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The Impact of the Covid-19 Pandemic Aspects on the Quality of Health Services in Jordan

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Abstract

This study is a combination between quality management and crisis management within a vital sector, i.e., the health sector, which requires continuous improvement and sustainability of its services that guarantee quality standards. This study aims to investigate the impact of the Covid-19 pandemic on the quality of health services in Jordan. An electronic national survey was designed and distributed after conducting the pilot study consisting of 50 respondents. The data was collected from 334 COVID-19-infected patients and non-infected patients who benefited from the medical services in Jordan. The results of the SEM-PLS confirm a statistically significant positive impact of Corona pandemic on the quality of health services. In addition, it shows a high agreement on the health service quality level. This study concludes that Jordan, like the countries of the Eastern Mediterranean and North Africa (MENA), has suffered from the effects of the Corona virus, and this crisis creates many challenges and threats to its healthcare systems. Therefore, researchers pointed out some recommendations for top management and decision-makers that the government should formulate flexible and long-term health strategies that can deal with sudden events and situations, guided by the information from this study.

Keywords

Quality management, Quality of health services, Corona pandemic, Jordan

JEL Classification

H12, H75, M1, M11, I10, I18

Introduction

The Covid-19 pandemic creates a public health crisis and results in a high rate of mortality and socioeconomic disruption globally (Zayas, et al., 2016). Jordan like many countries is still suffering from the Coronavirus, as it recorded 1,746,997 confirmed cases (17% of the population) and 14,122 deaths (0.137%) (World Health Organization, 2022). The health sector suffered from human, technical and financial problems because of the lack of sufficient experience of health staff and qualified specialists in the fields of epidemics (WHO, 2021), which was revealed by the Corona epidemic through the negative effects left by the virus. The epidemic, whose negative effects were evident in the health sector in most countries of the world. It showed its weak structure and unpreparedness for such emergencies, contrary to what is expected considering the technological and technical progress that the world is witnessing, as the number of infections was exacerbated very quickly and the death rate from that disease increased (Tarawneh, n.d.).

In terms of human and technical problems, Jordan enjoys a very high degree of medical care. Many doctors have been prepared and trained in Europe or North America. Most medications are available without a prescription. Jordan has a robust infection control system that is closely regulated by the government (www.internationalstudentinsurance.com). However, medical staff is at extremely high risk due to Covid-19, and data from several countries in the WHO suggests that health professionals are more likely to contract Covid-19 than the public. Health and wellness workers with Covid-19 have lost their lives globally, even though they make up less than 3% of the population on average and around 2% in all middle-income nations. The broad breakout of the pandemic has put health workers under extremely challenging working conditions, long hours, and unusual living circumstances, which will compromise their ability to provide patients with high-quality care (WHO, 2020).

In terms of financial problems, Jordan has been impacted by the Corona pandemic, as the slowdown in global economic activity is a barrier to foreign direct investment, remittances from overseas workers, and tourism, which accounted for 10% of GDP before the pandemic. Furthermore, the general closure has impacted over 250,000-day

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laborers and businesses facing cash shortages (Al-Ississ, 2020).

To address the growing need for health services, the Jordanian government has attempted to build several field hospitals such as Amman, Irbid, Zarqa, Maan, and Aqaba Field Hospitals, as well as Karak Field Hospitals, which are responsible for handling Covid-19's rising number of patients. The National Emergency Plan to Deal with the Novel Coronavirus (2020) has also been improved by Royal Medical Services (RMS) such that Queen Alia Hospital exclusively accepts Corona patients. Therefore, all health institutions, such as governmental, private hospitals, and RMS seek to reach health progress among healthcare providers, which is a goal for the continuous improvement and development process in the field of health quality.

Quality in a health system is an indicator of the success of a health service. It is an integrated approach to operations and procedures using equipment and materials provided to the patient to sustain his life and accelerate recovery and physical and psychological wellness by individuals with specialized knowledge and skills that meet the intended purpose of the patient and sometimes exceed his expectations (Aqili, 2011).

It is also known as the institution's production of service with a high degree of distinguished quality, to achieve the needs of its customers, support their expectations, and meet their aspirations, which is done through pre-defined criteria. Service and creating creativity in it (Aqili, 2011). Therefore, the SERVQUAL model proposed five dimensions to measure service quality (i.e., tangibility, assurance, reliability, safety, and responsiveness). Abdelgadir (2015) addressed these dimensions and considered them essential, but they differ in their importance.

The impact of epidemic affected all facets, particularly the health facet, which led the United Nations to conduct an extensive investigation of the impact of the epidemic on the standard of healthcare services provided to patients in most countries around the world to varying degrees depending on each country's capacity (United Nations, 2020). A study released by the World Bank revealed that this pandemic has exacerbated the load on health systems and limited the level of quality management in most nations, particularly in the Middle East and Africa. The findings revealed a level of imbalance, which indicated a variation in the quality of healthcare provided to the poor (Roberts, 2020).

