

# Determinants of Customer Satisfaction in the United Arab Emirates Health Care Industry

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## Research article

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# Abstract

**Background:** The United Arab Emirates is aiming to provide 'world-class healthcare' to its citizens. This study aims to study the association between overall satisfaction and various aspects of health care services in the United Arab Emirates on a country level.

**Methods:** The data was collected from 5,855 respondents on affordability, quality, accessibility, and responsiveness dimensions of health care. Besides frequency tables and descriptive statistics, statistical methods, such as Principal Component Analysis and Multiple Regression were used for dimension reduction and model the association between dependent (overall satisfaction) and independent (affordability, quality, accessibility, and responsiveness) variables.

**Results:** The findings indicated higher levels of satisfaction with quality and accessibility and lower levels of satisfaction with affordability and responsiveness. Recommendations are provided to address the latter two factors.

**Conclusions:** The study identifies issues in health care service provision in the United Arab Emirates and offers recommendations about enhancing affordability and responsiveness.

## Background

### *Introduction*

Services are characterized by intangibility, inseparability, heterogeneity, and perishability Zeithaml, Parasuraman, & Berry (1985). Intangibility refers to impalpability, inseparability refers to instantaneous delivery and consumption of services, heterogeneity refers to variability in service delivery and perishability refers to the "time dependency" and "time importance" of services, whereby services cannot be stored for future consumption (Onkvisit & Shaw, 1991). Given these attributes of services, an understanding of consumer needs and the subsequent delivery of services is fundamental in service-oriented industries. The appropriate alignment of consumers' needs and expectations and service delivery leads to customer satisfaction (Pont & Mcquilken, 2005).

The association between service quality and customer satisfaction has been widely explored in the private sector, including in banking (for example Hallowell, 1986; Mihelis, Grigoroudis, Siskos, Politis, & Malandrakis, 2001; Al-Eisa & Alhemoud, 2009; Sayani & Miniaoui, 2013; Sayani, 2015), the retail industry (for example Eskildsen, 2004; Elmelegy, Ponnaiyan, & Alnajem, 2017), telecommunications (for example Eskildsen, 2004; Md., 2014), and hospitality (for example; He, Li, & Lai, 2011). While the importance of service quality is undeniable in the private sector due to its association with organizational profitability, it is of greater importance in industries such as education and health care, where the public sector has an interest. The level of satisfaction with service delivery of these merit goods plays an essential role in policy analysis and development (Fonseca, 2013).

Berry and Seltman (2008) argued that health care services are significantly different from other services in several ways. Health care service are delivered as needed (Bendapudi, Berry, Frey, Parish, & Rayburn, 2006), patients do not have a control on the type and delivery of skill and labour-intensive procedures that are customized to their needs (Berry & Bendapudi, 2007) and are required to relinquish their privacy (Berry & Seltman, 2008). In addition, the delivery of health care services is a collaborative process between the service provider and the beneficiary (Berry & Bendapudi, 2007).

The quality of health care is measured concerning service quality or clinical quality (Lim, 2004). While the patients perceive service quality, clinical quality refers to rather hard measures of excellence, such as the proportion of specialists to other doctors, unscheduled returns to the operating room, and in-patient mortality (refer to Mainz, 2003; Yildiz & Demirors, 2014). The service quality in health care is broadly estimated based a triad between cost, quality, and accessibility often referred to as the 'Iron Triangle' or the 'Triad of Health care' (Kissick, 1994). However, it can also be measured in terms of availability, acceptability, appropriateness, competency, timeliness, privacy, confidentiality, empathy, attentiveness, caring, responsiveness, accountability, accuracy, reliability, comprehensiveness, continuity, equity, environment, and amenities and facilities (Mosadeghrad, 2013). The

evaluation of consumer perceptions on the above-mentioned overlapping dimensions of service quality enables policymakers to amend or devise policies that may lead to better outcomes and enhance customer satisfaction.

Governments globally are facing the challenge of providing quality and affordable health care to their citizens while ensuring the sustainability of the health care system. The costs related to health care are increasing exponentially due to evolving demographics (aging population), a growing population, lifestyle changes leading to non-communicable diseases, technological changes, and rising consumer needs and expectations (Alpen Capital, 2018).

