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Usefulness of volunteer urgent mobile health clinics in improving cost-effective healthcare in the Al-Qassim Region, Saudi Arabia

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***Abstract*---**Mobile clinics are generally customized vehicles equipped with important medical equipment and staff to provide primary health services for populations at risk, enforce disease prevention, and improve access to chronic health management, at reduced costs. The present study evaluated the usefulness and effectiveness of volunteer mobile clinics in providing healthcare in different medical specialties in rural area hospitals in Saudi Arabia. The study also estimated the cost of providing such healthcare facilities and stakeholder satisfaction through the use of a standardized questionnaire. A total of 1299 patients attended the 36 mobile clinics' setup with 39 volunteer consultants in five hospitals namely Al- Nabahanyah, Abanat, Qibah, and Qusiba. The age of the patients ranged between 1 to 80 years. The average cost per patient was reduced to 150 SAR which is 25% lesser than that of the national average cost of consultation (200 SAR). Based on the survey results it was seen that the overall satisfaction of patient services offered by mobile is very high (87.4%) while it ranged between 80-95% in different hospitals. However, the response rate was very low and ranged between 16-31% while the average response rate was 21.8%. It is concluded that mobile clinics are helpful in lowering health-care obstacles such as transportation, time, system complexity, and trust. They may be a vital element of the health care system, backed by government agencies, insurance companies, and volunteers, in order to provide health equity and reach the most disadvantaged and disenfranchised groups in need of quality and timely healthcare access.

***Keywords*---**Al Qassim, Healthcare cost, Mobile clinics, Saudi Vision 2030, Volunteer.

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1 Introduction

Mobile clinics are generally customized vehicles equipped with important medical equipment and staff to provide primary health services for populations at risk, enforce disease prevention, and improve access to chronic health management, at reduced costs (Hill *et al.,* 2014). They often deliver care to hard-to-reach or disaster-affected populations (Weiss *et al.,* 1999; Diaz-Perez *et al.,* 2004; Olteanu *et al.,* 2011). They are flexible in terms of personnel and services which can be tailored to geographic location, culture, language, gender, and/or choice of services to promote patient-centered healthcare (Guruge *et al.,* 2010). A typical mobile clinic program provides a range of primary care, dental care, and mental health care specifically management of chronic conditions requiring regular follow-up visits (Fils-Aimé *et al.,* 2018). Studies have indicated that mobile clinics can be effective in providing the same healthcare services provided in stationary healthcare facilities and are more cost effective for both clients and the healthcare providers compared to emergency room visits (Hill *et al.,* 2014; Fils-Aimé *et al.,* 2018; Attipoe-Dorcoo *et al.,* 2020). A study conducted in the USA estimated that mobile clinic programs resulted in annual savings of up to 36 USD for every 1 USD invested compared to emergency room visits (Hill *et al.,* 2014). However, there are some downsides to the idea of mobile clinics wherein initial capital investment and operational costs could be high (Pardeshi, 2005) and could also face limitations in terms of information management capacity, laboratory facilities, and staff recruitment (Post, 2007). Further, planning a mobile clinic program can involve multiple stakeholders from the private, non-profit, and public sectors, adding a level of complexity in the management of these programs not commonly found in other sectors (Douglass *et al.,* 2005; SHOPS Project, 2015). Consequently, the significant initial investment, such as acquisition costs of equipment and operating expenses for mobile clinics, needs careful planning, as well as serious consideration of outcomes and performance evaluation metrics (Muolavie *et al.,* 2000; Lien *et al.,* 2014).