Due to these unfavourable global effects, and because Jordan has high-quality recognition amongst Middle East countries in the health system, despite its rating as a developing country. the study needed to provide a scale of Covid-19 and to determine how this pandemic has affected Jordan's level and standard of healthcare services. In addition, the significance of this study is that it is being held at the national level of Jordan as a whole in terms of the places of health service provision and the various types of patients receiving the service (COVID-19 patients and non-COVID-19 patients), unlike previous studies that dealt with either a service provider e.g., hospitals, primary healthcare centres (Fetzer and Rauh, 2022; Rexhepi, et al., 2022; Halcomb, et al., 2022), or inpatient of a department in a hospital such as an ICU (Fernández-Castillo, et al., 2021), maternity word (Nedberg, et al., 2022; Vasilevski, et al., 2022; Drandić, et al., 2022) or patients suffering from a specific disease such as angina (Fetzer and Rauh, 2022). Some studies searched the perception and satisfaction of the health care customers (Gómez-Carmona, et al., 2022; Rexhepi, et al., 2022; Garably, 2020; Ciasullo, et al., 2020; Al-Neyadi, et al., 2018;). Some researchers studied other indicators classifications of health services such as environment, hospital, and clinical indicators (Mattiuzzi, et al., 2021), Health expenditure, Self-perceived health, Self-reported unmet need for medical examination, etc., (Halaskova and Bednar, 2021), and perceived quality, affordability, satisfaction, equity in the provision of care (Ciasullo, et al., 2020). Furthermore, this study was conducted on a healthcare system that combined public and private sectors which differs from the healthcare system in most developed countries in the EU except Austria or Cyprus (Universal public-private insurance system) and the Netherlands or Germany (universal private health insurance system). where the results vary even between countries that have the same health system (Halaskova and Bednar, 2021). Therefore, more research is still needed to cover this gap.

The subject matter of the current study is the application of the multivariate technique – Structural Equation Modelling (SEM) – to examine the impact of COVID-19 aspects on the quality of the health services provided by the healthcare system in Jordan. It also compares the health system in Jordan with EU countries' health systems. The evaluation of the impact may reveal the similarities and differences between the countries that have the same (different) healthcare system.

Literature Review

A pandemic is a global outbreak of a disease that creates a public health crisis and commonly results in a high rate of mortality and socioeconomic disruption (Zayas et al., 2016). Coronavirus is a series of Coronaviruses that cause acute respiratory infections in the respiratory system is considered a rapidly spreading infectious disease that was recently discovered and there was no information about this disease before its appearance in the Chinese city of Wuhan in late December 2019. It caused an international catastrophe for humans and health in addition to the economy in all countries and all vital sectors (De Wit, et al., 2020; Sohrabi, et al., 2020). Considering this, it is necessary to give sight of the Health System in Jordan, make a comparison with the EU Health system, then look at the quality of health services provided and the spread of Coronavirus, and how the disease affected health services provided to members of communities.

The health sector in Jordan consists of service providers (public, private, international, and charity sectors) and councils and institutions working on the development of health policy (Khader, et al., 2018). The public sector includes the Ministry of Health, the Royal Medical Services, and university hospitals (University of Jordan Hospital, King Abdullah University hospital). The private sector includes private hospitals and diagnostic and therapeutic centers in addition to hundreds of private clinics. The international sector and charitable sectors provide services through UNRWA clinics for Palestinian refugees and the UNHCR and charity association clinics (Khader, et al., 2018).

The percentage of insured citizens rose to more than 73%, despite the doubling of the population and the waves of refugees to Jordan (Centenary of the Jordanian State, 2021). Financing health insurance is at the expense of the employer, whether the employee is working in the public or military sector, or in the private sector that provides health services through contracts with insurance companies. The government is currently working towards expanding health insurance to reach comprehensive health insurance to include all citizens (Centenary of the Jordanian State, 2021).

In terms of hospital and clinical characteristics, the inpatient hospital beds increased by 1.06% in 2021, and an approximately stable average length of stay in the hospitals is 3.2 days during the past five years (Statistical Department, 2021). The number of patients using the ambulatory care service decreased by 3.965% in 2021 from 2017 (Statistical Department, 2021) referring to increased awareness among the citizens. Unlike in the EU, patients in Jordan are not required to be referred to a specialist by their primary care physician. Table (1) displays the statistical indicators comparing Jordan and European Union.

In Jordan, all medical staff in the public sector, including doctors and GPs working in hospitals are on the direct payroll of the public healthcare sector and are paid by the healthcare facilities for which they work (Alloubani, et al., 2016).

Table 1. Statistical Indicators 2021.

The indicators	Jordan	Europe
Population growth	0.64%	-0.12%
Fertility rate per woman in 2020	2.64	1.49
The median age of the population (Year)	23.8	44.1
Crude birth rate (per 1000 people)	21.11	10.424%
Age structure 0-14	32.1%	15.01
15-64	63.86%	63.86%
65- above	4.04%	21.13%
crude death rate (per 1000) in 2020	2.2%	11.6%
Length of stay (day)	3.2	2

Source: Authors based on Statista.com

In the EU there is a wide range of different attitudes and approaches to setting up a National Health Service (NHS). A fully developed NHS implies that resources and services are largely provided directly by the public sector and consumed free at the point of use. However, none of the EU countries provides a wholly public sector service and the trend has been towards a decrease in the state's role in service provision, for example in the United Kingdom and Italy (Sakowski and Marcinkiewicz, 2019; Youssef, et al., 1995).

In ambulatory medical and dental care, a private practitioner approach is a norm in the European Union (Sakowski and Marcinkiewicz, 2019). The situation is somewhat different relative to more expensive hospital-based services. In some countries, such as Denmark, Italy, and Ireland, state-controlled hospitals are a dominant feature whereas, in others, such as Germany, France, and Belgium, the private sector holds a large share of service provision. In a few countries such as the UK, Portugal, and Ireland there have been recent developments allowing major hospital services a greater degree of freedom from state control (Sakowski and Marcinkiewicz, 2019). The 1990 health care reform in the UK has provided for hospitals to become 'Trusts' that are more operationally independent from the state than has previously been the case. Similarly, the introduction of the General Practitioner (GP)-fundholding system- in the UK has provided for several practitioners to supply primary care services themselves and to contract for secondary care (hospital and specialist) services, all of which have to be paid for out of a fixed budget (Halásková and Bednar, 2021; Sakowski and Marcinkiewicz, 2019).

Sakowski and Marcinkiewicz (2019) concluded that there is a lack of availability of reliable and recent comparable data on healthcare input factors and utilization rates. Provision and utilization of hospital care differ by up to a factor of six in the European Union Member States, but country data are highly controversial among different sources.

