



Delay in Regular Visits of Chronic Disease Patients and Its Associated Factors during the COVID-19 Pandemic

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What's Known

- Delay in the follow-up of chronic diseases is a major challenge during pandemics (e.g., Ebola, COVID-19 pandemic).
- In different countries during the COVID-19 pandemic, level of education, socio-economic status, and fear of getting COVID-19 are important factors for seeking care.

What's New

- The COVID-19 pandemic was the most dominant reason for the delayed and is not limited to rural or urban residency, nor is it limited to socioeconomic and educational status.
- Among children, mothers, and fathers' groups, the children group had the least number of delays.

Abstract

Background: Chronic patients need regular follow-ups. During the COVID-19 pandemic, these regular visits can be affected. The delay of chronic patients and its contributing factors in their periodic visits during the COVID-19 pandemic are examined here.

Methods: This cross-sectional study was conducted between February and June 2021, in Fars, Iran. Two hundred and eighty-six households with at least one chronic patient were recruited. Then, several trained questioners called the studied households and asked about the studied variables. The dependent variable was the number of delays in regular visits during the COVID-19 pandemic. The results were analyzed through Poisson regression by SPSS Statistics version 22 and GraphPad Prism software version 9. A significance level of 0.05 was considered for this study.

Results: Out of 286 households 113 (73.4%) fathers, 138 (70.1%) mothers, and 17 (58.6%) children in the households reported delayed referral. In fathers, referring to the health center was significantly associated with a decrease in the number of delays ($P=0.033$). The higher age of the householder ($P=0.005$), the higher number of children ($P=0.043$), and having a family physician ($P=0.007$) in the mothers' group, also the number of children in households ($P=0.001$) in the children group were significantly associated with increasing the number of delays.

Conclusion: COVID-19 pandemic not only creates direct harmful effects but also adversely affects people in danger of chronic diseases. Delays in follow-ups are taken into account as a major challenge during the COVID-19 pandemic. This issue is not limited to rural or urban residency.

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Introduction

Following the COVID-19 pandemic in China at the end of 2019, the disease quickly became a pandemic and global challenge.¹ Then, disease control and prevention policies (e.g., lockdown and social distancing) were considered to reduce the transmission cycle of the disease-causing virus worldwide.² In this regard, Iran's government applied control policies from November 21 to December 4, 2020, in response to the

pandemic. These policies included canceling public events, banning celebrations, closing schools, universities, shopping malls, and holy shrines, and establishing checkpoints to detect COVID-19 cases at the city entrances. This situation continued in each city depending on its circumstances.³

Besides, these policies had a remarkable impact on society, including lifestyle changes, low physical activity, and dietary imbalances.⁴ For example, patients with chronic diseases should always manage their daily activities, diet, and exercise and require regular follow-ups to decline the risk of adverse health outcomes.⁵ However, this procedure was considerably affected by the disease pandemic. In this regard, Rabbone and colleagues reported that severe Diabetic ketoacidosis (DKA) cases were increased after the COVID-19 pandemic.⁶ This issue may be due to the reduction of health care services. Kiss and others showed that cardiovascular disease care and the admission of these patients were reduced during the COVID-19 pandemic.⁷ Besides, some studies worked on other chronic cases (i.e., cancers) and indicated the possible effects of the COVID-19 pandemic on the healthcare system and chronic diseases.^{8,9}

Since there is a remarkable problem with resources and a lack of access to health facilities and healthcare providers during the COVID-19 pandemic, chronic disease management becomes a major challenge for these patients.¹⁰ This issue can be more difficult in developing countries with a high prevalence of chronic diseases and poor health care systems.⁵

In general, most of the high number of mortalities in Iran at the beginning of the COVID-19 pandemic were related to this disease. However, many mortalities were not associated with this virus.^{11,12} In this regard, researchers proved that the COVID-19 pandemic and quarantine reduced the controls of cholesterol and blood pressure, diabetic foot screening, and vaccination indicators for patients in primary care.¹³ Moreover, some patients avoided visiting health care providers due to their concerns about services or fear of infection. This issue could delay treatment and increase out-of-hospital accidents in chronic patients.¹⁴ In addition, the emergency of capacity building for COVID-19 primary and secondary care reduced the essential care for chronic patients.¹² This situation could cause more severe consequences in some social groups and those who have already been affected by health inequalities.¹⁵

