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Comparison of the Distribution of Household Financial Contributions to the Health System before and during COVID-19 Outbreak: Evidence from Nationwide Survey in Iran

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Abstract

Background: Health and economy has substantially been influenced by the coronavirus disease 2019 (COVID-19) pandemic. Because of these impacts, household financial contribution to health system is likely to be changed. This study aimed to compare the distribution of household financial contributions before and during the COVID-19 epidemic.

Methods: This is a cross-sectional study. The data were obtained from Iran's Households Income and Expenditure Survey as a national representative survey and included 38,328 households in 2019 (before COVID-19) and 37,577 households in 2020 (during COVID-19 pandemic). The household expenditures deflated according to the Consumer Price Index. The indices of households' out-of-pocket Payments (OPP), catastrophic health expenditures (CHE), and impoverishment were calculated based on a standard methodology. Data analysis was done using an Excel-based software.

Results: The households' total expenditures declined for both urban and rural areas during the COVID-19 outbreak. Meanwhile, health expenditure experienced a negative growth rate for urban and rural households at –25.75% and –15.47%, respectively. The average per capita of OOP annually was 1,220,416 ($41.086 PPP) Rials for urban households and 1,017,760 Rials ($34.263 PPP) for rural households in 2020 (the era of COVID-19), which had dropped –30% and –16%, respectively, relative to 2019 (before COVID-19). The proportional share of health service types from the total health expenditure did not change importantly after the onset of COVID-19. The incidence of CHE and impoverishment due to health payments reduced after the onset of COVID-19.

Conclusion: The households' health expenditures changed considerably during the COVID-19 pandemic and these changes were the same for the urban and rural areas. Despite COVID-19 multi-faceted shocks, the findings of this study showed a slight decline in the incidence of CHE and impoverishment caused by health expenditures. It might be due to forgone health services during the COVID-19 pandemic. Data from these household surveys have some limits to depicting the real effects of this crisis.

Keywords: Health Disparities, Health Equity, Health Financing

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Introduction

The World Health Organization introduced fair financial

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↑What is "already known" in this topic:
COVID-19 as a multi-facetted crisis has raised the possibility of financial hardship for the households. However, there has been little discussion about the changes that occurred in the extent and trend of household financial contribution during the COVID-19 epidemic.

→What this article adds:
This study examined changes in household financial contribution for the healthcare system following the onset of COVID-19. These findings have significant implications for the understanding of how a multi-facetted crisis affect household's OOP for health service and subsequent indices. These findings imply some hidden warnings for developing countries toward sustainable Universal Health Coverage (UHC).

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contribution (FFC) as 1 of the 3 main goals of a health systems in the world health report 2000 (1). Also, the United Nations (UN) adopted sustainable development goals (SDG)-target 3.8 in 2015 that calls for universal health coverage (UHC), which means that everyone receives health services without facing financial hardship. Therefore, investigating the extend and trends of FFC indices is a continuing concern for policymakers to monitor the path to UHC (2).

Many reforms have been lunched in Iran and other countries during last 2 decades to reduce the out-of-pocket (OOP) expenses and protect households from catastrophic expenditures. The "New Medical Reform" has been implemented in the Chinese health system since 2009 toward financial protection (3). In a similar approach, the "Health Transformation Plan" (HTP) in Iran has begun in 2014, although there is some controversy about its achievements (4).

In spite of many reforms and initiatives done around the world to fulfil SDG targeted 3.8, it is estimated that the incidence of Catastrophic Health Expenditures (CHE) has increased during the last decades and the number of people pushed into poverty due to health payments remains unacceptably high (5). Recently, the COVID-19 pandemic brought multi-faceted shocks to human life that impedes progress in meeting UHC aspects (6). Thus, for better planning toward sustainable UHC, a clear assessment of FFC indices trends is necessary.

Assessing the household health expenditure via household survey data would provide real-world data to compute the incidence of CHE and the probable subsequent impoverishment (7). There is a growing body of literature about FFC indices (8, 9) and also few studies have investigated a pre-post comparison to track household health expenditure and analysis financial protection level after reforms or a crisis in Greece, China, and Iran (10-14). So far, however, there has been little discussion about the attributable impact of COVID-19 on household health expenditure. This paper attempts to show the extent of FFC indicators before and during the COVID-19 epidemic, which will help to address concerns about UHC when countries face with multi-facetted shocks and crisis.