The number of inpatient hospital beds per thousand population is highest in Luxembourg, the Netherlands, Finland, and Germany and lowest in Spain and Portugal. Inpatient bed rates have decreased in all countries over the last decades. The average length of stay in acute care is particularly high in Germany, the Netherlands, and Luxembourg but decreased in nearly all Member States over the past two decades. The trend is somewhat the reverse for admissions to acute care hospitals and Sakowski and Marcinkiewicz's (2019) study has shown that despite an overall reduction in bed availability and average lengths of stay in acute hospital care, admission rates, and expenditures have generally been increasing over the same period (Sakowski and Marcinkiewicz, 2019). Therefore, Mattiuzzi et al. (2021) revealed that the COVID-19 death rate in EU countries is significantly and positively associated with acute care bed occupancy.

In terms of healthcare productivity, hospital data are in favor of those countries with a comparatively low number of inpatient beds, namely the United Kingdom and Denmark. In ambulatory care, utilization of services in Germany and Italy is three times as high as in Portugal as measured by the number of home and office visits to a general practitioner or to an office-based specialist (data not illustrated). Consumption of prescribed drugs also varies considerably among the Member States of the EU (Sakowski and Marcinkiewicz, 2019).

Health systems that have thin access regulation and impose a cost-sharing mechanism outperformed other health system types (Ciasullo et al., 2020). Germany (Private system) and Austria (mixed system) scored high on expenditures and satisfaction with health care (Halásková and Bednar, 2021).

According to European Observatory on Health Systems and Policies, healthcare service quality is one of the health system performance core components (Busse, et al., 2019). The quality of health services is measured by the availability of many dimensions, and there is no agreement on the dimensions that determine the level of service provided by the health institution (Upadhyai, et al., 2019; Parasuraman, et al., 1988). It can be dated back to Donabedian (1966) who discussed the advantages and disadvantages of various techniques and approaches used to gauge the quality of medical care. According to (Myers, 1969), factors for healthcare safety include accessibility, efficacy, efficiency, improvement of care quality, and continuity of care. Equity and efficiency were added as additional quality measurement factors that are connected to the patient care experience by Donabedian (1980) (Brook and Lohr, 1981). The first model for measuring service quality based on qualitative techniques was created by (Grönroos, 1984). Then, based on exploratory research, Parasuraman et al. (1988) created the second service quality model (SERVQUAL), in which service quality is viewed as a function of the discrepancies between customer expectations and service performance. Five criteria served as the foundation for SERVQUAL: tangibles, dependability, responsiveness, assurance, and empathy. When Babakus and Mangold (1992) examined whether SERVQUAL was appropriate for the healthcare industry, they discovered that it was valid and reliable regarding the functional quality of services in hospitals (Endeshaw, 2021). Busse et al. (2019) explained that performance is the measure of the health system quality and quality measure is related to health service. In addition to SERVQUAL's validity and reliability in measuring functional quality that provides the patients' point of view (Allaham, et al., 2022), and its appropriateness for assessing service quality in Jordan (AL-Mhasnaha, et al., 2018). Therefore, the five characteristics of SERVQUAL are used to evaluate the quality of health service because of its popularity and applicability in health service. To ensure the suitability the authors of this study tailored it to suit the Jordan context (Endeshaw, 2021; Babakus and Boller, 1992). The dimensions of health service quality as defined by Arasli, et al. (2008) are Tangibility: represented by physical facilities, types of equipment, and the outward appearance of the personnel. Assurance: "the knowledge and courtesy of employees and their ability to inspire trust and confidence". Reliability: "the ability to perform the promised service responsibly and accurately". Safety: Empathy– "caring and understanding, which a company provides and/or offers its customers in terms of individualized and personalized attention". Responsiveness: "willingness to provide help and prompt service to customers".

Previous studies varied in ranking the importance of these dimensions. Abdelgadir (2015) addressed service quality dimensions and considered them essential, but they differ in their importance. The medical staff quality in Ayad (2016) has the greatest importance over the other dimensions. The overall assessment of expectations and perceptions of relevant services in primary healthcare centers in Kosovo by Rexhepi, et al. (2022) revealed that expectations scored higher than perceptions, and this gap is significant across all dimensions. The tangible dimension had the greatest disparity, followed by the responsiveness dimension. The empathy dimension had the smallest gap. The study by Al-Neyadi, et al. (2018) rated the assurance dimension as the highest while responsiveness was perceived as the least important of the five SERVQUAL dimensions.

Before Corona epidemic, Alka'abi (2013) found inadequacy in the quality of health services in the tangible dimension concerning the quality and modernity of rooms, the cleanliness of the hospital, and the availability of modern equipment and technologies. In most of the private hospitals in Basra / Iraq, there is a failure on the part of the medical and nursing staff to respond to the needs of patients and listen to their complaints. It also revealed the low level of sympathy of the medical staff with patients, and the inadequacy of their services to express affection. The study by Ayad (2016) on the medical institutions in Algeria found no impact of the quality of the medical staff, technical services, administration services, and hospitality services on patient satisfaction. The weak response of the health institution through its administrative staff leads to the creation of a low level of patient satisfaction.

Garably (2020) found that there is a correlation between health service quality and customer satisfaction. There is a correlation relationship between each dimension and customer satisfaction.

For providing basic services to minimize the impact of the Covid-19 pandemic on the quality of health services in terms of staff preparedness. In addition to providing enough medical workers at Jordanian hospitals to meet the patient's needs, Algunmeeyn, et al. (2020) pointed out the factors that had an impact on the health services provided during Covid 19, such as the shortage of pharmacists, doctors, and nurses during the Coronavirus outbreak. Fetzer and Rauh (2022) observe persistently worsened performance and longer wait times in A&E; severely limited access to specialist care; significantly delayed or inaccessible diagnostic services, and acutely harmed access to and quality of cancer care. They discover that providers under COVID-19 pressure experience significantly more excess deaths in non-COVID-related hospital episodes, such as those for heart attack treatment.