Overall, the past disease pandemics (e.g., the Ebola pandemic) showed that lockdowns,

healthcare paradigm shifts, and policies that reduced the transmission of infection could create long-term effects on society.¹⁶⁻¹⁸ In India, the care for non-communicable diseases and immunization were highly disrupted, while antenatal care services were less affected in primary care settings.¹⁹ Additionally, several studies implemented in different countries during the COVID-19 pandemic showed the level of education, socio-economic status, and fear of getting COVID were important factors for seeking care.²⁰⁻²² However, strengthening of primary care with a focus on family physicians forms the backbone of any healthcare system and could be a fundamental strategic function in combatting the pandemic.¹³

The family physician has been implemented in rural areas and cities with less than 20,000 population in Iran since 2005 and has been covering a population of over 25 million people. Following the implementation of this project and due to insufficient coverage of the health system in cities, its implementation in urban and over 20,000 people areas was started as a pilot in 2012 in Fars province. It was gradually expanded in all urban and rural areas of this province. Hence, it is expected that delivering healthcare to chronic patients and their follow-up will be continued based on the standard protocol with less delay during the pandemic.²³

This study evaluates the delay in regular visits of chronic disease patients during the COVID-19 pandemic and its associated factors in rural and urban areas.

Participants and Methods

Study Design and Setting

This cross-sectional study was conducted between February and June 2021 in Fars province, Iran. In this case, Fars province was categorized into five regions: North, West, East, South, and its capital, Shiraz city. Then, one county was randomly chosen from each region. Afterward, a health house in rural areas and a health post in urban areas were selected in every county. A random sampling method was considered for this study. Moreover, households with at least one chronic patient were randomly selected from the family records of the healthcare center. Finally, according to the pilot study, 286 households with at least one chronic patient were randomly recruited. In addition, this study was approved by the Ethics Committee of Shiraz University of Medical Sciences (Ethics Code No. IR.SUMS.REC.1399.1070).

In this study, households with at least one chronic disease patient in the family (i.e., father,

mother, or children) were eligible for entering the study. Besides, households must have had a continuous residence for at least five years in Fars province. Unwillingness to participate in the study was the exclusion criterion.

Data Collection/Procedure

The trained questioners called the studied households and after obtaining verbal informed consent from the participants, asked them about the variables under study. Moreover, some variables were checked and approved through the family records. These variables included covariates (independent variables) and dependent variables.

In this study, covariates were collected by a checklist with 19 questions for each target group. It was classified into two main categories, including (I) socio-demographic variables: such as place of residence (urban/rural), head of household (father/mother/other), age of householder, number of children, education level, and occupation of parents in the household, insurance type, having family physician (yes/no), house ownership (i.e., owner, rent, governmental, relatives' house), and socioeconomic status (i.e., lowest, low, middle, highest), and (II) disease information and referrals: such as type of disease (i.e., diabetes, hypertension, cardiovascular disease, cancers, kidney disease, and other diseases), having any delays during the COVID-19 pandemic (did you have any delays during the COVID-19 pandemic?), the reason for the delay (i.e., COVID-19 pandemic, financial problems, closure of health centers, and health staff recommendation), and the source of medicine supply in the case of delay (how was medicine supplied during the delay period?).

Besides, the dependent variable was defined as the number of delays (i.e., without delay or zero code, one time, two times, and more than two times) in patients with chronic disease during the COVID-19 pandemic. The participants who had a delay during the COVID-19 pandemic were asked, "How many times have the chronic patients been late?" (One time, two times, and more than two times).

Statistical Analysis

Descriptive statistics were utilized to present all quantitative and qualitative data. Quantitative variables were reported as mean±SD or median (IQ). Moreover, qualitative variables were shown as numbers (percentages). The uni-variate Poisson regression model was used to determine the factors affecting the number of delays in a patient with chronic disease (separately in

father, mother, and children). SPSS Statistics version 22 (American IBM Company) and GraphPad Prism software version 9 (GraphPad Software Company, California) were employed to analyze the data. A significance level of 0.05 was considered for this study.