The perceived quality should always be measured from the demand-side, which is from the end-user perspective (Reeves & Bednar, 1994). Accordingly, this paper aims to focus on the service quality of the health care sector in the UAE and attempts to measure the perceived satisfaction that is derived from various aspects of health care services in the country. Since service quality in health care is a multi-dimensional construct (Mosadeghrad, 2013), consumers' perceptions of various dimensions such as affordability, quality of delivery, accessibility, and responsiveness are evaluated. This paper adds to the increasing body of literature available on health care service delivery around the world. It focuses on an oil-exporting country that is striving to decrease its dependence on oil and diversify its economy. Moreover, the health care system in the country is nascent and is evolving rapidly to serve the population better.

This study aims to answer the following research question: To what extent do quality, affordability, accessibility, and responsiveness determine overall satisfaction in the UAE health care sector?

### *Background of Health Care in the United Arab Emirates*

The UAE health care sector is categorized by corresponding service utilization by public and private service providers. Despite the prominent presence of private health care providers in the country, the general public expenditure as a percentage of the overall health care expenditure is relatively high. Between 2000 and 2015, the proportion of public spending on health care has been approximately 67 percent on average of the total expenditure (World Bank, 2018).

The regulatory system in the health care industry in the UAE is multi-tiered and includes federal and emirate level regulatory bodies.<sup>[1]</sup> The Federal Insurance Authority also plays a key role in the UAE health care sector, as the UAE government is transitioning towards universal health coverage for all residents in the UAE (Alshamsan, Leslie, Majeed, & Kruk, 2017). The UAE health care industry is dominated by a handful of private health care providers. The mergers and acquisitions in the industry during the last few years have further consolidated the industry (Alpen Capital, 2018).

International accreditation is prevalent and encouraged by the UAE regulatory authorities across the health care sector. Over 70 percent of health care institutions and facilities have been accredited by international bodies, whilst the other facilities to be accredited by 2021, according to reports by the Ministry of Health and Prevention (Gulf News, 2017). Despite international accreditation of health care facilities, the standardization measures of quality are lacking throughout local private and public health care providers.

The importance of the insurance industry is paramount universally. The insurance industry in the UAE is fragmented, with 61 insurance companies (Insurance Authority, 2018) serving a population of approximately nine million people (Federal Competitiveness and Statistics Authority, 2018). The top five insurance companies have a collective market share of 56.2 percent (Milliman Market Monitor UAE, 2017).

In the UAE, there has been significant development across the health care system over the last two decades, including improvements in accessibility, affordability, and service delivery of clinical quality. With such developments, the UAE government continuously financed the health industry over the years, ensuring health care delivery to the population, even though during the times of falling oil revenues. One of the dilemmas is to stabilize the health care-related costs while extending accessibility and sustaining the quality of health care and affordability.

The National Agenda 2021 for UAE involves several indicators, which include health care, education, economy, justice, police and security, society, housing, infrastructure, and government services (UAE Vision 2021, 2018). Under the realm of health care, the UAE government plans to cooperate with all strategic stakeholders in the health care sector and other sectors in order to provide health care according to clear national and international quality standards and seeks to focus on preventive medicine and to reduce the prevalence of non-communicable diseases in the country (UAE Vision 2021, 2018). In line with these objectives, AED 4.84 billion (6.89 percent of the annual budget 2020) has been allocated to health care and social services programs (Ministry of Finance UAE, 2019). The actions aim to improve both clinical and service quality in the UAE health care sector.

This paper will primarily focus on evaluating the perceptions regarding various dimensions of service quality. The results will facilitate an understanding of challenges in health care services in the UAE.

### *Literature Review*

The Iron Triangle of Health Care developed by Kissick (1994) identified three critical elements for patient satisfaction: Quality, Cost, and Accessibility. The model is based on the principle of opportunity cost and trade-off, where all three elements are interdependent, and the achievement of two elements will only occur at the expense of the third (Kissick, 1994).