Several studies attempted to search for the health service quality in Jordan. A'aqoulah, et al. (2022) studied the expectations and perceptions of patients in two major educational hospitals. Aladwan, et al. (2021), and Al-Damen (2017) studied satisfaction and loyalty in one government hospital, and Khaleel, et al. (2022) applied it to one private hospital. AL-Mhasnaha, et al. (2018) studied satisfaction and applied it to Al-Husain Military Hospital while Zamil & Areiqat (2012) applied it to (public and private hospitals in Jordan. Such studies did not compare the quality of healthcare provided by the health system with other countries' health systems and were conducted during times when there were no pandemics. In addition, these studies concluded that satisfaction is affected by the health service quality, while tangible and empathy have a direct impact on patient loyalty and an indirect impact on patient loyalty through patient satisfaction in Khaleel, et al. (2022).

The following section provides the hypothesis, and the methods used to achieve the study objectives.

Methods

This study stands to build a measurement scale for COVID-19, investigate the importance of the five dimensions of health quality service in the Covid-19 pandemic, evaluate the public-private healthcare system in Jordan compared to the public healthcare system in the EU based on the theoretical background of healthcare systems and performed research in health quality, and test the following hypothesis:

H1: There is a statistically significant impact of Covid-19 on the quality of health services (Tangibility, Assurance, Reliability, Safety, and Response) provided by the Health Sector in Jordan.

H1.1: There is a statistically significant impact of Covid-19 on (Tangibility) as a dimension of the quality of health services provided by the Health Sector in Jordan.

H1.2: There is a statistically significant impact of Covid-19 on the (Assurance) as a dimension of the quality of health services provided by the Health Sector in Jordan.

H1.3: There is a statistically significant impact of Covid-19 on (Reliability) as a dimension of the quality of health services provided by the Health Sector in Jordan.

H1.4: There is a statistically significant impact of Covid-19 on (Safety) as a dimension of the quality of health services provided by the Health Sector in Jordan.

H1.5: There is a statistically significant impact of Covid-19 on (Response) as a dimension of the quality of health services provided by the Health Sector in Jordan.

Study Population and Sample

Jordan is a country that has limited natural resources and low- middle-income rates and a high population growth rate of 0.64% in 2021. Statistics issued by the Department of Statistics (2021) showed that the population in the Kingdom has increased from 6.5 million people in 2013 to 10.27 million in 2021 living on 89342 Km2 (Statista, 2022). Only 30% of the population is above the age of 30 years (CIA, 2022). Jordan's median age of the population is 23.8 years in 2021 (Statistical Department, 2021; CIA, 2022). According to Awad et al. (2009), Jordan has the best performance amongst all the Arab nations in the aspects of life expectancy, the rate of school admission, adult literacy, literacy of females, and other direct pointers (Alloubani, et al., 2016). Therefore, the study population consists of patients who received different healthcare services from all the governmental, private, educational, and Royal Medical Services (RMS) hospitals in Jordan during the COVID-19 pandemic. Meanwhile, the study sample finally consisted of 330 respondents which is adequate to represent the population (Sekaran & Bougie, 2019). The sample also includes both patients who are infected and not infected with the Coronavirus. Table (2) describes the study sample.

The quantitative approach was used through a cross-sectional study design to examine the impact of the COVID-19 pandemic as an independent variable on the quality of health services through its five dimensions as a dependent variable. The study looks to explore the effects of this new phenomenon on different aspects of the quality of health services in Jordan.

Table 2. Characteristics of Study Sample.

Gender		Age					Infected		Total
F	M	18-25	26-32	33-40	41-48	Above 49	Yes	No	
244	86	81	155	53	27	14	159	171	330
73.9%	26.1%	24.5%	47%	16.1%	8.2%	4.2%	48.2%	51.8%	100%
Service Provider Types									
Public		Private		RMS			Educational		Total
170		63		89			9		330
51.2%		19.1%		27.0%			2.7%		100%

Source: Authors based on SPSS Analysis Result.

Study Instrument

The study used a survey questionnaire as an instrument for data collection purposes. The instrument has been developed based on the previous relevant studies and SERVQUAL (perception part) which examine the same variables of this study, and the indicators or items also have been adapted from these sources with consideration of the contextual differences and word rephrasing. This is valid for the dependent variable whereas, the independent variable which is COVID-19 was developed for the first time by the researchers depending on the WHO reports and protocols. It includes 12 items divided between some COVID-19 aspects e.g., the use of the means and tools of prevention and protection, change in service patterns, access to service providers, and the use of social media and communication technology. The study instrument has been subjected to content validity to ensure its statements properly measure the intended factors. Therefore, a panel of academics working in different universities and field experts contributed to evaluating the ability of the items to gauge the factors, and then the researchers did some amendments to the items to be fitter with the study objectives. Due to the pandemic restrictions which limit social and personal direct communication, the researchers have designed an electronic survey questionnaire. Participants were asked to indicate their agreement about the items on a five-point Lickert Scale.

A total of 50 completed and reliable responses were managed for the pilot study to conduct the Exploratory Factor Analysis (EFA) and determine the dimensionality of each factor and the respective items for each factor, as well the study examines the internal consistency or the reliability of the measurement scales (Kyriazos, 2018). Table (3) shows the standards of extracted factors number based on the eigenvalue, variance percentage, and factor significance, only factors with eigenvalue of more than 1 were significant. The factors extracted from COVID -19, Tangibility, Assurance, Reliability, Safety, and Response explain 39%, 35%, 58%, 67%, 62%, and 53% respectively of the total variance. The factors were rotated by using Varimax rotation. Using Kaiser's (1970) criterion of retaining only functions with eigenvalues of 1 or above. No absolute threshold has been adopted, for the social sciences, a minimum of 60% cumulative variance is quite accepted (Hair, et al., 2010).

