



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



ELSEVIER

Contents lists available at ScienceDirect

Health policy

journal homepage: www.elsevier.com/locate/healthpol

Beyond COVID-19: a cross-sectional study in Italy exploring the covid collateral impacts on healthcare services



Maria Rosaria Gualano^a, Alessio Corradi^a, Gianluca Voglino^{a,*}, Fabrizio Bert^{a,b},
Roberta Siliquini^{a,b}

^a University of Turin, Department of Public Health Sciences and Paediatrics, Turin, Italy

^b AOU City of Health and Science of Turin, Turin, Italy

ARTICLE INFO

Article history:

Received 22 October 2020

Revised 27 January 2021

Accepted 3 March 2021

Keywords:

Covid-19

Unmet health needs

Indirect effects

Delay of care

ABSTRACT

With COVID-19, populations are facing unmet health needs due to fear of contagion, lockdown measures and overload of Healthcare services (HCS). The COCOS study aimed to investigate reduced healthcare access among Italian citizens, additionally looking for specific subgroups that will primarily need health services in the next future. A cross-sectional online survey was performed during the Italian lockdown between April and May 2020. Descriptive, univariable and multivariable (logistic regression models) analyses were performed: results are expressed as Odd Ratios and Adjusted Odd Ratios (ORs and AdjORs). Totally, 1,515 questionnaires were collected. Median age was 42 years (IQR 23), 65.6% were females. Around 21.8% declared to suffer from chronic diseases. About 32.4% faced a delay of a scheduled Medical Service (MS) by provider decision, 13.2% refused to access scheduled MS for the fear of contagion, and 6.5% avoided HCS even if having an acute onset issue. Alarmingly, 1.5% avoided Emergency Department when in need and 5.0% took medications without consulting any physician; patients suffering from chronic conditions resulted to be more prone to self-medication (AdjOR [95% CI]: 2.16 [1.16–4.02]). This study demonstrated that indirect effects of COVID-19 are significant. Large groups of population suffered delays and interruptions of medical services, and the most vulnerable were the most affected. Immediate efforts are needed to reduce the backlog that HCSs incurred in.

© 2021 Elsevier B.V. All rights reserved.

1. Introduction

It is possible that COVID-19 will be remembered as the worst health-related issue that affected 2020. In fact, governments defined the pandemic as the biggest challenge since Second World War. [1] However, there is a great probability that COVID-19 will be remembered also as the greatest calamity that affected the decade or worst. Even if the virus will be defeated with a widespread, effective vaccination program, its effects on health could exceed by far the already dramatic direct tolls.

In Europe, the 91.3% of deaths in 2017 came from non-communicable diseases (NCDs), with a leading position of cardiovascular diseases (36.4%) and neoplasms (27.6%). [2] Burden-wide, NCDs account for the 86.6% all of Disability Adjusted Life Years (DALYs), with the same two conditions in first places (18.4% and 18.6% respectively). [2–4] Furthermore, 74.1% of men and 79.7% of women report to suffer from NCDs: ~6.0% suffer from diabetes, ~18.0% report high blood pressure and 3.7% has a current cancer

to fight. [5] Although prevalence of NCDs may decrease as an effect of COVID-19, the outbreak and measures undertaken to fight it will greatly compromise the already fragile condition of these patients. [6] As an example, Tapper and Asrani discussed at least three major culprits of worsen care in cirrhosis care: that is, halting of screening for varices, cancellation of therapeutic procedures, decreasing of deceased donor liver transplantations. [7] Even though of different magnitude, suspension of healthcare services is well studied in post-disaster recovery phases: Katrina and Rita hurricanes raised crude mortality rate of 40% in the month following the disaster, and this increment remained after a year (12%) and even after ten years (5.6%). [8]

Suspension of medical services must not be thought exclusively as delayed routine visits. Elective surgery was largely delayed as a mean to prevent hospital overcrowding and to maintain surgical rooms free and ready for emergencies. This comprehend surgery of tumors. [9] However, mid- and long-term effects of this strategy on population health are currently unquantified, and concerns are rising on when this quantification will forcibly occur. [10] Sud et al. modeled that a delay of six months in cancer surgery can mitigate 43% of life-years gained treating an equivalent number of

* Corresponding author.

E-mail address: gianluca.voglino@unito.it (G. Voglino).

COVID-19 patients. [11] It is worth noting that scientific community is already creating frameworks and algorithms to handle the backlog. [12–14]

Furthermore, patients are underusing the services still offered to them because of fear of contagion. This is true for elective procedures but remains true also for emergency departments visits. In Italy, a reduction ranging from 73% to 88% in pediatric ED visits was described in March with multiple delayed accesses reported, often with severe consequences. [15] In Austria, a reduction of 39.4% in admissions for acute coronary syndrome was reported, in a period ranging from the start to the end of March. The Authors went beyond arguing that number of deaths was greater than the toll taken by COVID-19 at that time. [16] Similarly, among patients with stroke in Hong Kong, a median increase of one hour in time taken to present to the ED was found, compared with pre-COVID-19 era. [17]

Italy was among the first countries in Europe issuing a national lockdown, the 10th of March. [18] In this perspective, this work aims to find what health needs were not provided in Italian population, the extension of the phenomenon, and if are there any specific subgroups of populations that will need tailored services in the near future.