Methods

Research Design and Data

This is a cross-sectional study. The data were obtained from Iran's Households Income and Expenditure Survey (HIES) as a national representative survey and included 38,328 households in 2019 (pre-COVID-19 pandemic), and 37,577 households in 2020 (during the COVID-19 pandemic). In this national survey, the targeted households have been selected through 3 stages of random sampling. The HIES has been taken since the 1960s and tries to estimate the income and expenditure (including health expenditure) for urban and rural households at provincial and national levels. The OOP health expenditure was extracted from the third section of the survey questionnaire separately for each health service items including hospitalization, outpatient, pharmaceutical products, medical products and treatment equipment, paraclinical, as well as the addiction treatment.

Because the inflation rate was different for 2 compared years, the household expenditures deflated according to the Consumer Price Index (CPI) (15). Table 1 shows the CPI that was estimated by the Statistical Center of Iran.

Methods for calculating the FFC indices was adopted according to the methodology proposed by Xu (16). Data management and analysis were performed using an Excel-based software.

Poverty Line

The "Food Share" approach was applied to compute the poverty line (PL). First, the food expenditure share was calculated for all households, and then the weighted average of food expenditure of the households within the 45th to 55th percentile range was estimated as PL.

$$PL = \frac{\sum w_h * eqfood_h}{\sum w_{h\ 45th\ to\ 55th\ percentile}}$$

where Wh is the variable of the household weight and $eqfood_h$ is the food expenditures divided by the equivalent household size (16).

The subsistence expenditure for each household (se_h) was measured as follows:

$$se_h = PL * eqsize_h$$

Where $eqsize_h$ is equivalent household size. Further description is noted in Xu (2005) discussion paper (15).

If a household's total expenditure, exp_h, is less than its subsistence expenditure, thereby it referred as poor.

$$(exp_h < se_h) \rightarrow poor_h$$

Catastrophic Health Expenditure

CHE occurs when OOP health spending for a household is ≥40% of its capacity to pay (CTP) (16).

The CTP or nonsubsistence spending of each household is defined as the total expenditure minus the subsistence spending. However, for a household whose food expenditures are lower than its subsistence spending, the CTP equals the difference of the total household expenditure minus the food expenditure:

$$ctp_h = exp_h - se_h \quad if \quad se_h \leq food_h$$
$$ctp_h = exp_h - food_h \ if \ se_h > food_h$$

When OOPCTP proportion equals to or exceeds its 40%, that household is facing CHE.

Table 1. Consumer Price Index for Household Expenditure Derived From Statistical Center of Iran—Basic Year: 2016

Consumer Price Index		2019	2020
Household total expenditure	Urban	183.99	250.6
	Rural	191.38	263.47
Household health expenditure	Urban	158.25	205.25
	Rural	157.52	205.88

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$$OOPCTP_h = \frac{OOP_h}{CTP_h} \geq 0.40$$

Impoverishment

When nonpoor households pay high OOP expenditure without a financial protection plan, some households may be impoverished (in other words, household becomes poor after paying for health services). The following relation was used to determine the impoverished households:

$$exp_h \geq se_h \, , and \; exp_h - oop_h < se_h \rightarrow impoor_h$$

Fairness in Financial Contribution Index

The Fairness in Financial Contribution Index (FFCI) was calculated using the following equation that proposed by the WHO. The range of the FFC index is between 0 and 1. When it was close to 1, the fairness of the health financing system was improved.

$$FFC=1-\sqrt[3]{\frac{\sum_{h=1}^{n} w_h |oopctp_h - oopctp_c|^3}{\sum W_h}}$$

We calculated $OOPCTP_h$ for each household, by applying the following formula

$$oopctp_c = {(\sum w_h * oop_h)}/{\sum w_h * ctp_h)}$$

Results

The "Food share" approach was applied to calculate the PL. Our findings were demonstrated that the PL was 4,971,233.43 Rials and 7,076,019.96 Rials monthly per person for 2019 (before COVID-19) and (during COVID-19), respectively. Another study finding was illustrated with the following comparative tables. Table 2 compares the summary statistics about household expenditure for urban and rural households in Iran. It is apparent from this table that household health expenditure dropped for both urban and rural households after the onset of the COVID-19 epidemic. The average per capita of OOP annually was 1,220,416 ($41.086 PPP) Rials for urban households and 1,017,760 Rials (34.263 PPP int $) for rural households in 2020 (the era of COVID-19), which had dropped –30% relative to 2019 (before COVID-19).

