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**Original Article**

# The Effect of COVID-19 Pandemic on Households' Utilization of Rehabilitation Services: National Evidence from Iran Health System

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**Background:** The coronavirus disease-2019 (COVID-19) pandemic has affected the pattern of utilization of healthcare services. This study aimed to investigate the utilization of rehabilitation services before and after the COVID-19 pandemic in the health system of Iran.

**Methods:** This descriptive–analytical study used data from the Household Income and Expenditure Surveys of the Iran Statistics Center in 2018-2019 (before COVID-19) and 2020 (after COVID-19). The patterns of utilization and expenditures of rehabilitation services before and after this pandemic were investigated in different household subgroups. The multilevel logistic regression model was used to investigate the effect of COVID-19 on the utilization of health services by households.

**Results:** Although 258 (0.66%) households used rehabilitation services before the COVID-19 pandemic, only 175 (0.47%) households utilized them after the pandemic. Additionally, the average total rehabilitation costs per utilized household were 3,438,185 Iranian Rials (IRR) in 2018-2019 and 2,996,511 IRR in 2020-2021. Sex, age, education, size of household, place of residence, health insurance coverage, and income significantly affected the utilization of rehabilitation services by households during the study period (p < 0.001). Furthermore, the average use of rehabilitation services decreased by 22% (odds ratio = 0.78, p < 0.01) after the pandemic.

**Conclusion:** In Iranian households, the utilization and average expenditure of rehabilitation services significantly decreased after the COVID-19 pandemic. These findings strongly recommend health system policymakers to develop comprehensive plans to address future shocks arising from pandemics and other emergencies.

**Keywords:** COVID-19, Delivery of health care, Iran, Rehabilitation

## INTRODUCTION

According to the report of the World Health Organization (WHO), infectious diseases are still the sixth cause of death in the world. Among many infectious diseases, viral diseases caused by old and new variant of viruses have faced a serious challenge to human survival, and these viral infections, including human coronaviruses (HCoVs), are still one of the main causes of mortality worldwide [1]. The first report of an HCoVs disease dates back to 1965. So far, this virus has spread among birds, mammals and humans, most of which are observed with common cold symptoms [2]. Since 2000, several examples of this type of virus have been reported, including Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) in China and Middle East respiratory Syndrome Coronavirus (MERS-CoV) in Saudi Arabia [3,4]. A new variant of this virus was a severe respiratory infectious disease that was reported in Wuhan, China on December 31, 2019, and on February 12, 2020, WHO declared it as human coronavirus disease 2019 (COVID-19) [5,6].

Patients with moderate and severe COVID-19 primarily have lung dysfunction, which may be fatal. However, increasing evidence suggests that SARS-CoV-2 infections may also affect the nervous system (e.g., loss of taste) and cardiovascular function (e.g., increased risk of thrombosis) [7,8]. It has also been shown that many patients suffer from mental health problems that must be resolved through rehabilitation programs. The evidence shows that according to the disability, neurological, pulmonary, neuromuscular and cognitive complications, rehabilitation specialists can play an important role in the recovery process of people suffering from COVID-19 and rehabilitation for people suffering from COVID-19 in All stages of the disease are required [9,10]. Therefore, this disease in patients recovering from severe COVID-19 infection requires an approach that is implemented in a coordinated and systematic way as much as possible in the early stages of recovery. This approach requires organized rehabilitation teams including physiotherapists, occupational therapists, speech and language pathologists, rehabilitation psychologists or neuropsychologists, and physiatrists who collaborate with acute medical teams [11].

Rehabilitation is essential to maximize recovery for people after an acute illness and to maintain body functions in chronic disease. The COVID-19 pandemic, both directly and as a result of social isolation, lockdowns and disruption of the health care system, has created an increase in the need for rehabilitation services that focus on maximizing functional ability, psychological well-being, and social integration [12]. Rehabilitation services, especially when they are provided intensively and completely specialized, lead to long-term or medium-term savings in health and other

sectors. Also, these services reduce the indirect costs of continuous care and support for the individual's family and society [13].