Table 3. Total Variance Explained for Constructs.

	Extraction Sums of Squared Loadings	
Component	Total	% of Variance
COVID -19	4.774	39.78
Tangibility	2.470	35.29
Assurance	2.233	58.65
Reliability	2.713	67.81
Safety	3.144	62.88
Response	2.128	53.19

Source: Authors based on SMART PLS Analysis Result.

Kaiser-Meyer-Olkin (KMO)

In multivariate statistics, EFA is an important approach used to detect the underlying components and groupings of items measuring the construct. Kaiser-Meyer-Olkin (KMO) and Bartlett's test were used in this study as a Measure of Sampling Adequacy (MSA) which is a statistic that indicates the proportion of variance in variables caused by underlying factors. This procedure used the Principal Component Analysis (PCA) test technique while the KMO rotation with the orthogonal Varimax method was used to produce the obvious factor's structure. Generally, for the KMO value, the acceptable index is over 0.6 (Kaiser and Rice, 1974). Bartlett's Test of Sphericity

is required to assess the suitability of respondent data for factor analysis, and it should be significant (p<.05) (Williams, et al., 2010). Table (4) presents the results of this test which achieve the minimum threshold of this analysis.

Table 4. Suitability of Respondent Data.

Constructs	Number of components	Number of items	KMO	Approx. Chi-Square	Degree of freedom	Sig.
COVID -19	1	12	0.810	223.485	66	0.000
Tangibility	1	7	0.605	73.490	21	0.000
Assurance	1	4	0.707	41.281	6	0.000
Reliability	1	4	0.745	87.777	6	0.000
Safety	1	5	0.787	111.604	10	0.000
Response	1	4	0.692	431.147	6	0.000

Source: Authors based on SMART PLS Analysis Result.

Internal Consistency (Reliability)

The main criteria for testing questionnaire item reliability are estimated using Cronbach's alpha measure (Sekaran and Bougie, 2019). The generally accept coefficient of value is 0.70 and above (Hair et al., 2010). Cronbach's alpha value of 0.6 is said to have good reliability (Awang, 2015). Table (5) provides the reliability coefficients of each construct in the pilot study. The findings showed satisfactory reliability levels exceeding a value of 0.6.

Table 5. Reliability Test.

Construct	Items per component	Cronbach's Alpha (above 0.6)	Suggested items deleted	Status
COVID -19	12	0.84	No items deleted	Reliable
Tangibility	7	0.63 (0.68)*	Tangibility2 deleted	Reliable
Assurance	5	0.82	No items deleted	Reliable
Reliability	4	0.83	No items deleted	Reliable
Safety	5	0.85	No items deleted	Reliable
Response	4	0.64 (0.79)*	Response4 deleted	Reliable

Note: *Values after items deleted. **Source:** Authors based on SMART PLS Analysis Result.

To improve reliability which means deleting the poorest items. Thus, the study has deleted the item that coded tangibility2 which improves the reliability to 0.68, and the item that coded response4 which improves the reliability to 0.79. While the rest of the variables do not need to delete any items. From the results of the pilot analysis, it looks the most items of each construct of the pilot study were reliable and considerable for further study (Awang, 2015). In the process of the EFA, factor analysis for the measuring items was conducted and only items with 0.5 and above were acceptable for further analysis (Nunnally, 1967). Through the pilot study, the whole process of different analyses has fulfilled the data goodness of fit for the Principal Component Analysis (PCA) procedure. All study variables have met the criteria of reliability and goodness of fit for PCA procedures; therefore, it can proceed to the next analysis step called Confirmatory Factor Analysis (CFA) to reconfirm the validity of the study factors and their respective items.

Measurement Model Analysis

The literature stated that there are two key types of models called measurement models through the process of CFA for validity testing and the structural model for hypothesis testing (Hair et al., 2010). The current study has used Smart PLS (Partial Least Squares) Version 3 to examine the measurement model's different types of validity, namely convergent and discriminate validity, which will be discussed in the next sections.

Convergent Validity

Convergent validity is a statistical analysis used to present the agreements between the respective indicators of a particular variable. It also shows the possibility of finding a conflict between the measurements of this variable (Cheah, et al., 2018). Moreover, the study has used some different tests like outer loading, Composite Reliability (CR), and Average Variance Extracted (AVE) to check the convergent validity. Hair, et al. (2014b) suggest that outer loadings above 0.70 are considered for further analysis, so the study adopts this assumption. Furthermore,

the AVE and CR indicate how good the model is, they should meet the lower ranges of 0.50 and 0.60 respectively (Henseler, 2017). Table (6) presents the results of these required analyses, and mostly they have met the acceptance criterion. As illustrated in Table (6), many items were removed because of their poor reliability in the pilot study and lower outer loadings (below 0.60). The CR validates the internal reliability of the study measurements and provides an assessment of the shared variance by the measurements through the outer loadings of the indicators.

Table 6. Measurement Model Results*.

Construct	Item Code	Outer Loading	AVE	CR	Construct	Item Code	Outer Loading	AVE	CR
COVID-19	Covid-4	0.69	0.56	0.86	Reliability	Reliab.1	0.76	0.65	0.88
	Covid-5	0.81				Reliab.2	0.83		
	Covid-6	0.75				Reliab.3	0.84		
	Covid-7	0.77				Reliab.4	0.78		
	Covid-8	0.70			Safety	Safety.1	0.74	0.63	0.87
Tangibility	Tang.5	0.87	0.66	0.85		Safety.2	0.80		
	Tang. 6	0.83				Safety.3	0.86		
	Tang. 7	0.73				Safety.4	0.77		
Assurance	Assur.1	0.72	0.56	0.83	Response	Response1	0.82	0.69	0.87
	Assur.2	0.81				Response2	0.87		
	Assur.3	0.68				Response3	0.81		
	Assur.4	0.77							

Note: *Values after items deleted. **Source:** Authors based on SMART PLS Analysis Result.