Results

A total of 286 households with at least one chronic patient were considered in the study. The analysis results demonstrated that 154 fathers (58.3%), 197 mothers (68.9%), and 29 children (10.1%) in the households had a chronic disease. Besides, 71 (24.82%) and 11 (3.84%) households had two and three persons with chronic diseases, respectively. Table 1 provides demographic characteristics of households with at least one chronic patient. The father was a householder in 216 (75.5%) households. In addition, most households (88.3%) were covered by the family physician program.

Table 2 gives disease information and referrals of chronic patients. According to the results, hypertension was the most prevalent disease in parents (66.2% in fathers and 71.1% in mothers). Moreover, diabetes was the most common disease in children (37.9%). In the group with delayed referral, the most dominant disease in parents and children was hypertension (66.5% in fathers, 73.9% in mothers, and 41.2% in children). The referral place for most patients was the health center (56.7% in fathers, 61.2% in mothers, and 51.7% in children).

A total of 113 (73.4%) fathers, 138 (70.1%) mothers, and 17 (58.6%) children with chronic diseases reported delayed referrals during the COVID-19 pandemic. In these cases, the COVID-19 pandemic was reported as the most significant cause of delayed referral of chronic patients (73.2% in fathers, 39.5% in mothers, and 70.6% in children). The chronic patients who had delayed referrals often obtained their medications from pharmacies (35.7% in fathers, 45.7% in mothers, and 52.9% in children).

Figure 1 depicts the number of delays in the chronic patient. In this figure, the number of delays is represented for fathers, mothers, and children. In this case, most fathers and mothers had more than two times delay, while most children had two times delay.

Table 3 summarizes the delay in regular visits during the COVID-19 pandemic, and the information is stratified by the type of disease. According to the most prevalent disease in each subgroup, 72.5% of fathers with hypertension, 72.9% of mothers with hypertension, and 45.0% of children with diabetes delayed visiting the physician.

Table 1: Demographic characteristics of households with at least one chronic patient

Variables		Total households N=286 N (%)	Households wherein the father has a chronic disease N=154 N (%)	Households wherein the mother has a chronic disease N=197 N (%)	Households whose children have a chronic disease N=29 N (%)
Place of residence	Urban areas	147 (51.40)	87 (56.50)	95 (48.20)	16 (55.20)
	Rural areas	139 (48.60)	67 (43.50)	102 (51.80)	13 (44.80)
