

The utilization of health care services by people with type 2 diabetes living in slums in Tabriz, Iran, and sociodemographic factors that influence it: a cross-sectional study

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Abstract

Background

As one of the disadvantaged groups, slum-dwellers face health disparities. These disparities can also be attributed to inequalities in health care utilization. Therefore, this study aimed to investigate health care utilization among patients with type 2 diabetes living in Tabriz's slums in 2022.

Methods

A cross-sectional study was conducted. Our study included participants who were over 18 years old, did not suffer from physical and psychological disabilities and had lived in slums for at least 5 years. 13155 patients with type 2 diabetes live in slums in Tabriz, according to the official statistics of the Vice Chancellor for Health at Tabriz University of Medical Sciences. Thus, we selected 400 patients using stratified systematic random sampling. A questionnaire was used to collect data, and SPSS version 22 was used to analyze the results.

Results

Of the 400 patients, 215 were female (53.8%), 323 were illiterate or could read and write (58%) and 303 had low income (75.2%). Only 15% had supplementary health insurance, while 82.3% had basic coverage. Although 49.8% of patients felt they needed outpatient services, only 38.3% were able to receive them. A blood sugar test is the most frequently received service (50%), while psychological counseling is the least frequently received consultation (3.30%). Outpatient services were used more frequently by patients with higher socioeconomic status and those with diabetes complications ($P < 0.05$). The utilization of inpatient services was higher among older and less educated people ($P < 0.05$).

Conclusion

Among slum-dwellers with type 2 diabetes, health care utilization is low. The government and health system should focus on providing adequate education about diabetes and its importance, empowering slum-dwellers to improve self-care and disease management, expanding public insurance coverage, and sufficient coverage of costs by insurance organizations.

Background

Slum areas are known for deprivation [1]. Insecure residential status, houses structure with low quality, overcrowding, poor access to safe water, and poor access to sanitation and other infrastructure are the characteristics enumerated by the United Nations that can cause adverse health outcomes. One of the adverse health outcomes arising from slum-dwelling is the under-utilization of health care services [2]. Utilization can be defined as the number of uses of health care. Management of care can be evaluated by assessing the pattern of uses [3].

One of the most common non-communicable diseases (NCDs) that health care utilization affects its control and management is type 2 diabetes. Type 2 diabetes is an increasing public health problem all over the world [4–7]. The universal population affected by this lifelong disease has been over 425 million in 2017. It is projected that this chronic illness will reach 629 million people by 2045. [8]. Developing countries account for 75% of patients with diabetes and there is a growing trend in these communities [9]. In these countries, the economic burden of type 2 diabetes and its comorbidities is substantial [10]. Managing type 2 diabetes is difficult for developing countries due to political, practical,

cultural, and social confusion [11]. Diabetes has become a serious public health concern in Asian countries, particularly in Iran [12, 13]. According to World Health Organization (WHO) surveys, 10% of Iran's population lived with diabetes in 2016 [13, 14]. Risk factors for diabetes such as obesity, ethnic origin, and social inequality, the geographic distribution of diabetes is different in various cities, regions, and countries [15, 16]. Prevalence of diabetes is associated with poor living situations [17]. The odds of inflicting diabetes will be increased due to living in poor neighborhoods [18]. Therefore, disadvantaged groups such as slum dwellers are more susceptible to type 2 diabetes in terms of prevalence, risk factors, and complications [19, 20]. In addition, the disadvantaged groups are more likely not to adhere to standard health care [21]. The health systems must provide health care to the country's entire population [22]. Diabetes treatment and management have imposed a significant burden on health care systems [23].

Therefore, considering slum-dwellers in terms of health care utilization is a must. Considering the vulnerable conditions of slum-dwellers against type 2 diabetes, this study is focused on:

- 1) Utilization of essential health care among slum-dwellers with type 2 diabetes
- 2) Utilization rate of outpatient services and inpatient care among slum-dweller patients with type 2 diabetes and sociodemographic factors affecting them.
- 3) The number of uses of outpatient services and inpatient care and sociodemographic factors affecting it.

