A Review Of The Public Healthcare System In Saudi Arabia

[1]Saad Abdullah Alqarni, [2]Saleh Awad Althobaiti, [3]Sultan Masad Althagafi, [4]Fatimah Mohaya Almutairi, [5]Abdulrahman Adwan Alotaibi, [6]Reema Shabeeb Al Harthi, [7]Abdualkreem Saad Alamri, & [8]Meshal Mehmas Aljueed

Abstract

This paper aims to review the past, present, and future public healthcare system and how well the current healthcare system was able to deal with the COVID-19 pandemic in Saudi Arabia. Google Scholar and Google were searched using appropriate search terms. The collected papers were screened and selected to arrive at the final number of reviewed here. With small variations in the year of certain development, the historical development of the healthcare system in Saudi Arabia is clear. With the arrival of the modern treatment system alongside the significant oil revenues, the country could adopt an all-around strategy for the comprehensive development of its healthcare system. The current status of the Saudi healthcare system consists of a mixture of earlier trends and new technologies for remote care and self-management of chronic problems by patients themselves. The absence of standards makes it difficult to compare Saudi healthcare reforms with those in advanced countries and compare the Saudi systems in different periods. Modern trends are primarily driven by technological advances for remote healthcare, self-management of chronic problems by patients themselves, and increasing accessibility and affordability. Weaknesses in the current public healthcare system have prompted privatisation. To achieve the healthcare goals of Saudi Vision 2030, large funding is required, and the government is not in a position to invest adequate funds in this sector. Hence, PPP or other privatisation have been proposed and are being implemented as a par[1]t of Saudi Vision 2030. During the current COVID-19 pandemic, the Saudi healthcare system implemented several timely and proactive strategies to contain and reduce new cases. There has been much success in this respect, with only around 500 new cases reported daily. The limitations on the availability of appropriate papers and the difficulty of cross-paper analyses due to different methods of expression of results were two major limitations of this review.

Keywords: *Saudi Arabia, Public Healthcare, COVID-19, Review.*

Introduction

A review of the public healthcare system in Saudi Arabia can provide valuable insights into the strengths and weaknesses of the current system and identify key areas for improvement. This in turn can inform policy decisions and resource allocation, ultimately leading to improved healthcare services for the population. Additionally, Saudi Arabia has undergone rapid economic and social changes in recent years, which may have had an impact on the healthcare system. Therefore, a review of the system can also shed light on the effects of these changes and help guide future development and reform efforts.

[1, 2, 3, 4, 5, 6, 7, 8] Taif Health Cluster, Ministry of Health, Saudi Arabia.
[1]Corresponding Author Email: best-man-007@hotmail.com

This is a systematic review of the public healthcare system in Saudi Arabia. The review will deal with the evolution of the healthcare system, healthcare system organisations, current status, and modern trends in healthcare systems like e-health and healthcare systems in Saudi Arabia's current COVID-19 period.

The paper will conclude with a summary of the findings of the review and future directions. Limitations of this review will also be dealt with.

Methodology
Search terms related to the above topics were used for searching Google Scholar (5 pages of any time and three pages of the 2019-2022 periods) and Google to collect, screen, and select literature suitable for this review. Papers were screened and selected for this review based on their relevance. Although full texts were preferred, if important information was available from abstracts, they were also included. A total of 28 papers were selected in this manner.

Results

Evolution of the healthcare system in Saudi Arabia
The World Population Review (2022) estimated the population of Saudi Arabia for 2022 to be 35.85 million (41st in global ranking), increasing from 35.3 million in 2021. Current projections predict the population will reach its peak in 2060 at 45.35 million people and slowly decline after 2061. The estimated annual population growth rate for the country is 1.6%, currently placing it 72nd in the global ranking. This growth is also expected to decline after 2030, reaching 0.277% in 2060 with a corresponding decrease in women's fertility rate. The migration rate of people from other countries is 193 per day. This rate seriously affects the country's economic system. About 32.4% of the population is 0-14 years of age. About 64.8% are in the age group of 15-64 years. The 65+ age group comprises the remaining 2.8% of the total population. As the ageing population increases, the challenges of caring for a large, non-productive population also increase. Therefore, the Saudi healthcare system has a specific component for old-age care.

Health services in Saudi Arabia have increased and improved significantly during recent decades. The first public health department was established in Mecca in 1925 through a royal decree from King Abdulaziz. The role of this department was to sponsor and monitor free health care for the population and pilgrims by establishing many hospitals and dispensaries. This was an important first step in providing curative health services. However, the national income was not sufficient to achieve major progress in health care. The majority of people continued to depend on traditional medicines. The incidence of epidemic diseases remained high among the population and pilgrims. Another royal decree led to the establishment of the Ministry of Health (MoH) in 1950. With the initiation of five-year plans in 1975, the healthcare system progressed rapidly (Almalki, FitzGerald, & Clark, 2011). Further push to build a healthy, highly productive population has been implemented through the Saudi Vision 2030 (Saudi Arabia, 2021) programme since 2016.