The results obtained from the preliminary analysis of household health expenditure are summarized in Tables 3 and 4. These data were deflated to 2016 using the CPI for medical care. Household OOP spending for all health services has declined except for medical products and treatment equipment.

The information in Table 5 shows that during the first year following the start of the COVID-19 outbreak, FFC indices increased.

Table 1. Households' total expenditure for urban and rural households in Iran

Household's Expenditure			Before COVID-19 Epidemic (2019)	During the COVID-19 Epidemic (2020)	Growth (%)
Total expenditure	Urban	Total	1,827,030,010,786	1,784,391,036,756	-2.33
		Per-Capita	26,771,631	27,173,743	1
	Rural	Total	922,783,804,627	826,907,547,159	-10.39
		Per-Capita	14,352,118	13,065,580	-10
Health expenditure	Urban	Total	107,932,363,068	80,139,885,459	-34
		Per-Capita	1,581,542	1,220,416	-30
	Rural	Total	76,199,180,574	64,413,042,265	-18
		Per-Capita	1,185,130/97	1,017,760	-16

Table 2. Household OOP spending for health service items for urban population

	Household Health Expenditure Items	Before COVID-19 Pandemic (2019)		During COVID-19 Pandemic (2020)		Growth (%)
		Figure	%	Figure	%	
1	Hospitalization expenditures	84,666,965,551	78.44	58,581,677,387	73.10	-30.81
2	Outpatient expenditures	4,200,177,308	3.89	3,946,062,947	4.92	-6.05
3	Pharmaceutical products expenditures	8,051,090,087	7.46	7,369,024,365	9.20	-8.47
4	Medical products and treatment equipment expenditures	1,883,393,805	1.74	2,442,638,060	3.05	29.69
5	Dental expenditures	4,751,390,013	4.40	4,016,805,556	5.01	-15.46
6	Paraclinical expenditures	4,297,652,246	3.98	3,717,546,539	4.64	-13.50
7	Addiction treatment expenditures	81,694,058	0.08	66,130,604	0.08	-19.05
	Total	107,932,363,068	100	80,139,885,459	100	-25.75

Table 3. Household health expenditure items for rural population

No	Household Health Expenditure Items	Before COVID-19 Pandemic (2019)		During COVID-19 Pandemic (2020)		% Growth
		Figure	%	Figure	%	
1	Hospitalization expenditures	61,502,263,357	80.71	51,301,570,506	79.64	-16.59
2	Outpatient expenditures	3,017,767,617	3.96	2,308,907,337	3.58	-23.49
3	Pharmaceutical products expenditures	6,245,657,643	8.20	5,375,608,473	8.35	-13.93
4	Medical products and treatment equipment expenditures	522,595,873	0.69	1,312,035,957	2.04	151.06
5	Dental expenditures	1,930,744,338	2.53	1,513,384,354	2.35	-21.62
6	Paraclinical expenditures	2,937,532,697	3.86	2,573,887,436	4.00	-12.38
7	Addiction treatment expenditures	42,619,048	0.06	27,648,202	0.04	-35.13
	Total	76,199,180,574	100	64,413,042,265	100	-15.47

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Table 4. The summary statistics for FFC indices before and during COVID-19

FFC Indices	Before COVID-19 Epidemic (2019)			During COVID-19 Epidemic (2020)		
	Rural Households	Urban Households	Total population	Rural Households	Urban Households	Total population
Catastrophic health expenditures	4.194%	2.664%	3.4%	3.715%	2.181%	2.926%
Impoverishment due to health expenditures	1.492%	0.828%	1.044%	1.2%	0.658	0.921%
FFCI	0.8196	0.8451	0.8373	0.8228	0.8474	0.8398

Discussion

The study aimed to compare the distribution of household financial contributions to the health system before and during the COVID-19 epidemic. We investigated how Iranian households' spending was affected by an unprecedented spread of an epidemic. The findings have shown that the household's total expenditure and the household's health expenditure dropped for both urban and rural areas, except spending for medical products and treatment equipment expenditures. Theses reduction were found after deflating expenditures data, thus, implying a considerable drop in service utilization. After the start of COVID-19, the percentage of different categories of health services in overall health spending did not vary significantly. Surprisingly, FFC indices including CHE, impoverishment, and FFCI improved during COVID-19, which needs further discussion.

