

Assessment of the Patient's Experiences and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care among Diabetes Patients in the Urban Makkah Al-Mukarramah, in Saudi Arabia 2022

Abeer juwybir M Althubaiti¹, Noor Mobarak Albshre², Bahyia Salem Alsaafi³, Samar Abdullah Bamofleh⁴, Fahad Salman Almajnoni⁵, Ahlam masoud almowallad⁶, Dareen mohammedadnan dignah⁷, Reham Fahad Alnemari⁸, Naglaa Yakoub Gousti⁹, Abdullah Abdurabuh Al-kaabi¹⁰, Ahmad Muhanna. H. Alkhattabi¹¹, Ejlal mohammad Fedanoor¹², Zuhoor Hasan Bashmikh¹³, Turki Muhanna Alharbi¹⁴

¹Family medicine consultant, Al aziziah primary health care center, Saudi Arabia.

²Nursing technician, Shamiya Asfan Center in Jamoum, Makkah, Saudi Arabia.

³Senior ICU adult specialist, Khulais general hospital, Makkah, MOH, Saudi Arabia.

⁴North Jeddah Specialist Dental Center restorative consultant, Saudi Arabia.

⁵Nursing Specialist, Change management, Health affairs in Makkah, Saudi Arabia.

⁶Hospital management specialist, King Abdulaziz Hospital, Makkah, MOH, Saudi Arabia.

⁷Specialist dental assistant, North Jeddah speciality dental center, Saudi Arabia.

⁸General practitioner, Al Hindawiah PHC, Saudi Arabia.

⁹Nutrition Specialist, Directorate of Health Affairs Makkah, Saudi Arabia.

¹⁰Social service specialist, King Faisal Hospital, Saudi Arabia.

¹¹Health Services Manage. & Hospt, King Abdulaziz Hospital in Makkah, Saudi Arabia.

¹²General nursing, Al Kaakiya Health center in Makkah, Saudi Arabia.

¹³Social service specialist, King Faisal Hospital, Saudi Arabia.

¹⁴Social service specialist, King Faisal Hospital, Saudi Arabia

Abstract:

Background:

Diabetes Type 2 and/or hyperglycemia is associated with severe COVID-19 disease and increased mortality. It is now known that poor glucose control before hospital admission can be associated with a high risk of death. By achieving and maintaining glycemic control, primary care physicians (PCPs) play a critical role in limiting this potentially devastating outcome. Type 2 diabetes mellitus has huge economic burden for both patient and health-care system. Management

of the condition in Saudi Arabia faces multiple challenges such as paucity of trained medical and paramedical staff, poor quality, lack of satisfaction with services, and unaffordability of services. Hence, this study was done to determine the level of satisfaction and the out-of-pocket expenditure for type 2 diabetes patients receiving treatment from public and private sectors in urban of Makkah.

Aim of the study: To Assessment of the Patient's Experiences and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients in the Urban Makkah, in Saudi Arabia 2022.

Method: Cross-sectional analytical study was carried out among diabetes patients residing in the Urban Health Centre in the Makkah service area, Urban Health Centre to a population of spread over 4 villages. Study was conducted during the months of August and September 2022. Our total participants were (200) patients with Type 2 Diabetes attending in PHC.

Results: distribution of the participant with satisfaction and have a significant relation between the satisfaction and frequency while P-value <0.001 and X^2 25.48, participant toward Satisfaction with Diabetes Care study results show the majority of participant weak Satisfied were (45.0%) while average satisfied were (38.0 %), regarding the Satisfaction about Out-of-Pocket Expenditure for Follow-Up the most of participant in average were (55.0%).

Conclusion: The cost of diabetes care is more for patients seeking care from private sector than public sector. Availability of insulin and free syringes in the primary health center, provision of specialized footwear, and spectacles free of cost can help in reducing the out-of-pocket expenditure, PCPs will treat an increasing number of patients with diabetes who have symptoms of post-COVID-19 infection.

Keywords: Assessment, diabetes mellitus, Primary health care, patient satisfaction, Out-of-Pocket, Follow-Up Care, Saudi Arabia, Makka Al-Mukarramah.

Introduction

Diabetes is at epidemic levels and Type 2 diabetes (T2D), characterized by insulin resistance and insulin insufficiency, is the predominant form of diabetes (90–95% of cases) and is linked to obesity, aging, and individual genetic vulnerability.(1) Landmark studies of T2D have demonstrated significant clinical benefit from intensive management of elevated blood glucose (BG), blood pressure (BP), and blood lipids.(2,3) However, there is a significant gap between evidence-based recommendations for T2D and the medical care currently delivered .(4)

Type 2 diabetes mellitus is emerging as an epidemic and its treatment is a huge economic burden

both for the patient and for the health-care system. Management of this disease in Saudi Arabia faces multiple challenges, such as low levels of awareness, paucity of trained medical and paramedical staff, patient satisfaction with health-care facility, and unaffordability of medications and services (5). Patient's satisfaction depends upon the quality of health-care services provided. Previous research in Saudi Arabia have shown that although people have better trust in public sector compared to private sector, some people seek private sector for vaccination as they perceived higher competence when compared to public sector(6) Use of private sector services can increase the out-of pocket expenditure leading to more economic burden on the families. The term out-of-pocket expenditure is the share of the expenses the individual must pay directly to the healthcare provider, without a third party (insurer or government) (7).