The historical trend of healthcare development in Saudi Arabia was traced by Al-sharqi (2012) as a part of a comparison of healthcare systems in Saudi Arabia, the USA, and Australia. Before 1925, mostly traditional and religious or spiritual treatments were practised in almost all regions of Saudi Arabia. Only in certain areas, including the pilgrimage centres, do inadequate modern facilities exist to take care of international pilgrims. King Abdulaziz established a health department in 1925 to improve healthcare facilities for the general public. An organisation, the Bureau of Health and Aid, was also established in the same year. The Bill of Healthcare Services, consisting of 111 clauses, was issued in 1926 to guide the implementation of the healthcare system, the structure and responsibilities of the Bureau of Health and Aid, and structural and administrative systems for hospital operations. During 1941-1951, plenty of oil revenue was available to spend on

healthcare. Hence, healthcare organisations started to improve access to and quality of care. Capacity building of hospitals and preventive health management practices were initiated as policies. Dispensaries and quarantine at airports and seaports were also introduced during this period. The Ministry of Health (MoH) was created in 1951. MoH took over from the Bureau of Health and Aid. This development changed the concept of 'free' health services in the country. A definition of 'fee' for private hospital treatment was introduced. The strength of both the public and private sector hospitals was improved with the required human resources. As a result of the large-scale implementation of these steps, health expenditures increased from $US1.73 Million to $US1821.6 Million during this period. This increase was mainly aimed at improving the quality of healthcare services and preventive care programmes. The Alma Alta Declaration was adopted in 1978 to facilitate access to healthcare services, develop the health status of the population, improve health services management, and carry out research into health problems. The developments from 1981 to the present saw the MoH continuing to be the main organisation responsible for the provision of healthcare services in general and specialized hospitals. The Ministry also collaborates with several other government agencies to provide healthcare services to the population. The National Guards hospitals, the hospitals of the Ministry of the Interior, the Ministry of Defence and Aviation, and the Royal Commission for Jubail and Yanbu provide healthcare services to their employees and all Saudi citizens under special procedures prescribed by MoH. The Red Crescent Society and other voluntary organisations provide health emergency services and medical assistance during the annual pilgrimage season. Until 1999, healthcare services were free for the majority of Saudi citizens and expatriates through public or private healthcare providers. The Saudi government reformed its health policy to increase the availability of its healthcare services and to achieve parity with international medical advances by inviting the private sector to contribute. The health policy in the 21st Century, the New Saudi Health System (NSHS), implemented in 2002, promised equality of access and improvement in the quality of services in the entire country. Its mission was to utilize the private sector for services to insured individuals and to provide public healthcare services if the private services were inappropriate, unavailable, or inaccessible. Here, the health insurance companies were expected to act as a buffer between healthcare service providers and the patients or their employers. In the first stage of NSHS implementation in mid-2002, health insurance was made mandatory for all Saudi and expatriate workers in the private sector. Other Saudi citizens could either select free public healthcare services at public hospitals or pay for private sector services directly. They also had the option of purchasing an insurance plan for private healthcare services. The lessons learned in the first stage were used in the second stage to cover all Saudi citizens.

A slightly different version of the history of the Saudi healthcare system was given by Dabbagh (n.d.). In 1925, a public health department was established in Makkah and Public Health and Ambulance Services were launched later that year. MoH was said to have been established in 1950 instead of 1951. A few milestones of MoH have been listed. The differences could be due to the differences in converting Hijra year to Gregory year.

Current status of the Saudi healthcare system
Now, the MoH is the major provider of healthcare and finance for the Saudi population. There are 504 hospitals and 78600 beds in Saudi Arabia as of 2020, steadily increasing from 415 in 2010 (Statista, 2022). Against the WHO recommendation of 3 beds per 1000 population, Saudi Arabia had 2.4 beds in 2017 (Trading Economics, 2022). According to the Saudi government data, in 2015, there were 41297 beds in MoH facilities, 11449 beds in other government sectors, and 16448 beds in the private sector. These numbers are projected to increase to 74,000, 26,000, and 20,000, respectively (Alshamlan & Zverovich, 2018). The increasing population, especially the geriatric population, increasing prevalence of chronic health problems, growing trend of smoking, and adoption of modern lifestyles are given as the reasons for the need for more hospitals and beds in the country.

A diagram of the current healthcare delivery system provided by (Almalki, FitzGerald, & Clark, 2011) has been presented in Fig 1.
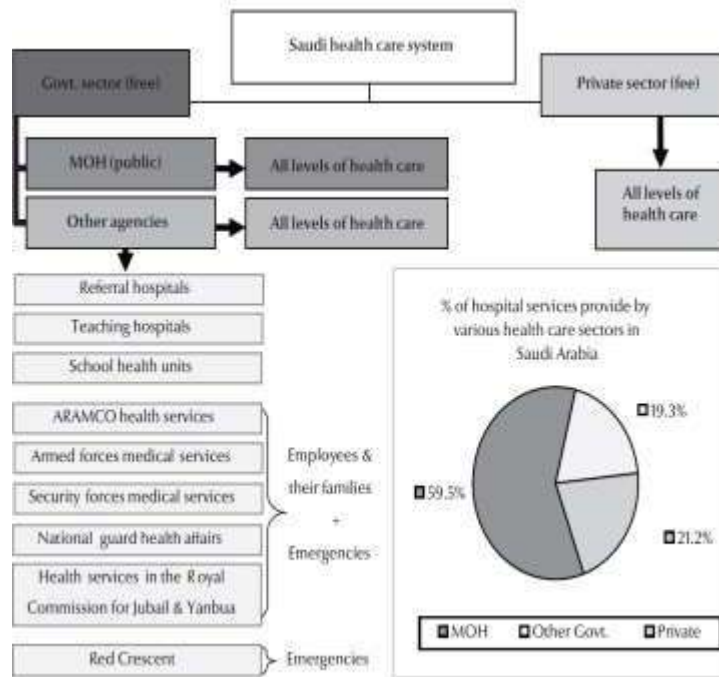

