Saudi Ministry of Health installed a mobile health clinics (MHCs) service nationwide to cover current healthcare gaps. The mobile clinic's objective is to deliver the necessary services to communities confronting difficulty reaching a health facility due to distance, time, and transportation. MHCs can also overcome administrative barriers such as difficulties in securing appointments and long waiting times. MHCs can deliver noninferior healthcare outcomes, promote value-based care, and improve patient access to care.

MHCs are vehicles customized with medical equipment capable of delivering health services to various health groups. They are operated by health professionals to increase healthcare accessibility and promote disease prevention at a lower cost.<sup>[1]</sup> The Massachusetts Health Promotion and Chronic Disease Prevention Partnership identified mobile clinics as the best way to help patients manage chronic diseases, and connect communities and medical facilities. MHCs have substantial impacts on preventive health screening, chronic disease management, and emergency care. Around 2,000 MHCs in the United States offer up to 6.5 million visits per annum, providing primary care, prevention screening, dental services, prenatal care, pediatric care, and disease management.<sup>[2]</sup> In total, 45% of the MHCs in the United States offer prevention screenings, 42% offer primary care, and 30% offer dental services.<sup>[3]</sup> A strong consensus exists among Australian experts that maternal and child health, dental services, and public health in the forms of disease prevention should be available in rural areas.<sup>[4]</sup> PHC services should be available regardless of the geographical location.<sup>[5]</sup> Providing dental screenings and promoting oral health awareness are also essential services for underserved people in rural areas. Indeed, MHCs can be used to offer comprehensive oral health services.<sup>[6]</sup> Researchers have discussed how MHCs can benefit rural communities. These units could help rural areas obtain care services.<sup>[7]</sup> Typically, communities in such regions experience significant challenges in accessing care. In Saudi Arabia, many people in the Kingdom's rural areas deal with multiple health disparities.<sup>[8]</sup> MHCs, therefore, can be used in assisting such groups in accessing healthcare services. However, such efforts would require ensuring that these units are easily accessible to the target community. The degree to which a person living in a rural area can access an MHC is bound to affect their overall well-being. People who could not access MHCs in South Africa faced a higher risk of being depressed.<sup>[9]</sup> In many cases, such individuals may feel neglected, and this belief would affect their health and quality of life. An MHC can be more effective when it allows members of the target community to access the resource and use it to manage their health needs.<sup>[10]</sup> These findings demonstrate a need to prioritize MHCs' availability when assessing how the strategy would affect the community. Rural populations in many countries are often overlooked by the healthcare system,<sup>[11]</sup> as a result, members of these communities face profound impediments that prevent them from accessing care. In some cases, limited care services

in rural areas can be unaffordable, and residents are forced to pay for these services when needed.<sup>[12]</sup> The ideal strategy for using MHCs should include ensuring that the unit provides affordable care services to target communities. Failure to manage the costs of care furnished through the MHC would render the approach unreliable.

Proper planning can help clinicians eliminate healthcare barriers in rural areas. The lack of an exact schedule could result in people not being aware of when the MHC would be available. In Mozambique, poor scheduling would make rural communities unable to take advantage of MHCs.<sup>[13]</sup> Such problems would have been avoided if health practitioners have planned adequately and informed the community about their schedules. Efforts to adopt MHCs in other countries, including Saudi Arabia, should include ensuring that clinicians are able to communicate effectively with the community about their plans. This strategy helps in enhancing the effectiveness of MHCs in rural areas.

This study aims to measure MHC accessibility from the beneficiary's perspective. This study is essential for two reasons. First, the literature on access to healthcare services in rural areas through MHCs is scarce in Saudi Arabia. One study done more than a decade ago presents people's satisfaction levels using MHCs.<sup>[14]</sup> Since then, many improvements have been made in the building infrastructure and operation strategies of MHCs, especially since 2017. Therefore, one faces a massive gap in the literature on the topic. Second, this study is expected to provide insights for the policymakers in the Ministry of Health regarding the beneficiaries' perception of access to this kind of care model in remote areas.

## Subjects and Methods

The purpose of this study was to assess the overall level of access to mobile clinics that provide PHC services in remote areas of Saudi Arabia. The study measures the general access level through four dimensions: physical accessibility, availability, financial affordability, and acceptability. The study also examines the differences between both the overall level of access and the following demographic information: gender and nationality (Saudi, non-Saudi), as well as disability. Additionally, the study analyzed the relationship between the overall level of access and satisfaction.