Methods

Study design and study setting

This research is a cross-sectional study conducted among slum-dwellers with type 2 diabetes in Tabriz city in 2022. Inclusion criteria for the study were being over 18 years old, not disabled physically or mentally, and living in slums for at least 5 years. Other types of diabetes were excluded from the study. Tabriz is a metropolis located in northwest Iran with almost 2 million inhabitants. In recent years, Tabriz has witnessed an increase in the population of slums, according to municipal officials. In Tabriz city, 382124 people lived in slums at the time of the study, according to the official statistics. In recent years, health complexes have been launched in Tabriz city slums. Launching the health complexes in slums has made diabetic patients identified increase from 6 cases to 621 cases [24]. These results show that slum-dwellers with this silence disease have been neglected even in terms of disease diagnosis, until a few years ago. The Tabriz city health system has consisted of some health complexes. Each health complex controls some health service centers. Four health complexes are located in the slums of Tabriz (Chamran, Azadi, Imam Khomeini, Hakim). Each complex controls 3-4 health service centers. In general, there are 15 health service centers in slums.

Sampling processes

According to the Vice-Chancellor for Health of Tabriz University of Medical Sciences, there are 13155 patients with type 2 diabetes living in Tabriz's slums. To calculate the appropriate sample size, we used Morgan's table [25]. Nearly 375 patients were required based on this table. To increase the power of the study, we selected 400 patients with type 2 diabetes. In Tabriz, slums are located in geographically different areas. To reduce selection bias, health service centers located in each area should be selected. Therefore, we conducted four simple random samplings to select the health service centers under each complex's supervision. Based on the diabetic population in any health complex, some health care centers were selected. Two, three, one, and one center were selected from Chamran, Azadi, Imam Khomeini, and Hakim, respectively. Non-compliance of some interviewees was predicted so more patients in each stratify were considered. Fig 1 shows the process of sampling.

Iran's integrated health system, known as SIB, records, maintains, and updates information on health status. Patients' primary data, such as addresses and phone numbers, were gathered from the SIB system in health service centers. Patients with type 2 diabetes were categorized according to their gender and ten-year-old age. Then, stratified systematic random sampling was used to select patients from these groups.

Data collection tools, data analysis, and ethical considerations

To collect information about diabetic patients' health care needs, a literature review was conducted. However, the study information on healthcare utilization and costs of diabetes in Brazil was the most useful to create a questionnaire about diabetes health care [27]. To specify the essential health care services for diabetic patients, we used the IraPEN (Iran's package of essential NCDs) instructions. IraPEN package has characterized essential health services and time intervals for them. So, we compared the rate of utilization with the recommended advice by IraPEN for patients with type 2 diabetes. The obtained information was discussed with medical specialists. According to experts, the questionnaire covers the study objectives. Additionally, to demographic information, the questionnaire asked about outpatient services utilization and frequency in the last four weeks, inpatient care utilization and frequency in the past year, and health care utilization and receiving consultation in the past three months. The utilization questions were answered with yes and no, or frequency of use. The complete questionnaire is accessible [see S-1]. Data were collected by two trained individuals. The data collectors were responsible for asking the questions, and the questionnaire was completed concurrently. This was due to the likelihood of illiteracy in the slum dwellers' population. We trained data collectors not to ask directional questions. As a result, we were relatively confident that the study was not biased. Because of the specific process of data collection and the low probability of data loss, our approach for missing data is to exclude cases pairwise. After collecting the data, SPSS version 22 was used to perform descriptive and analytical statistics on the data. We used a binary logistic regression model to examine the effect of sociodemographic variables on utilization. In the following, we used the generalized model to predict the number of uses of outpatient services and inpatient care. Participants' informed consent was obtained, and the respondents were informed that participation was entirely voluntary. We informed the participants that the study's findings would be published in a scientific journal.

Results

Characteristics of the population

Out of 400 patients, 215 were female (53.8), 323 were illiterate or were able to read and write (58%) and 303 had low income (75.8%). 82.3% had basic health insurance coverage, but only 15% had supplementary insurance. Table 1. Shows descriptive statistics of the study population.