In the beginning of the pandemic, a shortage of beds in acute care hospitals necessitated the use of several inpatient rehabilitation units for acute pulmonary care, but as the epidemic has progressed, almost all health care sectors have been affected. In some medical centers in areas with high prevalence of COVID-19 cases, rehabilitation units were converted into acute medical units to treat patients with COVID-19 pneumonia [10].

The evidence shows that less than one percent of households benefited from rehabilitation services in Iran before the COVID-19 pandemic. Geographical, social and economic inequalities in the use of these services have also been reported [13]. However, the need for rehabilitation services for disabilities related to COVID-19 or previous disability after contracting COVID-19 [9]. However, in many countries rehabilitation treatments for outpatients with chronic diseases have decreased in response to social distancing policies implemented to reduce the prevalence of infection in the population [14]. Thus, the pandemic has severely affected the provision of most rehabilitation services, creating barriers to their use that are likely to be more pronounced in low- and middle-income countries [15]. Due to rare information about the use of rehabilitation services in the period after the COVID-19 pandemic, this study aimed to investigate the use of these services in the period before and after the start of the COVID-19 disease in Iran and to identify the factors affecting the use these health services.

## MATERIALS AND METHODS

This is a descriptive-analytical, cross-sectional study that has used the data of the Household Income and Expenditure Surveys (HIES) of Iran Statistics Center (ISC) in 2018-2019 and 2020-2021. Sampling method of HIES has three stages and is done using probability sampling methods. By selecting the samples, the information needed in this survey is collected through face-to-face interviews using a standard questionnaire designed for annual surveys. In the present study, in order to investigate the benefit of rehabilitation services (audiometry, optometry, speech therapy and physiotherapy) between Iranian urban and rural households before and after COVID-19 pandemic, the raw data of HIES was used. The statistical population of this research is the households of the entire country and the sample under investigation is also selected from the entire population of the country. After data cleaning 38,960, and 37,557 households were included in the analysis for 2018-2019 (March 2018 to March 2019), and 2020-2021 (March 2020 to March

2021), respectively. Data of 18,610 households in the rural areas and 20,350 households in the urban areas was extracted for year 2018-2019 as before COVID-19 period. Also, 18,251, and 19,306 rural and urban households were extracted from rural and urban areas, respectively in 2020-2021 as after COVID-19 period.

The questionnaire used in the surveys of ISC is the "Urban-Rural Household Income and Expenditures" questionnaire, which is completed through an interview with the head of the household or a member over the age of fifteen. This questionnaire has four parts as follows: social characteristics of the family members, details of the place of residence and facilities and major necessities of life, food and non-food expenditures and household income. The sixth part of the food and non-food expenditures of this questionnaire is related to the health and medical expenditures of households in a month, which includes the expenditures related to pharmaceutical and medical products, medical devices and equipment, outpatient medical services, dental services, paramedical services, and treatment of drug addiction. In the present study, the use of rehabilitation services was considered as dependent variable. According to the initial assumption of the study, paying for rehabilitation services by the household was considered as using these services. Households that paid for these services were marked as households that used rehabilitation services, and households that did not pay for these services were considered as households that did not use rehabilitation services in the study period.

Logistic regression (cumulative distribution functions) used to estimate the study model. Cumulative distribution functions create a set of changes in the independent variable that puts the value of p (Equation 1) between zero and one. These functions have uniform properties (in the sense that they are increasing or decreasing uniform functions).

$$p(y|x) = \varphi(b\hat{}x) = \int_{-\infty}^{b\hat{}x} \varphi(z)d(z) \tag{1}$$

Therefore, we can consider logit regression models in which the dependent variable essentially represents two groups, each of which takes the values 0 and 1. In this study, the logit model was defined as follows (2):

