

## Use of health services and adherence to social distancing by adults with Noncommunicable Diseases during the COVID-19 pandemic, Brazil, 2020

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**Abstract** *The present study investigates the association between the self-reported diagnosis of non-communicable disease (NCD) and the adherence to social distancing and the use of health services during the COVID-19 pandemic. This was a cross-sectional study with Brazilian adults who participated in the ConVid– Behavior Survey, conducted online between April 24 and May 24, 2020 (n = 45.161). This study considered the following NCDs: diabetes, hypertension, respiratory disease, heart disease, and cancer, and evaluated the use of health services and the adherence to social distancing, as well as estimated the prevalences and adjusted prevalence ratio (aPR); 33,9% (95% CI: 32,5–35,3) referred to one or more NCD. Individuals with NCDs showed a greater adherence to intense social distancing (aPR: 1,07; 95% CI: 1,03–1,11), sought out health services more often (aPR: 1,24; 95% CI: 1,11–1,38), and found greater difficulty in scheduling doctor's appointments (aPR: 1,52; 95% CI 1,35–1,71), receiving healthcare treatment (APR: 1,50; 95% CI: 1,22–1,84) and medication (APR: 2,17; 95% CI: 1,77–2,67), and performing examinations (APR: 1,78; 95% CI: 1,50–2,10) and scheduled interventions (APR: 1,65; 95% CI: 1,16–2,34). The presence of NCDs was associated with social distancing, seeking out health care, and difficulty in using health services.*

**Key words** *Quarantine, Infection by coronavirus, Noncommunicable diseases, Access to health services*

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## Introduction

Noncommunicable Diseases (NCDs) are the main cause of death worldwide and are responsible for 71% (41 million) of the deaths around the world in 2016. NCDs are also considered a public health problem due to the increase in economic and social costs caused by morbidity, hospitalization time, and mortality<sup>1</sup>.

In the scenario of the Coronavirus (COVID-19) pandemic, NCDs become even more worrisome, since these diseases and their behavioral and metabolic risk factors aggravate cases, increasing hospitalization time and mortality rates by COVID-19<sup>2</sup>. Moreover, individuals with NCDs are more often affected by the more severe forms of COVID-19, which require hospitalization, intensive care, and the use of ventilators<sup>2</sup>. A study done in Italy revealed that 96.2% of the people who died from COVID-19 had hypertension (69.2%), type 2 diabetes (31.8%), ischemic heart disease (28.2%), chronic obstructive pulmonary disease (16.9%), and cancer (16.3%)<sup>3</sup>.

Adherence to social distancing, recommended by the World Health Organization (WHO) as one of the non-pharmacological measures which contribute to lessen the spread and transmission of COVID-19<sup>4</sup> may, on the other hand, cause negative health effects, mainly in people with NCDs. Social distancing may result in changes in daily routines and lifestyle, such as diminished physical activity, an increase in the consumption of tobacco and alcoholic beverages<sup>5</sup>. It may also compromise access to health services<sup>2,6-7</sup> and, consequently, to the continuity of the medical care provided to individuals with NCDs, thus causing a decline in their health conditions.

One study done by the Pan-American Health Organization (PAHO) revealed that NCD prevention and treatment services have been affected by the COVID-19 pandemic throughout the American continent<sup>8</sup>. Routine health services have been reorganized or discontinued, with the interruption of assistance for diseases like cancer, cardiovascular disease, and diabetes<sup>8</sup>. Additionally, healthcare personnel caring for NCDs were redirected to work in contingency actions against COVID-19<sup>8</sup>.

In this context, reduction or even interruption of routine health care constitutes a threat to people who live with NCDs and may cause a “parallel epidemic of avoidable deaths<sup>8</sup>.” Therefore, there is a need to investigate the use of health services during the COVID-19 pandemic by people with NCDs.

Considering what has been proposed, the present study sought to investigate if the self-reported NCD diagnosis is in fact associated with adherence to social distancing and the use of health services during the COVID-19 pandemic in Brazil.

## Methodology

### Study design and sampling process

This is a cross-sectional study conducted with adult individuals (18 years of age and older) residing in Brazil, who participated in the virtual health survey “ConVid - Behavior Survey. ConVid was conducted by the Oswaldo Cruz Foundation (Fundação Oswaldo Cruz - FIOCRUZ) in a partnership with Universidade Federal de Minas Gerais (UFMG) and Universidade Estadual de Campinas (UNICAMP), with the objective of evaluating changes in lifestyle and the health care of Brazilians during the COVID-19 pandemic<sup>9</sup>.