Table 1
Sociodemographic characteristics and frequency of utilization

Variables	Categories	Frequency (percent)	Outpatient services			Inpatient care		
			Utilization %	X2	P-value	Utilization %	X2	P-value
Gender	Male	185 (46.3)	34.1	2.56	.10	38.9	.12	.72
	Female	215 (53.8)	41.9			37.2		
Age	> 30	38 (9.5)	31.6	1.154	.886	7.9	44.586	< .0001
	30–40	91 (22.8)	37.4			29.7		
	40–50	82 (20.5)	37.8			29.3		
	50–60	87 (21.8)	41.4			40.2		
	< 60	102 (25.5)	39.2			61.8		
Education	Illiterate	111 (27.8)	38.7	1.885	.597	50.5	33.982	< .0001
	Reading and writing ability	121 (30.3)	39.7			48.8		
	Diploma	131 (32.8)	34.4			25.2		
	Academic education	37 (9.3)	45.9			10.8		
Marital status	Single	40 (10.0)	43.5	1.383	.240	42.4	.978	.323
	Married	308 (90.0)	36.7			36.7		
Occupation *	Employee	30 (7.5)	16.7	15.975	.014	60.0	15.690	.016
	Worker	57 (14.3)	35.1			28.1		
	Farmer	14 (3.5)	78.6			7.1		
	Freelance	106 (26.5)	37.7			39.6		
	Housewife	112 (28.0)	39.3			36.6		
	Retired	16 (4.0)	37.5			50.0		
	Unemployed	65 (16.3)	40.0			41.5		
Income (The Iranian Rial)	< 40 million	303 (75.8)	35.3	4.562	.033	39.9	1.984	.159
	40–80 million	78 (24.3)	47.4			32		
Insurance	Yes	329 (82.3)	41.0	6.080	.014	38.3	.070	.792
	No	71 (17.8)	25.4			36.6		
Type of insurance	Social insurance	193 (57.8)	47.2	10.433	.005	37.8	2.894	.235
	Iranian health insurance	114 (34.1)	28.9			34.2		

* Fisher's exact test

	Others	27 (8.1)	48.1			51.9		
supplementary insurance	Yes	60 (15.0)	51.7	5.380	.020	36.7	.053	.817
	No	340 (85.0)	35.9			38.2		
Disease duration (in years)	> 5	114 (28.5)	35.1	5.564	.234	19.3	30.475	< .0001
	5–10	104 (26.0)	33.7			38.5		
	10–15	55 (13.8)	43.6			34.5		
	15–20	40 (10.0)	52.5			57.5		
	< 20	46 (11.5)	37.0			56.5		
Treatment type	Lifestyle change	27 (6.8)	44.4	16.806	.001	25.9	43.594	< .0001
	Oral pills	236 (59.0)	30.5			26.7		
	Insulin	17 (4.3)	35.3			47.1		
	Mixed regime simultaneously	120 (30.0)	52.5			61.7		
Comorbidity	Yes	286 (71.5)	45.1	19.964	< .0001	51.0	72.527	< .0001
	No	114 (28.5)	21.1			5.3		
* Fisher's exact test								

Utilization

The percentage of health services utilization is shown in Fig. 2. The most frequently utilized services were blood sugar testing (50%), Blood pressure measurement (32.50%).

Figure 3 shows the percentage of patients who have received the essential consultations. The importance of taking medicine and how to take it (53%), and diabetes and its complication (30.80) were the most frequent received consultations.

The 199 (49.8%) patients needed outpatient services and only 153 (38.3%) were able to use them during the previous four weeks, according to the patient. Additionally, 158 (39.5%) patients required inpatient care, while 152 (38%) patients were able to access it in the last year. Table 2 presents the rate of need for outpatient services and inpatient care, the utilization rate, and the frequency of these services during the past 4 weeks for outpatient services, and during the last year for inpatient care.

Table 2
Utilization of outpatient services and inpatient care

Variables	Categories	Outpatient services	Inpatient care
		Frequency (Percent)	Frequency (Percent)
Need	Yes	199 (49.8)	158 (39.5)
	no	201 (50.2)	242 (60.5)
utilization	yes	153 (38.3)	152 (38.0)
	no	247 (61.7)	248 (62.0)
frequency of use	0	74 (18.5)	245 (61.3)
	1	44 (11.0)	74 (18.5)
	2	18 (4.5)	44 (11.0)
	3	19 (4.8)	18 (4.5)
	4	0	19 (4.8)