$$y_i^* = \beta\hat{}X_i + \varepsilon_i \tag{2}$$

Where $y_i^*$ is the dependent variable of the use of rehabilitation services by the household, $\beta\hat{}$ is the vector of parameters that should be estimated to show the household's use of rehabilitation services, an imaginary dummy variable was created which 1 denotes households that used rehabilitation services, and 0 indicated households that didn't use these services during defined period of the study. $X_i$ are explanatory variables that include; sex, age, marital status of households, and education level of head of households, size of households, Place of residency (urban/rural), income quintile, and region of residency. Based on geographic, ethnic, language, income level of provinces, they were divided into 5 regions. Region 1 includes Tehran, Qazvin, Mazandaran, Semnan, Golestan, Alborz, and Qom provinces. Region 2 incudes provinces of Isfahan, Fars, Bushehr, Charmahal, Bakhtiari, Hormozgan, Kohgiloye, and Boyer-Ahmad. Region 3 compromises West Azabijan, East Azarbijan, Ardabil, Zanjan, Guilan, and Kurdistan. Region 4 includes Kermanshah, Ilam, Lorestan, Hamadan, Marjazi, and Khozestan. Region 5 includes provinces Razavi Khorasan, South Khorasan, North Khorasan, Kerman, Yazd, Sistan, and Balochestan. Microsoft Excel 2019 and Microsoft Access 2019 software (Microsoft, Redmond, WA, USA) were used for data extraction. Also, Stata version 14.2 software (StataCorp LLC, College Station, TX, USA) was used for data analysis.

The study has received ethical approval from the Ethics Committee of Kermanshah University of Medical Sciences, with the assigned ethical code: IR.KUMS.REC.1400.844.

## RESULTS

The results of descriptive statistics related to the year 2018-2019 (the year before the start of the COVID-19 disease) show that 258 households (0.66%) used rehabilitation services and 38,702 households (99.34%) did not use rehabilitation services. This number was 175 households (0.47%) and 37,382 households (99.53%) for the year 2020-2021 (the year after the start of the COVID-19 disease). In total, during these two years, the total users of rehabilitation services were 433 households (0.57%) and 76,084 households (99.43%) did not use any of rehabilitation services. Also, the average of rehabilitation costs for all households was equal to 26,662.55 Iranian Rials (IRR) in 2018-2019 and it was equal to 18,947.56 IRR in 2020-2021. Also, the average total rehabilitation costs per household using these services is 3.438,185 IRR in 2018-2019 and 2,996,511 IRR for 2020-2021 (Table 1).

Other findings showed that the rate of use of rehabilitation services in households headed by a woman in 2018-2019 was 0.62% and was 0.31% in 2020-2021. This number was 0.67% and 0.49% for male-headed households before and after the disease, respectively.

Based on the age of the head of the household in 2020-2021, the age group of 41-60 years had the highest rate of using rehabilitation services (0.70%), while in 2020-2021 the lowest rate of utilization was for this age group (0.45%). Compared to 2018-2019, the use of rehabilitation services has decreased in all age groups in 2020-2021.

**Table 1.** Utilization of households from rehabilitation services before and after COVID-19 in Iran

| Year | Total | Utilization | | Total costs for all households | | Total costs for utilized households | |
|---|---|---|---|---|---|---|---|
| | | No | Yes | Mean | Standard deviation | Mean | Standard deviation |
| 2018-2019 | 38,960 (50.92) | 38,702 (99.34) | 258 (0.66) | 26,662.55 | 486,897.8 | 3,438,185 | 4,348,978 |
| 2020-2021 | 37,557 (49.08) | 37,382 (99.53) | 175 (0.47) | 18,947.56 | 450,769.2 | 2,996,511 | 4,831,637 |
| Total | 76,517 (100) | 76,084 (99.43) | 433 (0.57) | 22,729.43 | 468,840.2 | 3,235,512 | 4,576,336 |

Values are presented as number (%).
COVID-19: coronavirus disease-2019.

Before the onset of the disease, the rate of utilization in households with single heads was 0.79%, married 0.68%, and divorced/widows 0.53%, while after the pandemic of COVID-19, the rate of using rehabilitation services for these three groups was 0.39%, 0.49% and 0.33% respectively.

Therefore, based on the marital status of the head of the household, the use of rehabilitation services in all groups has decreased in 2020-2021 compared to 2018-2019. The findings of the study by education level also showed that only in households where the education level of the head is master of sciences (MSc) or higher, the use of rehabilitation services has increased after the pandemic of COVID-19 (0.66% for before and 1.01% for after COVID-19). Both in 2018-2019 and 2020-2021, the amount of rehabilitation services used among insured households was higher than among uninsured ones.

According to the place of residency, the rate of using rehabilitation services in urban and rural households was 0.74% and 0.58% before COVID-19, respectively, while this rate was 0.58% in urban households and 0.33% among rural households after COVID-19 pandemic.