A cross-sectional interview-led survey-based study was conducted with all people who visited any of the nine mobile clinics in nine remote cities in the Kingdom of Saudi Arabia (Makkah, AL Madinah, Jeddah, Asir, Hail, Tabuk, Alhoudod Alshamaliyah, Riyadh-Wadi Aldwaser, and Jizan). During the study period, 1,017 people were targeted to be interviewed as a nonprobability convenience sample. Three hundred and twenty-one patients had missing contact information and 196 people had no response. A response rate of 49.2% was achieved, and a sample size of 500 was obtained [Figure 1].

## Data collection

Data collection took place between August 10<sup>th</sup>, 2020, and October 10<sup>th</sup>, 2020, via telephone interviews. The mobile clinic visitor's contact information was collected daily from the mobile clinic coordinator in each city. Well-trained interviewers filled out a questionnaire during a phone interview. The aims of the research have been clarified to the participants by the interviewers and consent was obtained.

## Questionnaire design

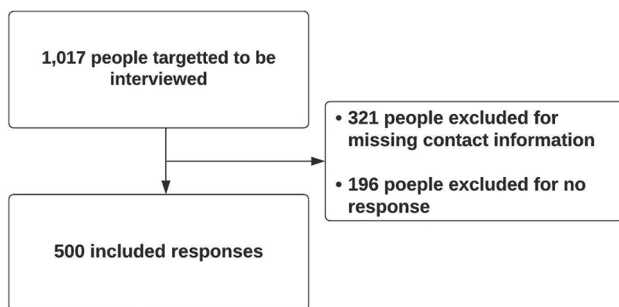
The questionnaire was influenced by multiple works of literature.<sup>[15-18]</sup> Some questions were selected from the literature, and some new questions were added. Experts in public health reviewed and evaluated the statements to validate the questionnaire. An in-house pilot study was done on Tabouk mobile clinic ( $n=15$ ) in June 2020 to assess the research tool's clarity and feasibility. The demographic questionnaire contains 11 variables, the remaining variables were concerned with MHCs' four vital dimensions: accessibility, availability, affordability, accessibility, and overall satisfaction.

## Ethical consideration

The current study endeavored to treat all participants ethically. An application for the Protection of Human Subjects was submitted to and approved by the Central Institution Review Board in the Ministry of Health (General Directorate of Research and Studies). All data and information collected through the demographic questionnaire and survey instruments will remain confidential.

## Data analysis

IBM Statistical Package for the Social Sciences version 26 statistical software was used for data analysis. The descriptive analysis described the study participants' demographic characteristics. Standard central tendency and variability measures were used for continuous data and percentages for categorical data. Since the data distribution is not normal, the Spearman correlation and Mann–Whitney test were utilized rather than the independent  $t$ -test. Spearman correlation was used to find the relationship between access to mobile clinics and the satisfaction of beneficiaries. Mann–Whitney  $U$  tests were used in determining access levels between beneficiaries with different demographic characteristics.



**Figure 1:** Procedure of participants recruitment for the study and study analysis

## Results

### Demographics

Table 1 summarizes participants' gender, age, nationality, disability, and region. Most respondents were male (82.4%), Saudi (92.4%), and had no underlying physical disabilities (92.6%). The age of participants followed a normal distribution; most ages fell within 30–59 years. The majority of patients were from Mecca (13.6%) followed by Medina (12.2%) and Jizan (12%).

Table 2 provides further demographic information, including marital status, education level, employment, and mode of transport to MHCs. In total, 22.6% of respondents were single and never married. Moreover, the most common education level was found to be limited to secondary school (36.6%), followed by elementary school (18.6%), and then a bachelor's degree (15.4%). In total, 1.2% of participants were illiterate, 5.8% were educated only with the basics of reading and writing, and only 0.2% of all participants had a postgraduate degree. The unemployment rate was found to be at 14%, and most employed individuals worked for the government sector (34.6%). Most common modes of transportation to designated MHCs were found to be through a private car (77%) and walking (22.2%). Public transportation in addition to using a bicycle or a motorbike alarmingly accounted for less than 1%.