Extensive literature is available on quality in health care, and several definitions of quality have been proposed. According to Mosadeghrad (2013), quality in health care can be excellence, value, conformance to standards and guidelines, and meeting customer needs and expectations. Compliance with these dimensions of quality would result in satisfied end-users or ultimate beneficiaries of the health care service. A patient-centered approach in health care provision dictates "... [quality is that which] exceeds patient expectations and achieves the highest possible clinical outcomes with the resources available" (Øvretveit, 1992, p. 4). This encompasses both clinical and service quality dimensions of the health care service, encircling both care and service aspects. Donabedian (1980) referred to these aspects as technical quality and interpersonal quality. The author highlighted that in health care provision, a distinction is drawn between *care*, which is related to the direct technical intervention (i.e., treatment, medication, check-ups, etc.) and *service*, which is concerned with the patients' experience of their interaction with the health care provider. However, both care and service are interconnected and inseparable and are essential to the overall quality of the patients' experience. While patients might not necessarily be able to assess the technical elements of care, they can evaluate their experience in terms of the quality of service. Cohen (1996) highlighted that patients tend to give more weight to the interpersonal aspects of their experience with the health care provider.

Several factors contribute to the importance of patient satisfaction as a tool to help health care providers understand patients' perspectives and enhance overall quality. First, patient satisfaction and patient loyalty were found to be correlated. For example, in Yemen, Anbri, Ghani, Yadav, Dahar, & Su (2010) found that patients' satisfaction with reliability, empathy, and assurance had a significant influence on patient loyalty. Similarly, Mortazavi, Kazemi, Shirazi, & Aziz-Abadi (2009) concluded that there is a significant correlation between patient satisfaction and patient loyalty in nursing care, operating rooms, admission, and administration.

Second, from a consumerist perspective, patients can be viewed as customers, especially in a competitive market of private health care providers. Therefore, when health care delivery is commodified, patient (or consumer) satisfaction is crucial to organizational profitability as patients are empowered to leave the consumption loop due to dissatisfaction and find other options (Owusu-Frimpong, Nwankwo, & Dason, 2010). While there is a direct link between organizational profitability and patient satisfaction (Norazah, Chiam, & Norbayah, 2011), the latter can also contribute to reducing costs associated with resolving customer complaints (Pakdil and Harwood, 2005).

Lastly, various aspects of patient satisfaction contribute to policy and organizational reform (Blendon, Leitman, Morrison, & Doneland, 1990). Although patient satisfaction surveys are not widely utilized in health care service assessment (Coulter, 2002), they have the potential for identifying performance gaps and indicate areas of improvement.

Some health care professionals might dismiss patient satisfaction as being too subjective to determine health care quality (Coulter, 2002); however, patient-centered approaches to health care emphasize the importance of satisfying patients' expectations. In this sense, patient-satisfaction is an evaluative process in which a patient cognitively and emotionally reacts to the health care they receive (Pascoe, 1983). Therefore, it is integral to include recipients' perceptions of service quality in the evaluation of overall satisfaction.

Another important aspect of health care is *cost*; synonymously used with the term *affordability*. Affordability, as a generic term, can be best defined as a measure of someone's purchasing power towards a good or service (Levesque, Harris, & Russell, 2013). According to Glickman (2017), "affordability is not a synonym for low prices. It describes a qualitative ability to pay - an interaction of price, disposable income, and judgments about the necessity of a particular good." Accordingly, affordability of health care reflects the purchasing power of the end-user, derived from his disposable income, to pay for health care services.

To personalize the actual cost and affordability of health care, Emanuel, Glickman, & Johnson (2017) proposed the development of an "Affordability Index"<sup>[2]</sup>, which relates the average cost of health care to the average household income. The authors themselves indicated that the index is not perfect in determining the affordability of health care services. Glickman (2017) highlighted several limitations of the index, such as regional and national variability in health care spending, and the cost of insurance subsidized insurance for low-income families and double counting employer contributions to premiums. The index also has a limitation with respect to its universal applicability as many countries do not have universal or sponsored insurance.

Accessibility to health care is a complex and multi-dimensional construct. Levesque et al. (2013) highlighted that the literature on health care defines and operationalizes accessibility with respect to financial physical and geographical accessibility, predisposing and enabling factors, availability, accommodation, affordability, acceptability, adequacy, and cultural acceptability. Gulliford et al. (2002) broke-down *access* into "having" sufficient health care providers or, in other terms, availability and gaining access to such providers, which depends on actual utilization and affordability.