2. Materials and methods

A cross-sectional study was performed between April 19th and May 3rd, 2020 through an online questionnaire. The questionnaires were distributed at a national level using the institutional account of the Department of Public Health Sciences (University of Torino). Participation was voluntary and without compensation. Informed consents were obtained. The Internal Review Board of the Department of Public Health Sciences (University of Torino) approved the protocol. The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Exclusion criteria were being underage or had not been living in Italy during the lockdown. The present work is a part of the COCOS project and focus on the healthcare access of the subjects involved.

2.1. The questionnaire

The online questionnaire, written in Italian, was made by forty-nine items. A first section investigated socio-demographic characteristic of the sample. Additionally, information about health status was collected such as history of chronic diseases, health insurance coverage or previous COVID-19 test results. A second section assessed behaviors of respondents during the lockdown, such as the number of hours spent on internet, the sources of information used, having avoided physical activity because of the fear of injuries. Additionally, the level of trust in different professionals involved during the pandemic was assessed using a ten items scale with zero as “no trust at all” and ten as “complete trust”. The third section consisted of validated psychometric tests. Depressive symptoms presence was investigated through the Patient Health Questionnaire-2 (PHQ-2) and anxiety was measured by the Generalized Anxiety Disorder-2 (GAD-2). [19,20] A score of three or above represents a higher probability of major depression and anxiety disorders, respectively, and thus this value was used to recode test results as binary outcomes. [19,20] Additionally, subjects were asked to report eventual sleep disturbances. Finally, the fourth section evaluated the Healthcare access (HCA). In particular, the present study aimed to assess the impact of the restrictive measures on the HCA. Therefore, although previous tools were used to assess different dimensions of HCA, the authors decided to use new items specifically included in the questionnaire. [21,22] In particular, the survey assessed if scheduled medical services were delayed, investigating if this delay was due to healthcare provider

decision or due to subject decision for the fear of infection. Additionally, it was required to define the type of service that was delayed. Furthermore, it was investigated whether the respondents had an acute problem but avoided seeking help due to the fear of infection. If the answer was yes, subjects were required to specify what healthcare service they were avoiding. The last question assessed the taking of medications without the consultation with a physician and, in case of a positive answer, the reason was investigated. For each question, subjects were able to state if the scheduled medical service was programmed for themselves or for a family member. To perform statistical non-descriptive analysis, responses regarding medical services programmed for a family member were excluded.

Additionally, in-depth information on every question and on variables recoding can be found on previous paper published on peer-reviewed journal. [23]

2.2. Statistical analysis

Descriptive analyses were performed for all variables and for continuous variables normal distribution was assessed (Shapiro-Wilk test). Shapiro-Wilk test null hypothesis is that the population is normally distributed. A p-value lower than the defined alpha level means that there is evidence that the distribution is not normally distributed. In this case, parametric tests such as T tests cannot be used because their assumptions would not be met, and non-parametric statistical tests should be used. Differences between the groups defined by each outcome were investigated using chi-squared tests (when appropriate: Fisher's exact test) and Mann-Whitney U tests (when appropriate: Kruskal-Wallis H test). Univariable and multivariable logistic regressions were conducted to assess the independent variables influence on each binary outcome. The results were expressed as Odd Ratios OR, 95% CI in univariable models, and as Adjusted Odd Ratios AdjOR, 95% CI in multivariable regression model, where more than a variable at a time was considered. The covariates included in final, multivariable models were selected based on results of univariable tests. All variables with a p-value ≤ 0.05 at univariable test were automatically entered in the final model, while covariates with p-values ≤ 0.25 at univariable tests were selected with a stepwise backward method. [24] Age and gender were entered as potential confounders.

SPSS (v25) was used and a two-tailed p-value ≤ 0.05 was considered statistically significant. Missing values were excluded.

3. Results

The collected questionnaires were 1556, but 41 were excluded because they met the exclusion criteria, and the final sample was made of 1515 questionnaires. Full descriptive data is shown in Table 1. Interestingly 21.8% (N = 326) declared to suffer from chronic conditions and only 1.1% (N = 16) resulted positive to COVID-19 tests.

One third of the sample had a scheduled personal medical service that was delayed and one fourth had a family member who was affected by a delayed medical service due to the provider decision. In particular, 6.8% (N = 103) of the sample had personal and family member scheduled medical services delayed due to provider decision. The services that were delayed were mainly outpatient visit, dentist visit or screening procedure.

The proportion of subjects who decided to not attend a scheduled medical service because of the fear of the infection was lower. In particular, 13.2% (N = 200) refused personally to attend the medical services while in the 8.8% (N = 134) of the cases a family member refused the service. In Table 1 the most frequent services not attended by the sample are reported. In fact, 6.5% (N = 97)