Also, both in 2018-2019 and 2020-2021, with the increase in income level, the use of rehabilitation services has increased. In this way, the households in the highest income quintile had the highest use of these services (2018-2019: 1.18% and 2020-2021: 0.84%) (Table 2).

The findings of the study by regions of the country also showed that before the COVID-19 pandemic, the use of rehabilitation services from the highest to the lowest amount was in regions one (0.92%), four (0.63%), two (0.60%), five (0.57%), and three (0.54%). After the COVID-19, the amount of use of rehabilitation services, from the highest to the lowest, was related to regions one (0.63%), four (0.50%), two (0.43%), third (0.42%), and five (0.33%) (Table 2).

According to the findings, female-headed households have a higher probability of using rehabilitation services, thus these households had 39% more probability than male-headed households (odds ratio [OR] = 1.39, p < 0.001).

In households where the age of the head was more than 60 years, they have a higher probability of using rehabilitation services than other age groups (OR = 1.32, p < 0.001). Also, households whose head is married (OR = 0.74, p < 0.001)

or widowed/divorced (OR = 0.51, p < 0.001) had a lower probability of using rehabilitation services than households with a single head.

Households whose education level was MSc or higher than their other counterparts have the highest probability of using these services (OR = 1.08, p < 0.001). Also, with the increase in the number of people in each household, the use of rehabilitation services has increased. Therefore, households with five or more members have a higher chance of using these services than households with fewer people (OR = 1.04, p < 0.001). Also, households with insurance coverage use rehabilitation services 2 times more than households without insurance coverage (OR = 2.00, p < 0.001). In addition, with the increase in the income level, the household's chances of using rehabilitation services have increased. Therefore, households in the highest income quintile have the highest chance of using these services and use rehabilitation services 2.90 times more than those in the first income quintile (OR = 2.90, p < 0.001).

The results of the place of residency also showed that the households living in the rural areas have a lower likelihood to use rehabilitation services than the households living in urban areas (OR = 0.67, p < 0.001). Examining the period before and after the pandemic of the COVID-19 disease also showed that the average use of rehabilitation services in the period after the pandemic has decreased by 22% (OR = 0.78, p < 0.01). The logistic regression results of Table 3 show more details about factors affecting the use of rehabilitation services during the COVID-19 pandemic.

## DISCUSSION

Our descriptive findings showed that the proportion of utilization, and the mean cost of rehabilitation services has reduced during the coronavirus pandemic compared to before the pandemic. Also, the analysis of logistic regression indicated that the utilization of rehabilitation services significantly has reduced by 22% following the COVID-19 pandemic. There is increasing evidence that the coronavirus disease has affected adversely the provision of basic healthcare worldwide [16]. Restrictions due to COVID-19 may be

**Table 2.** Comparison of benefiting from rehabilitation services in Iranian households before and after COVID-19 based on the studied variables