As the health care system continues to evolve, it is important to understand the role of mobile health providers, because the ability to afford and provide healthcare in rural areas is a concern amidst efforts to provide access to quality healthcare through the objectives of The National Transformation Program (NTP) 2030. Vision 2030 program aims to achieve governmental operational excellence, improve economic enablers, and enhance living standards including healthcare (Saudi Vision 2030, 2020). Because empowerment of volunteers was one of the criteria that can enhance the living standard of the community, particularly in health care according to vision 2030, one of the aims of the Saudi vision 2030 is to reach one million volunteers that serve the community in different specialties (Saudi Vision 2030, 2020). Therefore, the number of community associations and non-profit sectors in the kingdom increased to 9015 at end of the year 2016. In view of this, the present study evaluates the usefulness and effectiveness of volunteer mobile clinics in providing healthcare in different medical specialties in rural area hospitals in Saudi Arabia. The study also estimated the cost of providing such healthcare facilities and patient satisfaction through the use of a questionnaire.

2 Materials and Methods

Clinics Setup

In the Al-Qassim area, four mobile clinics were deployed to four 50-bed rural hospitals. The Al-Qassim area lies in the center of Saudi Arabia. The hospitals targeted included Al- Nabahanyah, Abanat, Qibah, and Qusiba. These hospitals are situated in tiny settlements around the Al-Qassim area. Each community has a population of between 5000 and 46000 people. cardiology, dermatology, ENT, ophthalmology, gastrointestinal, pediatrics, obstetrics & gynecology, surgery, rheumatology, urology, endocrine, and internal medicine clinics were made available. Table 1 depicts the distribution of clinics in hospitals. The mobile clinics operated from December 2019 through February 2022. Before the consultation clinic, a primary medical committee was formed. The goal of forming this primary medical committee was to compile a list of patients for each clinic in each hospital prior to the clinic's start date and based on the severity of the situation.

Table 1
Distribution of mobile clinics in hospitals

Name of Hospital	Number of Clinics	Type of Clinic
Al-Nabahanyah Hospital	4	Dermatology, Cardiology, ENT, Ophthalmology,
Abanat Hospital	6	Internal Medicine (2), Dermatology, Pediatric, OB/GYN, Surgery.
Qebah Hospital	9	Internal Medicine, Gastroenterology, Thoracic, Dermatology, Cardiology, General Surgery, ENT, Endocrine. Urology.
Alsayah Hospital	10	Internal Medicine, Gastroenterology, Thoracic, Dermatology, Cardiology, General Surgery, ENT, Endocrine. Urology. Rheumatoid
Qusiba Hospital	7	Dermatology, Cardiology, orthopedic, ENT, Ophthalmology, Endocrine. Rheumatoid

Study design and cost analysis

Cross-sectional descriptive analysis was used to examine the economic values of the mobile clinics as well as the patient and medical volunteer satisfaction with the service of the free mobile clinics. The economic advantages were calculated using the cost of secondary and tertiary health care, which is 200 Saudi Riyal

(SAR). The computation was based only on the cost of the visit because medical examination and medicines were given by local hospitals under the Ministry of Health. Patients were requested to take part in questionnaires in order to provide feedback on the degree of performance of the mobile clinic services. The number of patients and clinics were obtained from the association's records following care delivery.

3 Results and Discussion

A mobile clinic is a specially designed vehicle that visits communities to offer health treatment. They provide a wide range of health services and are often staffed by a mix of physicians, nurses, community health workers, and other health professionals. While health care reform has increased insurance coverage, there are still significant barriers to regular health care, particularly for disadvantaged groups (Oriol *et al.,* 2009; Guruge *et al.,* 2010; Clark *et al.,* 2011; Sommers, 2015). Mobile health units assist marginalized areas in overcoming typical hurdles to health care access, such as time, distance, and trust, and have shown gains in health outcomes and cost savings (Song *et al.,* 2013; Brown-Connolly *et al.,* 2014; Drake *et al.,* 2015; Taylor *et al.,* 2016).

The present study evaluated the usefulness and effectiveness of volunteer mobile clinics in providing healthcare in different medical specialties in rural area hospitals in Saudi Arabia. The study also estimated the cost of providing such healthcare facilities and stakeholder satisfaction through the use of a standardized questionnaire.