Figure 1 The current healthcare delivery system in Saudi Arabia (Almalki, FitzGerald, & Clark, 2011).

The current organisational structure of MoH is given in Fig 2.

The two diagrams provide a good overview of the current organisational and structural aspects of the Saudi healthcare system. The regulatory aspects of the Saudi healthcare system are handled by the National Health Council, the Ministry of Health, the Saudi Commission for Health Specialties, the Council of Co-operative Health Insurance, and the Saudi Food and Drug Authority. The strengths of the current Saudi healthcare system are universal coverage, accessibility for all, comprehensive at four care levels (Fig 4), and safety and equity. However, the primary care system is weak. There is multi-sectoral control leading to duplication of services, coordination difficulties, waste of resources, and poor electronic health records system.
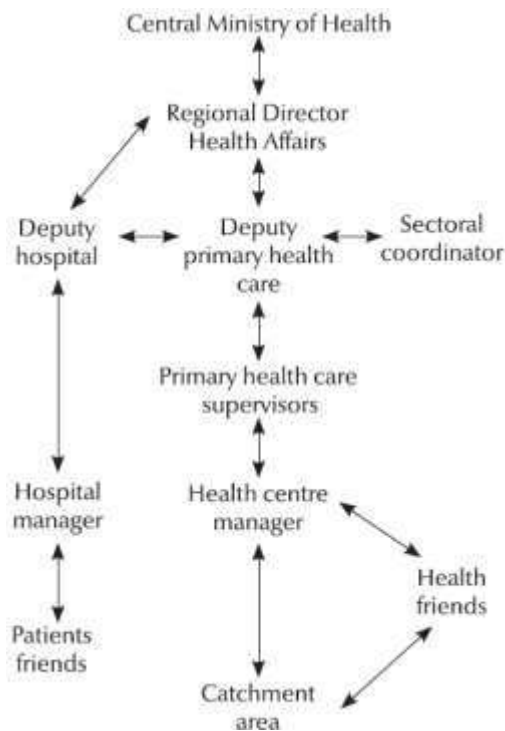
Figure 2 The current organisational structure of the Ministry of Health, Saudi Arabia (Almalki, FitzGerald, & Clark, 2011).

Saudi Arabia has invested heavily in improving its healthcare system by establishing healthcare infrastructures and other components. In 2016, expenditure on health on a per capita basis in Saudi Arabia was the lowest when compared to Australia, the USA, the UK, and France, as shown in Fig 3. The highest was in the USA, followed by Australia. Now, the situation has improved. In 2018, the inflation-adjusted PPP-based per capita healthcare expenditure was 3502 USD, a triple-fold growth.
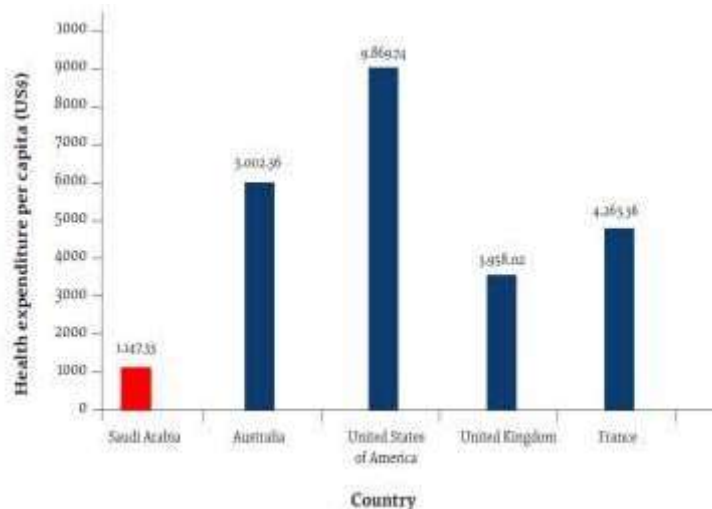

Figure 3 Healthcare expenditure of Saudi Arabia compared to four developed countries (Asmri, Almalki, Fitzgerald, & Clark, 2020).

However, their efficiency and efficacy suffer from several inadequacies. Asmri, Almalki, Fitzgerald, and Clark (2020) identified the areas for improvement in the case of primary healthcare as the scope, structure, infrastructure, financing, increased demand, increased costs, and workforce capacity. Critical challenges like inequitable access to health services, quality and safety of services, the growing burden of chronic diseases, lack of an effective information system, management and leadership issues, and gaps in the referral system also exist. The current Saudi healthcare system has four layers, as shown in Fig 4.