Table 1

		N = 1515 % or Median (IQR)	
Age*		42 (23)	
Gender	Male	34.4	
	Female	65.6	
Citizenship	Italian	98.3	
	Other	1.7	
Geographical Area	North	75.5	
	Centre	13.7	
	South	10.8	
Family Status	Single/Divorced	38.9	
	Married/Cohabitant	61.1	
Living alone^		19.6	
Education Level	None	0.1	
	Elementary School	0.2	
	Middle School	4.8	
	High School	26.0	
	University	68.9	
Employment	Unemployed	6.2	
	Student	7.1	
	Employed (public sector)	24.9	
	Employed (private sector)	29.5	
	Self-employed	13.7	
	Entrepreneur	2.4	
	Retiree	14.8	
	Housewife	1.3	
	I do not work	20.7	
	My activity is not changed	15.3	
Activity during lockdown	Smart working	32.6	
	Layoff	6.5	
	Parental Leave	0.5	
	Paid Vacation	1.0	
	My activity is reduced	10.3	
	My activity is stopped	7.7	
	I lost my job	1.2	
	Other	4.2	
	Healthcare worker^		20.4
	Healthcare worker (relative)^		35.1
Health Insurance^		33.8	
Chronic Conditions^		21.8	
Positive to COVID-19^		1.1	
Time spent on internet*	Hours/day	9 (6)	
Time spent on internet (Trend)	Stable	21.6	
	Increased	75.1	
	Decreased	1.5	
	I do not know	1.8	
Source of Information (TV)^		70.0	
Source of Information (Internet)^		83.2	
Source of Information (Newspaper)^		52.8	
Trust level*	Doctors	8 (2)	
	Politicians	5 (3)	
	Experts	6 (2)	
	Journalists	5 (3)	
Received chain letter/messages^		85.5	
Online Grocery^		58.4	
Times went out*	Number/Week	3 (6)	
Avoidance of activity (fear of injuries)^		23.3	
Avoidance of activity (peer pressure)^		26.1	
Do you wear a facemask going out?	No, I do not think is useful	4.4	
	No, I was not able to find one	1.7	
	Yes, sometimes	17.7	
	Yes, always	71.1	
	I do not go out	5.0	
Depression (PHQ-2)^		24.7	
Anxiety (GAD-2)^		23.2	
Trouble Sleeping^		42.2	
Delay of scheduled health service (decided by the provider)	Respondent**	32.4	
	Respondent's family member**	25.6	
	No	49.0	
	Service		
	Outpatient visit**	32.8	
	Dentist**	16.7	
	Screening**	7.9	
	Vaccination**	1.7	
	Diagnostic Test**	3.1	
	Surgical Procedures**	3.7	
Others**	3.8		

(continued on next page)

Table 1 (continued)

			N = 1515
			% or Median (IQR)
Avoidance of scheduled health services	<i>Respondent**</i>	13.2	
	<i>Respondent's family member**</i>	8.8	
	<i>No</i>	78.5	
	<i>Service</i>		
		Outpatient visit**	11.9
		Dentist**	5.0
		Screening**	3.6
		Vaccination**	1.1
		Diagnostic Test**	2.3
		Surgical Procedures**	0.3
	Others**	0.8	
Avoidance of acute healthcare	<i>Respondent**</i>	6.5	
	<i>Respondent's family member**</i>	3.4	
	<i>No</i>	90.4	
	<i>Service</i>		
		General Practitioner**	4.6
		Continuity Care Service**	0.3
		Emergency Department**	1.5
		Pharmacist**	0.3
		Other Specialist**	2.7
		Other professional**	1.5
Self-medication	<i>Respondent**</i>	5.0	
	<i>Respondent's family member**</i>	1.1	
	<i>No</i>	94.1	
	<i>Reason</i>		
		Not urgent	2.7
		Trouble getting in contact with the doctor	1.6
		Fear of going to the doctor	0.5
	Not knowing correct point of contact	0.3	
	Other reasons	0.7	

Figures are absolute frequencies or Median and Interquartile Range (IQR), when appropriate.

* Continuous variable.

** : More than one answer was accepted.

^ : Yes/no dichotomous question. "Yes" frequency is reported.

of the subjects interviewed had an acute health problem but refused to seek help because of the fear of the infection. Finally, only 22 (1.5% of the sample) would have searched assistance from the Emergency Department, while 79 (4.6%) from the General Practitioner.

Regarding self-medication, 5% of the sample (N = 74) declared use of drugs without medical prescription. "I do not consider it an urgent matter now" was the reason most reported to justify self-medication (2.7%, N = 41).

As reported in Table 2, to have had a personal medical service delayed due to the provider decision was significantly associated to socio-demographic variables, such as age ($p < 0.001$), gender ($p = 0.001$), education level ($p = 0.034$), occupation ($p < 0.001$), to health conditions, such as suffering from chronic conditions ($p < 0.001$) or a previous diagnosis of Covid-19 ($p = 0.026$), and to behaviors such as using television as source of information ($p = 0.029$), having received chain messages ($p = 0.006$), to be scared to go outside ($p < 0.001$) and to avoidance of physical activity because of the fear of injuries ($p < 0.001$).

On the contrary, as reported in Table 3, factors associated with medical services avoidance were different.

Non-Italian citizenship ($p = 0.048$) and trust level toward politicians ($p = 0.049$) were the only variables significantly associated with avoidance of scheduled of medical service. Similarly, a current occupation ($p = 0.010$) resulted to be associated with higher self-medication probability, as fear of going out ($p = 0.032$), anxiety ($p = 0.026$) and sleep disturbances ($p = 0.002$).

More variables resulted to be associated with avoidance of seeking help for an acute onset issue. In fact, suffering from chronic conditions ($p = 0.020$), trust level towards doctors ($p = 0.002$), fear of going out ($p < 0.001$), depression ($p < 0.001$), anxiety ($p = 0.001$), sleep disturbances ($p < 0.001$) and activity avoidance either because of the fear of injuries ($p < 0.001$) or peer pressure ($p < 0.001$) were all associated with this specific outcome.