Householder	Father	216 (75.50)	147 (95.50)	129 (65.50)	20 (69.00)
	Mother	68 (23.80)	6 (3.90)	67 (34.00)	8 (27.60)
	Other	2 (0.70)	1 (0.60)	1 (0.50)	1 (3.40)
Age of householder	(Mean±SD)	60.30±12.79	60.25±13.03	61.86±12.29	62.29±14.81
Number of children	Median (IQR)	3 (2-5)	3 (2-5)	4 (2-6)	4 (2-7)
Father's level of education	Answered	N=269	N=152	N=181	N=28
	Illiterate	46 (17.10)	30 (19.70)	30 (16.60)	5 (17.90)
	Elementary	64 (23.80)	37 (24.30)	47 (26.00)	2 (7.10)
	High school	68 (25.30)	37 (24.30)	48 (26.50)	10 (35.70)
	Diploma	26 (9.70)	19 (12.50)	10 (5.50)	2 (7.10)
	Graduate	44 (16.40)	29 (19.00)	25 (13.80)	6 (21.40)
	The father has died	21 (7.80)	-	21 (11.60)	3 (10.70)
Mother's level of education	Answered	N=286	N=154	N=197	N=29
	Illiterate	65 (22.70)	31 (20.10)	50 (25.40)	7 (24.10)
	Elementary	83 (29.00)	37 (24.00)	69 (35.00)	6 (20.70)
	High school	61 (21.30)	34 (22.10)	36 (18.30)	5 (17.20)
	Diploma	23 (8.00)	17 (11.00)	10 (5.10)	3 (10.30)
	Graduate	50 (17.50)	31 (20.10)	32 (16.20)	7 (24.30)
	The mother has died	4 (1.40)	4 (2.60)	-	1 (3.40)
Father's job	Answered	N=265	N=153	N=178	N=27
	Unemployed	14 (5.30)	10 (6.50)	7 (3.90)	3 (11.10)
	Farmer/rancher	45 (17.00)	28 (18.30)	28 (15.70)	4 (14.80)
	Worker	20 (7.60)	11 (7.20)	14 (7.80)	1 (3.70)
	Employed	27 (10.20)	18 (11.80)	16 (9.00)	2 (7.40)
	Self-employed	92 (34.70)	51 (33.30)	59 (33.10)	12 (44.40)
	Retired	46 (17.40)	35 (22.90)	33 (18.50)	2 (7.40)
	The father has died	21 (7.90)	-	21 (11.80)	3 (11.10)
Mother's job	Answered	N=285	N=154	N=196	N=29
	Housewife	255 (89.50)	137 (89.00)	176 (89.80)	23 (79.30)
	Working at home with income	9 (3.20)	5 (3.20)	9 (4.60)	4 (13.80)
	Employed	17 (6.00)	8 (5.20)	11 (5.60)	1 (3.40)
	The mother has died	4 (1.40)	4 (2.60)	-	1 (3.40)
Type of insurance	Answered	N=286	N=154	N=197	N=29
	Iranian	88 (30.80)	44 (28.60)	58 (29.40)	7 (24.10)
	Social security insurance	95 (33.20)	54 (35.10)	61 (31.00)	11 (37.90)
	Army insurance	21 (7.30)	17 (11.00)	14 (7.10)	1 (3.40)
	Emam Khomeini insurance	7 (2.40)	3 (1.90)	5 (2.50)	2 (6.90)
	Health Insurance	33 (11.50)	15 (9.70)	23 (11.70)	3 (10.30)
	Rural insurance	26 (9.10)	11 (7.10)	23 (11.70)	4 (13.80)
	Other	6 (2.10)	3 (1.90)	4 (2.00)	1 (3.40)
	No insurance	10 (3.50)	7 (4.50)	9 (4.60)	-
		The mother has died	4 (1.40)	4 (2.60)	-
Family physician	Answered	N=283	N=151	N=195	N=29
	Yes	250 (88.30)	125 (82.80)	170 (87.20)	26 (89.70)
	No	33 (11.70)	26 (17.20)	25 (12.80)	3 (10.30)
House ownership	Answered	N=279	N=148	N=193	N=28
	Owner	238 (85.30)	121 (81.80)	169 (87.60)	23 (82.10)
	Rent	37 (13.30)	24 (16.20)	20 (10.40)	4 (14.30)
	Governmental	1 (0.40)	1 (0.70)	1 (0.50)	1 (3.60)
	Relatives' house	3 (1.10)	2 (1.40)	3 (1.60)	-