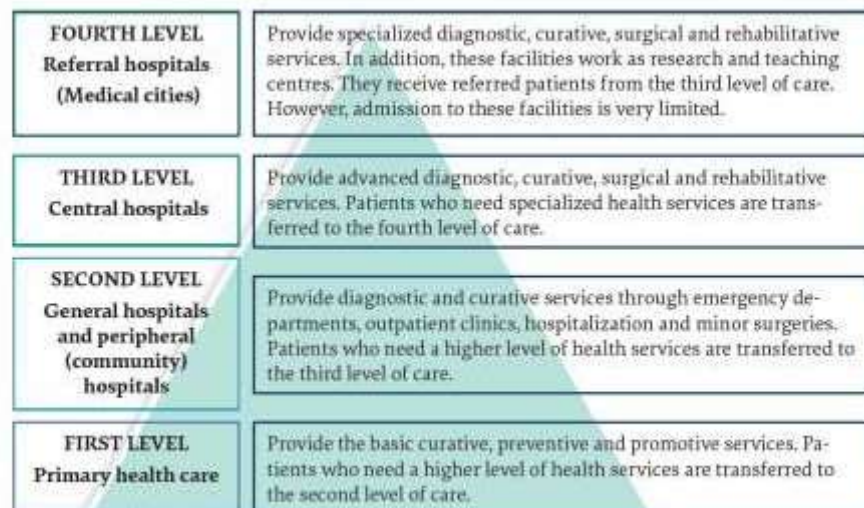| FOURTH LEVEL Referral hospitals (Medical cities) | Provide specialized diagnostic, curative, surgical and rehabilitative services. In addition, these facilities work as research and teaching centres. They receive referred patients from the third level of care. However, admission to these facilities is very limited. |
THIRD LEVEL Central hospitals	Provide advanced diagnostic, curative, surgical and rehabilitative services. Patients who need specialized health services are transferred to the fourth level of care.
SECOND LEVEL General hospitals and peripheral (community) hospitals	Provide diagnostic and curative services through emergency departments, outpatient clinics, hospitalization and minor surgeries. Patients who need a higher level of health services are transferred to the third level of care.
FIRST LEVEL Primary health care	Provide the basic curative, preventive and promotive services. Patients who need a higher level of health services are transferred to the second level of care.

Figure 4 The four layers of the Saudi healthcare system (Asmri, Almalki, Fitzgerald, & Clark, 2020).

In a master thesis, Gamaleldeen (2015) observed that the main challenge of the current Saudi Arabian healthcare system as a whole is that the major health services of the MOH are located in a few free-standing hospitals confined to a few locations in large cities rather than smaller outpatient clinics spread out throughout the country to cover more area. This has happened mainly due to the unwillingness of healthcare professionals to serve smaller towns and rural areas, as many amenities are not available to them in these places. There is also a shortage of healthcare resources, including physicians, nurses, and healthcare facilities and equipment, reflecting this imbalanced spread of infrastructure.

An investigation on the level of adoption of health data standards in Saudi Arabia by Alkraiji, Jackson, and Murray (2016) showed technological, infrastructure, organisational, and environmental challenges to its full implementation. The technological factors were the complexity and compatibility of health data standards, IT infrastructure, switching costs, market uncertainties, systems integration, and promoting the use of advanced systems. The organisational factors were the lack of adequate policies and procedures and information management plan, resistance to change, data analysis, and accreditation. The main environmental factors were the lack of a national regulator and data exchange plan, the national healthcare system, and the shortage of professionals.

In the case of primary healthcare in Saudi Arabia, good access and effective care were observed (Almutairi & Al Shamsi, 2020) for maternal healthcare and the control of epidemic diseases. On the other hand, poor access and effectiveness of care were noted in the case of chronic disease management programmes, referral patterns as reflected in referral letters and feedback reports, health education, and interpersonal care due to language barriers. The barriers to high-quality care were problems with evidence-based practice implementation, professional development, the use of referrals to secondary care,

and organisational culture. Successful improvements were noted in the case of mobile medical units, electronic referrals, online translation tools, and mobile devices and their applications. These can be implemented to improve the quality of the primary healthcare system in this country.

Of the 315166 prescriptions of outpatients and inpatients of Saudi hospitals screened, 4934 (1.56%) contained prescription errors. Of these, 30.7% were related to improper dose and 20% were related to improper frequency. Two-thirds of prescribing errors did not cause any harm to patients. Most prescribing errors were made by medical residents (52%), followed by specialists (33%). Prescribing errors were associated with a lack of documenting clinical information and prescribing anti-infective medications. For this research, Alharaibi, et al. (2021) used the data from the Medication Error Electronic Report Forms database for 2017 and 2018.

The changing international scenario, reduced oil revenues, high population growth, emerging lifestyle diseases, and demands for a better quality of care have impacted the development of the Saudi health system. In this article, Rahman and Alsharqi (2019) contended that the current economic conditions of the KSA and the dynamics of local and global markets were the primary drivers for healthcare reforms.