High out-of-pocket costs correlate with lower therapy compliance leading to poor prognosis (8). Limited studies are available regarding the patient satisfaction and out-of pocket expenses for the diabetic care in Saudi Arabia. This study can provide useful information regarding 2 of 3 goals of universal health coverage: quality of care and financial protection among diabetes patients. (9) By assessing the health-care costs, the cost of diabetes care is more for patients seeking care from private sector than public sector. Availability of insulin and free syringes in the primary health center, provision of specialized footwear, and spectacles free of cost can help in reducing the out-of-pocket expenditure. (10)

According to the World Health Organization (WHO), telemedicine uses information and communication technologies to promote health, provide medical care, exchange medical information and educate healthcare providers and patients over long distances.(11) Likewise, these technologies are used by healthcare professionals to diagnose, treat and prevent diseases where distance is a crucial factor.(12) Telemedicine systems use smartphones, computers, tablets, internet platforms, webcams, microphones, teleworking devices, video calls, video conference systems, video communication, e-mail and other digital and virtual connections that facilitate communication between patients and healthcare providers at long distances.(13)

Literature Review

India had 61.3 million patients with type 2 diabetes mellitus in 2011, which is predicted to increase to 101.2 million by 2030 (14). In Indian scenario, the total annual expenditure on diabetes care is 10 000 INR in urban and 6260 INR in rural areas (15). In a low-income family residing in an urban locality, an adult diabetes patient spends approximately 34% from his family income (16). People suffering from type 2 diabetes mellitus are more prone to develop cardiovascular disease,

obesity, hypertension, and dyslipidemia, which increase the cost of treatment further (17).

Kaur, et al.(2015) report that Though most of our patients have not used telemedicine prior to this time, the extremely high use of smart devices and wide availability of access to the internet, including in remote areas in Saudi Arabia, made our transition to telemedicine a relatively smooth one.(18)

Another study from Delhi reported that more than half of the average annual direct cost of type 2 diabetes was medication-related costs (19), which is also similar to the findings were found in the study done in Saudi Arabia (63%) (20) and Nigeria (84%) (21), where more number of patients was satisfied with the diabetes care. However, contrast findings were found in studies done in Mexico (22) and Sudan (23).

American Diabetes Association, (2020) . Diabetes care is an area that is well suited to the use of telemedicine, especially with the evolving advances in glucose monitoring devices and remote glucose data sharing features. (24)Even for patients who still depend on SMBG, they can use Bluetooth glucose meters that allow for data upload to the cloud, or they can simply send photos of their daily glucose log to the HCPs via email or phone texts (25)

Also, other studies found that telemedicine increases communication among healthcare professionals and reduces visits to hospitals.(26,27) The aforementioned advantages are important contributions offered by the utilization of telemedicine in healthcare settings.(28)

Chronic Illness Center indicates that telemedicine has a role in the clinical care of patients with DM. Moreover, the patient response to telemedicine services was encouraging. In fact, overall, high of patients answered the calls and attended the virtual clinics in hospital during the period from March to June 2020, based on the statistics of the appointment department at our institution.(29)

Our findings regarding the impact of telemedicine care on improving the outcomes of patients with DM is consistent with other studies reported in the literature.(30) For instance, one of the largest studies conducted to investigate the effect of telemedicine on DM outcomes is the Informatics for Diabetes Education and Telemedicine project that included 1665 patients. This randomized controlled trial compared the outcomes of DM patients provided with telemedicine care with DM patients not enrolled in telemedicine system.(31) The study participants in this project showed improvements in glycaemic control, blood pressure readings and cholesterol levels after following the participants for 1 year.(32)

Rationale:

this study was done to assessment of the Patient's Experiences and Satisfaction in Diabetes Care

and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients in the Urban Makkah Al-Mukarramah, in Saudi Arabia 2022 for type 2 diabetes patients receiving treatment from PHC and private sectors in urban Saudi Arabia. can offer a convenient way of expanding access to healthcare in Saudi Arabia accurately and cost-effectively while minimizing the risk of COVID-19 transmission. More efforts should be exerted to provide healthcare settings with technical equipment and training needed for telemedicine. Regulations to implement telemedicine on a large scale in Saudi Arabia while protecting data privacy are also needed, as a result of adopting the Diabetes Telemedicine Clinic, we were able to successfully reduce the number of patients, HCPs, and staff physically present in the clinics without negatively impacting the quality of care provided to our patients nor their satisfaction with the visits..