One aspect of accessibility is the availability of health care services when required, which can be operationalized, for example, as the number of patient-physician contacts (Turner & Pol, 1995). In addition, availability can be determined by the number of hospitals and clinics, the number of beds in each institution, and the adequacy of physicians and nurses (Tucker, 2002). Mosadeghrad (2013) argued that while availability is essential, accessibility (physical, financial, and conceptual) is crucial. The author highlighted that accessibility is especially critical when the service costs are high, and insurance is unavailable. Gulliford et al. (2002) argued that from a policy perspective, facilitating access to health care refers to helping people to utilize appropriate health resources in order to preserve or improve their health.

Besides the factors discussed above, Mosadeghrad (2013) found that responsiveness in health care service provision is also relevant, especially because information asymmetry exists between patients and service providers. This aspect of quality may include active listening, trust, respect, confidentiality, courtesy, and effective communication referred to as interpersonal aspects by Cohen (1996). Lack of perceived responsiveness on the part of the service provider may lead to lower levels of satisfaction among the recipients of health care services (Naidu, 2009).

Besides the factors discussed above, the literature discusses many other factors that determine perceived service quality in health care provision (refer to Mosadeghrad, 2013). It is evident that various aspects of health care delivery are highly interdependent, and their operationalization varies greatly in the literature (for example, Levesque et al., 2013). This paper primarily focuses on three factors (cost, quality, accessibility), as suggested by Kissick (1994) and responsiveness in the UAE health care sector.

[1] The Ministry of Health and Prevention regulates the health care sector on a federal level (UAE Ministry of Health and Prevention, 2018). The emirate-level regulatory authorities regulate health care providers in Abu Dhabi, Dubai, and Sharjah.

(Department of Health - Abu Dhabi, 2018; Dubai Health Authority, 2018; Sharjah Health Authority, 2018). Besides these, all the private companies in the Dubai Health Care City are regulated by a separate entity (Dubai Health Care City Authority, 2018).

[2] Affordability Index is a ratio that relates health insurance costs to household incomes over time. It is calculated by dividing the mean cost of an employer-sponsored family health insurance policy by median household income.

## Methods

The literature affirms that overall satisfaction with health care services is associated with various dimensions, such as quality, cost, accessibility, approachability, and responsiveness, to name a few. This study intends to investigate whether or not these associations are relevant in the context of the UAE. Based on the research question, the study hypothesizes that *there is no association between quality, affordability, accessibility, responsiveness, and overall satisfaction in the UAE health care sector.*

Given the nature of the study, quantitative analysis is deemed to be most appropriate for data collection and analysis. Quantitative research methods allow broad data collection and analysis across a large number of respondents (Creswell, 2009).

The target population for the research study consisted of citizens and residents of the UAE.[1] The data for the study was collected by YouGov and the Mohammed Bin Rashid School of Government in Dubai. A convenience sampling method was used to collect data. While the use of a convenience sample may impact how representative a sample is, a larger sample size may mitigate this limitation to some extent.

The appropriate sample size for a population of 9,121,170 was calculated through Raosoft Sample Size calculator as an estimate (Raosoft Inc., 2004; Wilson, 2014). A sample size  $n=3,382$  was found to be suitable; however, the actual sample size exceeded the appropriate sample size by approximately 65 percent, and  $n$  was equal to 5,855.

The respondents were asked to provide socio-demographic information, which is summarized in Table 1. In addition, they were asked to indicate whether or not they have a regular general physician, whether they have visited a doctor in the last three years, and lastly, whether they intend to go back to their home countries for medical consultation.

The survey items for the health services factors were adopted from the survey developed by Marshall and Hays (1994) with the authors' permission. The use of SERVQUAL (Parasuraman, Zeithaml & Berry, 1985) survey is common in the health care literature. However, this study opted for the above instrument as it was deemed appropriate for an exploratory study across the health care sector in the UAE and was not targeted to a particular service provider. While eighteen questions were included in the survey, nine affirmative questions were used for data analysis. The survey was produced in English and was then translated into Arabic. These questions were classified under overall satisfaction, quality, affordability, accessibility, and responsiveness. The responses to all the questions were recorded on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree).

The English and Arabic surveys were disseminated online. The survey instrument fully complied with the ethics guidelines. All appropriate procedures related to informed consent, confidentiality, anonymity, participants' rights, and the conditions of participation, including the right to refuse or withdraw without penalty, were observed for the study.