Saudi Vision 2030
Saudi Vision 2030, initiated in 2016 (Saudi Arabia, 2021), was aimed at the rapid economic growth of Saudi Arabia with specifically targeted growth areas involving high investments. The health initiative of Vision 2030 was caused by the rapid increase in population and demographic shift towards the older population. The currently available free healthcare services cannot meet the growing demand. As MoH funding was progressively reduced by the Saudi government since 2015, free healthcare had to be denied to private sector employees. Hence, to establish a sustainable healthcare system, privatisation and finding a method of financing such a system were required. The 15 objectives of the National Healthcare Transformation Programme for improved quality of life were incorporated into Vision 2030 healthcare projects. The Vision Realisation Officer (VSO) is responsible for implementing these projects to achieve the objectives. The role of the MoH will be limited to its regulatory role in this scheme (Dabbagh, n.d.).

In Vision 2030, the healthcare sector development is to be achieved through privatisation. Privatisation is already gaining ground in the Saudi healthcare system. However, the role of the public healthcare sector is critical for achieving the health of all sections of its population. Therefore, along with privatisation, the government must strengthen its public healthcare sector to ensure affordable, accessible, and high-quality healthcare for all. Increased privatization leads to rising costs for people in health care and adversely affects equity and accountability in the provision of its services. The government has been promoting private-sector healthcare since the 1990s. The government encourages the entry of the private sector into the healthcare sector by providing interest-free loans to construct private facilities. This strategy led to the privatization and expansion of the private healthcare sector from 18 in 1971 to 91 in 2000 and 163 in 2019. The private hospitals were owned and operated by different individuals and organizations consisting of physicians or other health professionals who wanted to expand their practice in the private sector. Direct entry of corporates to invest in the healthcare sector over the last two decades. The government introduced some changes in the regulations to increase investment in primary health care, public-private partnerships (PPP), and privatization of one of the medical cities. The short-term aim for 2020 was to privatize 2,259 Primary Health Centres (PHCs), 295 hospitals, and one of the medical cities. By 2030, 200 hospitals and 2300 PHCs are to be privatised. In the PPP model, the government wants to give hospital management to the private sector and keep all other key components with it. In line with Vision 2030 objectives, the principal objectives of privatization in healthcare were strengthening the targeted private sector to increase private investment in state-owned entities, improving the

quality of services, and easing government finance. The role of the government will be limited to legislative, regulatory, and organizational development. The health sector was opened up for foreign investment up to even 100% ownership investment, unlike other sectors of the economy. Privatisation is especially significant as the government funds are fast draining out to meet the entire cost of population healthcare. The need for additional healthcare resources has been aggravated by the current COVID-19 pandemic (Rahman, 2020).

To meet the shortage of trained healthcare professionals, Saudi Arabia needs to build appropriate HRD capacity along with aggressive policy regulation. The future investment in the healthcare sector should first meet the needs of local healthcare human resources. Saudization and the 'Nitaqat' programmes have been effective in pushing the Saudization targets in the private sector, providing a high scope for the absorption of a larger number of young, trained Saudi people in the healthcare sector (Al-Hanawi, Khan, & Al-Borie, 2019).

In Saudi Arabia, palliative care in Saudi Arabia is still in its early stages. Although two decades have passed, palliative care is not available in many regions across Saudi Arabia. To implement the transmission projects of healthcare reforms of Vision 2030, a group of expert healthcare professionals, Care Design Group (CDG 1-3, was asked to develop a healthcare model for patients with life-shortening illnesses in Saudi Arabia. The care pathway for the end of life care was explained in this paper by Alshammary, Duraisamy, Albalawi, and Ratnapalan (2019) in Fig 5.

Figure 5 The end-of-life care pathway (Alshammary, Duraisamy, Albalawi, & Ratnapalan, 2019).

Modern trends

According to Rahman and Salam (2021), Saudi Arabia has been changing its healthcare system from a predominantly free, public, and comprehensive system under a welfare model to an increasingly mixed-economy model. Thus, the welfare state is slowly moving toward a liberal model. This leads to the domination of market forces in healthcare provisions. The private sector has been trusted to provide better healthcare provision. The country is unable to manage the massive problems in the health sector caused by population growth, lifestyle changes, the shift in disease patterns, higher expectations, increasing healthcare costs, limited infrastructure and resources, and poor management practices in providing quality healthcare. There is a need to attract private sector investment to improve quality and efficiency, develop manpower, and standardize services. The current pattern of unsustainable healthcare drives the restructuring of the present healthcare system toward its institutionalization to meet future challenges.

Significant advantages to implementing powerful predictive analytics in healthcare settings were identified. If the Saudi Arabian healthcare system needs to move into big data analytics, its hospitals need to have complete and functional EMR systems in place. However, most Saudi hospitals are paper-based and use very basic software tools. A nationwide healthcare strategy aimed at supporting the nationwide transition to EMR systems was initiated in 2008. However, it failed because the Saudi hospitals faced many implementation challenges. During 2007-2011, $10 million was wasted on 52 healthcare IT projects. The challenges of financial, organizational, and regulatory types and the lack

of specialized manpower to execute EMR projects have been identified. Saudi Arabia needs to establish a national body to implement a unified national plan. Even beyond implementation, physicians need to be motivated to adopt EHR technologies. If they are convinced about the predictive power of big data analytics through research using data mining, the physicians may adopt it. The use of predictive analytics is highly beneficial to predict patients at high risk and provide earlier treatment for chronic problems to avoid medical complications, reduce treatment costs, and reduce the mortality rate (Alharthi, 2018).