A multivariable logistic regression was modeled to estimate possible predictors of vulnerability to a medical service delay due to provider decision (Table 4).

Older people (AdjOR: 1.02), females (AdjOR: 1.61), patients suffering from chronic conditions (AdjOR: 1.53) and subjects who received chain messages (AdjOR: 1.59) presented an increased risk to have had a scheduled medical service delayed due to provider decision. On the other hand, subjects living in Southern Italy (AdjOR: 0.58) and people going out more frequently (AdjOR: 0.97) showed a lower risk of reporting this delay.

Similar models were used to evaluate predictors of the other variables assessed and the results are displayed in Table 4. None of the variables that were significantly associated with the avoidance of scheduled medical services because of the fear of infection at the univariable analysis were associated at the multivariable regression model too. In fact, no association was found for any variable. On the contrary, subjects with sleep disturbances (AdjOR: 1.93) or who avoided activity due to the fear of incurring in an injury (AdjOR: 2.33) were more at risk of avoiding acute care for the fear of infection, while patients with a higher trust level towards doctors (AdjOR: 0.75) had a lower risk of avoiding acute care when in need. Finally, subjects with an occupation (AdjOR: 2.28) and suffering from chronic conditions (AdjOR: 2.16) resulted to be more prone to self-medication.

4. Discussion

COVID-19 had a big impact on everyone's life, but probably some people were affected more than others. Exploring specific needs, it will be possible to tailor interventions such as public health information campaigns or increase individual departments budget.

One third of our sample faced a delay due to healthcare provider decision, a fourth declared a family member had the same

Table 2

		Delay of scheduled health service (decided by the provider)		p
		NoN = 1010 (67.6%)	YesN = 484 (32.4%)	
Age*		40 (22)	47 (28)	<0.001
Gender	Male	73.2	26.8	0.001
	Female	64.8	35.2	
Citizenship	Italian	67.7	32.3	0.415
	Other	60.0	40.0	
Geographical Area	North	67.2	32.8	0.051
	Centre	67.4	32.6	
	South	77.6	22.4	
Family Status	Single/Divorced	69.5	30.5	0.218
	Married/Cohabitant	66.4	33.6	
Living alone	No	67.9	32.1	0.555
	Yes	69.8	30.2	
Education Level	High school or lower	63.8	36.2	0.034
	University	69.4	30.6	
Occupation	No	58.9	41.1	<0.001
	Yes	71.2	28.8	
Activity during lockdown	No variation	64.6	35.4	0.073
	Smart working	67.3	32.7	
	Guaranteed income	77.1	22.9	
	Activity Stopped	68.0	32.0	
Healthcare worker	No	67.2	32.8	0.137
	Yes	71.7	28.3	
Healthcare worker (relative)	No	67.4	32.6	0.424
	Yes	69.4	30.6	
Health Insurance	No	69.0	31.0	0.228
	Yes	65.9	34.1	
Chronic Conditions	No	71.7	28.3	<0.001
	Yes	54.1	45.9	
Positive to COVID-19	No	67.6	32.4	0.026
	Yes	93.8	6.3	
Time spent on internet (Amount)*	Hours/day	9 (6)	8.5 (5)	0.161
Time spent on internet (Trend)	Stable	71.3	28.7	0.143
	Increased	66.7	33.3	
	Decreased	54.5	45.5	
	I do not know	77.8	22.2	
Source of Information (TV)	No	71.7	28.3	0.029
	Yes	65.9	34.1	
Source of Information (Internet)	No	63.0	37.0	0.092
	Yes	68.5	31.5	
Source of Information (Newspaper)	No	69.9	30.1	0.075
	Yes	65.6	34.4	
Trust level*	Doctors	9 (2)	8 (2)	0.084
	Politicians	5 (3)	5 (3)	
	Experts	6 (2)	6 (3)	
	Journalists	5 (3)	5 (3)	
Received chain letter/messages	No	75.9	24.1	0.006
	Yes	66.5	33.5	
Online grocery	No	70.1	29.9	0.105
	Yes	66.1	33.9	
Times went out*	Number/Week	3 (6)	3 (5)	0.001
Fear of going out	No	70.8	29.2	<0.001
	Yes	60.8	39.2	
Wearing facemask	Other	70.7	29.3	0.115
	Always	66.5	33.5	
Activity avoidance (fear of injuries)	No	70.1	29.9	<0.001
	Yes	60.5	39.5	
Activity avoidance (peer pressure)	No	69.0	31.0	0.183
	Yes	65.3	34.7	
Depression (PHQ-2)	No	68.4	31.6	0.250
	Yes	65.1	34.9	
Anxiety (GAD-2)	No	67.3	32.7	0.779
	Yes	68.1	31.9	
Trouble Sleeping	No	69.3	30.7	0.097
	Yes	65.2	34.8	

Figures are absolute frequencies or Median and Interquartile Range (IQR), when appropriate.