A multi-step data analysis was employed to draw a conclusion about the sample and infer a conclusion about the population. In the first step, preliminary analyses such as frequency tables, descriptive statistics, and correlation estimates were produced. The results of correlations were used to determine the need for principal component analysis (PCA) with varimax rotation. In the last step of the analysis, the components extracted through PCA were used in a multiple regression model to estimate the association between overall satisfaction and various dimensions of service quality in the UAE health care industry.

### ***Principle Component Analysis***

PCA is used for dimension reduction in the presence of the large number of variables and multicollinearity. However, another statistical method, such as regression or structural equation, needs to be subsequently used to estimate dependence between the derived factors and the dependent variable.

To ensure the parsimony of the multiple regression model, PCA was employed for dimension reduction. The need for PCA was determined by estimating correlations between the variables included in the data collection instrument (refer to Table 4).

Field (2005) indicated that the sample size is of major consideration when using any form of factor analysis. Since the sample size in this study is substantially large relative to the number of variables involved, the use of PCA is deemed appropriate. The appropriateness of the sample size is determined by the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO). Kaiser (1974) indicated that KMO values ranging between 0.7 and 0.9 are considered to be good. In addition to the sample size, the strength of the relationship between variables is determined by Bartlett's test. A p-value less than the significance level ( $\alpha = 0.05$ ) associated with Bartlett's test statistic is indicative of the appropriateness of using factor analysis.

The appropriate number of factors extracted is determined by 'eigenvalues' and 'scree plots.' The factors having eigenvalues of one or greater than one generally is retained. All such factors tend to explain the most variance and are suitable to be included in statistical methods determining the association between the dependent variable and independent factors.

### ***Multiple Regression Analysis***

Regression analysis enables the study to find an association between one dependent variable and one or more independent variables. The regression equation requires the variables to be numeric. This study uses one dependent variable, which is the overall satisfaction of the respondents, and four independent variables that resulted from the PCA. The independent variables are classified under cost, quality, accessibility, and responsiveness.

The resulting regression equation can be written as

$$\text{Overall Satisfaction} = \beta_0 + \beta_1 (\text{Affordability}) + \beta_2 (\text{Quality}) + \beta_3 (\text{Accessibility}) + \beta_4 (\text{Responsiveness}) + \epsilon$$

Where

$\beta_0$  is the constant term

$\beta_1$  to  $\beta_4$  are the coefficients of the factor's affordability, quality, accessibility, and responsiveness, and

$\epsilon$  is the error term

The magnitude of the coefficients will ascertain the importance of each factor in determining the overall satisfaction of the respondents with respect to various dimensions of health care services in the UAE.

[1] According to the UAE Federal Competitiveness and Statistics Authority (2018), the UAE population was 9,121,167

## **Results**

Table 1 presents the profile of the respondents. The male respondents comprised 59 percent of the sample. The sample appears to be representative of the population with respect to age, population distribution across the seven emirates, and population composition (Emiratis and non-Emiratis) (Federal Competitiveness and Statistics Authority, 2018; Government.ae, 2018).

With respect to education and income, 53 percent of the participants indicated having a Bachelor's degree, approximately 34 percent indicated having some form of postgraduate education, and 78 percent of the respondents specified having a monthly income of AED 25,000 or less. Nearly 50 percent of the respondents indicated having a sponsored insurance plan. Approximately 66 percent of the sample do not have a family physician, and 20 percent indicated not having a medical check-up in the last three years. Moreover, 51 percent of the respondents intend to go back to their home countries for medical treatment if the need arises.