Aim of the study:

To Assessment of the Patient's Experiences and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients in the Urban Makkah , in Saudi Arabia 2022

Objectives:

To Assessment of the Patient's Experiences and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients in the Urban Makkah , in Saudi Arabia 2022

Methodology:

Study design:

This study is a cross sectional descriptive study

Study Area

Patients aged 35 to >60 years and above with type 2 DM during the Coronavirus Disease 2019 Outbreak attending in primary health care outpatient in the diabetes center, the patients were recruited from an integrated care clinic at the diabetes center and clinics of the Family and Community Medicine Department at Makkah Al-Mokarrama, Saudi Arabia at diabetes center and clinics of the Family and Community Medicine Department, high-risk patients with type 2 diabetes are referred to this diabetes center and clinics of the Family and Community Medicine Department from, the patients receive comprehensive diabetes care during

Study Population

The study has been conducted among patients aged 35 to >60 years and above with type 2 DM. Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients attending in primary health care outpatient in the Diabetic Center, family and Community Medicine Department in the Makkah, from August and September 2022

Selection criteria:

Inclusion criteria

- In this study, the inclusion criteria included the following: patients aged 35 to >60 years with Type 2 Diabetes.

Exclusion criteria :

- All patients with Type 2 Diabetes and after receiving Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients or traditional care were excluded. Based on these inclusion and exclusion criteria, in the traditional care model, we included all the first 50 patients who met the criteria. Socio economic and clinical characteristics, such as age, sex, and comorbidities, were included in the Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients. (200 patients).

Sample size

The sample size has been calculated by applying Raosoft sample size calculator based on (The margin of error: 5%, Confidence level: 95%, and the response distribution was considered to be 20%) accordingly the Sample size is 250 of diabetic patients attending and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been (200). Computer generated simple random sampling technique was used to select the study participants.

Sampling technique :

Systematic random sampling technique is adopted. By using systematic sampling random as dividing the total population by the required sample size; (200)

Data collection tool

- patients with Type 2 Diabetes during the who were managed using Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients. Deliver Follow-up Care. Patients were

followed for at least 3 month to assess the Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients.. to deliver care for diabetic patients with Type 2 Diabetes .

- Diabetic patients' age, sex, disease duration, follow-up period, comorbidities, shipping, and the frequency of Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients.
- Consequently, the medications, laboratory tests, medical supplies, shipping, phone calls, and clinic visits were collected. The visits to the clinic and laboratory tests were retrieved from the Ministry of Health, Saudi Arabia.

Data collection technique :

Researcher has been visits the selected Diabetic Center after getting the approval from the ministry of health. She has been explained the purpose of the study to all participants attending the clinic. The data has been collect from August and September 2022.

Data entry and analysis:

The Statistical Package for Social Sciences (SPSS) software version 24.0 has been used for data entry and analysis. Descriptive statistics (e.g., number, percentage) and analytic statistics using test for the association and the difference between two categorical variables were applied. A p-value ≤ 0.05 has been considered statistically significant.

Pilot study:

A pilot study has been conducted to test the methodology of the study, the questionnaire has been clear .

Ethical considerations:

- Permission has been obtained, and has been Verbal consents from all participants in the questionnaire were obtained.
- All information was kept confidential, and a result has been submitted to the department as feedback.

Budget: Self-funded

Results

Table 1: Distribution of Socio-demographic characteristics of the study participants in Diabetes Care (age, gender, Level of education, Nationality, economic level) (n=200).

	N	%
Age		
<35	48	24
35-50	38	19
50-60	44	22
>60	70	35
Gender		
Female	84	42
Male	116	58
Level of education		
Illiterate	42	21
Primary school certificate	30	15
Middle school certificate	30	15
High school certificate	44	22
Intermediate or post high school	36	18
Graduate or postgraduate	18	9
Nationality		
Saudi	150	75
Non-Saudi	50	25
Occupation		
Employed	64	32
Housewife	108	54
Unemployed	28	14
Family history of diabetes mellitus		
Present	150	75
Absent	50	25
BMI Categories		
Underweight	30	15
Normal weight	44	22

Overweight	76	38
Obese	50	25
Economic level		
Low	68	34
Average	48	24
High	84	42

Table 1 shows that most of the participants (35.0%) were in the age group >60 years follow by the (24.0%) were the age group <35 years, the majority of them were male (58.0%) while female(42.0%), regarding Educational level the majority of participant are High school certificate were(22.0%) while Illiterate were(21.0%), also regarding Nationality the majority of participant are Saudi were(75.0%) while Non- Saudi were(25.0%), regarding Occupation the majority of participant are Housewife were(54.0%) while Employed were(32.0%). Regarding the Family history of diabetes mellitus the majority of participant present were (75.0%) while absent were(25.0%), regarding BMI Categories the majority of participant are Overweight were(38.0%) while Obese were(25.0%). Regarding the Economic level the majority of participant High were (42.0%) while low were(34.0%) .