* Continuous variable.

problem. Most of these services were outpatient visits, and data is coherent with decision of governments to delay outpatients' visits when possible. [25] Another quota reported delayed surgical procedures, as described by other Authors. [26] Another good one-tenth avoided a medical service for the fear of infection, which in most cases was an outpatient visit. Considering that hospitals had

already suspended non urgent visits, patients were probably willingly delaying urgent ones. In fact, the 1.5% of the sample declared to have avoided seeking help even if affected by an acute problem, a concerning issue well described in various settings. [15,27–29] Finally, the 5% of the responders avoided consulting the physician before taking a medication, a well-known cause of medication

Table 3

		Avoidance of scheduled health services			Avoidance of acute healthcare			Self-medication		
		No	Yes	p	No	Yes	p	No	Yes	p
		N = 1315 (86.8)	N = 200 (13.2)		N = 1397 (93.5)	N = 97 (6.4)		N = 1420 (93.7)	N = 74 (4.9)	
Age*		42 (23)	42 (25)	0.992	42 (23)	43.5 (23)	0.880	42 (24)	42 (16)	0.230
Gender	Male	86.5	13.5	0.851	95.0	5.0	0.087	96.4	3.6	0.073
	Female	86.8	13.2		92.7	7.3		94.3	5.7	
Citizenship	Italian	86.5	13.5	0.048	93.6	6.4	0.266	95.1	4.9	0.830
	Other	100.0	0.0		88.0	12.0		96.0	4.0	
Geographical Area	North	86.8	13.2	0.785	93.5	6.5	0.614	95.3	4.7	0.175
	Centre	85.5	14.5		92.0	8.0		96.0	4.0	
	South	85.1	14.9		94.8	5.2		91.8	8.2	
Living alone	No	87.4	12.6	0.185	93.2	6.8	0.805	95.4	4.6	0.144
	Yes	84.5	15.5		93.6	6.4		93.2	6.8	
Education Level	High school or lower	88.4	11.6	0.246	93.5	6.5	0.959	96.5	3.5	0.080
	University	86.2	13.8		93.4	6.6		94.4	5.6	
Occupation	No	88.6	11.4	0.185	91.8	8.2	0.089	97.3	2.7	0.010
	Yes	86.0	14.0		94.2	5.8		94.1	5.9	
Activity during lockdown	No variation	87.0	13.0	0.474	93.6	6.4	0.992	96.4	3.6	0.137
	Smart working	86.1	13.9		93.2	6.8		94.0	6.0	
	Guaranteed income	84.2	15.8		93.2	6.8		92.4	7.6	
	Activity Stopped	89.3	10.7		93.3	6.7		95.8	4.2	
Healthcare worker	No	87.4	12.6	0.150	92.8	7.2	0.076	95.2	4.8	0.531
	Yes	84.2	15.8		97.7	4.3		94.3	5.7	
Healthcare worker (relative)	No	86.9	13.1	0.814	93.7	6.3	0.618	95.5	44.5	0.245
	Yes	86.5	13.5		93.0	7.0		94.2	5.8	
Health Insurance	No	86.3	13.7	0.517	92.9	7.1	0.283	95.6	4.4	0.180
	Yes	87.5	12.5		94.4	5.6		94.0	6.0	
Chronic Conditions	No	86.7	13.3	0.725	94.2	5.8	0.020	95.7	4.3	0.056
	Yes	87.4	12.6		90.6	9.4		93.1	6.9	
Time spent on internet (Trend)	Stable	87.0	13.0	0.662	95.4	4.6	0.330	96.3	3.7	0.197
	Increased	86.5	13.5		92.8	7.2		94.4	5.6	
	Decreased	95.5	4.5		95.5	4.5		100.0	0.0	
Source of Information (Internet)	I do not know	85.2	14.8		96.3	3.7		100.0	0.0	
	No	88.2	11.8	0.473	93.1	6.9	0.771	96.7	3.3	0.178
	Yes	86.5	13.5		93.6	6.4		94.7	5.3	
Trust level*	Doctors	8.5 (2)	8 (6)	0.343	9 (2)	8 (2)	0.002	9 (2)	8 (2)	0.599
	Politicians	5 (3)	5 (7)	0.049	5 (3)	4 (3)	0.211	5 (3)	5 (4)	0.836
	Experts	6 (2)	6 (2)	0.137	6 (2)	6 (3)	0.537	6 (2)	6 (3)	0.965
	Journalists	5 (3)	5 (3)	0.607	5 (3)	5 (3)	0.191	5 (3)	3.5 (5)	0.627
Received chain letter/messages	No	87.4	12.6	0.751	95.8	4.2	0.127	96.7	3.3	0.202
	Yes	86.6	13.4		92.9	7.1		94.6	5.4	
Online grocery	No	87.2	12.8	0.693	94.8	5.2	0.085	95.1	4.9	0.912
	Yes	86.5	13.5		92.5	7.5		95.0	5.0	
Fear of going out	No	86.8	13.2	0.831	95.3	4.7	<0.001	95.8	4.2	0.032
	Yes	87.2	12.8		89.1	10.9		93.2	6.8	
Activity avoidance (fear of injuries)	No	85.9	14.1	0.131	95.6	4.4	<0.001	94.9	5.1	0.725
	Yes	89.1	10.9		86.6	13.4		95.3	4.7	
Activity avoidance (peer pressure)	No	85.9	14.1	0.132	94.9	5.1	<0.001	95.1	4.9	0.643
	Yes	88.9	11.1		89.3	10.7		94.5	5.5	
Depression (PHQ-2)	No	86.3	13.7	0.578	94.8	5.2	<0.001	95.4	4.6	0.191
	Yes	87.5	12.5		89.4	10.6		93.7	31.1	
Anxiety (GAD-2)	No	86.4	13.6	0.575	94.7	5.3	0.001	95.7	4.3	0.026
	Yes	87.5	12.5		89.6	10.4		92.8	7.2	
Trouble Sleeping	No	87.4	12.6	0.366	95.9	4.1	<0.001	96.5	3.5	0.002
	Yes	85.7	14.3		90.1	9.9		92.9	7.1	

Figures are absolute frequencies or Median and Interquartile Range (IQR), when appropriate.