**Table 1: Demographics**

Demographic variables	%	$n=500$
Gender		
Male	82.4	412
Female	17.6	88
Nationality		
Saudi	92.4	462
Non-SaudiS	7.6	38
Do you have any disabilities?		
Yes	7.4	37
No	92.6	463
Age		
Under 18	3.6	18
18–29	13.4	67
30–39	22.6	113
40–49	25.6	128
50–59	17.8	89
60–69	11.2	56
70 and more	5.8	29
City		
Mecca	13.6	68
Medina	12.2	61
Asir	10.8	54
Jeddah	10.2	51
Hail	10.4	52
Tabuk	9.8	49
Riyadh (Wadi Aldawaser)	9.2	46
Alhudod Alshamaliyah	11.8	59
Jizan	12	60

Current illnesses are reflected in Table 3. Diabetes was the most prevalent disease in our studied population, with 25.6% of respondents currently seeking medical attention for the disease. Following diabetes, hypertension was the second most prevalent disease found among 23% of respondents. Following diabetes and hypertension, 5.4% documented asthma, 3.4% documented obesity, 2% documented “heart disease”, 0.4% of respondents documented “blood disease”, and 0.2% respondents documented “cancer disease”, and 38.6% of respondents marked “Not Applicable.”

**Table 2: Demographics (continued)**

Demographic variables	%	n=500
Marital status		
Married	70.2	351
Single	22.6	113
Divorced	3.4	17
Widow/widower	3.8	19
Education level		
Illiterate	1.2	6
Read and write	5.8	29
Primary	10	50
Elementary	18.6	93
Secondary	36.6	183
Diploma after secondary school	12.2	61
Bachelor	15.4	77
Postgraduate	0.2	1
Employment status		
Unemployed	14	70
Student	8.4	42
Government sector employee	34.6	173
Private sector employee	13.2	66
Retired	24.8	124
Business owner	5	25
What was the mode of transportation used to reach the mobile clinic?		
Private car	77	385
Public transportation	0.4	2
Motorbike	0.2	1
Bicycle	0.2	1
Walking	22.2	111

**Table 3: Chronic diseases**

Demographic variables	%	n=500
Chronic disease		
Diabetes meletus	25.6	128
Hypertension	23.0	115
Chronic pulmonary disease	0	0
Asthma	5.4	27
Heart disease	2.0	10
Blood disease	0.4	2
Kidney disease	0	0
Liver disease	0	0
Cancer disease	0.2	1
Immunodeficiency disease	0	0
Obesity – BMI 30 or more	3.4	17
Not applicable	58.6	207

## Overall Level of Patient Access to Healthcare via MHCs

The overall level of patient access was assessed using the four dimensions of accessibility, availability, affordability, and acceptability [Table 4]. Each dimension had unique points, and answers to each point included a 5-item Likert scale of “Strongly disagree, disagree, neutral, agree, and strongly disagree”.

Points assessing physical access included “time it takes to reach MHC is short”, “MHC location is apparent”, “distance from your home to MHC is near”, “it was easy reaching the MHC”, and “MHC was well prepared and convenient for a patient with a disability”. The overall mean of responses to these points was 4.55 (4.55 / 5) with a standard deviation of 0.42. Points assessing availability included “short waiting time”, “receiving the desired primary medical service”, “convenient MHC work schedule”, “receiving all required medications”, and “tools and equipment required for any treatment are available.” The overall mean of responses to these points was 4.66 (4.66/5) with a standard deviation of 0.33. Affordability was assessed through two points: “the cost of reaching the MHC is inexpensive” and “the cost of medication is inexpensive” The overall mean of responses to these points was 4.85 (4.85/5) with a standard deviation of 0.38. Acceptability was assessed through three points: “health workers understand my language/local accent”, “I did not encounter any form of discrimination from the service provider” and “the presence of male and female health providers in the MHC is suitable for me” The overall mean of responses to these points was 4.86 (4.86/5) with a standard deviation of 0.23.

Levels of access to MHCs, by specific demographic variables, were evaluated using Mann–Whitney *U* results. Demographic variables used included gender, nationality, and disability [Table 5]. There were no significant differences in levels of access to MHC by gender ( $p$ -value=0.124), or disability ( $p$ -value=0.284). A statistical difference ( $p$ -value=0.001) in the levels of access to MHC was found when assessing nationality (Saudi vs non-Saudi).