Socioeconomic status	Answered	N=285	N=153	N=197	N=29
	Highest		3 (1.10)	2 (1.30)	3 (1.50)
High		25 (8.80)	15 (9.80)	16 (8.10)	4 (13.80)
Middle		135 (47.40)	76 (49.70)	93 (47.20)	9 (31.00)
Low		81 (28.40)	40 (26.10)	55 (27.90)	10 (34.50)
Lowest		41 (14.40)	20 (13.10)	30 (15.20)	6 (20.70)

#Qualitative variables are reported as numbers (percentage) and quantitative variables as mean±SD or Median (IQR).

Table 2: Disease information and referrals of chronic patients by family members

Variables		Father with a chronic disease N=154 N (%)	Mother with a chronic disease N=197 N (%)	Children with a chronic disease N=29 N (%)
Type of disease*	Diabetes	54 (35.10)	74 (37.60)	11 (37.90)
	Hypertension	102 (66.20)	140 (71.10)	10 (34.50)
	Cardiovascular disease	38 (24.70)	43 (21.80)	3 (10.30)
	Cancers	8 (5.20)	6 (3.00)	1 (3.40)
	Kidney disease	5 (3.20)	8 (4.10)	2 (0.70)
	Other diseases	9 (5.70)	20 (7.70)	3 (10.30)
Referral place*	Health house/ health posts	87 (56.50)	120 (61.20)	15 (51.70)
	Health Center	46 (29.90)	56 (28.60)	10 (34.50)
	Family Physician office	30 (19.50)	39 (19.90)	9 (31.00)
	Private clinic	35 (22.70)	34 (21.90)	6 (20.70)
	Other	3 (1.90)	2 (1.00)	-
Did you have any delays during the COVID-19 pandemic?	Yes	113 (73.40)	138 (70.10)	17 (58.60)
	No	41 (26.60)	59 (29.90)	12 (41.40)
How many times have the chronic patients been late?	Answered	N=113	N=138	N=17
	1 time	18 (15.90)	41 (29.70)	5 (29.40)
	2 times	39 (34.50)	44 (31.90)	7 (41.20)
	More than 2 times	56 (49.60)	53 (38.40)	5 (29.40)
What is the reason for the delay in the chronic patient's visit? *	Answered	N=113	N=138	N=17
	COVID-19 pandemic	82 (73.20)	113 (39.50)	12 (70.60)
	Financial problems	4 (3.60)	4 (2.90)	5 (29.40)
	Closure of health centers	10 (8.90)	6 (4.30)	-
	Health staff recommendation	6 (5.40)	7 (5.10)	-
	Other	28 (25.00)	20 (14.50)	2 (11.80)
How was the medicine supplied during the delay period?*	Answered	N=113	N=138	N=17
	I had medicine from the past	34 (30.10)	46 (33.30)	4 (23.50)
	I got the medicine from the pharmacy	55 (35.70)	63 (45.70)	9 (52.90)
	I stopped taking the medicine	6 (5.30)	1 (0.70)	1 (5.90)
	I was taking the medicine irregularly	7 (6.20)	11 (8.00)	-
	I was using other people's medicine	-	2 (1.40)	-
	I contacted the doctor by phone	20 (17.20)	20 (14.50)	4 (23.50)
	Other	9 (8.00)	14 (10.90)	1 (5.90)

#Data was reported as N (%); * Some People might have selected more than one option

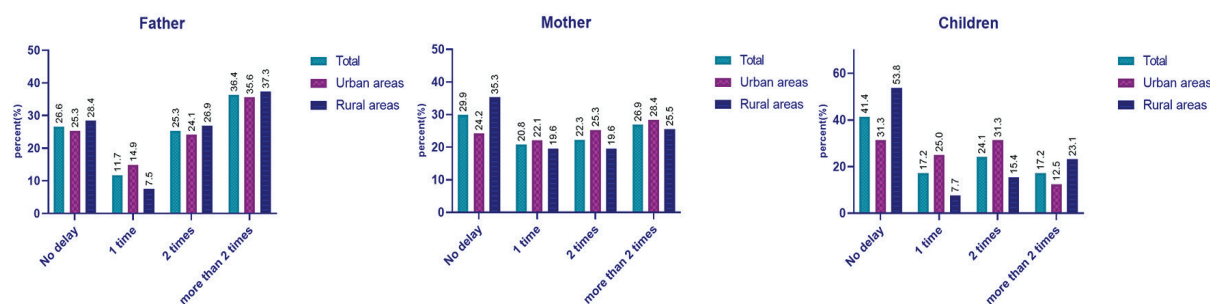


Figure 1: The number of delays in regular visits during the COVID-19 epidemic in the chronic patient separately in father, mother, and children.

Table 3: Percentage of people who were delayed in referral during the COVID-19 pandemic grouped by the type of the disease

Type of disease	Delays during the COVID-19 pandemic in the father	Delays during the COVID-19 pandemic in the mother	Delays during the COVID-19 pandemic in the children
Diabetes (%)	37/54 (68.50)	49/74 (66.20)	6/11 (54.50)
Hypertension (%)	74/102 (72.50)	102/140 (72.90)	7/10 (70.00)
Cardiovascular disease (%)	25/38 (65.80)	33/43 (76.70)	1/3 (33.00)
Cancers (%)	5/8 (62.50)	4/6 (66.70)	0/1 (0.00)
Kidney disease (%)	4/5 (80.00)	5/8 (62.50)	1/2 (50.00)
Other diseases	8/9 (89.00)	9/20 (45.00)	1/3 (33.00)

#Data was reported as N (%); Some People might have had more than one chronic disease