| Variable | Before COVID-19 (2018-2019) | | | After COVID-19 (2020-2021) | | |
|---|---|---|---|---|---|---|
| | Total | Utilization | | Total | Utilization | |
| | | No | Yes | | No | Yes |
| **Sex of head of household** | | | | | | |
| Female | 5,171 (13.27) | 5,139 (99.38) | 32 (0.62) | 5,522 (14.70) | 5,505 (99.69) | 17 (0.31) |
| Male | 33,789 (86.73) | 33,563 (99.33) | 226 (0.67) | 32,035 (85.30) | 31,877 (99.51) | 158 (0.49) |
| **Age of head of household (yr)** | | | | | | |
| ≤ 40 | 12,635 (32.43) | 12,561 (99.41) | 74 (0.59) | 10,495 (27.94) | 10,445 (99.52) | 50 (0.48) |
| 41-60 | 16,059 (41.22) | 15,946 (99.30) | 113 (0.70) | 16,115 (42.91) | 16,042 (99.55) | 73 (0.45) |
| > 60 | 10,266 (26.35) | 10,195 (99.31) | 71 (0.69) | 10,947 (29.15) | 10,895 (99.52) | 52 (0.48) |
| **Marital status of head of household** | | | | | | |
| Single | 504 (1.29) | 500 (99.21) | 4 (0.79) | 510 (1.36) | 508 (99.61) | 2 (0.39) |
| Married | 33,183 (85.17) | 32,957 (99.32) | 226 (0.68) | 31,372 (83.53) | 31,218 (99.51) | 154 (0.49) |
| Widow/divorces | 5,273 (13.53) | 5,245 (99.47) | 28 (0.53) | 5,675 (15.11) | 5,656 (99.67) | 19 (0.33) |
| **Education level of head of household** | | | | | | |
| Illiterate | 9,407 (24.15) | 9,358 (99.48) | 49 (0.52) | 8,663 (23.07) | 8,640 (99.73) | 23 (0.27) |
| Under diploma | 18,283 (46.93) | 18,168 (99.37) | 115 (0.63) | 18,088 (48.16) | 18,005 (99.54) | 83 (0.46) |
| Diploma | 6,372 (16.36) | 6,319 (99.17) | 53 (0.83) | 6,166 (16.42) | 6,133 (99.46) | 33 (0.54) |
| Bachelor | 3,992 (10.25) | 3,957 (99.12) | 35 (0.88) | 3,752 (9.99) | 3,725 (99.28) | 27 (0.72) |
| MSc and higher | 906 (2.33) | 900 (99.34) | 6 (0.66) | 888 (2.36) | 879 (98.99) | 9 (1.01) |
| **Size of household (person)** | | | | | | |
| 1-2 | 10,229 (26.26) | 10,177 (99.49) | 52 (0.51) | 10,415 (27.73) | 10,382 (99.68) | 33 (0.32) |
| 3-4 | 20,669 (53.05) | 20,513 (99.25) | 156 (0.75) | 19,515 (51.96) | 19,414 (99.48) | 101 (0.52) |
| ≥ 5 | 8,062 (20.69) | 8,012 (99.38) | 50 (0.62) | 7,627 (20.31) | 7,586 (99.46) | 41 (0.54) |
| **Health insurance coverage** | | | | | | |
| No | 4,533 (11.64) | 4,514 (99.58) | 19 (0.42) | 4,297 (11.44) | 4,285 (99.72) | 12 (0.28) |
| Yes | 34,427 (88.36) | 34,188 (99.31) | 239 (0.69) | 33,260 (88.56) | 33,097 (99.51) | 163 (0.49) |
| **Place of residency** | | | | | | |
| Rural | 18,610 (47.77) | 18,502 (99.42) | 108 (0.58) | 18,251 (48.60) | 18,190 (99.66) | 61 (0.33) |
| Urban | 20,350 (52.23) | 20,200 (99.26) | 150 (0.74) | 19,306 (51.40) | 19,192 (99.41) | 114 (0.59) |
| **Income quintile** | | | | | | |
| 1st (the lowest) | 7,792 (20.00) | 7,771 (99.73) | 21 (0.27) | 7,511 (20.00) | 7,495 (99.79) | 16 (0.21) |
| 2nd | 7,792 (20.00) | 7,754 (99.51) | 38 (0.49) | 7,511 (20.00) | 7,486 (99.67) | 25 (0.33) |
| 3rd | 7,792 (20.00) | 7,740 (99.33) | 52 (0.67) | 7,511 (20.00) | 7,484 (99.64) | 27 (0.36) |
| 4th | 7,792 (20.00) | 7,737 (99.29) | 55 (0.71) | 7,511 (20.00) | 7,467 (99.41) | 44 (0.59) |
| 5th (the highest) | 7,792 (20.00) | 7,700 (98.82) | 92 (1.18) | 7,513 (20.00) | 7,450 (99.16) | 63 (0.84) |
| **Region** | | | | | | |
| 1 | 8,651 (22.20) | 8,571 (99.08) | 80 (0.92) | 8,511 (22.66) | 8,457 (99.37) | 54 (0.63) |
| 2 | 7,810 (20.05) | 7,763 (99.40) | 47 (0.60) | 7,598 (20.23) | 7,565 (99.57) | 33 (0.43) |
| 3 | 6,660 (17.09) | 6,624 (99.46) | 36 (0.54) | 6,192 (16.49) | 6,166 (99.58) | 26 (0.42) |
| 4 | 7,620 (19.56) | 7,572 (99.37) | 48 (0.63) | 7,054 (18.78) | 7,019 (99.50) | 35 (0.50) |
| 5 | 8,219 (21.10) | 8,172 (99.43) | 47 (0.57) | 8,202 (21.84) | 8,175 (99.67) | 27 (0.33) |