Privatization of health care may lead to unequal healthcare access between poor and rich and increase healthcare costs. To address the growing healthcare needs, effective utilization of the healthcare workforce in public health, rather than privatisation alone, is essential. In this respect, the survey results (Alanzi, 2021) revealed the Saudization programme, creating employment opportunities in rural areas, growth in the economy, increased opportunities for women and the disabled, and growth in employment as the major areas for the use of gig economy in the Saudi Arabian health-care system.

According to Rahman and Al-Borie (2021), although the Saudi government highlighted the Vision 2030 healthcare programmes to gain popularity, actual action to improve population health is limited. The government needs to pay increased attention to the development of a sustainable healthcare system by strengthening human resources, decentralization, and efficient use of resources through stewardship, good governance, accountability, and transparency.

The challenges and solutions for security and privacy in the case of the smart healthcare system in Saudi Arabia were reviewed by Algarni (2019). For a smart healthcare system, sensors, wearables, and devices monitor a patient's vital parameters. The security and privacy of these vital parameters during collection and transmission are the major concerns. Classification systems for various aspects of privacy and security of these vital parameters during collection and transmission were also done.

The Internet of Things (IoT) provides smart services and remote monitoring across healthcare systems through a set of interconnected networks and devices. The nature of patients' sensitive and confidential information in IoT-based data collection and management makes ensuring security a critical issue in IoT-based healthcare systems. Based on the results obtained, Nasiri, Sadoughi, Tadayon, and Dehnad (2019) identified two main groups of security requirements related to cyber security and cyber resiliency. Cyber security consists of two parts: CIA Triad (three features) and non-CIA (seven features). Six major features of cybersecurity were identified as: reliability, safety, maintainability, survivability, performability, and information security (covering the CIA triad of availability, confidentiality, and integrity).

Recently, artificial intelligence (AI) and big data analytics have been applied to mobile health to provide an effective healthcare system. Various unorganized and unstructured datasets occur due to the emergence of mobile applications along with healthcare systems. These data are not managed well. A schematic diagram of the m-healthcare system was provided by Alotaibi (2020) and given in Fig 6.
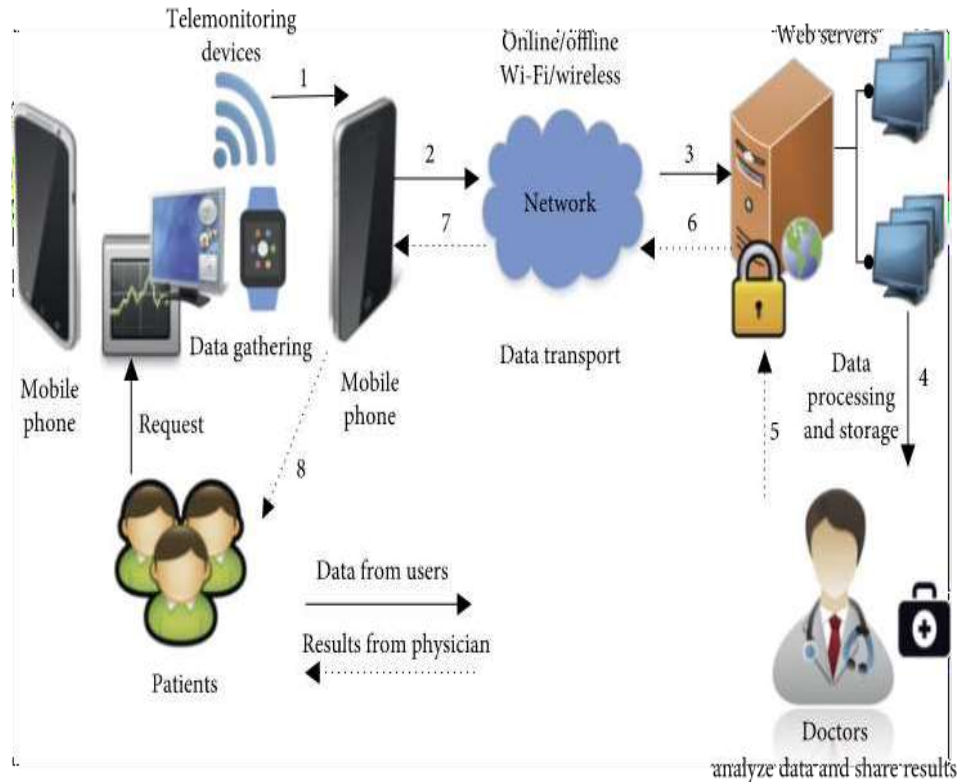
Figure 6 Schematic diagram of the mobile healthcare system (Alotaibi, 2020)

Briefly, mobile phones are used by patients to generate data from multiple telemonitoring devices. These data are transmitted to the doctors for treatment and also stored in networks for processing and analysis, which can be used by doctors to provide evidence-based treatment to patients.