Discriminant Validity

The discriminant validity describes the extent to of the latent constructs are different from other constructs within the same model. Consequently, this analysis has been used in this study to measure the distinctiveness of the variables and analyse the correlations between the model variables to avoid any potential overlapping between them (Hair et al., 2014a). For this, the most common type of criteria used to test this kind of validity is examining the cross-loading which indicates the correlation between the variables. In this method, the values of the outer loadings for each respective construct should exceed the correlation with other variables (Ab Hamid, et al., 2017). Hence, the matrix of this approach helps to investigate and interpret the discriminant validity as given in Table (7) which presents the results of this validity. The results of the cross-loadings given in Table (7) indicate that the correlation of each factor in off-diagonal and bold values which represent the square root of AVE and they have exceeded the correlation with other different variables. Therefore, the discriminant validity of the factors was assessed in this study, and it has met the suggested results and confirmed the validity of the measurement model.

Table 7. Discriminant Validity.

	Covid	Assurance	Empathy	Response	Safety	Tangibility
Covid	0.748					
Assurance	0.441	0.752				
Reliability	0.433	0.521	0.810			
Response	0.452	0.423	0.557	0.564		
Safety	0.458	0.499	0.620	0.805	0.834	
Tangibility	0.345	0.463	0.474	0.640	0.359	0.817

Source: Authors based on SMART PLS Analysis Result.

Data Preparation

Some important procedures should be performed to check the appropriateness and eligibility of the dataset for further analysis and to avoid any possible mistakes that would influence the results. The study used the Mahalanobis distance to explore any extreme values in the data, the critical value of Chi-square (x2) at a more restricted significance level ($p < 0.001$) at a specific degree of freedom (DF) was conducted. The degree of freedom

of this analysis was 5, and the value of Chi-square value at significance level p<0.001 is equal to 20.52. So, the study is interested to skip the observations with distance values more than this value which is viewed as outliers. In this setting, only four cases are evaluated as multivariate outliers from the total of 334 responses, although the little cases were evaluated at extreme values, the study goes with the suggestion of removing these cases from further analysis to ensure the accuracy of the results, so the final valid observations after checking the missing and outliers become 330 responses.

Performing the measurement model by PLS algorithm illustrated path coefficients, and coefficient of determination R^2 for the dependent variable, healthcare services quality. The latent endogenous construct of healthcare service quality got an R^2 of 0.346. Hair Jr, et al. (2017) stated that a value of R^2 ranging from 0.33 to 0.67 is moderate. The path coefficient provides the nature of the causal relation. The key path of COVID-19 toward the healthcare services quality resulted in a value of 0.589 which is considered significant since it is greater than 0.20 (Hair et al., 2014b).

Structural Model Analysis

After conducting the required tests of the measurement model, the next step is examining the structural model to test the study hypothesis. By using the PLS-SEM bootstrapping procedure, the importance of coefficients was conducted and revealed the results with great significant paths =14.743.

Predictive Relevance of the Model (Q^2)

Predictive relevance (Q^2) has also been performed in this study to assess the quality of the structural model. The key assumption of this analysis is that the structural model needs to show a greater capacity to predict the dependent variable (Ramayah, et al., 2018). For this aim, the Blindfolding procedure has been calculated to get the Q^2 through the Smart PLS. The procedure of blindfolding was used with the reflective dependent variable. To achieve the test, the value of cross-validity redundancy should be more than zero (Q^2> 0), which indicates a predictive relevance (Hair et al., 2017). The validated redundancy value of the healthcare service quality equals 0.109. Therefore, the explanatory variable provides predictive relevance.

Results

The healthcare quality dimensions are evaluated in Jordan by distributing an electronic survey during the period from November 2021 to late December 2021 using descriptive statistics in SPSS V.22, and multivariate analysis, Partial Least Square-Structural Equation Model. Descriptive statistics of the study's variables are shown in Table 8.

Table 8. Descriptive Statistics.

The Variable	Mean	STD
Covid-19	3.88	0.675
Tangibility	3.865	0.661
Assurance	3.902	0.624
Reliability	3.975	0.677
Safety	3.756	0.689
Response	3.757	0.780

Source: Authors based on SPSS Analysis Result.

The last important step to analyse and assess the structural model is testing the research hypotheses by examining the path coefficients. To achieve this aim, the hypothesized relationships were evaluated by running the nonparametric analysis of bootstrapping approach that explains the precision of parameter estimates.

T-value is the criteria used to determine the significance of the suggested relationships which widely acts as the critical values. Table 9 presents the findings of the path coefficients to test the study hypotheses.

The study model has one main hypothesis divided into five sub-hypotheses for the factors that shape the healthcare services quality during the COVID-19 pandemic over different hospitals in Jordan operating in various regions. The findings illustrated according to the path coefficients given in Table 9 that the beta values for all hypothesized relationships were significant and supported by positive values. All the path coefficients were significant based on the significance value (P-value < 0.05); hence they all were significant and supported at P-value < 0.001.

Table 9. Path Coefficient of Study Hypotheses.

Hypothesis	Constructs Path	Beta	Standard deviation	T-value	P-value	Results
H1	Covid → quality	0.589	0.040	14.743	0.000	Supported*
H1.1	Covid → tangibility	0.640	0.040	15.957	0.000	Supported*
H1.2	Covid → assurance	0.753	0.027	27.491	0.000	Supported*
H1.3	Covid → reliability	0.836	0.016	53.052	0.000	Supported*
H1.4	Covid → safety	0.805	0.020	40.931	0.000	Supported*
H1.5	Covid → response	0.758	0.025	30.853	0.000	Supported*

Note: * Significant level at <0.001. **Source:** Authors based SMART PLS Analysis Result.