Sociodemographic factors affecting utilization

The results of the chi-square test show (Table 1) that the utilization of outpatient services is affected by occupation, so farmers are the most utilizers with 78.6% and employees are the lowest utilizers with 16.7%. ($P = 0.014$). Higher-income ($P < 0.0001$), having insurance ($P = 0.014$), having social insurance ($P = 0.005$), having supplementary insurance ($P = 0.02$), adopting the mixed regime simultaneously ($P = 0.001$), and having comorbidity ($P < 0.0001$) are affecting outpatient services utilization. Utilization of inpatient care is affected by older ages ($P < 0.0001$), lower education ($P < 0.0001$), being an employee ($P = 0.016$), higher disease duration ($P = 0.0001$), adopting the mixed regime simultaneously ($P < 0.0001$), and having comorbidity ($P < 0.0001$).

To achieve the odds ratio for the independent variables, we applied a binary logistic regression model for the dependent variables (utilization = 0, non-utilization = 1). Based on the results of the Hosmer and Lemeshow test, the logistic model is fitness ($\chi^2 = 4.381$, p -value = .0821). Results of the binary logistic regression model show (Table 3) female gender (Adjusted OR = 1.871, CI 1.170 to 2.993) and higher-income (Adjusted OR = 1.984, CI 1.105 to 3.562) increase the probability of outpatient services utilization. Being a farmer is related to higher outpatient services utilization ($P = 0.023$). Having comorbidity ($P < 0.001$) and taking oral pills increase the use of outpatient services and inpatient care utilization.

Table 3
Binary Logistic regression model for sociodemographic factors affecting utilization

variables	Outpatient services				Inpatient care			
	P-value	Adjusted OR	95% CI for OR adjusted		P-value	Adjusted OR	95% CI for OR adjusted	
Lower	Upper	Lower	Upper					
Gender (reference = male)								
female	.009*	1.871	1.170	2.993				
Income (reference > 4 million)	.022*	1.984	1.105	3.562				
4–8 million								
Occupation (reference = unemployment)								
Employee	.097	.474	.196	1.144				
Worker	.122	1.821	.852	3.892				
Farmer	.037*	9.237	1.139	74.898				
Freelance	.804	1.083	.578	2.030				
Housewife	.516	1.230	.658	2.300				
Retired	.542	.711	.237	2.128				
Treatment type (reference = mixed regime simultaneously)								
Lifestyle change	.912	1.058	.391	2.858	.518	1.461	.462	4.618
Oral pills	.012*	1.982	1.166	3.369	< 0.001*	3.131	1.825	5.369
Insulin	.737	1.248	.342	4.559	.915	.932	.256	3.391
Comorbidity (reference = yes)								
no	< 0.001*	.347	.200	.603	< 0.001*	.077	.031	.189
*significant was considered for p-value < 0.05								

Sociodemographic factors affecting the number of uses

We used a generalized linear model to predict the number of uses for outpatient services and inpatient care. The higher number of uses for outpatient services is related to being a farmer, $P = 0.022$ (Wald $\chi^2 = 2.285$, 95% CI -1.153 to -0.092), and having comorbidities ($P < 0.001$). Use of oral pills ($P < 0.001$), and having comorbidity (Wald $\chi^2 = 17.473$, 95% CI 0.300 to 0.831) were related to a higher number of uses of inpatient care. Table 4 shows sociodemographic factors affecting the number of uses.

Table 4
Generalized linear model for sociodemographic factors affecting the number of uses

variables	Outpatient services			Inpatient care		
	P-value	Wald x2	95% CI for Wald x2	P-value	Wald x2	95% CI for Wald x2
Lower	Upper	Lower	Upper			
Occupation (reference = unemployed)						
Employee	.663	.190	-.370	.581		
Worker	.091	2.861	-.735	.054		
Farmer	.022*	5.285	-1.153	-.092		
Freelance	.119	2.426	-.607	.069		
Housewife	.496	.463	-.375	.182		
Retired	.424	.640	-.696	.292		
treatment type(reference = Mixed regime simultaneously)						
Lifestyle change				.148	2.093	-.817 .123
Oral pills				< 0.001*	18.138	-.798 -.295
Insulin				.313	1.018	-.918 .294
Comorbidities (reference = no)						
yes	< 0.001*	15.571	.192	.571	< 0.001*	17.473 .300 .831
*significant was considered for p-value < 0.05						