* Continuous variable.

error, which can cause negative consequences in some patients [30].

Seeking for associations between these outcomes and data collected via the questionnaire, is possible to hypothesize what (if any) subgroups of population suffered more frequently medical services delays. Looking at delays decided by the provider, a first association was found for age. Considering that another good as-

sociation was found in patients with chronic conditions, it could be argued that old, chronically ill people are those who most need healthcare services on a scheduled basis, and as such are the most hit by postponement of non-urgent services. [25] Due to cross-sectional design of this study, the finding could also mean that chronic condition reported prevalence grew in people who experienced delays. Another good association was found with feminine

Table 4

		Delay of scheduled health service decided by the provider AdjOR (95% CI)	Avoidance of scheduled health services AdjOR (95% CI)	Avoidance of acute healthcare AdjOR (95% CI)	Self-medication AdjOR (95% CI)
Age	Years	1.0 (1.01-1.03)*	1.00 (0.99-1.01)	1.01 (1.00-1.03)	1.01 (0.98-1.03)
Gender	Male	Ref.	Ref.	Ref.	Ref.
	Female	1.61 (1.19-2.17)*	1.01 (0.73-1.41)	1.25 (0.75-2.09)	1.39 (0.75-2.60)
Geographical Area	North	Ref.	-	-	-
	Centre	1.07 (0.71-1.59)	-	-	-
	South	0.58 (0.35-0.98)*	-	-	-
Education Level	High school or lower	Ref.	-	-	-
	University	0.94 (0.67-1.28)	-	-	-
Occupation [^]		0.74 (0.53-1.02)	-	-	2.28 (1.08-4.80)*
Chronic Conditions [^]		1.53 (1.07-2.19)*	-	1.46 (0.86-1.45)	2.16 (1.16-4.02)*
Positive to COVID-19 [^]		0.23 (0.03-1.87)	-	-	-
Time spent on internet - Trend	Stable	Ref.	-	-	-
	Increased	1.41 (0.99-1.99)	-	-	-
	Decreased	3.44 (1.03-11.53)*	-	-	-
	I do not know	0.49 (0.10-2.36)	-	-	-
Source of Information TV		1.07 (0.79-1.46)	-	-	-
Trust level	Doctors	-	-	0.75 (0.64-0.89)*	-
	Politicians	-	1.03 (0.95-1.11)	-	-
Received chain letter/messages [^]		1.59 (1.04-2.43)*	-	-	-
Online grocery [^]		-	-	1.53 (0.94-2.49)	-
Times went out	Number/Week	0.97 (0.95-1.00)*	-	-	-
Fear of going out [^]		1.11 (0.81-1.52)	-	-	1.56 (0.89-2.74)
Wearing facemask	Other	-	-	-	-
	Always	-	-	-	-
Activity avoidance fear of injuries [^]		1.24 (0.89-1.74)	-	2.33 (1.43-3.80)*	-
Activity avoidance peer pressure [^]		-	-	1.50 (0.91-2.45)	-
Depression PHQ-2 [^]		-	-	1.42 (0.83-2.43)	-
Anxiety GAD-2 [^]		-	-	1.15 (0.65-2.03)	1.47 (0.79-2.74)
Trouble Sleeping [^]		-	-	1.93 (1.17-3.17)*	1.41 (0.78-2.56)

* p-value<0.05

[^] Yes/no question. "Yes" answer' AdjOR is reported, "No" answer is reference category.

gender, both in univariable and adjusted analyses. This evidence is of difficult interpretation: a hypothesis is that females more often than males have scheduled screening visits. Interestingly, a positive association was found between delayed medical services and both a decrement in time spent on internet and reception of chain letter/messages, but further studies are needed to deepen this finding.

Other considerations can be done looking at intentional avoidance of healthcare services data. In fact, no factors seem correlated to avoidance of scheduled visits. This seems to suggest that the fear of COVID-19 that kept users away from healthcare services is a widespread phenomenon, at least in this Italian sample. Similar results were found worldwide by other Authors in Austria, [16] Israel, [31] Bangladesh, Kenya, Nigeria, Pakistan, [32] Iran. [33] In contrast, there is indeed association between avoidance of healthcare services in urgent need (even ED) and some characteristics. This suggests that, even if fear of contagion is generalized, there are subgroups of people who are even ready to avoid ED when in need. Not surprisingly, people who declared to have low trust level in doctors were more likely to avoid services when in urgent need. In addition, a strong association was found between this avoidance and avoidance of outdoor activities (due to fear of injuries) and sleeping disorders. It is likely that people who got to avoid medical services when in need were so scared that they avoided other activities too. Although it should be demonstrated by further studies focusing on the subject, it is possible that a quota of actual COVID-19 patients avoided ED until the last. Similar evidence was found during Ebola outbreaks not only in Africa but also in USA where risk of contagion was very low. [34,35] Indeed, avoidance of

ED had negative effects on other afflictions, such as coronary syndromes or strokes. [16,17]

Finally, an association was found between self-medication and chronic conditions, suggesting that patients affected by chronic conditions had to comply with delayed scheduled services by self-treating themselves. Another positive association was found with employment status: in fact, employed people could have had more difficulties in reaching healthcare services due to time constraints, especially during a pandemic.