Discussion

The study was conducted aiming at building a measurement scale for COVID-19, exploring the quality level of health services (tangibility, assurance, reliability, safety, and responsiveness) provided by the health sector in Jordan during the Covid-19 pandemic, and evaluating the public-private healthcare system in Jordan compared to the public healthcare system in the EU. The study proposed a research framework comprising one independent variable, namely Covid-19 aspects, and five dimensions of healthcare quality. The scale built in this study success in predicting the dependent variables with a moderate R2 of 0.346, the key path of COVID-19 toward the healthcare services quality resulted in great significant paths.

In the present study, the main hypothesis assumed a significant impact of Covid-19 on the quality of health services. Depending on the descriptive statistics of the Covid-19 aspects variable, the pandemic added a burden on health management. The hospitals' departments are well-equipped with the necessary equipment and tools to control the pandemic and utilized proper personal protection equipment (PPE) which contributed to keeping a safe healthcare environment. Also, conducting Covid-19 examinations contributed to quickly detecting confirmed cases and enhancing the healthcare services for the patients. Furthermore, the patterns of the healthcare services provided positively changed during the Covid-19 pandemic. The effectiveness of the healthcare services cadre has also increased during the Covid-19 pandemic according to the respondents' points of view. The result in Table (9) reveals that Covid-19 aspects highly and positively impacted the quality of health services provided in Jordan from patients' points of view at the national level.

The five sub-hypotheses assumed a significant impact of Covid-19 on all dimensions of service quality. The results in Table (9) proved these hypotheses as highly and positively impacted depending on the t values and their significance. The reliability dimension scored highest followed by safety. The tangibility scored the lowest impact. The high score of reliability shows the importance of the ability of the healthcare system in Jordan to perform the promised service responsibly and accurately. This result proves what was circulated by the local and international media about the role played by the Jordanian government and the success it achieved in dealing with the Corona pandemic. Citizens recognized their government's ability to deliver on its promises. This was done through the imposition of Martial Law and the control of the army to impose a curfew, renting hotels as isolation centers to receive Jordanian citizens wishing to return to Jordan, providing artificial respirators and ICUs, providing equipment and supplies for laboratory examination of the virus, and then providing vaccines of various types in laboratories and examination centers assigned by the Ministry of Health Free and affordable in private laboratories. The mechanism followed by Jordan -as a mixed health system- in providing health services raised secondary care expenditures by %18.76 in 2021 compared to 2018 (Ministry of Health Budget), at the same time perceived as high by the patients. This result is similar to Halásková and Bednar (2021) who concluded that Austria (mixed system) scored high on expenditures and satisfaction with health care.

The safety dimension ranked second which revealed the caring and understanding of the staff for the patients. Despite the psychological and physical pressure, medical staff in the hospitals and centers helps in providing psychological safe for the patients during this pandemic. This result refers to the good training that medical staff received during their study, and it may be due to the psychological nature of the Jordanian people, who are characterized by sympathy, love, altruism, and helping others. On the opposite, Fernández-Castillo, et al. (2020) concluded that fear and isolation influence ICU Nurses and prevent them from providing the required humanization of health care.

Tangibility was moderately perceived by patients in Jordan both infected with Covid-19 and not infected with the virus with an average score of 3.19 according to the Likert scale. The average opinion of the respondents about non-infected patients getting an increase in the quality of services during the Corona pandemic was also at a moderate degree of 3.31. When studying the impact of the Covid-19 aspects on tangibility, it showed a positive

and significant impact, but it was the least among the dimensions of the quality of health services. The perception and impact of this dimension can be explained to a lesser extent than the other dimensions of quality, to the fact that citizens in Jordan are among the highest educated in the region and can distinguish good services, in addition to the fact that a percentage of them (73% insured in the public sector) are insured in the private sector and they are required to receive treatment in government centers and hospitals designated for Covid-19 patients. This study finds a moderate perception of the tangibility without significant variation between infected and non-infected patients opposite of the study conducted in England by Fetzer and Rauh (2022) who observe adverse effects on the accessibility and quality of non-infected Covid-19 care. They discover that providers under COVID-19 pressure experience significantly more excess deaths in non-COVID-related hospital departments, such as those for heart attack treatment. The statistical indicator of mortality in Table (1) revealed a high mortality rate of 11.6% compared to Jordan's with 2.2%, in addition to the high rate of the elderly in European countries of 21.13, compared to 4.4% in Jordan may explain the results.

The finding of this study is similar to those of previous studies (WHO, 2020; Mattiuzzi et al., 2021; Branswell, 2020; Halcomb, et al., 2020; Duan and Zhu, 2020). The study prepared by WHO (2020) indicated an increase in psychological and physical pressure on health staff during the pandemic due to the long working hours and the lack of appropriate health personnel to deal with the epidemic. Also, Mattiuzzi et al. (2021) reported an inverse association between the number of general hospitals, physicians, and nurses with mortality in the EU. The Jordanian government, represented by the Ministry of Health and Security and Crisis Management Center, worked to increase the number of medical personnel, reaching 18,792 at the end of 2021(Statistical Department, 2021), worked to open field hospitals and sought the help of medical personnel from the private sector to overcome the psychological and physical pressure on health staff, and the increase in the number of deaths for different age groups, especially for those over the age of 30, injuries and deaths among health personnel. In addition to the fact that the health sector, represented by its medical and material cadres, has been exhausted, its burdens have increased, and the health system has been disrupted. The oxygen cut-off incident in Al-Salt Governmental Hospital, which resulted in 6 deaths, has revived talk of the "flagging" of the public health sector in Jordan, its enlargement, its low efficiency, poor management, and the absence of coordination, follow-up, and accountability between the Ministry of Health, its directorates, and affiliated hospitals. This matter dates back to the time when the Jordanian Ministry of Health was suffering from a general shortage of medical personnel and an acute shortage of specialized doctors, which was revealed by the pandemic and the Salt incident itself (Economic & Social Council of Jordan, 2020).