## Level of satisfaction

Satisfaction was assessed through seven points, each of which was answered on a 5-item Likert scale. These seven points included satisfaction with patient privacy, MHC space, level of hygiene of MHC, medical staff’s concern, physician counseling and education, time spent with a healthcare professional, and overall feeling of satisfaction. The mean satisfaction level was found to be 4.76 (4.76/5) with a standard deviation of 0.26. Overall, 98.3% of respondents were satisfied, 1.3% were neutral, and only 0.4% were dissatisfied. The correlation between levels of satisfaction and access to MHC was evaluated through Spearman’s correlation and was found to be statistically significant  $p$ -value = 0.001, with a positive moderate correlation ( $R = 0.42$ ).

## Discussion

A mobile health clinic is a built-in movable customized clinic in a recreation vehicle, container, or any other suitable vehicle. It

**Table 4: Patient access to clinics**

The overall level of patient access to mobile clinics	Mean	StD
Physical accessibility dimension	4.55	0.42
Availability dimension	4.66	0.33
Financial affordability dimension	4.85	0.38
Acceptability dimension	4.86	0.23
The overall level of patient access to mobile clinics	4.73	0.33
Rejection Neutral Acceptance		
%	1.16	3.40
		95.44

**Table 5: Statistical analysis**

Group	n	Mean rank	Sum of ranks	Mann–Whitney U	Wilcoxon W	Z	P
Male	412	245.94	1,01,327				
Female	88	271.85	23,923	16249	1,01,327	-1.540	0.124
Saudi	462	242.8	1,12,175				
Non-Saudi	38	344.08	13,075	5,222	1,12,175	-4.189	*0.001
Well	463	248.56	1,15,083.5				
Disabled	37	274.77	10,166.5	7667.5	1,15,083.5	-1.071	0.284

serves as an OPD reaching out to mostly the underserved rural and vulnerable communities. The concept of health care on wheels is quite established and practiced in the western world; however, it is comparatively new in Saudi Arabia.<sup>[14]</sup> The public health sphere is continuously evolving, from PHC promotion in the 1978 Alma-Ata Declaration and HFA by the year 2000, as well as the Millennium Development Goals, UHC to current Sustainable Development Goals. PHC has been the backbone of preventive and clinical care throughout the evolving healthcare journey and is still the foundation of the healthcare system. As a component of the Kingdom's Vision 2030, the Saudi Arabian agenda for sustained development<sup>[19]</sup> gives a vision for health care including universal access to equity-based healthcare and people's improved well-being at all levels: physical, mental, and social. Like the rest of the world, health system strengthening has been in progress in the Eastern Mediterranean Region. Family practice is recognized and adopted as a core element of PHC in many countries including Saudi Arabia, Oman, A , ahrain, Kuwait, Tunisia, etc.

Like the global 2030 plan for sustained development, Saudi Arabia has its vision set for 2030. To realize the vision, a National Transformation Plan has been formulated. The delivery plan for 2018–2020 presents a guide in which this envisioned transformation will occur in various phases within a decade.<sup>[20]</sup> The total population of Saudi Arabia is 34,218,169, out of which, almost 84.1% of the total population resides in urban areas. However, there are scattered, harder-to-reach remote areas representing the rural community. Data from 2015 to 2020 shows an estimated 2.17% yearly urbanization rate in Saudi Arabia. By following macro trends, we can see that the percentage of urbanization has not been uniform.<sup>[21]</sup> Saudi Arabia ranks in the top 20 economies globally, and its GDP per capita was USD 20,471 in 2015. Oil revenues make up a significant bulk (80%) of its annual budget. However, Vision 2030 seeks to diversify

the economy and reduce oil dependency.<sup>[22]</sup> The government provides healthcare for citizens, free of cost. For noncitizens, their employers bear the cost of healthcare mostly through healthcare franchising or medical insurance. MOH provides healthcare services to 57% of the population through 284 hospitals and 2390 PHC centers. The Ministry of Health registered approximately 52 million visits to PHC centers with around two or fewer yearly visits per person.<sup>[23]</sup> In the context of health care, the National Transformation Program includes three strategic objectives implemented through 70 initiatives and governed by Key Performance Indicators (10 indicators, 24 subindicators). Within the strategic objectives, clause 2.1.1 of the NTP book plans to ease access to healthcare. It envisions expanding healthcare capability and capacity (hospital staff, equipment, beds, etc.). To provide affordable and timely healthcare services to the whole population based on geographic distribution and demographics, a 10% increase in existing service coverage is needed including peripheral areas; from 78% to 88%.<sup>[20]</sup>