Table 2 . Distribution of the Satisfaction Frequency for Follow-Up Care and out-of-Pocket among Diabetes Mellitus of the participants .

	N	%	Chi-square	
Satisfaction with Diabetes Care			X ²	P-value
Weak	90	45	25.48	<0.001*
Average	76	38		
High	34	17		
Satisfaction about Out-of-Pocket Expenditure for Follow-Up				
Weak	50	25	43	<0.001*
Average	110	55		
High	40	20		

Table 2 Regarding distribution of the participant with satisfaction and have a significant

relation between the satisfaction and frequency while P-value <0.001 and X^2 25.48, participant toward Satisfaction with Diabetes Care study results show the majority of participant weak Satisfied were(45.0%) while average satisfied were(38.0 %), regarding the Satisfaction about Out-of-Pocket Expenditure for Follow-Up the most of participant in average were(55.0%) while weak is (25.0%) while heave a significant relation P-value <0.001 and X^2 34.0.

Figure 1 Distribution of the Satisfaction Frequency for Follow-Up Care and out-of-Pocket among Diabetes Mellitus of the participants

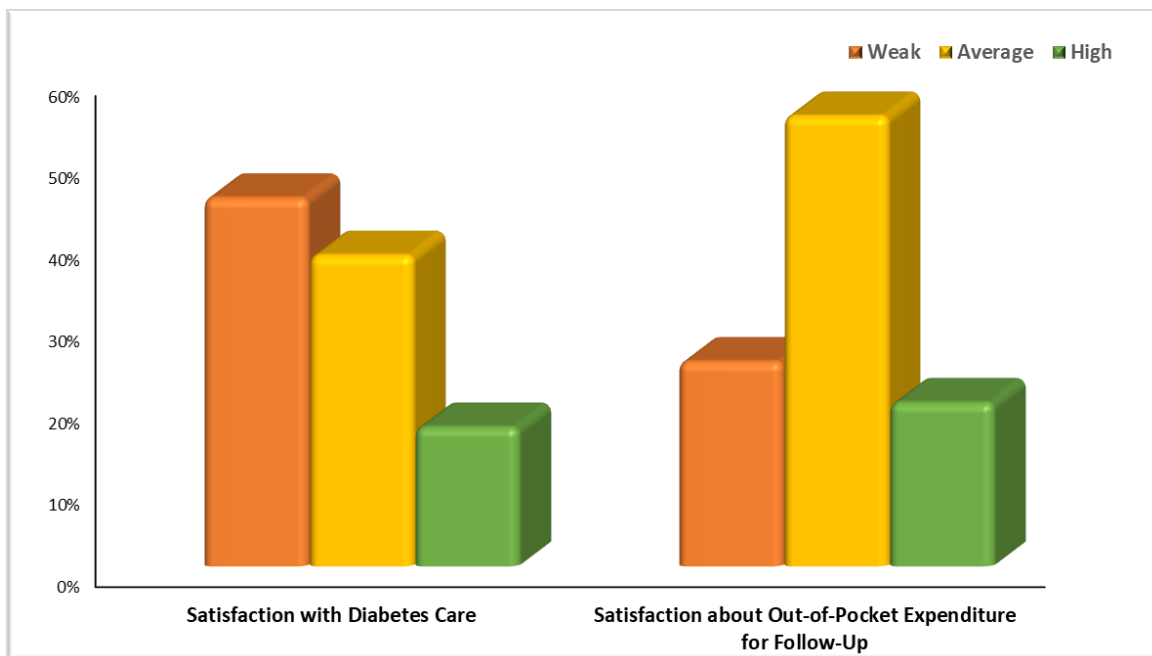


Table 3. Distribution of the association of socio demographic Variables and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care .

		Total	Satisfaction with Diabetes Care						Chi-square	
			Weak		Average		High		X^2	P-value
			N	%	N	%	N	%		
Age	<35	48	2	25.5	1	23.6	7	20.5	24.57	<0.001
	35-50		38	1	16.6	2	28.9	1		
			3	6	8	8	4	9		*

	50-60	44	1 3	14.4 4	1 5	19.7 4	1 6	47.0 6		
	>60	70	3 9	43.3 3	2 1	27.6 3	1 0	29.4 1		
Gender	Female	84	2 6	28.8 9	4 5	59.2 1	1 3	38.2 4	15.79 0	<0.001 *
	Male	116	6 4	71.1 1	3 1	40.7 9	2 1	61.7 6		
Level of education	literate	42	1 1	12.2 2	2 2	28.9 5	9	26.4 7	17.15 6	0.071
	Primary school certificate	30	1 3	14.4 4	1 0	13.1 6	7	20.5 9		
	Middle school certificate	30	1 9	21.1 1	1 0	13.1 6	1	2.94		
	High school certificate	44	2 2	24.4 4	1 6	21.0 5	6	17.6 5		
	Intermediate or post high school	36	1 8	20.0 0	1 3	17.1 1	5	14.7 1		
	Graduate or postgraduate	18	7	7.78	5	6.58	6	17.6 5		
Nationality	Saudi	150	8 0	88.8 9	5 0	65.7 9	2 0	58.8 2	17.44 3	<0.001 *
	Non-Saudi	50	1 0	11.1 1	2 6	34.2 1	1 4	41.1 8		
Occupation	Employed	64	2 0	22.2 2	2 6	34.2 1	1 8	52.9 4	17.43 8	0.002*
	Housewife	108	5 0	55.5 6	4 5	59.2 1	1 3	38.2 4		
	Unemployed	28	2 0	22.2 2	5	6.58	3	8.82		
Family history of	Present	150	6 0	66.6 7	6 8	89.4 7	2 2	64.7 1	13.74 6	0.001*