A total of 1299 patients attended the mobile clinics' setup in five hospitals namely Al- Nabahanyah, Abanat, Qibah, and Qusiba (Table 2). The age of the patients ranged between 1 to 80 years. A total of 36 clinics comprising 14 different specialties (Dermatology, cardiology, orthopedic, ENT, ophthalmology, endocrine, rheumatoid, urology, general surgery, thoracic, gastroenterology, internal medicine, OB/GYN, and pediatric) were conducted between December 2019 through February 2022 with 39 volunteer medical consultants from various disciplines. The number of average patients attending each clinic was 36. The total cost of setting up mobile clinics in each hospital was divided by the number of patients attended and the average cost per patient was 150 SAR (Table 2) which is 25% lesser than that of the national average cost of consultation (200 SAR). It is noteworthy that the cost of the clinics was borne by the organizations and the medical facilities were provided free of cost to the patients.

Table 2
Patient enrolment and cost of clinic operations

Name of Hospital	Number of Clinics	Number of patients	Cost of each clinic (SAR)	Total cost of the clinics (SAR)
Al-Nabahanyah Hospital	4	153	150	22950
Abanat Hospital	6	312	150	46800
Qebah Hospital	9	327	150	49050

Alsayah Hospital	10	370	150	55500
Qusiba Hospital	7	137	150	20550
Total	36	1299	150	194850

Furthermore, of the 1299 patients who attended different clinics, the majority were males (Figure 1). Figure 2 depicts the education levels of the patients wherein, the majority (55%) were secondary and high school educated followed by less than secondary school education (30%) and university education (15%). The marital status of the patients is presented in Figure 3. Sixty-five percent of them were married and 35% were single. Among various specialties, internal medicine received the highest number of patients (247) followed by cardiology (206), general surgery (175), dermatology (150), and ENT (143). Other clinics received between 15-78 patients in total. The cases requiring further evaluation were referred to tertiary hospitals which included King Fahd Specialist Hospital, Buraidah, and Buraidah Central Hospital. In most cases, the referrals were proportionate to the number of patients received in each specialty wherein the highest referrals were made from internal medicine (40), cardiology (36), general surgery (35), and dermatology (35). The overall data on patients attended and referrals are presented in Figure 4. The average number of referrals across the specialties stood at 18.28%.