This work has several limitations. First, due to cross-sectional study design, is impossible to establish causality in found associations. Further, prospective studies will clarify these findings. Then, because the recruitment occurred over social networks, selection bias is very likely: people who have suffered outages were more probably driven to start and complete the questionnaire. On another hand, very old people and socially disadvantaged strata of population were probably underrepresented, despite being ones of the most vulnerable subgroups to delays and suspensions of healthcare services.

After the survey was performed, specific health policies were made to address these issues. In particular financial resources were used to increase health workforce and to permit additional healthcare services in order to reduce waiting list, particularly for patients affected by chronic conditions and in the prevention sector. [36] Nevertheless, a full implementation of similar policies was not possible due to the second wave. Therefore, further studies are required to investigate the impact of the pandemic on health services delay and to analyze the effects of the different policies each country.

5. Conclusions

This work is one of the firsts that attempt to estimate, although in a cross-sectional fashion, the “health debt” that we incurred because of COVID-19 pandemic, a debt that must sooner or later be paid back. While it is important to manage this problem as soon as possible, reducing the interests that are already building up, little can be done without knowledge of who are the most affected. In modern history, a globally, widespread, long suspension of routine healthcare services had never been seen. This work suggested that magnitude of the effects of this suspension could be huge with health (and economics) impacts still to be determined.

Declaration of Competing Interest

None.