diabetes mellitus	Absent	50	3 0	33.3 3	8	10.5 3	1 2	35.2 9		
BMI Categories	Underweight	30	1 6	17.7 8	1 1	14.4 7	3	8.82	14.55 3	0.024*
	Normal weight	44	2 2	24.4 4	1 6	21.0 5	6	17.6 5		
	Overweight	76	4 0	44.4 4	2 6	34.2 1	1 0	29.4 1		
	Obese	50	1 2	13.3 3	2 3	30.2 6	1 5	44.1 2		
Economic level	Low	68	1 2	13.3 3	4 2	55.2 6	1 4	41.1 8	55.87 1	<0.001 *
	Average	48	2 1	23.3 3	1 0	13.1 6	1 7	50.0 0		
	High	84	5 7	63.3 3	2 4	31.5 8	3	8.82		

Table (4) show that is a significant relation between Satisfaction with Diabetes Care and demographic data regarding age increase in 50-60 years high satisfaction were (47.06%) follow by >60 age in satisfaction were(43.0%) while P-value=0.001, X^2 24.574. Regarding the gender is a significant relation between satisfaction and gender increase in male in weak were (71.11%) followed by female were in average satisfaction were(59.21%) also P-value=0.001, X^2 = 15.790. Regarding the Level of education is no significant relation between satisfaction and Level of education increase in High school certificate in weak were (24.44%) also P-value=0.071, X^2 = 17.156. Regarding the Nationality is a significant relation between satisfaction and Nationality increase in Saudi in weak were (88.89%) also P-value=0.001, X^2 = 17.443. Regarding the Occupation is a significant relation between satisfaction and Occupation increase in Housewife in average were (59.21) also P-value=0.001, X^2 = 17.438. Regarding the Family history of diabetes mellitus is a significant relation between satisfaction and Family history of diabetes mellitus increase in average were (89.47%) also P-value=0.001, X^2 = 13.746. Regarding the BMI Categories is no significant relation between satisfaction and BMI Categories increase in weak were (44.44%) also P-value=0.024, X^2 = 14.553. Regarding the Economic level is a significant relation between

satisfaction and Economic level increase in weak were (63.33%) also P-value=0.001, $X^2= 55.871$

Table 4 . Distribution of the association of socio demographic Variables and Satisfaction of Satisfaction about Out-of-Pocket Expenditure for Follow-Up .

		Total	Satisfaction about Out-of-Pocket Expenditure for Follow-Up						Chi-square	
			Weak		Average		High		X^2	P-value
			N	%	N	%	N	%		
Age	<35	48	21	42.00	12	10.91	15	37.50	43.837	<0.001*
	35-50	38	11	22.00	19	17.27	8	20.00		
	50-60	44	16	32.00	24	21.82	4	10.00		
	>60	70	2	4.00	55	50.00	13	32.50		
Gender	Female	84	16	32.00	32	29.09	36	90.00	47.410	<0.001*
	Male	116	34	68.00	78	70.91	4	10.00		
Level of education	literate	42	11	22.00	23	20.91	8	20.00	20.477	0.025*
	Primary school certificate	30	7	14.00	19	17.27	4	10.00		
	Middle school certificate	30	10	20.00	20	18.18	0	0.00		
	High school certificate	44	7	14.00	23	20.91	14	35.00		
	Intermediate or post high school	36	11	22.00	13	11.82	12	30.00		
	Graduate or postgraduate	18	4	8.00	12	10.91	2	5.00		
Nationality	Saudi	150	45	90.00	81	73.64	24	60.00	10.909	0.004*
	Non-Saudi	50	5	10.00	29	26.36	16	40.00		
Occupation	Employed	64	12	24.00	32	29.09	20	50.00	38.845	<0.001*
	Housewife	108	23	46.00	75	68.18	10	25.00		
	Unemployed	28	15	30.00	3	2.73	10	25.00		
Family	Present	150	45	90.00	90	81.82	15	37.50	38.727	<0.001*

history of diabetes mellitus	Absent	50	5	10.00	20	18.18	25	62.50		
BMI Categories	Underweight	30	9	18.00	13	11.82	8	20.00	11.469	0.075
	Normal weight	44	13	26.00	23	20.91	8	20.00		
	Overweight	76	10	20.00	49	44.55	17	42.50		
	Obese	50	18	36.00	25	22.73	7	17.50		
Economic level	Low	68	42	84.00	19	17.27	7	17.50	89.606	<0.001*
	Average	48	6	12.00	23	20.91	19	47.50		
	High	84	2	4.00	68	61.82	14	35.00		