The usefulness of blockchain technology for ensuring the safety of healthcare data was explored by Quasim, Algarni, Radwan, and Alshmrani (2020). Cybercriminals are working hard and using time and resources to exploit and monetize healthcare data. The blockchain can help in creating a single database to collect data during clinical trials and allow patients' data security. The authors proposed a framework for making a healthcare system using blockchain technology.

According to Shafqat, et al. (2020), there is increased interest in the use of big data technology in healthcare to manage massive collections of heterogeneous health datasets such as electronic health records and sensor data. These are increasing in volume and variety due to the commoditization of digital devices. The modern healthcare system requires an overhaul of the ill-equipped traditional healthcare software/hardware paradigms and an augmentation of new "big data" computing and analysis capabilities.

As Saudi Arabia is well ahead in its Vision 2030 implementation, the achievement of its healthcare targets may be affected due to its workforce struggling with shortages, skill imbalance, gender disparity, and access issues. Its healthcare system should adopt a rigorous approach through heavy investments in medical, nursing, and other specialized fields of education. Planning for the healthcare workforce needs to consider appropriate strategies to reflect all aspects related to their number, skills, and gender distribution to meet the future health needs of the population and thus facilitate the achievement of the Vision.

Healthcare during the current COVID-19 period
Saudi Arabia has been facing the double burden of Middle Eastern respiratory syndrome coronavirus (MERS-CoV) and coronavirus-2 (SARS-CoV-2) or COVID-19. Waseem, et al. (2022) suggested some simultaneous management and prevention strategies to address the spread and mortality due to these two diseases. The MERS outbreak has been prevalent since 2012, and the first COVID-19 case was reported in March 2020. Its healthcare system has been facing the challenge of simultaneously keeping two potentially deadly viral infections under control. The simultaneous allocation of healthcare resources to both diseases may be problematic. The nosocomial spread of both viruses poses a high risk of dual infection of healthcare workers, their families, and close contacts. Although the mortality rate is higher in the case of MERS, the spread is higher in the case of COVID-19 due to the latter being non-symptomatic in many cases. The existence of common characteristics between the two diseases makes awareness and education programmes difficult. No specific vaccine or antiviral drug exists for MERS. Apart from the standard management practices for these two diseases, simultaneous testing of the population for MERS-CoV and SARS-CoV-2 can facilitate combating these two overwhelming and simultaneous outbreaks. The prevention and management strategies need to be based on the results of epidemiological and demographic studies of the two diseases. Simultaneous testing facilities for both diseases, with special attention to camel workers (MERS). With the increasing need for healthcare services, the recent COVID-19 pandemic has created challenges not only associated with patients but also with physicians.

The extent to which the MERS experience helped Saudi Arabia combat the COVID-19 pandemic was assessed by Algaissi, Alharbi, Hassanain, and Hashem (2020). On February 6th, almost a month before the first COVID-19 case was identified in the country, the first early proactive decision was issued by the Saudi government in response to the spread of the COVID-19 pandemic. It stopped all direct flights between Saudi Arabia and China. On February 27th, the government suspended entry of Hajj and Umrah pilgrims and tourists and monitored all entry points to Makkah and Madinah. On February 28th, Saudi Arabia banned the inbound travel of individuals from COVID-affected countries, including GCC citizens who had travelled to the affected countries before coming to Saudi Arabia. On March 4th, Umrah was completely suspended, and the two holy mosques in Makkah and Madinah were closed daily for cleaning and disinfection by March 5th. On March 8th, the Saudi government shifted schools and universities to remote learning and virtual classrooms. This was accompanied by a travel ban to all affected countries and putting in place mandatory quarantine for passengers who have already arrived from these countries. On March 9th, Saudi Arabia pledged 10 million US dollars to the WHO to help in their efforts to fight the pandemic. By March 12th, all social and governmental gatherings and events were suspended or postponed. These included the Saudi-African and Arab-African summits. All international and domestic air travel, sports events, and workplaces (except security and health sectors) were suspended. The five daily prayers in homes. Digital health was quickly activated and utilized for several services, like a "my health" app for people to seek medical help and receive medical prescriptions without the need to visit medical centres. Various awareness campaigns using celebrities were held through social media. Imposing curfews, lockdowns of major cities, total travel bans within the country, enforcing these with penalties for violations, and free healthcare for all citizens. The various strategies, along with the daily new cases, have been mapped as given in Fig 7.
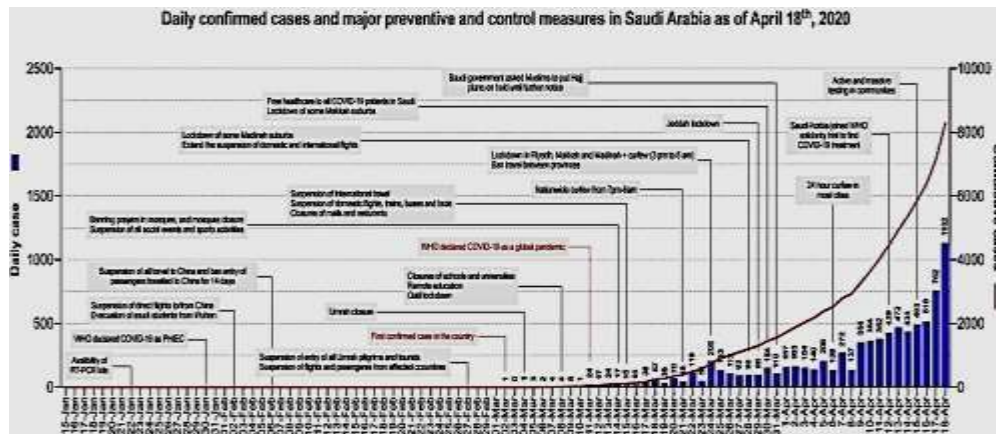
Figure 7 Mapping daily new COVID-19 cases and the response of the Saudi government (Algaissi, Alharbi, Hassanain, & Hashem, 2020).