Table 1: Respondents' Profile

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>	<b>Education</b>	<b>Frequency</b>	<b>Percent</b>
Male	3462	59%	Doctorate	226	4%
Female	2393	41%	Master's degree	1159	20%
<b>Age</b>			Postgraduate Diploma	835	14%
Below 20	268	5%	Bachelor's Degree	3086	53%
20-35 years	3072	52%	Others	549	9%
36-50 years	2010	34%	<b>Income</b>		
51+ years	505	9%	Low (up to 15,000 AED)	3419	58%
<b>Nationality</b>			Medium (15,001 to 30,000 AED)	1476	25%
Emirati	829	14%	High (Greater than 30,001 AED)	960	16%
Non-Emirati	5026	86%	<b>Insurance Plans</b>		
<b>Emirates of Residence</b>			Individual Plans (Self-financed)	1569	27%
Dubai	2839	48%	Family Plan (Self-financed)	1237	21%
Abu Dhabi & Al Ain	1501	26%	Company Sponsored with Co-payment	1966	34%
Ajman	398	7%	Company Sponsored without Co-payment	919	16%
Sharjah	876	15%	Traveler Plans (Self-financed)	164	3%
Umm al-Quwain	105	2%	<b>Regular Family Physician</b>		
Fujairah	50	1%	Yes	1989	34%
Ras al-Khaimah	86	1%	No	3866	66%
<b>Household Size</b>			<b>Medical Visit in the UAE in Last Three Years</b>		
1-3	2339	40%	Yes	4694	80%
4-6	2752	47%	No	1161	20%
7-9	542	9%	<b>Intend to go back Home for Medical Consultation</b>		
10+	222	4%	Yes	2991	51%
			No	2864	49%

The frequencies of responses to various questions are presented in Table 2. Two factors stand out clearly – responsiveness and affordability. While all the other factors recorded a higher number of responses on the right side of the spectrum, that is agreed and strongly agreed, the responsiveness and cost factors have a high percentage of neutral responses, 42 percent, and 36 percent, respectively. This neutrality, while ambiguous, may be interpreted as dissatisfaction with health care services on these dimensions.

Table2: Frequency Tables and Descriptive Statistics

	1	2	3	4	5	Mean	Median	SD
<b>Quality</b>								
Doctors are good about explaining the reason for medical tests.	2.72	8.08	19.45	51.39	18.36	3.75	4.00	0.94
I think my doctor's office has everything needed to provide complete medical care.	0.99	5.31	19.64	54.43	19.62	3.86	4.00	0.82
When I go for medical care, they are careful to check everything when treating and examining me.	2.08	9.26	22.95	49.48	16.23	3.69	4.00	0.92
<b>Accessibility</b>								
I have easy access to the medical specialists I need.	2.56	8.42	20.15	51.73	17.13	3.72	4.00	0.93
I am able to get medical care whenever I need it.	2.15	8.03	20.68	53.41	15.73	3.73	4.00	0.90
My doctors treat me in a very friendly and courteous manner.	0.75	4.30	15.54	58.00	21.40	3.95	4.00	0.78
<b>Responsiveness</b>								
Doctors usually spend plenty of time with me.	2.63	19.06	42.22	28.90	7.19	3.19	3.00	0.91
<b>Cost</b>								
I feel confident that I can get the medical care I need without being set back financially.	6.75	12.93	36.29	30.38	13.65	3.31	3.00	1.07
<b>Overall Satisfaction</b>								
The medical care I have been receiving is just about perfect.	2.27	8.57	23.59	49.62	15.95	3.68	4.00	0.92

1 = Strongly Disagree; 2 = Disagree; 3 = Uncertain; 4 = Agree; 5 = Strongly Agree

This interpretation also strengthens due to low means and medians associated with responsiveness (mean 3.19; median 3) and affordability (mean 3.31; median 3). All other factors recorded a mean and median of 4, indicating relatively higher levels of

satisfaction with them.

Table 3: Correlations

Health care Service Variables	1	2	3	4	5	6	7	8
1 I think my doctor's office has everything needed to provide complete medical care.	.532**							
2 The medical care I have been receiving is just about perfect.	.623**	.566**						
3 I feel confident that I can get the medical care I need without being set back financially.	.440**	.385**	.488**					
4 When I go for medical care, they are careful to check everything when treating and examining me.	.510**	.481**	.555**	.458**				
5 I have easy access to the medical specialists I need.	.438**	.449**	.504**	.407**	.481**			
6 My doctors treat me in a very friendly and courteous manner.	.427**	.395**	.451**	.312**	.417**	.401**		
7 Doctors usually spend plenty of time with me.	.371**	.304**	.370**	.342**	.367**	.322**	.356**	
8 I am able to get medical care whenever I need it.	.356**	.378**	.436**	.364**	.401**	.491**	.405**	.326**
**Correlation is significant at the 0.01 level								

The correlations between various factors were statistically significant ( $\alpha = 0.01$ ). The correlation estimates were relatively high (refer to Table 4), suggesting interdependence between various variables. Accordingly, PCA was employed for dimension reduction.