Values are presented as number (%).
COVID-19: coronavirus disease-2019, MSc: master of sciences.

one of the major reasons for poorer access to rehabilitation in Iran. In agreement with our study, a study in Saudi Arabia (2021), indicated that occupational therapy, physiotherapy, and speech therapy services were significantly affected during the COVID-19 pandemic so that the number of patients came down from 1,616 to 425 in a care hospital during the COVID-19 pandemic [17]. A study by MacDonald et al. (2021) [18] in the UK, indicated that lockdown and social restrictions had limited access to physiotherapy and face to

face follow-up among patients undergoing total hip/knee arthroplasty. Also, Chadd et al. (2021) [19], in the UK, found that referrals to speech and language therapy services during the COVID-19 pandemic were considerably less than in the same period in 2019. Overall, literature reveals that COVID-19 had a negative impacts on access to rehabilitation and the recovery of patients during the pandemic.

On the other hand, fear of COVID-19 may be a contributing factor to limited access to rehabilitation during the

**Table 3.** The logistic regression model for factors affecting the use of rehabilitation services on aggregate data of 2018-2019 and 2020-2021, Iran

| Variable | OR | 95% CI | p-value |
|---|---|---|---|
| Sex of head of household (ref: male) | 1 | | |
|   Female | 1.39 | 1.362, 1.41 | < 0.001 |
| Age of head of household (yr) (ref: ≤ 40) | 1 | | |
|   41-60 | 1.08 | 1.07, 1.09 | < 0.001 |
|   > 60 | 1.32 | 1.31, 1.37 | < 0.001 |
| Marital status of head of household (ref: single) | 1 | | |
|   Married | 0.74 | 0.73, 0.76 | < 0.001 |
|   Widow/divorces | 0.51 | 0.49, 0.52 | < 0.001 |
| Education level of head of household (ref: illiterate) | 1 | | |
|   Under diploma | 0.92 | 0.91, 0.93 | < 0.001 |
|   Diploma | 0.89 | 0.88, 0.90 | < 0.001 |
|   Bachelor | 0.98 | 0.96, 0.99 | < 0.010 |
|   Master of sciences and higher | 1.08 | 1.06, 1.10 | < 0.001 |
| Size of household (ref: 1-2 person) | 1 | | |
|   3-4 | 1.03 | 1.02, 1.04 | < 0.001 |
|   ≥ 5 | 1.04 | 1.03, 1.05 | < 0.001 |
| Health insurance coverage (ref: no) | 1 | | |
|   Yes | 2.00 | 1.98, 2.02 | < 0.001 |
| Place of residency (ref: urban) | 1 | | |
|   Rural | 0.67 | 0.67, 0.68 | < 0.001 |
| Income quintile (ref: 1st [the lowest]) | 1 | | |
|   2nd | 1.21 | 1.19, 1.23 | < 0.001 |
|   3rd | 1.61 | 1.59, 1.63 | < 0.001 |
|   4th | 1.66 | 1.64, 1.69 | < 0.001 |
|   5th (the highest) | 2.90 | 2.86, 2.94 | < 0.001 |
| Region (ref: 1) | 1 | | |
|   2 | 0.81 | 0.80, 0.82 | < 0.001 |
|   3 | 0.71 | 0.70, 0.71 | < 0.001 |
|   4 | 0.67 | 0.66, 0.68 | < 0.001 |
|   5 | 0.80 | 0.79, 0.81 | < 0.001 |
| COVID-19 (ref: no) | 1 | | |
|   Yes | 0.78 | 0.78, 0.79 | < 0.010 |

Log likelihood = –2,091,450.2; Pseudo $R^2$ = 0.0268; Prob (chi2) < 0.001.
COVID-19: coronavirus disease-2019.