### KSA and primary healthcare

In Total, 77% of the rural population in Saudi Arabia is provided healthcare services by around 1,400 PHC centers within 30 kilometers of their respective residences (MOH Standard). However, for the remaining 23%, access to PHCs still seems farfetched. The distribution in these 400 communities is sparse, and each consists of less than 500 residents. In 2017, the Ministry of Health launched an initiative for multifunctional primary care services. Spacious (20×2 meters LxW) MHCs contains a doctor's room, nurse station, dental room, X-ray setup, lab, waiting area, and toilet. The literature on access to healthcare services in rural areas through MHCs is scarce. An older study described people's satisfaction levels using MHCs.<sup>[14]</sup> However, the infrastructure and the operation of MHCs have drastically improved over the last 10 years, especially after 2017. Therefore, there is a considerable gap in the literature on the topic.

Access to health services does not have a global standard definition because it has multiple dimensions and determinants. It is the availability of high-quality, accessible, acceptable, and appropriate healthcare services at the right time to all the people who require them at a price that they can afford.<sup>[24]</sup> Quantitative and qualitative data from research articles of 20 years identified a few potential barriers for the vulnerable population to access the traditional healthcare system. These include language barriers, logistics, insurance, financial status, hospital timings, cultural norms, lack of resources (e.g., healthcare providers), geographic constraints, psychological barriers, doctor–patient relationships, patient privacy, etc.<sup>[3]</sup> The study advocates that MHCs can address and manage most of the barriers of the traditional healthcare system. MHCs can efficiently play their role to grant the opportunity in the rural population neighborhood. The infrastructure design requires lesser resources that become limiting factors or barriers in a conventional urban healthcare setup. The physical proximity of PHCs to the community plays a significant role in the use of services.<sup>[25]</sup> In another study,

the author adds accommodation and approachability to the determinants of healthcare access.<sup>[26]</sup>

Accessibility and approachability are almost interchangeable concepts in the context of access to healthcare. Data from the United States mobile health map shows that more than 6.5 million rural populations have benefitted from some 2000 MHCs nationwide. People had access to PHC services (42%), preventive health programs (45%), dental workups (30%), and at some places, specialized care services like mammography, eye care, and help with mental disorders. MHCs provide an efficient platform as an alternative healthcare system in the shape of MHCs as compared to standardized healthcare facilities due to insurance hassles, logistical issues, appointments, and long waiting periods. This platform could provide accessible healthcare services to the targeted population and evolve them according to the changing health needs. In a traditional healthcare system, poor people in rural areas lack the motivation and resources to travel far for appointments. Then, paperwork and long waiting hours pose a considerable barrier in terms of accessibility. Bringing healthcare to the target population's doorsteps can eliminate these barriers.<sup>[3]</sup> Approximately 36% of the sample population was dissatisfied with the location of MHCs in their study.<sup>[14]</sup> Our study can make a difference and reduce gaps in existing literature in geographic locations, i.e., rural Saudi Arabian areas. Travel time and physical proximity are determined by cost path analysis (via road network).<sup>[27]</sup> Healthcare setups can be efficient accordingly to provide maximum benefit to the target population. In Yemen, healthcare setups' physical accessibility was a significant factor in mild and severe malaria cases. The farther the people lived from clinics, the greater the obstacles to seeking care at an appropriate time. Furthermore, the geographic proximity to healthcare services resulted in increased vaccination uptake in the pediatric population.<sup>[28]</sup>