Table 4: Principal Component Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.88
Chi-Square - Bartlett's Test of Sphericity	12,039.35
df	21.00
Sig.	0.00
<b>Quality</b>	
Eigen Value	3.47
% of Variance	49.63
<b>Accessibility</b>	
Eigen Value	0.74
% of Variance	10.63
<b>Responsiveness</b>	
Eigen Value	0.73
% of Variance	10.36
<b>Cumulative %</b>	<b>70.62</b>

The KMO of 0.88 indicated the suitability of employed PCA for dimension reduction purposes. Accordingly, three factors were identified a priori and these three factors (quality, accessibility, and responsiveness) explained nearly 71 percent of cumulative variance. The affordability factor was excluded from the PCA as it had only one question and it was then included as a separate independent variable in the multiple regression equation.

As presented in Table 5, the quality of health care service delivery in the UAE has the highest Eigenvalue (>3) and explains the nearly 50 percent of the total variance. The other two factors are also important; however, the Eigenvalues are less than one, and the percentage of variance explained by them is approximately one-fifth of that of the quality aspect and ranges between 10-11%.

Table 5: Multiple Regression

	$\alpha$		Std. Error	t-Stat
Intercept	3.32		0.031	107.149*
Quality	$\beta_2$	0.51	0.009	56.573*
Accessibility	$\beta_3$	0.28	0.009	32.545*
Responsiveness	$\beta_4$	0.18	0.008	21.416*
Affordability	$\beta_5$	0.11	0.009	12.08*

\*Significant at the 0.01 level

In the last step of data analysis, four aspects (quality, accessibility, responsiveness, and affordability) were included in multiple regression analysis. The estimated model was statistically significant (F-statistic 1764.265; p-value 0.000), with an  $R^2$  of 0.547 and an adjusted  $R^2$  of 0.546. The  $R^2$  and adjusted  $R^2$  values indicate that nearly 55 percent of the variability in the perceived overall satisfaction can be explained by the four factors included in the model as independent variables. There is a negligible difference between  $R^2$  and adjusted  $R^2$  values suggesting that the specification of the model is appropriate, and all the factors are relevant in estimating the model. All the independent variables are statistically significant, with a p-value of 0.00 ( $\alpha = 0.05$ ). It is evident that quality has the highest coefficient, followed by accessibility, responsiveness, and lastly, affordability. The positive coefficients indicate that better perceptions related to all the four factors would lead to higher overall satisfaction.

Based on the results of multiple regression, the model can be presented as:

Overall Satisfaction from Health care Delivery in the UAE = 3.32 + 0.51 (Quality) + 0.28 (Accessibility) + 0.18 (Responsiveness) + 0.11 (Affordability)

The results of the multiple regression model indicate that there are statistically significant relationships between the dependent and independent variables under consideration, and therefore, there is enough evidence to reject the null hypothesis.

## Discussion

Based on the results of the data analysis, responsiveness and affordability appear to be lagging behind on customer satisfaction. Both responsiveness and affordability have a positive association with overall satisfaction. This indicates that when the customers' expectations concerning these two factors are met, the perceived overall satisfaction with health care services will increase. While affordability has the lowest coefficient among the four aspects of health care delivery in the UAE, the factor is statistically significant in the model, and therefore, requires attention. It also appears that the respondents perceive that doctors do not spend adequate time with them.

The demand and supply gap of health care services has led to increased demand-side costs, resulting in a negative impact on the affordability of health care in the UAE (Sayani, Moonesar, Elsholkamy & Zakzak, 2019). The country is considered to be one of the most expensive destinations in the Middle East for medical treatment, whilst the average price of a doctor's visit is US\$ 69, with an approximate 80 percent higher as compared with Singapore and 240 percent higher than in Saudi Arabia (Sayani et al., 2019). Moreover, medical inflation in the UAE is estimated to be 9.9 percent, which is the highest in the GCC (Alpen Capital, 2018). The UAE government has chosen to present price control mechanisms for health services and medicines (The National, 2014) to safeguard that the eventual recipients of the health care services are not experiencing extremely higher costs. In addition, the UAE government is transitioning towards universal health coverage for the population (Alshamsan et al., 2017) to reduce out-of-pocket health care expenses.