COVID-19 pandemic in Iran. At the onset of the COVID-19 pandemic, extensive public reports and stories in both traditional and social media served to generate fear, panic and stigmatization because of the life-threatening effects of COVID-19. Thus anxiety and fear of COVID-19 caused the interruption of rehabilitation services for people with disabilities. Similarly, a study by Uys et al. (2021) [20], in South Africa, showed that some service-users decided not to attend therapy due to different factors including being afraid of contracting the coronavirus. Overall, studies highlight that the factors such as isolation, social distancing, fear of COVID-19, vulnerability, and socioeconomic factors had negative effects on access to therapies during COVID-19 [20-23].

In the present study, married head of households had a greater, and a higher OR of access to rehabilitation services compared to the unmarried ones before and after CO-VID-19 pandemic. Studies show that low emotional support and poor social capital can increase the odds for poor self-related health and insufficient access to healthcare [24].

The analysis of logistic regression indicated individuals with higher education level were more likely to use more rehabilitation services than those with lower education level. Studies reveal that low education level can be associated with poorer access to rehabilitation services [25,26]. Educational attainment is a key predictor of information needs among health services customers [27]. Information can improve timely access to rehabilitation services. A study by Vameghi et al. [28] in Iran indicated that lack of awareness in families was a key factor for delay in access to Speech and language therapy services. Similarly, Aarabi et al. [29] in a systematic review found that lack of information about needed services among parents was a major barrier to access to rehabilitation services among people with spectrum

disorders in Iran.

Regarding Table 3, insurance coverage and higher income levels significantly increased the odds of access to rehabilitation services in Iran during the COVID-19 pandemic. There are three main groups of organizations that provide different financial protection in Iran including social health insurance schemes, institutional health insurance funds, and commercial organizations [30]. Rehabilitation services, except physiotherapy and audiometry, are not covered by health insurance. The Health benefits package is not contained needed therapy services for people with disabilities and thus the proportion of out of pocket payments is high for such services. The national health accounts show that the share of out of pocket payments for rehabilitation services among households was 37.6% in 2017 while this percentage for the government and social heath insurances was 18.7% and 24.6% respectively [31]. As a result, individuals with higher income are more likely to afford therapy services than their lower-income counterparts, and health insurance coverage can increase the odds of access to some rehabilitation services such as physiotherapy and audiometry in Iran.

Also, our results showed that living in an urban area is associated with better access to rehabilitation in Iran. Regarding Iran's health system, primary health care is the only health service provided in rural areas through health houses and rural comprehensive health centers. Rehabilitation services are concentrated in urban areas and people who live in urban settings are more likely to have better geographical access to such services. Also, studies show that there is an inequitable distribution of rehabilitation services in Iran so that the rate of physiotherapy offices in Tehran was 105.55 per 1,000,000 population while this rate for the whole country was about 48.90 per 1,000,000 population [32]. Also, we should note that the community-based rehabilitation (CBR) program is the main approach to identifying people with disabilities (PWDs) in rural settings, training families, and providing assistive devices and social support in Iran. Literature shows that the home-based training in the CBR program has had a significant impact on the attitude, skills and knowledge of PWDs and their families in rural settings in Iran [33-36].

Overall, the present study highlights the remarkable disruption to rehabilitation services provision after the COVID-19 pandemic in Iran. This exposes a need for more comprehensive research to understand how rehabilitation services have been impacted by the coronavirus pandemic in various waves of infection to monitor access to healthcare and to estimate the potential long-term health of PWDs. To the best of our knowledge, the lack of evidence for the impact of the COVID-19 pandemic on rehabilitation services in Iran is a major evidence gap that should be addressed with the aim of informing future policy for rehabilitation services protection and pandemic preparedness.

## CONCLUSION

The results of this study indicate that following the COVID-19 pandemic, Iranian households have experienced a notable decline in both the consumption and average expenditure on rehabilitation services. These findings highlight the importance of proactive measures by health policymakers to address future shocks arising from infectious disease outbreaks and other emergency situations. Taking such measures is crucial for removing barriers that hinder the accessibility of rehabilitation services and other essential societal needs for households. By proactively addressing these barriers, health policymakers can ensure that individuals and families have appropriate access to the necessary services they require for their well-being and recovery. This approach is vital in maintaining and improving the overall quality of life for the affected households, particularly in the face of unexpected events like the COVID-19 pandemic or other emergencies.

## NOTES

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