First, dropping of household's total expenditure during COVID-19 was found for both rural and urban households after deflating expenditure's data. However, this reduction was greater for rural households. This finding broadly supports the work of other studies in Thailand (17) and the UK (18). A popular explanation is the direct and indirect effects of COVID-19 on markets, employment, and income which mediated in household economic (19).

In accordance with the present results, previous studies have demonstrated reduction in health service utilization. Some hypotheses could account for the drop in health spending. During the COVID-19 outbreak "forgone care" increased especially for fear of infection, barriers to access and utilization, and financial reasons (20, 21). In other words, demand for health care has been decreased (22) and households' willingness and ability to buy health services are down. According to research done by Zhang et al in all 365 mainland cities of China, the pandemic significantly reduced health care service utilization (23). In the United States, Cutler (24) reported a drop in health spending in 2020 relative to 2019. There is a paucity of the trends of health care utilization and spending in Iran after the COVID-19 outbreak.

COVID-19 imposed socioeconomic shocks in the fields of business, employment, and health around the world. These shocks have direct and indirect impacts on household income, savings, consumption, poverty, and health behaviors (25). Thus, it is expected that the FFC indices for financial protection likely be changed during COVID-19. The COVID-19 pandemic is projected to aggravate financial hardship owing to OOP health spending, according to the Global Monitoring Report 2021 for UHC (5). Contrary to these logical statements, findings of this study showed that FFC indices slightly get better after the onset of COVID-19. The incidence of CHE was 3.4% before the COVID-19 epidemic, which fell to 2.92% during the COVID-19 epidemic. Furthermore, the findings revealed a decline in impoverishment due to health expenditures after the onset of COVID-19 (from 1.044% in the year before the COVID-19 to 0.921% during the COVID-19 epidemic) epidemic. Finally, FFCI was improved for both rural and urban populations during the COVID-19 epidemic. It is important to explain such results within the context of COVID-19 pandemic. COVID-19 pandemic restricted access to health care and people delayed or give up seeking health care. Thus, their demand and its subsequent OOP spending declined. In other words, the COVID-19 pandemic increased forgone care in the health system. On the other side, methods and tools for assessing households' financial contribution to the health system (7) are based on households' OOP payments in real world and forgone care not taken into account.

Finally, we used data from a national representative survey and applied a common standard methodology for analysis of household health spending. However, this study has some limitations. First, households that surveyed in 2 comparative years are unique for each year. Second, the forgone care effect was not considered in these household surveys when illustrating the crisis' actual impact.

Conclusion

The study findings highlighted the changes in household health expenditures and FFC measures after the COVID-19 outbreak. A reduction in the total household expenditure and OOP spending for health was found, which implies lower service utilization after the onset of COVID-19. The percentage of households have faced with CHE and impoverishment caused by health expenditures was decreased during the COVID-19 pandemic. This result is somewhat counterintuitive against expected financial hardship due to COVID-19 pandemic. Due to the absence of information regarding care that was forgone during the COVID-19 outbreak, it is difficult to draw a firm conclusion regarding health equity insights.

Abbreviations

FFC, Fair Financial Contribution; HIES, Households Income and Expenditure Survey; CHE, Catastrophic Health Expenditures, WHO, World Health Organization; UHC, Universal Health Coverage, CTP: Capacity to Pay

Authors' Contributions

R.E. and M.J.K. developed the initial idea and conceptualization. All authors contributed to study design. M.J.K. and R.E. extracted and analyzed the data. R.E. and M.J.K. drafted the paper and all authors contributed in revisions.

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All authors read and approved the final manuscript.

Availability of Data and Materials

The data were obtained from Iran's Households Income and Expenditure Survey. The dataset used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate

This study received approval from the Research Ethics Committee of Gonabad University of Medical Sciences, Iran (IR. GMU. REC.1401.001). Methods have been performed in accordance with relevant guidelines and regulations. We used secondary data from Iran's Households Income and Expenditure Survey, which is carried out annually by the Statistics Centre of Iran and we did not involve primary data collection at individual level or human subjects.

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Conflict of Interests

The authors declare that they have no competing interests.