As discussed in section 2, the health care sector in the UAE appears to be consolidated with few players in the market. While having a few large players in the industry may promote investments in technology and human capital, it may also entail the risk that larger players may exploit the end-users by offering high cost but low-quality services. Reducing the multi-level regulatory burden may lead to lower entry barriers and promote competition, leading to increased affordability and improved service quality.

Unlike the UAE health care industry, the insurance industry is fragmented, with 61 insurance companies serving a population of approximately nine million. This negatively impacts the capacity of insurance companies to achieve economies of scale and scope and invest in the provision of cost-effective health insurance policies to retail and corporate customers, which in turn would result in increased affordability. The UAE government has made efforts to consolidate the insurance industry by increasing capital requirements for the insurance providers. However, concentrated efforts will be required to consolidate the insurance industry to drive the health insurance premiums down. A well developed and mature insurance sector will enable risk pooling and diversification, resulting in lower cost and premiums for the insurers and the insured respectively

The findings related to responsiveness require further investigation. According to the Dubai Health Authority (2018) annual statistics report, there are 2.9 doctors for every 1,000 residents (0.5 percentage points decline as compared to 2016) in Dubai. This ratio is high compared to that in many developed countries. For example, the United States of America, Canada, and the United Kingdom are reported to have 2.6 (2014), 2.5 (2015), and 2.8 (2016) doctors per 1,000 residents, respectively (WHO, 2018). Having a comparable density of physicians with developed countries does not indicate the sufficiency of human capital in the health care industry. The shortage of doctors leads to increased pressure to spend less time with patients, resulting in displeasure on the responsiveness factor of the service quality. The most obvious solution to this is to increase the number of physicians. This can be achieved by encouraging youth in the country to opt for medicine as a career of choice and attract foreign talent. The recent announcement regarding changes in the immigration laws may pave the way for qualified foreign doctors to join the UAE workforce.

## Conclusions

This paper aimed to examine the association between overall satisfaction and affordability, quality, accessibility, and responsiveness in the UAE health care sector. Statistical analysis techniques such as PCA and multiple regression were used to model the relationship between the dependent and independent variables. The use of PCA enabled data-driven dimension reduction, resulting in the four factors mentioned above. The results of data analysis highlighted responsiveness and affordability as the most concerning factors for respondents. While the sample was large, and it appeared to be representative of the UAE population in some aspects, the use of convenience sampling may limit the generalizability of the findings. The study can be extended by classifying the respondents according to their socio-demographic profiles and evaluating whether significant differences exist between perceptions of different groups of respondents. Furthermore, a study can be conducted to isolate the perceptions of those respondents who indicated an intention to have medical treatment in their home countries.

## List Of Abbreviations

GCC: Gulf Cooperation Countries

KMO: Kaiser-Meyer-Olkin Measure of Sampling Adequacy

PCA: Principle Component Analysis

UAE: United Arab Emirates

## Declarations

### Ethics approval and consent to participate

The local level ethical committee considered this project to be a health quality research project among the public 18 years or older (REC-04-017). The ethics approval (REC-04-017) was provided by the MBR School of Government Research Ethics Committee within the Government of Dubai, United Arab Emirates. The consent the authors obtained from study participants was written, at the beginning of the survey, where the participant was informed of his/her rights in participating in the survey, and if agree to proceed further, and at any time they wanted to leave the survey, they can proceed to exit the survey.

## Consent for publication

Not Applicable- the manuscript does not contain data from any individual person.

## Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Competing interests

The authors declare that they have no competing interests.

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## Authors' contributions

HS: Made a substantial contribution to all the sections. Participated in review, analysis and interpretation. Involved in drafting the manuscript and revising it critically for important intellectual content. IAM: Made a substantial contribution to background, methods and discussion sections. Involved in drafting the manuscript and revising it critically for important intellectual content. LZ: Made a substantial contribution to study design. Participated in review, analysis and interpretation. MM: Made a substantial contribution to background and method sections. All authors give final approval for the version to be published and agreed to be accountable for all aspects of the work.

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