The experiences of MERS emergence in 2012 continue, but the COVID-19 epidemic has put Saudi Arabia on a high alert and ready to take whatever measures to curb COVID-19 spread. In these respects and in preventing the further spread of COVID-19, Saudi Arabia has performed much better than many other countries.

Adly, et al. (2020) evaluated the preventive strategies of the Saudi government to minimise the spread of COVID-19 and developed a detailed COVID-19 prevention strategy as a framework for the Saudi Arabia community. Performing screening tests as early as possible for rapid detection of infected cases, fast treatment, and instant isolation for suspected cases were the most definitive public health strategies. Preventive measures reduced the infection and death rates around Saudi Arabia by 27%. A diagram of the timeline of preventive steps taken by the Saudi government compared with the daily COVID-19 confirmed new cases recorded from February 3–July 21 2020, has been given by the authors (Fig 8)
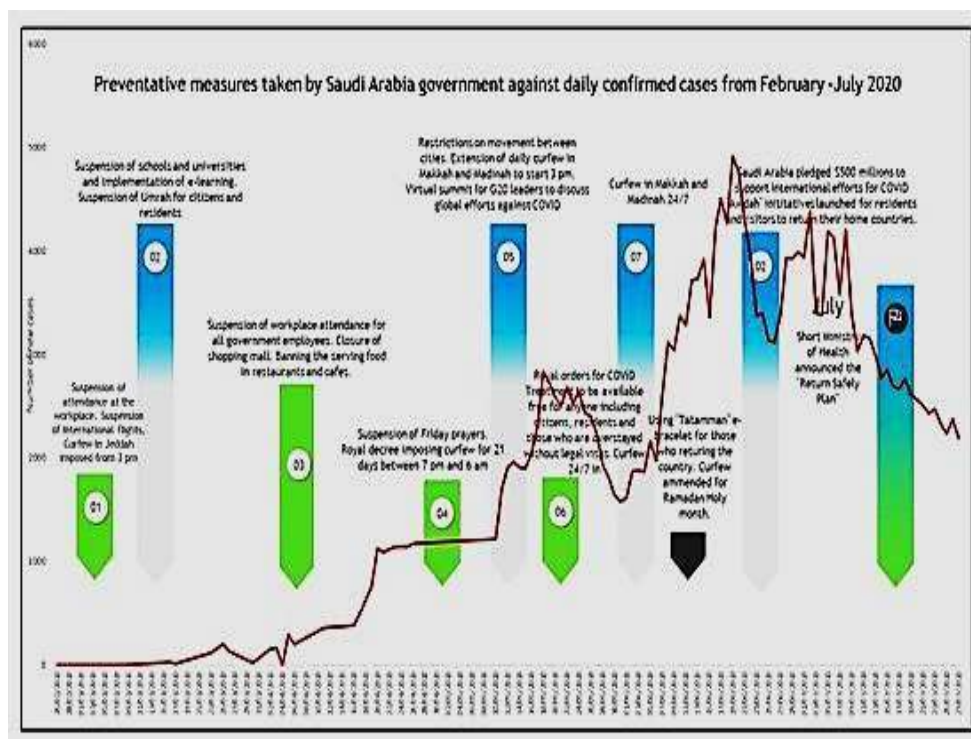

Figure 8 Timeline of preventive measures vis-vis daily fresh COVID-19 cases in Saudi Arabia (Adly, et al., 2020).

The preventive strategies were not effective until early March. Only when movement restrictions were imposed from 12 March did a dramatic decline in daily cases. The use of social media for announcing policy changes and increasing awareness of COVID-19 among the public were very effective preventive strategies. A set of preventive measures proposed by the authors is presented in Fig 6. Similar strategies have been adopted in other countries.

Conclusions

Although Saudi Arabia has been updating its healthcare system in line with the rapid development of technologies, most of them are still in the half-done stage. Many methods to improve the healthcare system have been suggested in the reviewed papers. One notable method is the progressive privatisation of healthcare. However, there is also a need to retain and improve public healthcare institutions to ensure equity and accessibility to the entire population. Only when there is a judicious mixing of private and public healthcare institutions like PPP can the healthcare targets of Saudi Vision 2030 be achieved.

The Saudi government has been implementing proactive preventive policies against the current COVID-19 pandemic. The policy initiatives match the surge of the pandemic in most of the period examined. Still, some challenges related to remote and rural areas remain.

Papers dealing with healthcare systems were fewer. A systematic review by combining quantitative data from different papers was not possible, as most of them were not expressed in the same units.

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