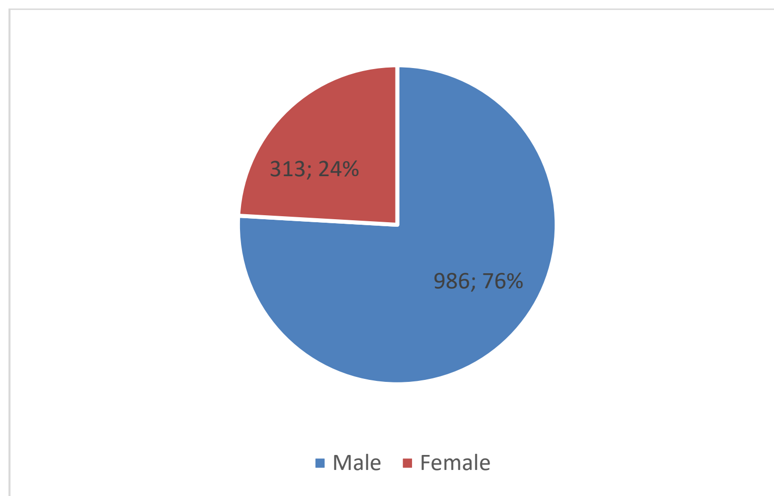

Figure 1. Gender characteristics of the patients treated

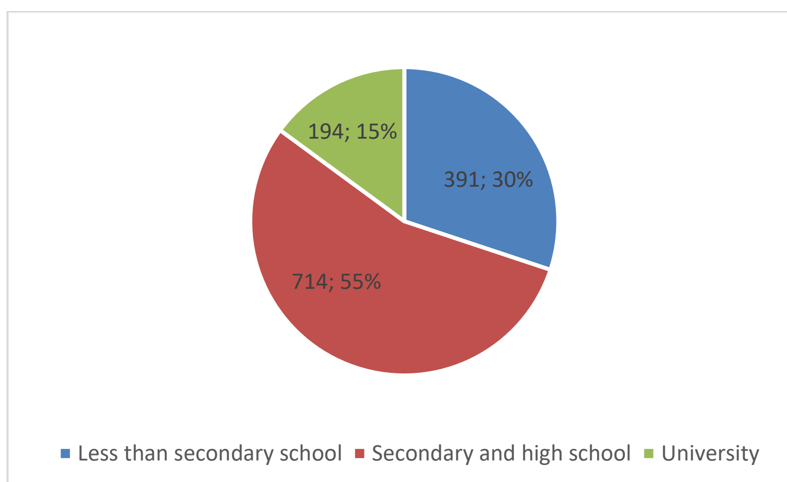

Figure 2. Education levels of the patients treated

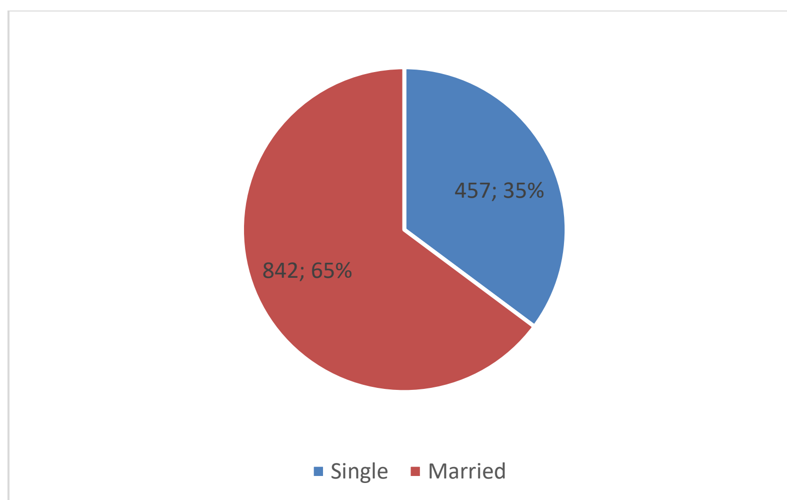

Figure 3. Marital status of the patients treated

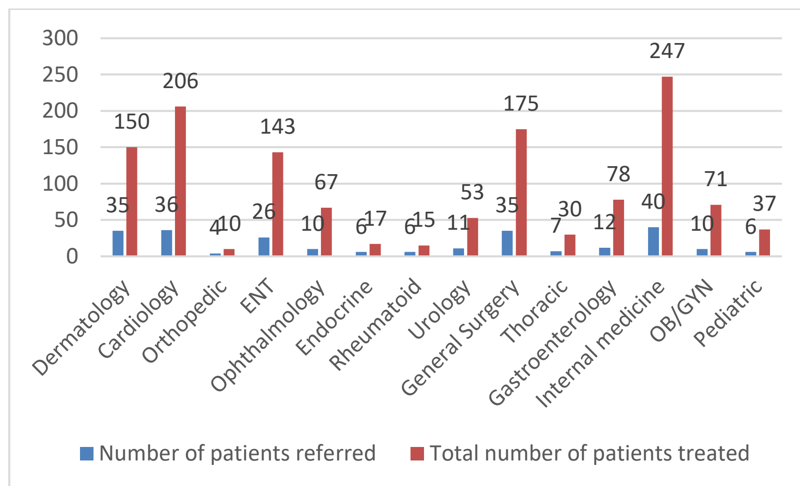

Figure 4. Distribution of patients treated and referred across medical specialties

A total of 1299 patients attended the 36 mobile clinics' setup with 39 volunteer consultants in five hospitals namely Al- Nabahanyah, Abanat, Qibah, and Qusiba. The average cost per patient was reduced to 150 SAR which is 25% lesser than that of the national average cost of consultation (200 SAR). Lowering operational costs is very important given the availability of primary and secondary preventative care at mobile clinics, health outcomes are very likely to improve while expenditures are lowered. Our observations are consistent with an earlier study wherein mobile clinics were effective in lowering the healthcare cost substantially (Malone *et al.,* 2020). As a result, future studies should consider these findings. Despite these constraints, the findings of the study provide insight into the innovative methods mobile clinics stretch the limits of the health care system and enhance health equity, particularly among our most vulnerable populations.