References

- Huggler J. Coronavirus is Germany's biggest challenge “since Second World War” Angela Merkel says. *The Telegraph*; 2020. <https://www.telegraph.co.uk/news/2020/03/18/coronavirus-germanys-biggest-challenge-since-second-world-war/> (accessed June 19, 2020).
- European Commission EU burden from non-communicable diseases and key risk factors | EU Science Hub. EU Science Hub; 2017. <https://ec.europa.eu/jrc/en/health-knowledge-gateway/societal-impacts/burden> (accessed May 30, 2020).
- O'Donovan MR, Gapp C, Stein C. Burden of disease studies in the WHO European Region—a mapping exercise. *Eur J Public Health* 2018;28:773–8. doi:10.1093/eurpub/cky060.
- James SL, Abate D, Abate KH, Abay SM, Abbafati C, Abbasi N, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet North Am Ed* 2018;392:1789–858. doi:10.1016/S0140-6736(18)32279-7.
- Huijts T, Stornes P, Eikemo TA, Bambara C, Beckfield J, Wendt C, et al. Prevalence of physical and mental non-communicable diseases in Europe: findings from the European Social Survey (2014) special module on the social determinants of health. *Eur J Public Health* 2017;27:8–13. doi:10.1093/eurpub/ckw232.
- Palmer K, Monaco A, Kivipelto M, Onder G, Maggi S, Michel JP, et al. The potential long-term impact of the COVID-19 outbreak on patients with non-communicable diseases in Europe: consequences for healthy ageing. *Ageing Clin Exp Res* 2020;1. doi:10.1007/s40520-020-01601-4.
- Tapper EB, Asrani SK. The COVID-19 pandemic will have a long-lasting impact on the quality of cirrhosis care. *J Hepatol* 2020. doi:10.1016/j.jhep.2020.04.005.
- Quast T, Andel R, Sadhu AR. Long-term effects of disasters on seniors with diabetes: Evidence from hurricanes Katrina and Rita. *Diabetes Care* 2019;42:2090–7. doi:10.2337/dc19-0567.
- Thaler M, Khosravi I, Leithner A, Papagelopoulos PJ, Ruggieri P. Impact of the COVID-19 pandemic on patients suffering from musculoskeletal tumours. *Int Orthop* 2020. doi:10.1007/s00264-020-04636-4.
- Søreide K, Hallet J, Matthews JB, Schnitzbauer AA, Line PD, Lai PBS, et al. Immediate and long-term impact of the COVID-19 pandemic on delivery of surgical services. *Br J Surg* 2020. doi:10.1002/bjs.11670.
- Sud A, Jones M, Broggio J, Loveday C, Torr B, Garrett A, et al. Collateral damage: the impact on outcomes from cancer surgery of the COVID-19 pandemic. *Ann Oncol* 2020;13:19. doi:10.1016/j.annonc.2020.05.009.
- Rubino F, Cohen RV, Mingrone G, le Roux CW, Mechanick JI, Arterburn DE, et al. Bariatric and metabolic surgery during and after the COVID-19 pandemic: DSS recommendations for management of surgical candidates and postoperative patients and prioritisation of access to surgery. *Lancet Diab Endocrinol* 2020. doi:10.1016/S2213-8587(20)30157-1.
- Topf MC, Shenson JA, Holsinger FC, Wald SH, Cianfichi LJ, Rosenthal EL, et al. Framework for prioritizing head and neck surgery during the COVID-19 pandemic. In: *Head and Neck*, 42. John Wiley and Sons Inc.; 2020. p. 1159–67. doi:10.1002/hed.26184.
- Iyengar KP, Jain VK, Vaish A, Vaishya R, Maini L, Lal H. Post COVID-19: planning strategies to resume orthopaedic surgery –challenges and considerations. *J Clinical Orthop. Trauma* 2020. doi:10.1016/j.jcot.2020.04.028.
- Lazzerini M, Barbi E, Apicella A, Marchetti F, Cardinale F, Trobia G. Delayed access or provision of care in Italy resulting from fear of COVID-19. *The Lancet Child and Adolescent Health* 2020;4:e10–1. [https://doi.org/10.1016/S2352-4642\(20\)30108-5](https://doi.org/10.1016/S2352-4642(20)30108-5).
- Metzler B, Siostrzonek P, Binder RK, Bauer A, Reinstadler SJ. Decline of acute coronary syndrome admissions in Austria since the outbreak of COVID-19: the pandemic response causes cardiac collateral damage. *Eur Heart J* 2020;41:1852–3. doi:10.1093/eurheartj/ehaa314.
- Teo K-C, Leung WCY, Wong Y-K, Liu RKC, Chan AHY, Choi OMY, et al. Delays in stroke onset to hospital arrival time during COVID-19. *Stroke* 2020. doi:10.1161/STROKEAHA.120.030105.
- Italian Government Decree of the President of the Council of Ministers, 9 March 2020, Italy: GU; 2020. n.62 del 09-03-2020.
- Kroenke K, Spitzer RL, Williams JBW, Monahan PO, Löwe B. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med* 2007;146:317–25. doi:10.7326/0003-4819-146-5-200703060-00004.
- Kroenke K, Spitzer RL, Williams JBW. The patient health questionnaire-2: Validity of a two-item depression screener. *Med Care* 2003;41:1284–92. doi:10.1097/01.MLR.0000093487.78664.3C.
- Ferreira DC, Marques RC. Do quality and access to hospital services impact on their technical efficiency? *Omega* 2019;86:218–36. doi:10.1016/j.omega.2018.07.010.
- Ferreira DC, Nunes AM, Marques RC. Doctors, nurses, and the optimal scale size in the Portuguese public hospitals. *Health Policy* 2018;122:1093–100. doi:10.1016/j.healthpol.2018.06.009.
- Gualano MR, Lo Moro G, Voglino G, Bert F, Siliquini R. Effects of Covid-19 lockdown on mental health and sleep disturbances in Italy. *Int J Environ Res Public Health* 2020;17:4779. doi:10.3390/ijerph17134779.
- Scott AJ, Hosmer DW, Lemeshow S. Applied logistic regression. *Biometrics* 1991;47:1632. doi:10.2307/2532419.
- Ministry of Health Guidelines for reorganization of delayable planned activity during the COVID-19 emergency. Italy: Ministry of Health; 2020.
- Ralli M, Greco A, de Vincentis M. The effects of the COVID-19/SARS-CoV-2 Pandemic outbreak on otolaryngology Activity in Italy. *Ear, Nose Throat J* 2020;014556132092389. doi:10.1177/0145561320923893.
- Hammad TA, Parikh M, Tashtish N, Lowry CM, Gorbey D, Forouzandeh F, et al. Impact of COVID-19 pandemic on ST-elevation myocardial infarction in a non-COVID-19 epicenter. *Catheterization and Cardiovascular Interventions*; 2020. doi:10.1002/ccd28997.
- Colivicchi F, Di Fusco SA, Magnanti M, Cipriani M, Imperoli G. The impact of the Coronavirus Disease-2019 pandemic and Italian lockdown measures on clinical presentation and management of acute heart failure: COVID-19 pandemic and heart failure management. *J Card Fail* 2020. doi:10.1016/j.cardfail.2020.05.007.
- Rosenbaum L. The untold toll — The pandemic's effects on patients without Covid-19. *N Engl J Med* 2020;382:2368–71. doi:10.1056/NEJmms2009984.
- Mira JJ, Lorenzo S, Guilbert M, Navarro I, Pérez-Jover V. A systematic review of patient medication error on self-administering medication at home. *Expert Opin Drug Saf* 2015;14:815–38. doi:10.1517/14740338.2015.1026326.
- Shinan-Altman S, Levkovich I, Tavori G. Healthcare utilization among breast cancer patients during the COVID-19 outbreak. *Palliat Support Care* 2020;18:385–91. doi:10.1017/S1478951520000516.
- Ahmed S, Ajisola M, Azeem K, Bakibinga P, Chen Y-F, Choudhury NN, et al. Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria and Pakistan: results of pre-COVID and COVID-19 lockdown stakeholder engagements. *BMJ Glob Health* 2020;5. doi:10.1136/bmjgh-2020-003042.
- Nosratabadi M, Sarabi N, Masoudiyekta L. A case report of vaginal delivery at home due to fear of Covid-19. *Iran J Psychiatry* 2020;15:366–9. doi:10.18502/ijps.v15i4.4306.
- Espinola M, Shultz JM, Espinel Z, Althouse BM, Cooper JL, Baingana F, et al. Fear-related behaviors in situations of mass threat. *Disaster Health* 2016;3:102–11. doi:10.1080/21665044.2016.1263141.
- Shultz JM, Cooper JL, Baingana F, Oquendo MA, Espinel Z, Althouse BM, et al. The role of fear-related behaviors in the 2013–2016 West Africa Ebola Virus Disease Outbreak. *Curr Psychiatry Rep* 2016;18:1–14. doi:10.1007/s11920-016-0741-y.
- Presidente della Repubblica. DECRETO-LEGGE, n. 104, 14 agosto 2020. n.d.