### Availability

Many articles have defined availability as available resources. Nevertheless, as time passes by, researchers add various elements and angles to its description. One finds itself often confused about which definition to adopt. Availability is the adequate stock and supply of healthcare providers with their skills best suited to the population.<sup>[29]</sup> Another perspective describes that having the potential to utilize present or available services comes under service availability. The services should be available in an adequate amount when and where they are required. Usual resource availability indicators include human resources (number of hospital staff per capita, doctors, nurses, paramedics, etc.), equipment, number of beds, etc. One can see that there is no global or standard definition of availability, and some authors include the availability of resources 'when' they are needed.<sup>[30]</sup> Allocation of available resources to a specific geographic area (rural or urban) and the level of care (primary or specialist care) require efficient and evidence-based planning.<sup>[31]</sup> Mooney confronts the confusion by bringing equity in these dimensions of access to health. He measures availability as the cost incurred

to people for getting healthcare. Geographically, people living in rural areas would pay more price for the same resources than those in urban areas. Therefore, equity demands equal opportunity given to people to obtain equitable healthcare.<sup>[32]</sup> To find the best framework synthesis to provide PHC for the disabled population living in rural areas<sup>[33]</sup> attempted to draw connections between certain factors to minimize barriers and achieve desired PHC access in rural areas. They reviewed 36 articles, out of which 23 discussed availability as a significant factor and placed 'resources' as a subtheme to access healthcare in the rural sector. Resource categories are human resource, infrastructure (physical structures, e.g., hospitals, field clinics, MHCs), services (primary care, specialist care). The authors explained lack of trained staff for disabled people, increased staff turnover due to low salaries in rural areas, absence of pharmacy and laboratories, and inadequate supply of medication, and equipment as the limiting barriers. In MHCs, availability would mean that people of rural areas can utilize the healthcare services from the medical staff within MHCs, in the vicinity of their residence.

Planners and policymakers have used another term for resources and ability, known as the healthcare system's capacity and capability. These are usually discussed with relevance to the increasing demand for healthcare from the population and the existing system trying to match the demand. 'Capacity' refers to the healthcare system's quantitative elements, e.g., the number of beds, doctors, nurses, etc. Many studies have categorized them into "Staff, Stuff, Structures, and Systems", whereas 'Capability' refers to the qualitative aspect of healthcare potential, i.e., tacit knowledge, training, surgical skills, etc.<sup>[34]</sup> Capacity seems like availability, yet the minor difference is that availability refers to existing potential. In contrast, capacity refers to the potential to stretch the ability, especially with the demanding influx of patients, e.g., during disasters or outbreaks.

### Affordability

Another significant dimension of access to healthcare is affordability. It is the financial resources, capacity, and time required to pay for the appropriate healthcare services they require. Time is discussed in affordability because it refers to the opportunity cost. A daily wager or salaried person spends in reaching out to obtain medical services can result in income loss. Therefore, the opportunity to gain access to healthcare has costs.<sup>[26]</sup> Direct medical costs include paying for medical services, medicines, procedures, etc. PHC is the cornerstone of healthcare infrastructure.<sup>[35]</sup> Therefore, for any country desiring effective PHC service delivery, the medication should be made affordable for the community.<sup>[36]</sup> The rural and vulnerable population can get subsidized or low-cost treatment with insurance companies or public healthcare schemes. The indirect medical cost includes transportation, accommodation, and food costs if people travel to a clinic in a distant place.<sup>[33]</sup> MHCs are mostly established to cut down costs and provide affordable healthcare solutions to vulnerable and rural communities. Medical and administrative

expenses and insurance issues are usually not a burden on the population it serves.<sup>[1]</sup> An essential prerequisite of the mobile health clinic is serving the underserved population with high-quality care at a low or minimal cost. The cost of disease management is not only in this facility, but such a service also cuts down logistics costs to reach healthcare setups. Opportunity cost, an element for poor people in the rural community, especially on daily wages, can be well managed in community outreach MHCs by planning operational timings of MHCs according to the community's availability. A study in 2014 reviewed an estimated 1,500–2,000 MHCs in the United States catering to the healthcare needs of more than 5 million population, mostly to the communities with the least access to high-quality healthcare services such as ethnic minorities, displaced, immigrants, rural dwellers, uninsured, and homeless people. In this study, visits made by women (54%) outranked men (46%).<sup>[11]</sup> The only available study done on MHCs conducted in Saudi Arabia a decade ago shows the opposite picture. Men were the most frequent visitors, i.e., 90.3% of the sample population.<sup>[14]</sup> The annual health records usually show disease-specific data<sup>[37]</sup> concludes the study that instead of disease-specific data, person-centered and based population measurements are emerging as decisive evidence in the primary healthcare domain.