Table (4) show that is a significant relation between Satisfaction about Out-of-Pocket Expenditure for Follow-Up and demographic data regarding age a significant relation increase in <35 years in weak satisfaction were (42.00%) follow by >60 age in average satisfaction were(50.00%) while P-value=0.001, X^2 43.837. Regarding the gender is a significant relation between satisfaction and gender increase in female in high were (90.00%) followed by male were in weak satisfaction were(68.00%) also P-value=0.001, X^2 = 47.410. Regarding the Level of education is no significant relation between satisfaction and Level of education increase in High school certificate in high were (35.00%) also P-value=0.025, X^2 = 20.477. Regarding the Nationality is a significant relation between satisfaction and Nationality increase in Saudi in weak were (90.0%) also P-value=0.001, X^2 = 10.909. Regarding the Occupation is a significant relation between satisfaction and Occupation increase in Housewife in average were (68.18) also P-value=0.001, X^2 = 38.845. Regarding the Family history of diabetes mellitus is a significant relation between satisfaction and Family history of diabetes mellitus increase in Present in weak were (90.00%) also P-value=0.001, X^2 = 38.727. Regarding the BMI Categories is no significant relation between satisfaction and BMI Categories increase in Overweight in average were (44.55%) also P-value=0.075, X^2 = 11.469. Regarding the Economic level is a significant relation between satisfaction and Economic level increase in low in weak were (84.00%) also P-value=0.001, X^2 = 89.606

Discussion

This was a cross-sectional study conducted among diabetes patients to To Assessment of the

Patient's Experiences and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients in the Urban Makkah , in Saudi Arabia 2022. The cost of diabetes care for government acility was high with majority contributed by diet and transportation costs. Out-of-pocket expenditure found in for private health facility

Saudi Arabia was not far from putting telemedicine in practice during the Coronavirus Disease 2019 outbreak. The Ministry of Health in Saudi Arabia and the private sector had developed several telemedicine services before and during the Coronavirus Disease 2019 outbreak as a part of the Saudi Vision (2030) that managed to invest in health and provide innovative digital solutions for the increasing need for healthcare(33) We undertook the current study to Assessment of the Patient's Experiences and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients in the Urban Makkah Al-Mukarramah, in Saudi Arabia 2022

shows that most of the participants (35.0%) were in the age group >60 years, the majority of them were male (58.0%), regarding Educational level the majority of participant are High school certificate were(22.0%), the majority of participant are Saudi were(75.0%) , regarding Occupation the majority of participant are Housewife were(54.0%). Regarding the Family history of diabetes mellitus the majority of participant present were (75.0%) , regarding BMI Categories the majority of participant are Overweight were(38.0%). Regarding the Economic level the majority of participant High were (42.0%) .(See Table 1)

In China, a study conducted on 161 tertiary hospitals representing 29 provinces showed that 93.8% of tertiary hospitals provided synchronous and asynchronous telemedicine services during the Coronavirus disease 2019 and 75.8% of hospitals had assigned telemedicine staff (30). Another study conducted on 48 public dental hospitals in China during the COVID-19 pandemic showed that 90% of hospitals changed their face-to-face consultations to web based and mobile-based consultations, and telemedicine triage to detect the cases that needed urgent intervention was carried out in 69% of the included hospitals (28)

only one-third of patients were satisfied with the care provided for diabetes mellitus. This can be attributed to the type of health facility in which the patient satisfaction was assessed in Mexico and Sudan studies as it was conducted in primary health-care facility. While other studies including the current one had more number of patients receiving care from secondary and tertiary care facility(29).

The current study also distribution of the Satisfaction Frequency for Follow-Up Care and out-of-Pocket among Diabetes Mellitus of the participants found that patient with care provided when compared to the patients who did not have any complications . This shows that the health facilities

are better equipped to handle outpatient care of the diabetes patients when compared to inpatient care for complications related to diabetes mellitus in both public and private health facilities(21).

Regarding distribution of the participant with satisfaction and have a significant relation between the satisfaction and frequency while P-value <0.001 and X² 25.48, participant toward Satisfaction with Diabetes Care study results show the majority of participant weak Satisfied were(45.0%) while average satisfied were(38.0 %), regarding the Satisfaction about Out-of-Pocket Expenditure for Follow-Up the most of participant in average were(55.0%) while weak is (25.0%) while have a significant relation P-value <0.001 and X² 34.0. (See table 2)

Major strength of the study is the collection of details in relation to both quality of diabetes care assessed through the level of satisfaction of the patients and financial protection of diabetes patients assessed via the out-of-pocket expenditure incurred in both public and private facilities. The current study adds to the limited literature available regarding the assessment of diabetes care in Makkah Al-Mukarramah Saudi Arabia health-care settings .Found the cost of diabetes care is more for patients seeking care from private facility compared to government facility. Strategies aimed at reducing out-of-pocket expenditure need to be developed. Patients approach tertiary health-care facility for insulin vials leading to raised direct nonmedical costs such as transportation costs. Hence, insulin and free syringes should be made available in the primary health center level(23).