References

1. World Health Organization. The world health report 2000: health systems: improving performance: World Health Organization; 2000.
2. Barasa E, Nguhiu P, McIntyre D. Measuring progress towards sustainable development goal 3.8 on universal health coverage in Kenya. BMJ Glob Health. 2018;3(3):e000904.
3. Fu XZ. The comparison of catastrophic health expenditure and its inequality between urban and rural households in China. Health Econ Rev. 2022 Dec;12(1):1-7.
4. Abdi Z, Alvandi R, Haghdoost B, Sazgarnejad S, Ahmadnezhad E, Najafi B, et al. Measuring progress toward Universal Health Coverage in Iran: two years after the implementation of the Health Transformation Plan. J Biostat Epidemiol. 2022;8(2):170-80.
5. World Health Organization. Tracking universal health coverage: 2021 global monitoring report. World Health Organization; 2021.
6. Sachs J, Kroll C, Lafortune G, Fuller G, Woelm F. Sustainable development report 2022. Cambridge University Press; 2022 Oct 6.
7. Wagstaff A, O'Donnell O, Van Doorslaer E, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation: World Bank Publications; 2007.
8. Eze P, Lawani LO, Agu UJ, Acharya Y. Catastrophic health expenditure in sub-Saharan Africa: systematic review and meta-analysis. Bull World Health Organ. 2022;100(5):337.
9. Azzani M, Roslani AC, Su TT. Determinants of household catastrophic health expenditure: a systematic review. Malay J Med Sci. 2019 Jan;26(1):15.
10. Crookes C, Palladino R, Seferidi P, Hirve R, Siskou O, Filippidis FT. Impact of the economic crisis on household health expenditure in Greece: an interrupted time series analysis. BMJ Open. 2020;10(8):e038158.
11. Xu Y, Zhou Z, Gao J. Effect of the New Health Care Reform on catastrophic health expenditure in households of patients with chronic diseases in Shaanxi Province: a before-and-after analysis. Lancet. 2017;390:S94.
12. Xu Y, Ma J, Wu N, Fan X, Zhang T, Zhou Z, et al. Catastrophic health expenditure in households with chronic disease patients: A pre-post comparison of the New Health Care Reform in Shaanxi Province, China. PloS One. 2018;13(3):e0194539.
13. Abdi Z, Hsu J, Ahmadnezhad E, Majdzadeh R, Harirchi I. An analysis of financial protection before and after the Iranian Health Transformation Plan. East Mediterr Health J. 2020;26(9):1025-33.
14. Kyriopoulos I, Nikoloski Z, Mossialos E. The impact of the Greek economic adjustment programme on household health expenditure. Soc Sci Med. 2019;222:274-84.
15. Dunn A, Grosse SD, Zuvekas SH. Adjusting health expenditures for inflation: a review of measures for health services research in the United States. Health Serv Res. 2018;53(1):175-96.
16. World Health Organization. Distribution of health payments and catastrophic expenditures methodology. World Health Organization; 2005.
17. Hean O, Chairassamee N. Household consumption expenditure in Thailand during the first COVID-19 lockdown. Household consumption expenditure in Thailand during the first COVID-19 lockdown. 2022:1.
18. Hacioglu Hoke S, Känzig DR, Surico P. Consumption in the time of COVID-19: evidence from UK transaction data. 2020.
19. Davis G. The many ways COVID-19 affects households: consumption, time, and health outcomes. Rev Eco Househ. 2021;19(2):281-9.
20. Anderson KE, McGinty EE, Presskreischer R, Barry CL. Reports of forgone medical care among US adults during the initial phase of the COVID-19 pandemic. JAMA Network Open. 2021;4(1):e2034882-e.
21. Jiskrova GK, Bobák M, Pikhart H, Ksinan AJ. Job loss and lower healthcare utilisation due to COVID-19 among older adults across 27 European countries. J Epidemiol Community Health. 2021;75(11):1078-83.
22. Moynihan R, Sanders S, Michaleff ZA, Scott AM, Clark J, To EJ, et al. Impact of COVID-19 pandemic on utilisation of healthcare services: a systematic review. BMJ Open. 2021;11(3):e045343.
23. Zhang Y-N, Chen Y, Wang Y, Li F, Pender M, Wang N, et al. Reduction in healthcare services during the COVID-19 pandemic in China. BMJ Glob Health. 2020;5(11):e003421.
24. Cutler DM, editor How COVID-19 changes the economics of health care. JAMA Health Forum; 2021: American Medical Association.
25. Martin A, Markhvida M, Hallegatte S, Walsh B. Socio-economic impacts of COVID-19 on household consumption and poverty. Econ Disasters Clim Chang. 2020;4(3):453-79.

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