Discussion

This study assessed health care utilization among slum-dwellers with type 2 diabetes. Utilization of outpatient services and inpatient care is lower than slum-dwellers needs. Previous studies illustrated that health care utilization for NCDs among slum-dwellers is lower than in non-slums [28]. Factors such as higher age, financial constraints, achieving regular sources of care, and lower self-assessment of health status are mentioned as reasons for underutilization [29]. Despite the IraPEN plan that was launched to higher access to care for NCDs in 2014 by Iran's health ministry [30, 31], utilization of essential health care services among slum-dwellers with type 2 diabetes is dramatically low. IraPEN has been designed according to the recommendations of the WHO for the use of primary health care to prevent and control NCDs [32]. As part of this plan, diabetic patients must receive essential health care services once every three months. Sugar tests and foot examinations, respectively, have not been used by 50% and 85% of slum-dwellers in the past three months. Similarly, 70%, 76%, and 90% of patients have not received consultations on physical activity, nutrition, and weight control. Low health care utilization can be attributed to several factors. As a result, a health care plan alone cannot increase utilization. In order to address the challenges and obstacles faced by disadvantaged groups, it is imperative that innovative, multisectoral, flexible, and well-coordinated care models are developed. [33].

The findings of the study confirm that uninsured patients with type 2 diabetes are less likely to get appropriate health care services [34]. Iran has four main health insurance organizations. They are social insurance, Iran health insurance, armed forces health insurance, and the Imam Khomeini relief committee health insurance. Ninety-two percent of insured patients are covered by social insurance or Iran health insurance. The type of insurance is affecting the use of outpatient services. In Iran, there are some clinics and hospitals dependent upon social insurance that provide free services. This option can lead to higher utilization. Iran's health insurance does not cover enough costs, resulting in lower outpatient utilization for its insured. In Iran, coverage of whole costs by government insurance isn't possible. Supplementary insurance covers the cost and services which not covered by basic health insurance. [35]. Supplementary insurance leads to removing financial barriers. But seeking supplementary insurance is probably related to higher income [36].

A financial constraint is a major barrier to obtaining health care [37, 38]. We found income to be a determinant factor in outpatient service use, even though almost all the study patients had incomes below the poverty line. Our study shows that even small increases in income level lead to an increase in outpatient care. Based on the results of our study, patients with academic education are more likely to use outpatient services, while those with low education are more likely to use inpatient care. Interpretations should be conducted with caution. This can be due to patients with low education not seeking medical help in time and consequently deteriorating. Due to the use of outpatient services, patients with academic education may be less likely to need to be hospitalized. We should not overlook the importance of self-care knowledge. Knowledge may influence health care utilization [39]. Also, health literacy leads to better diabetes management [40]. The findings of our study are entirely aligned with other data. Women are more users of health care, and they visit doctors more frequently, but inpatient care has fewer differences between men and women [26, 41]. Elderly patients require more inpatient care. Based on the current trends, Iran is the second-fastest aging country in the world, after South Korea [42]. As people age, their consumption of health care services increases, which results in higher costs [43]. Higher disease duration increases the utilization of health services. The condition can be caused by the deterioration of diabetes over time. Complications such as retinopathy increase with increasing duration of diabetes [44]. Farmer patients are more likely to utilize outpatient services after adjusting for variables. In addition, the frequency of uses for outpatient services is more among farmers. One reason could be that their insurance covers costs adequately. When diabetes is controlled with mixed regimes simultaneously, outpatient services and inpatient care are utilized more. This regime can be adopted as a response to the disease's advanced stages. Patients with lifestyle changes to control their diabetes are the least likely to require inpatient care. These patients are also more likely to utilize outpatient services. The results should be interpreted with caution. Outpatient services may decrease the need for inpatient care. Lifestyle changes can improve diabetic outcomes such as weight loss and drug reduction [45]. We were surprised to find that taking oral pills increased the odds ratio for the use of outpatient care and inpatient care after adjusting for the variables. Additionally, the use of oral pills increases the number of uses for hospitalizations. In Iran, One of the most common medicine for type 2 diabetes control is metformin. The results of our study do not support the finding that metformin could improve clinical outcomes compared to insulin, lifestyle changes, and other antidiabetic medications [46]. Deprivation increases the likelihood of comorbidities, and the number of comorbidity increases utilization and the number of uses of health care services [47, 48]. It may be a reason for the high rate of comorbidity among slum-dwellers, and accordingly the higher number of uses of services by patients with comorbidity. Finally, we recommend a qualitative study for a deeper understanding of the reasons for low health services utilization based on patients' and staff's views. We present pioneering research on type 2 diabetes care utilization among slum-dwellers. One limitation of the study is that it does not provide a prosperous comparison group for comparing health care utilization. In addition, the utilization may have been affected by COVID-19.