Conclusions

The current study found that almost the patients with diabetes mellitus are satisfied with the care received. is more for patients seeking care from private sector than public sector. Further qualitative research can be done to explore the reasons for dissatisfaction among the patients and develop appropriate health financing strategies by interviewing the relevant stakeholders. Regulations to implement telemedicine on a large scale in Saudi Arabia while protecting data privacy are also needed, as a result of adapting to the deliver healthcare for patients with Type 2 Diabetes during the COVID-19 Pandemic.

References:

1. Burgos-Morón, E., Abad-Jiménez, Z., Martínez de Marañón, A., Iannantuoni, F., Escribano-López, I., López-Domènech, S., ... & Víctor, V. M. (2019). Relationship between oxidative stress, ER stress, and inflammation in type 2 diabetes: the battle continues. *Journal of clinical medicine*, 8(9), 1385.

2. Bain, S. C., Klufas, M. A., Ho, A., & Matthews, D. R. (2019). Worsening of diabetic retinopathy with rapid improvement in systemic glucose control: a review. *Diabetes, Obesity and Metabolism*, 21(3), 454-466.
3. Ajjan, R., Slattery, D., & Wright, E. (2019). Continuous glucose monitoring: a brief review for primary care practitioners. *Advances in therapy*, 36(3), 579-596.
4. Calvano, A., Izuora, K., Oh, E. C., Ebersole, J. L., Lyons, T. J., & Basu, A. (2019). Dietary berries, insulin resistance and type 2 diabetes: An overview of human feeding trials. *Food & function*, 10(10), 6227-6243.
5. Murphy, C. V., Saliba, L., MacDermott, J., Soe, K., & Dungan, K. M. (2020). Individualizing glycemic control in the critically ill. *Critical care nursing quarterly*, 43(1), 14-27.
6. Alanazy, A., Fraser, J., & Wark, S. (2021). Provision of emergency medical services in rural and urban Saudi Arabia: An overview of personnel experiences. *Asia Pacific Journal of Health Management*, 16(2), 148-157.
7. Albejaidi, F. The Role of Leadership in Improving Efficiency, Effectiveness and Safety Measures of Hospitals, Primary Healthcare Centers, & Pharmaceutical Firms.
8. ALobaid, A. M., Gosling, C., McKenna, L., & Williams, B. (2021). Perceptions of EMS leaders and supervisors on the challenges faced by female paramedics in Riyadh Saudi Arabia: a qualitative study. *International Journal of Emergency Services*.
9. AlShayban, D. M., Naqvi, A. A., Islam, M. A., Almaskeen, M., Almulla, A., Alali, M., ... & Haseeb, A. (2020). Patient satisfaction and their willingness to pay for a pharmacist counseling session in hospital and community pharmacies in Saudi healthcare settings. *Frontiers in Pharmacology*, 11, 138.
10. Kader Mohiuddin, A. (2020). Patient satisfaction with healthcare services: Bangladesh perspective. *International Journal of Public Health*, 9(1), 34-45.
11. World Health Organization. (2020). Coronavirus disease 2019 (COVID-19): situation report, 51
12. Badawy, S. M., & Radovic, A. (2020). Digital approaches to remote pediatric health care delivery during the COVID-19 pandemic: existing evidence and a call for further research. *JMIR pediatrics and parenting*, 3(1), e20049.
13. Almalki, Z. S., Alahmari, A. K., Alshehri, A. M., Altowaijri, A., Alluhidan, M., Ahmed, N., ... & Alqahtani, A. M. (2022). Investigating households' out-of-pocket healthcare expenditures based on number of chronic conditions in Riyadh, Saudi Arabia: a cross-sectional study using quantile regression approach. *BMJ open*, 12(9), e066145.