Table 4: Factors associated with the number of delays in chronic patients

Variable	B	CI 95% for B	P value	
Father	Place of residence	Urban areas	Ref	-
		Rural areas	0.02	-0.22 to 0.25
	Level of education	-0.02	-0.12 to 0.06	0.621
	Socioeconomic status	0.01	-0.12 to 0.15	0.830
	Refer to the health center	No	Ref	-
Yes		-0.31	-0.59 to -0.03	0.033*
Mother	Place of residence	Urban areas	Ref	-
		Rural areas	-0.15	-0.38 to 0.07
	Level of education	-0.03	-0.15 to 0.08	0.547
	Socioeconomic status	0.02	-0.10 to 0.15	0.692
	Age of householder	0.01	0.003 to 0.02	0.005*
	Number of children	0.05	0.001 to 0.11	0.043*
	Having family physician	No	Ref	-
Yes		0.60	0.18 to 1.08	0.007*
Child	Place of residence	Urban areas	Ref	-
		Rural areas	-0.14	-0.85 to 0.52
	Father's level of education	-0.005	-0.20 to 0.18	0.959
	Mother's level of education	-0.004	-0.20 to 0.18	0.960
	Socioeconomic status	-0.19	-0.54 to 0.15	0.277
Number of children	0.28	0.11 to 0.47	0.001*	

*Significant at 0.05 level; CI: Confidence interval; #Uni-variate Poisson regression model.

Table 4 expresses factors affecting the number of delays in chronic patients. These items are categorized into three subgroups. In fathers with chronic disease, referring to the health center was significantly associated with decreasing the number of delays (P=0.033). In mothers with chronic disease, the householder age (P=0.005), the number of children (P=0.043), and having a family physician (P=0.007) were significantly associated with increasing the number of delays. Besides, in children with chronic disease, the number of children in households (P=0.001) significantly increased the number of delays.

Discussion

The findings revealed that a significant number of households delayed their referral. The COVID-19 pandemic was the most dominant reason for the delay. Among children, mothers, and fathers groups, the children group showed the least number of delays. The reason is that families

take their children's conditions more seriously than themselves. Moreover, the achieved results showed that the COVID-19 pandemic caused many follow-up delays. In this regard, a study proved that preventing delays could save lives and reduce detrimental effects.²⁴

Hypertension and diabetes were the most prevalent chronic diseases among adults and children, respectively. Furthermore, hypertension was the most common chronic disease with delayed follow-up in both adult and children groups. This issue was due to the high prevalence of hypertension in the community. Besides, patients do not have an accurate perception of the risk of irregular follow-up.²⁵ This situation is an alarm for policymakers. Although coronary heart disease (CHD) has been decreased in developed countries, CHD prevalence is still increasing in developing countries.²⁰ Additionally, the direct effects of high blood pressure on CHD risk are widely known. Therefore, delays in regular visits of hypertensive patients can have detrimental effects.

Among all three groups, education level and socioeconomic status were not significantly associated with follow-up delays. This finding contrasts with the common belief.^{18, 26} Besides, rural or urban residency was not significantly associated with follow-up delays. This result is matched with one of the “Morbidity and Mortality Weekly Reports” prepared by the Centers for Disease Control and Prevention (CDC).²⁷ In general, in the case of a pandemic, everyone is at risk of misinformation without considering their social or educational situations. However, another study stated that trust in science reduced the susceptibility to misinformation.²¹

The percentage of pharmacy visits in the delayed referral group was significantly higher than the others. In this case, these patients only refilled their drugs by visiting pharmacies without visiting the referral health units. This finding raises various concerns, because people with chronic diseases (e.g., diabetes and hypertension) require regular evaluation and physical exams. Some studies suggested periodic evaluation and healthy lifestyle importance for both children and adolescents.²² Likewise, the European guidelines state that patients with pulmonary arterial hypertension (PAH) require periodic risk assessments.²⁸

In this study, it was observed that adult males had the highest delay rate among all groups. They missed their referral visits more than two times. This issue showed that the male gender utilized primary care services fewer than others, and they were more susceptible to misinformation.²⁹ Besides, the COVID-19 lockdowns caused many adult males to be laid off or unpaid. According to one of the CDC reports, a high prevalence of avoiding routine and urgent medical care due to COVID-19 concerns was observed in adults among unpaid caregivers.²⁷ In addition, individuals who sought to follow up their care in governmental health centers had lower delays than individuals who tended to go to the private sector or anywhere else. This issue revealed that health centers affiliated with the national health network system were more active than other sectors in healthcare follow-up.³⁰

The results demonstrated that an increase in the mothers' age and children's number significantly increased the number of mothers' delays. Moreover, follow-up delay was remarkably associated with having a family physician. Indeed, family physicians are responsible for primary care through passive or active follow-up.³¹ In addition, rural and urban areas of Fars province have gradually undergone a family physician program since 2005.²³ Although most of the population of this

province was covered by family physicians,³² the population's referral to family physicians was reduced due to the frequent lockdowns, their fear of hiring COVID-19 infection, and lack of active follow-up from the family physicians' side.