Compared with EU studies, the Lack of general hospitals, doctors, and nurses, as well as high acute care bed occupancy, according to Mattiuzzi et al (2021) form the major contributors to COVID-19 mortality rates across EU nations. Duan and Zhu (2020) declared that the medical staff cares about the psychological aspect in terms of its treatment, and the average focus is on this aspect to some extent by health authorities. Halcomb et al. (2020) concluded providing care professionals of Health care, such as providing nurses with skills and scientific and practical experience in dealing with patients, ensures the quality of nursing health services. The study conducted by Ayad (2016) on a group of Algerian hospitals in terms of quality, showed that the quality of health services represented by the dimensions (the quality of the medical staff, the quality of the assistant medical staff, the quality of technical services, the quality of hotel services, the quality of administrative services) had a significant impact on satisfaction in general among the study sample. In terms of the importance of providing medical equipment appropriate and supplies to improve the quality of health services to combat the Corona epidemic, the current study agreed with Brancewell (2020).

While Jebril et al. (2020) showed an average level of impact. This may refer to the different characteristics of the respondents between the two studies, where the demographic characteristics of this study showed that many respondents are married women under 32 years of age, and the majority received the services in public health centers, unlike Jebril's study. However, the respondents were moderately aware of three things: the equipment and preparation of hospitals and health centers during the pandemic, health care for non-Coronavirus patients, and the ability of health personnel to provide psychiatric care to patients. The importance of the quality dimensions varies between studies, our study agreed with (Rexhepi et al., 2022; Alka'abi, 2013) in ranking the importance of the quality service dimensions, and disagreed with (Khaleel, et al., 2022; Al-Neyadi et al., 2018).

The results of this study came to increase the focus of the government and its health departments in following up on matters related to Corona, while working to make greater efforts in terms of management and follow-up closely on this aspect, in agreement with a study conducted by the WHO (2020).

Conclusion

The resilience of the health system is a critical determinant of how a country will respond to an epidemic. In emergencies such as COVID-19, the ability of the health system to deliver essential services depends on the current burden and basic capacity of the health system. The health system in Jordan has dealt with the epidemic and taken measures to adapt to it promptly so that the disease burden does not rise and get out of the control of

the health system in Jordan. Despite that, and from the results of this study, it was found that there are some issues that the health system could not deal with efficiently, like the rest of the manifestations, such as the readiness of most hospitals with the necessary machines and equipment, the shortage in some medical and technical specialties, as well as dealing with the psychological conditions of patients, whether infected with the Coronavirus or other patients. As the epidemic increases pressure on all sectors in Jordan, and therefore the health sector must be equipped with strong facilities and professional capabilities through the work of training programs that may enable the medical staff to deal professionally with such a situation. The results of the study will be beneficial for the healthcare sector therefore, this study recommends that the government must formulate long-term health strategies that can deal with sudden events and situations to ensure rapid and productive results and enable the success of the health sector. Restoration of the Jordanian state to its role in providing efficient public health care in Jordan (since health systems that have thin access regulation and impose a cost-sharing mechanism outperformed other health system types (Ciasullo et al., 2020), reorganizing the health sector with clarification of the roles of different health service providers (as the private hospitals have 36% of the total beds and 70% of the physicians (Jarar and Ali, 2021) and the high cost in the private hospital does not mean high quality), lean managing the human resources that drain the budget, and retaining qualified cadres with the sustainability of training, addressing the causes of leakage of specialist doctors to the private sector, paying attention to health care programs, and changing citizens' attitudes towards health care and specialization.

Hospital management should pay more attention to the different aspects of the quality process while providing its services and should be aware of the potential impactful effects arising from this epidemic. Opening effective channels of communication between hospitals, health directorates, and the Ministry of Health, activating control and accountability systems. Since the quality process is ongoing, hospitals must be informed of changes in this topic and incorporated as well as modernize their capabilities for greater success. They are also called upon to understand patients' expectations and address their concerns. All hospital departments need to consider alternatives and strategic options while formulating their strategies, this allows them to be more responsive to unforeseen situations and reduces uncertainties in the environment. Hospitals should increase their oversight through the management and various health personnel to drive more significant improvements in the quality and performance of healthcare services in different workplaces. Also, expand eldercare, childcare, and healthcare infrastructure, access, and innovation for the benefit of people and the economy. There is a need to involve these Civil Society Organizations (CSOs) in decision-making by finding national initiatives to facilitate dialogue between stakeholders and decision-makers on the one hand and CSOs on the other (Khader, et al., 2018).

The study has a few limitations, that may influence the possibility of generalization of the results to other contexts or sectors. For example, the study has been conducted in a developing setting of Jordan which has unique characteristics and different capabilities and facilities being influenced by the Covid-19 pandemic, it may be applied to other countries that have a similar healthcare system. It used a cross-sectional approach and administrated an electronic survey subject to restrictions imposed by the defense law. The sample participants in this study were from different regions across the kingdom and visiting different types of hospitals, this may add more perceptions to the study and provide insightful and meaningful perspectives. But the study needs to use new measuring factors such as economic factors and include different research methods for further results that can contribute to a better understanding of the effects of this pandemic on diverse industries. As the study used the PLS-SEM method to analyze the results, this may restrict the chances of having different findings by using mediation effects for example the financing sources, Information Technology, and digital media accessibility, which can add more value to this topic. The study did not consider demographic factors; thus, future studies need to conceptualize different models with new dimensions of quality in different industries with new samples and populations.

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