### Acceptability

A doctor–patient relationship where the bond is driven by the patient-centered approach, informed consent, health education, and patient empowerment shows promising elements of excellent healthcare services. MHCs closer to their homes or neighborhood with cultural sensitivity and patient autonomy provide a trusting relationship between the provider fraternity and the community. MHCs in familiar surroundings are more welcomed as wellness and social platform for the community.<sup>[38]</sup> The Centers for Disease Control and Prevention (CDC) introduced three buckets of prevention,<sup>[39]</sup> including traditional, innovative, and total population prevention. The third bucket, i.e., total population or community comprehensive prevention, best fits the MHCs scenario where the target population is a specified rural area.<sup>[33]</sup> Thirty-six articles, out of which 26 articles mentioned acceptability as a significant determinant of healthcare access. However, their target population was patients with disabilities. They categorized acceptability further into the behavior of doctors/staff and the quality of care. Services were acceptable to people when the doctor–patient relationship was on the positive side. Similarly, people with mental illness showed reluctance due to their previous negative experience with traditional setups' quality of care. A cross-sectional study done in Saudi Arabia on MHCs did not evaluate acceptability per se. Nevertheless, the sample population was highly satisfied with the doctors and services.<sup>[14]</sup> Healthcare services can be customized and prioritized according to the rural community's acceptability and health needs. High-quality, timely, and appropriate primary care should be provided through MHCs. Medical and nonmedical staff should be trained in technical and communication skills to encourage trust in a patient-centered relationship. Healthcare providers who

are more sensitive to cultural beliefs and individual's behavior show a positive association with acceptability.<sup>[40]</sup> Technological innovation has created a great deal of feasibility for people living in the world. In all industries, technical progress has changed the outlook and initiated simplicity. Therefore, the mobile medical clinics within the remote areas of Saudi Arabia have to remove lots of barriers. Mobile medical clinics are different from traditional healthcare strategies. It has provided many benefits such as easy access to care by removing geographical differences, providing fixed healthcare settings, and removing social barriers. The mobile medical clinic provides many services such as delivering healthcare facilities at the doorstep, frequently convenient venue of convenience making communication easy between doctors and patients, reducing cost, providing detailed information about the insurance status, accessibility to diverse languages, and access to transportation. The research conducted interprets that most participants strongly agree that mobile clinics in remote areas of Saudi Arabia provide easy physical accessibility. Patients reached the mobile clinics quickly and agreed that mobile clinics were near their homes. The location of the mobile clinics was apparent and visible to the participants. Overall, reaching out to mobile clinics is easy and comfortable. While the respondent demographic characteristics are different from the Saudi population (17.6% females in study respondents compared to 49.1% for the general Saudi population), this low female participation was also observed in other studies,<sup>[14]</sup> where only 9.7% of respondents were females. This confirms an existing gender containing in accessing mobile clinic services, even though the female proportion increased from 2008 to 2020 by 8%. In addition, the results also describe no statistically significant difference between females and males in accessibility, with slightly higher female acceptability. Similarly, 98.8% of study participants accepted the gender of the mobile clinic staff providing the health services. In contrast, cultural barriers discourage females from participating in surveys and seeking healthcare. One issue present in both studies is the inclusion of females attending the clinics only, who may not adequately represent other females refraining from the service due to staff gender. With these highlights, the cause for the gender difference in study respondents could be in part social and related to the mobile clinic staff gender.

### Availability of mobile clinics services

The research interprets that the potential mobile health clinic provides some cost-saving benefits, one of the most significant benefits to the healthcare system.<sup>[41]</sup> The availability of mobile clinic services within the remote areas of Saudi Arabia establishes an initiative that plays an efficient role in improving patients' health and provides feasibility. It helps patients to avoid hospital admissions and assists in improving the lives of patients. The patients in this study accepted the waiting time. Patients do not have to wait for a more extended period before the check-up. The work schedules for mobile clinics are coinvents. However, it was the least acceptable item in this study, with 64.2% acceptance and 11.2% rejection. These results are consistent with<sup>[14]</sup> study,

where 20.5% of respondents did not accept the Al-Laith mobile clinic's working schedule in the Western region.