Different studies proved the crucial role of telemedicine during the COVID-19 pandemic. This situation improved the diagnosis and referral of patients with life-threatening conditions such as myocardial infarction.³³ Nevertheless, telemedicine is not widely used in Iran. Therefore, this infrastructure may have many barriers and challenges in situations such as the COVID-19 pandemic.³⁴

Overall, the impacts of follow-up delays should not be underestimated. In this regard, a study showed that nearly one-third of adults who reported delaying or forwent seeking health care stated that this situation worsened one or more of their health conditions or limited their ability to work or perform other daily tasks.³⁵ In another study, almost all patients diagnosed with advanced skin cancer had a delayed follow-up. Moreover, the delay in the diagnosis and treatment of skin cancer was strongly influenced by delayed follow-up. In addition, the prevalence of advanced melanomas and keratinocytes during the COVID-19 pandemic was higher than their prevalence before the COVID-19 pandemic.²⁴ In general, urgent procedures delayed during the pandemic must be closely tracked and rescheduled. In this regard, a survey of gastrointestinal practices in the United States showed that two-thirds of respondents had no specific plan to address the postponement of non-urgent endoscopy procedures.³⁶ Additionally, protracted surgical delays can adversely affect a patient's overall survival.³⁷

In most families, children delayed their referral two times, which was lower than the number of delays in adults. Indeed, parents believed that their children were more vulnerable to chronic diseases than COVID-19 infection. Besides, this issue arises from the belief that children are not at risk of severe COVID-19 infection or mortality.³⁸ In addition, families with more children showed a higher number of follow-up delays in children. Furthermore, the mothers' follow-up delays were analyzed, and the results showed that in more populated families, parents found themselves and their children more susceptible and vulnerable to COVID-19 infection. In this case, hypertension (HTN) was the most common disease in children who delayed their follow-ups. Childhood HTN arises from primary or secondary causes. These diseases require close monitoring, because hypertension in

children contributes to the increment of risk of developing hypertensive encephalopathy and seizures, cerebrovascular accidents, and congestive heart failure. Besides, most children tend to develop left ventricular hypertrophy.³⁹ In addition, the subsequent prevalent disease in children who delayed their follow-ups was diabetes. During COVID-19 lockdowns, most children with type 1 diabetes tended to seek medical evaluation or follow-ups at the time of disease worsening.⁴⁰

This novel study was accomplished for the first time in Iran with a wide range of participants. It could help health policymakers to strengthen primary care with a focus on family physicians to prevent excess mortality and morbidity during the pandemic. However, recall bias probably occurred due to the long period from the onset of this pandemic in Iran. The authors have made their efforts to reduce this bias through high-quality interviews and well-skilled interviewers.

Conclusion

The COVID-19 pandemic not only creates direct harmful effects but also adversely affects people in danger of chronic diseases. Delays in follow-ups are taken into account as a major challenge during the COVID-19 pandemic. This issue was not limited to rural or urban residency. Besides, this circumstance did not depend on socioeconomic and educational situations. The result of the present study could help policymakers modify their routine approach in designing healthcare services. As a result, strengthening telemedicine infrastructure would be an appropriate solution for current and upcoming pandemics. Moreover, it is necessary to understand the population's health-seeking behavior and healthcare providers' behavior during this devastating pandemic.

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Authors' Contribution

H.J: Study concept and design, acquisition, analysis, and interpretation of data for the work, drafting the work or revising it critically for

important intellectual content; Z.F: Study concept and design, analysis data, and interpretation of data, drafting and critical revision of the manuscript; A.Z: Study concept and design, acquisition, and interpretation of data, drafting the manuscript; D.H: Study concept and design, acquisition, and interpretation of data, drafting the manuscript; M.J.L: Acquisition and analysis of the data, drafting the manuscript and revising the manuscript; F.A: Acquisition and analysis of the data for the work, drafting the manuscript, revising the manuscript and M.F: Substantial contributions to the conception and design of the work; acquisition, analysis, interpretation of data for the work, drafting and critical revision of the manuscript. All authors have read and approved the final manuscript to be published, and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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