Overall satisfaction of mobile service satisfaction and respondents' percentages are shown in Figure 5. The response rate was very low and ranged between 16-31% while the average response rate was 21.8%. Based on the survey results it was seen that the overall satisfaction of patient services offered by mobile is very high (87.4%) while it ranged between 80-95% in different hospitals.

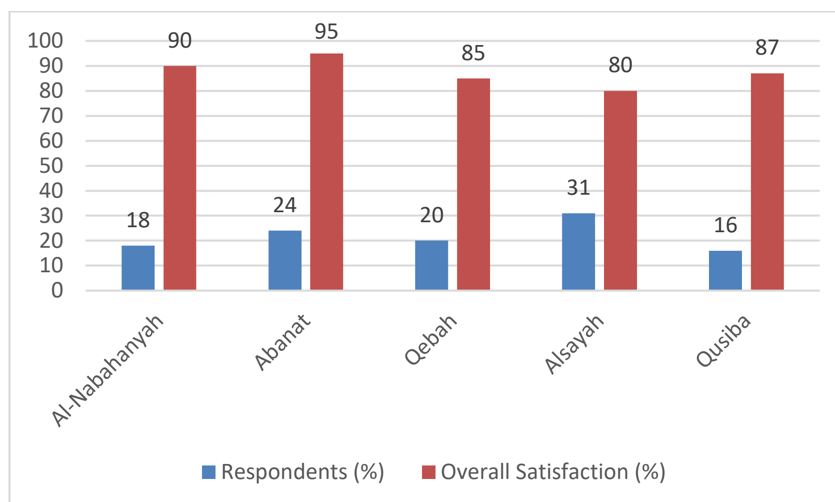

Figure 5. Respondents and overall patient satisfaction percentage

In our study, we found that though the overall satisfaction with patient services offered by mobile is very high (87.4%) the response rate was very low and ranged between 16-31%. This was predicted in this distant area due to cultural challenges that hinder women from participating in such surveys as well as visits to health institutions, save in emergency cases, and which require women to be accompanied by a male relative. Furthermore, the fact that the clinics were solely staffed by men may have deterred women from using them, since they may have gone to a primary health care center to obtain treatment from female healthcare personnel. Solutions for overcoming this barrier and increasing female use of mobile clinics might include adding female health care staff or extending mobile clinic working hours till later in the day or allowing male relatives to return from work and accompany female family members and children to the mobile clinic (Aljasir and Alghamdi, 2010). These steps are important because reducing inequities in healthcare access is an essential objective in healthcare and is vital for national health. Measuring the difficulty of access in really underserved regions, on the other hand, is a vital step in planning and implementing healthcare policy to improve those services and give additional assistance. Despite the existence of approaches and tools for modeling healthcare accessibility, the complexity of data makes it difficult to comprehend at the local level for focused program implementation (Sritart *et al.*, 2021).

4 Conclusion

Saudi Vision 2030 aimed to improve the general well-being of the Saudi population by providing healthcare services where people work, live, and play, and understanding why and how these systems function might inform successful community-clinical links. While primary care clinics and hospitals are available throughout the country, many underserved rural and urban communities continue to have healthcare inequities that may be addressed by increasing the network of mobile clinics. Furthermore, mobile clinics are particularly helpful in lowering health-care obstacles such as transportation, time, system complexity, and trust. They may be a vital element of the health care system, backed by

government agencies, insurance companies, and volunteers, in order to provide health equity and reach the most disadvantaged and disenfranchised groups in need of quality and timely healthcare access.

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