In the same context,<sup>[3]</sup> it has been reported that the mobile clinic schedule is one of the limiting constraints, leading to fragmentation of care. These are also added to the available healthcare system, including laboratory services, medications, and referrals. In contrast, our study respondents reported high availability of medications that they can easily retrieve medication given by doctors during the visits (97.4% can receive prescribed medications), and this difference may be attributed to the free medications provided by the government. The results show that the patients are delighted with the tools and equipment required for treatments. Disabled patients found mobile clinics slightly more accessible than other participants, but the difference was not statistically significant in contrast to the situation described for other primary healthcare settings where patients with disabilities found more obstacles in accessing health services than others.<sup>[33]</sup> The travel distance, transportation problems, perceived quality of care, and service availability were major reasons present in other primary healthcare settings, all of which are better in mobile clinics services.

### Affordability mobile clinics services

The study by the National Academies of Sciences, Engineering & Medicine<sup>[42]</sup> interprets that vulnerable populations can easily access mobile clinics, bolster prevention, manage chronic diseases, reduce costs, expand coverage, and delivery reform. Besides increasing opportunities for mobile clinics to partner with hospitals, health systems, and insurers to improve care at a lower price, the study results show the direct cost, “fee for service,” and “medication cost.” The “transportation” represents the indirect cost. The government provides health services free of charge. The medication is also free when it is available in the mobile clinic. Patients can easily afford the mobile clinic as it is the majorly inexpensive cost of medications. For the indirect cost, “the transportation” shows that most patients consider this cost affordable.

### Acceptability to mobile clinics services

The study discussed acceptability to mobile clinic services in three variables: language, discrimination, and staff gender, with a high overall acceptance rate (98.33%). Despite that, the acceptance for nondiscriminative service was slightly lower than the other two components (mean score of 4.75 compared to 4.90 and 4.93 for language and staff gender, respectively). Discrimination is fundamental as mobile clinics usually outreach remote areas where there are ethnic minorities and unique cultural norms. In total, 59% of mobile clinic clients in the United States were ethnic minorities, including Blacks, Hispanic, Asians, and native residents.<sup>[3]</sup> This issue needs special training for healthcare providers as well as regular monitoring as the service expands.

### Patient satisfaction mobile clinics services

Respondents in this study reported a very high satisfaction rate

of 98.3% satisfied. Other national and international publications support this result. For instance, in<sup>[14]</sup> the authors reported a 94.9% overall satisfaction rate, which was higher for respondents from the mountainous areas than coastal areas in Western Saudi Arabia. Similarly, the study by<sup>[43]</sup> interprets those patients are intensely satisfied with the mobile clinic service. It provides the patient's name and complete details. Along with the doctors' prescription, the tag name provides that patients can easily communicate with doctors individually without any difficulty and consults whenever patients face an emergency. Patients tend to be more satisfied as they do not have to face much time in waiting areas. Rural and urban provide prevention and healthcare services where people work. The study results show that most patients are extensively satisfied with the mobile clinic facilities as healthcare officers can understand patients' language. Mobile clinics protect patients from discrimination based on color and ethnicity. Patients can easily interact with their doctors, regardless of the physician's gender.

### Limitations

This study is not without limitations. First, participants in this study were those who have used MHCs and are keen to receive healthcare services from them; participants did not include those who do not visit the mobile clinics posing a selection bias. Second, the current study used a nonprobability sample; the issue of generalizability of the study's findings to a larger population may be limited. Finally, only a 49.16% response rate was achieved, limiting our sample size.

### Conclusion

This study was primarily concerned with evaluating access to mobile clinics in a rural area of Saudi Arabia. The mobile clinics provide PHC services to rural and underserved communities, considering various physical, financial, and social factors. We recommend the broader adoption of mobile clinics in remote areas of Saudi Arabia to facilitate access to healthcare and increase the geographical distribution of PHC services. Following the result of this study that showed the least acceptance percentage was related to work schedules compared to other items, we recommend re-evaluating mobile clinics' work schedules to meet the need of beneficiaries in rural areas. Given the scarcity of studies in mobile clinics in Saudi Arabia, further larger-scale studies are required to assess and evaluate MHCs.

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### Conflicts of interest

There are no conflicts of interest.

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