Conclusion

In this study, slum-dwellers with type 2 diabetes had lower health care utilization compared with diabetic care instructions provided by IraPEN. Using the results of the analysis, options for improving the status quo are suggested. The government must pay special attention to slums due to their sociodemographic characteristics. Because of low education in slums, the health system must provide adequate education about diabetes and the importance of its control. Also, slum-dwellers empowerment for self-caring and disease self-management must be considered. Iran's law on public insurance coverage needs to be implemented. The organization of Iran's health insurance must consider sufficient coverage of costs for slum-dwellers. Government must support patients with comorbidity through subsidies, so they could be covered by supplementary insurance. Due to the low income of the slum-dwellers, the government should consider cheap and accessible health service delivery to the neighbors. In view of the fact that older people often require inpatient care, their disease costs should be adequately covered.

Declarations

Ethics approval and consent to participate

The study has been performed in accordance with the declaration of Helsinki and has been approved by the ethics committee of Tabriz University of medical science with approval ID: IR.TBZMED.REC.1400.961. Informed written consent was obtained from all literate patients. The informed consent form was read for illiterate patients and informed written consent was obtained from their legal guardian.

Consent for publication

Participants were ensured that information will be used anonymously and exclusively for the study objectives. We informed the participants that the study's results would be published in a scientific journal.

Availability of data and materials

On reasonable request, the corresponding author can provide the datasets used in this study.

Competing interests

Neither of the authors declared competing interests

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Authors' contributions

F.GH. conducted the design, method development, and writing up of the final manuscript. H.J. Conducted analysis, review, and editing and was involved in the design R.K.H. was involved in the design, method development, review, and editing. M.GH. was involved in editing, review, and supervision.