14. Geetha, P., & Shanmugasundaram, P. (2019). A Prospective Observational Study on assessment of risk factor associated with diabetic retinopathy in patients diagnosed with type 2 Diabetes Mellitus in south Indian population. *Research Journal of Pharmacy and Technology*, 12(2), 595-599.
15. Maheshwari, P., & Shanmugarajan, T. S. (2019). Evaluation of Prescribing Practices of Metformin in Patients with Type-2 Diabetes Mellitus. *Research Journal of Pharmacy and Technology*, 12(2), 531-534.
16. Itumalla, R., Kumar, R., Tharwat Elabbasy, M., Perera, B., & Torabi, M. R. (2021, December). Structural Factors and Quality of Diabetes Health Services in Hail, Saudi Arabia: A Cross-Sectional Study. In *Healthcare* (Vol. 9, No. 12, p. 1691). MDPI.
17. Li, J. Q., Wang, Y. H., Lu, Q. D., Xu, Y. Y., Shi, J., Lu, L., & Bao, Y. P. (2019). Prevalence of psychological distress in type ii diabetes in China: a systematic review and meta-analysis. *Heart and Mind*, 3(4), 147.
18. Kaur, R., Kajal, K. S., Kaur, A., & Singh, P. (2015). Telephonic consultation and follow-up in diabetics: impact on metabolic profile, quality of life, and patient compliance. *North American Journal of Medical Sciences*, 7(5), 199.
19. Madan, A., Bindal, S., & Gupta, A. K. (2021). Social distancing as risk reduction strategy during COVID-19 pandemic: A study of Delhi-NCT, India. *International Journal of Disaster Risk Reduction*, 63, 102468
20. Khosravizadeh, O., Ahadinezhad, B., Maleki, A., Hashtroodi, A., Moqadam, A., & Kamali, H. (2022). Understanding Medication-Related Belief in Patients with Type 2 Diabetes: a Meta-Analytic Review. *Clinical Diabetology*.
21. Adibe, M., Chinwe, U., & Udeogaranya, P. (2007). Diabetes self-care knowledge among type 2 diabetic outpatients in south-eastern Nigeria. *Education*, 2012.
22. Ranjbaran, S., Shojaeizadeh, D., Dehdari, T., Yaseri, M., & Shakibazadeh, E. (2020). Determinants of medication adherence among Iranian patients with type 2 diabetes: An application of health action process approach. *Heliyon*, 6(7), e04442.
23. Priya, T. K., Jayaseelan, V., Krishnamoorthy, Y., Sakthivel, M., & Majella, M. G. (2020). Patient's Experiences and Satisfaction in Diabetes Care and Out-of-Pocket Expenditure for Follow-Up Care Among Diabetes Patients in Urban Puducherry, South India. *Journal of Patient Experience*, 7(6), 1445-1449.
24. Eze, N. D., Mateus, C., & Cravo Oliveira Hashiguchi, T. (2020). Telemedicine in the OECD: an umbrella review of clinical and cost-effectiveness, patient experience and

implementation. *PloS one*, 15(8), e0237585

25. Onishi, Y., Yoshida, Y., Takao, T., Tahara, T., Kikuchi, T., Kobori, T., ... & Kasuga, M. (2021). Diabetes management by either telemedicine or clinic visit improved glycemic control during COVID-19 pandemic state of emergency in Japan. *Journal of Diabetes Investigation*
26. De La Torre-Díez, I., López-Coronado, M., Vaca, C., Aguado, J. S., & de Castro, C. (2015). Cost-utility and cost-effectiveness studies of telemedicine, electronic, and mobile health systems in the literature: a systematic review. *Telemedicine and e-Health*, 21(2), 81-85.
27. Shiff, B., Frankel, J., Oake, J., Blachman-Braun, R., & Patel, P. (2021). Patient satisfaction with telemedicine appointments in an academic andrology-focused urology practice during the COVID-19 pandemic. *Urology*, 153, 35-41.
28. Tchero, H., Kangambega, P., Briatte, C., Brunet-Houdard, S., Retali, G. R., & Rusch, E. (2019). Clinical effectiveness of telemedicine in diabetes mellitus: a meta-analysis of 42 randomized controlled trials. *Telemedicine and e-Health*, 25(7), 569-583.
29. Xu, T., Pujara, S., Sutton, S., & Rhee, M. (2018). Peer reviewed: telemedicine in the management of type 1 diabetes. *Preventing chronic disease*, 15.
30. Faruque, L. I., Wiebe, N., Ehteshami-Afshar, A., Liu, Y., Dianati-Maleki, N., Hemmelgarn, B. R., ... & Tonelli, M. (2017). Effect of telemedicine on glycosylated hemoglobin in diabetes: a systematic review and meta-analysis of randomized trials. *Cmaj*, 189(9), E341-E364.
31. Tchero, H., Kangambega, P., Briatte, C., Brunet-Houdard, S., Retali, G. R., & Rusch, E. (2019). Clinical effectiveness of telemedicine in diabetes mellitus: a meta-analysis of 42 randomized controlled trials. *Telemedicine and e-Health*, 25(7), 569-583.
32. Fantinelli, S., Marchetti, D., Verrocchio, M. C., Franzago, M., Fulcheri, M., & Vitacolonna, E. (2019). Assessment of psychological dimensions in telemedicine care for gestational diabetes mellitus: A systematic review of qualitative and quantitative studies. *Frontiers in psychology*, 10, 153.
33. Beatty, J. R. (2020). A Telemedicine Follow Up Program to Improve Glycemic Outcomes For Patients With Uncontrolled Type 2 Diabetes.