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Figures

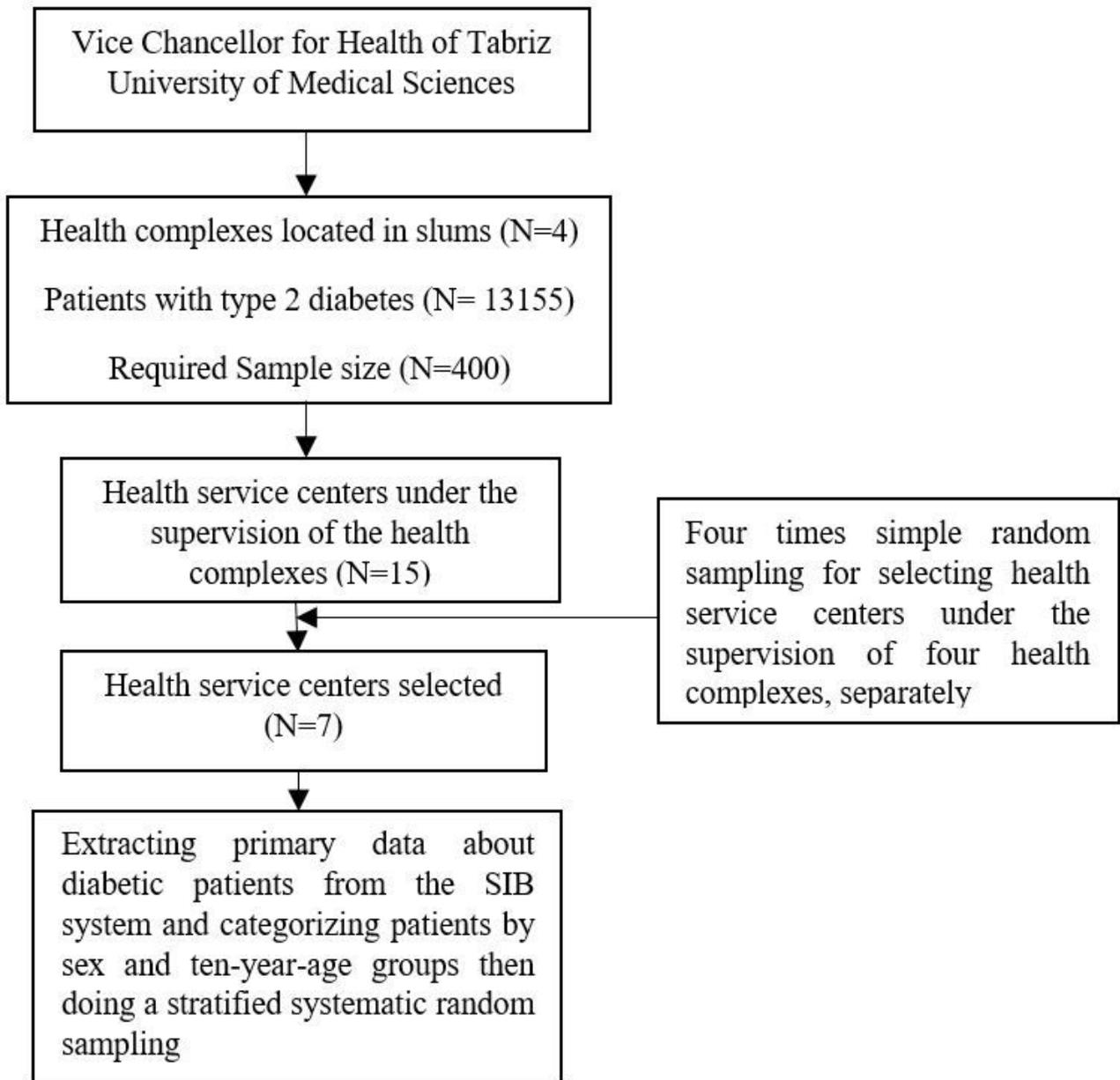


Figure 1

The process of sampling

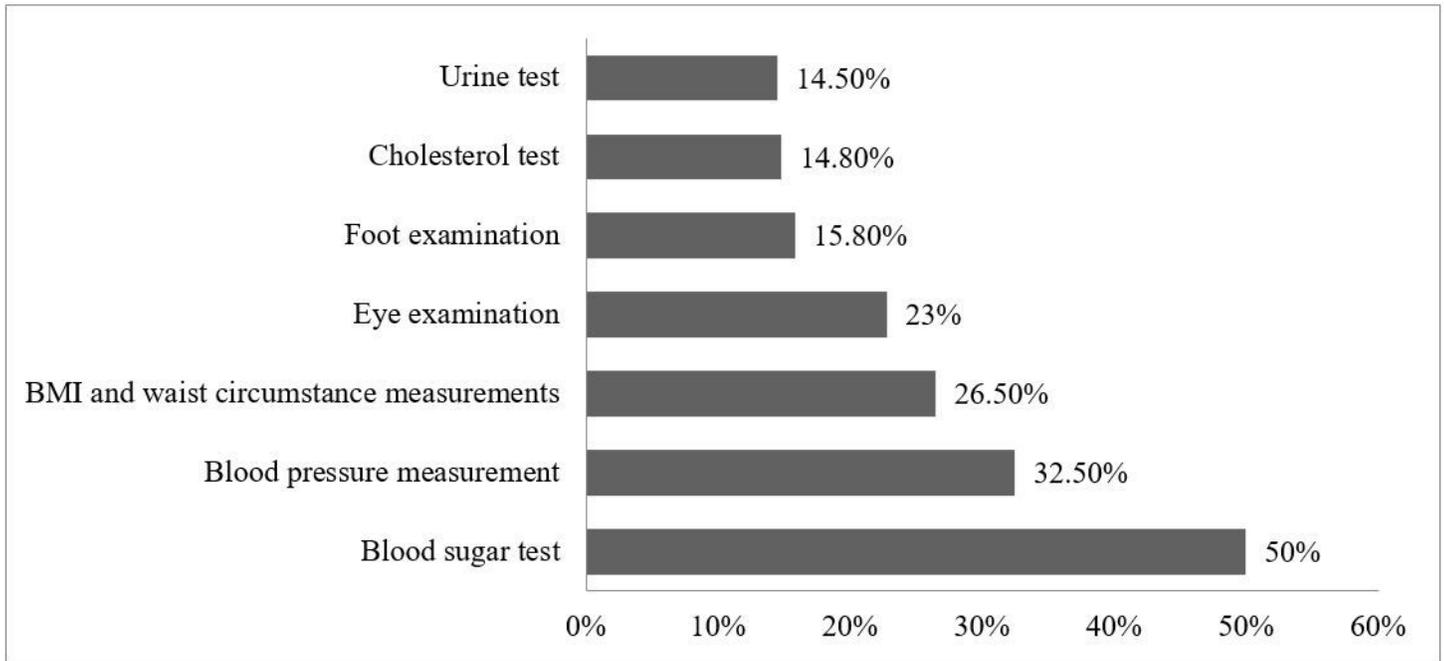


Figure 2

The percentage of people who have received essential health services in the past three months

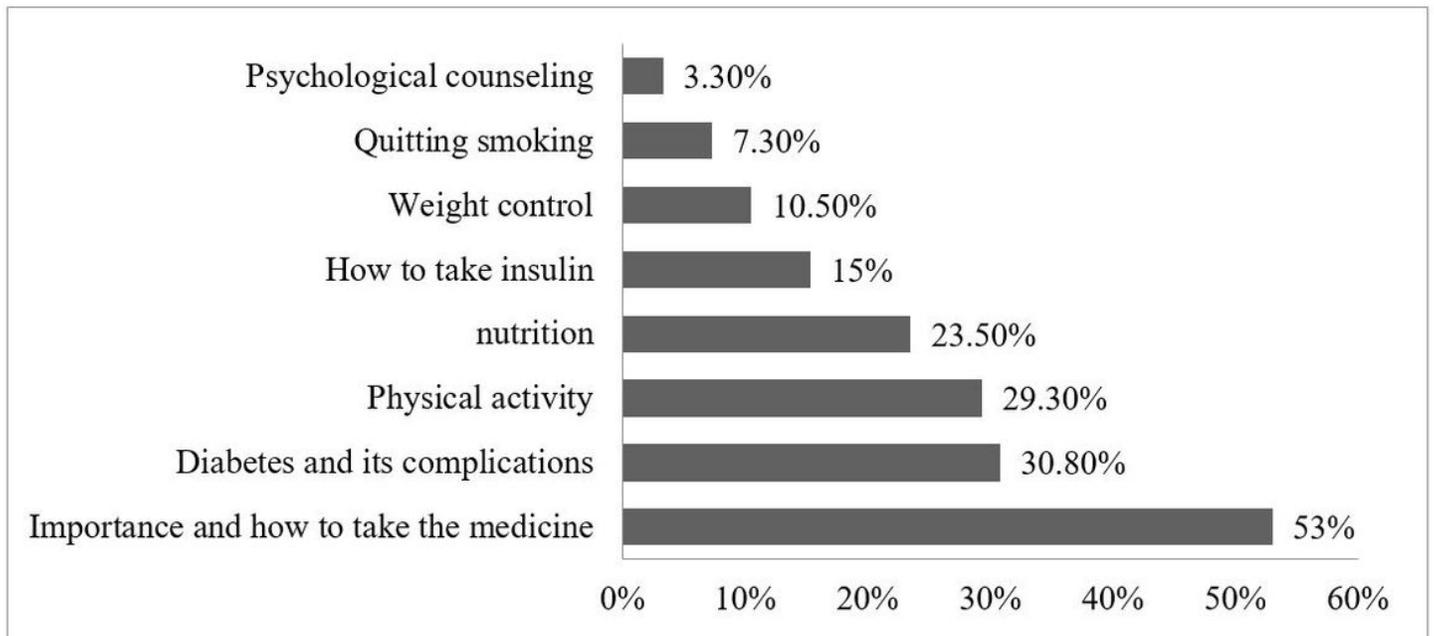


Figure 3

The percentage of patients who received essential consultations in the past three months

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