Data collection took place between April 24 and May 24, 2020, through the process of filling out an online questionnaire. Each person of 18 years of age and older residing in Brazil was eligible to participate in this study.

The participants were invited to participate through a chain sampling procedure<sup>10</sup>. Firstly, the responsible surveyors selected a group of survey agents (called “influencers”) from different states of Brazil to commence the network of participants. After answering the questionnaire, the influencers sent the link to the survey to at least 20 people from their social networks, following a stratification by sex, age group (18 to 39; 40 to 59; 60 and older), and level of education (incomplete High School or less, complete High School or more). Each person who received the link was asked to invite three other people from their social networks through a message at the end of the questionnaire: *Be a part of the ConVid Network and share this survey with three or more guests from your social networks. You can do this by clicking on this link or copying and sending our link: <https://convid.fiocruz.br>.*

The information was collected directly through the Internet and stored in the server of FIOCRUZ Institute of Communication and Scientific and Technological Information on Health, without the possibility of identifying the participants.

More detail about the survey can be found in the official site of the ConVid – Behavior Survey<sup>9</sup>.

## Study variables

The self-reported NCD diagnosis was defined by a positive answer about the presence of one or more NCD among the following options: Diabetes, Hypertension, Respiratory disease, Heart disease, and Cancer. The question in the online questionnaire referred to the previous medical diagnosis of these diseases: "Has any doctor diagnosed you with one of these diseases?"

To evaluate *intense social distancing*, the following question was used: "During the pandemic of the new coronavirus, how seriously did you follow (or still follow) restrictions in coming in contact with other people?" The answer options were: a) "I did nothing, carried on with normal life"; b) "I tried to take precautions, to stay away from people, reduced contact a little, did not visit elderly people, but I kept working and leaving home"; c) "I stayed home and only left to shop for groceries and to go to the drugstore"; d) "I rigorously stayed home and only left when I needed to get health treatment". The variable was categorized as "no" (options "a" and "b") and "yes" (options "c" and "d").

*Use of health services* was evaluated according to those seeking out health services and the difficulties in accessing those services. To evaluate an individual's search for health services, the following question was used: "During the coronavirus pandemic, did you schedule an appointment with a doctor, dentist, or other healthcare professional?" The answers were "yes" or "no". Concerning difficulties to access the services, the following question was used: "In the course of the pandemic, did you have any of these difficulties related to health care?": a) "Scheduling an appointment"; b) "Having a health appointment"; c) "Getting medication"; d) "Being hospitalized". The answer options were "yes" or "no".

The following sociodemographic variables were analyzed: sex (male or female), age group (18 to 39; 40 to 59 and 60 years and older) and education (incomplete High School; complete High School; and complete College).

## Data Analysis

Network sampling is not probabilistic; therefore, it is impossible to calculate the natural weights of the sampling design. Hence, to obtain a representative sample and for the same population distribution to be identified in the National Household Sample Survey Sampling (PNAD in Portuguese) from the Brazilian Institute of Geography and Statistics (IBGE) in 2019, post-stratifi-

cation procedures<sup>11</sup> were used, according to: State of the Brazilian Federation, capital, sex, age group (18 to 29; 30 to 39; 40 to 49; 50 to 59; 60 years and older), level of education (incomplete College; Complete College), and race/color<sup>12</sup>. This technique corrects the under or over representation of population groups and has often been used in entire surveys, such as the Continuous PNAD and the Telephone Inquiry for Risk Factor Vigilance and Protection Against Noncommunicable Diseases (Vigitel in Portuguese)<sup>13</sup>.

A descriptive analysis of the variables through the calculation of relative frequencies and 95% confidence intervals (95% CI) was performed. To evaluate the association between self-reported diagnosis of one or more NCDs, the use of health services and the adherence to the social restriction measures, the rough and adjusted prevalence ratio (aPR) according to sex, age group, and education were calculated, as was their respective 95% CI, with the use of Poisson regression models with robust variance.

Information was processed by Stata, version 14, employing the survey method, which considers the post-stratification weights.

## Ethical Aspects

This research was based on Resolution 466/2012 from the National Health Council and approved by the National Research Ethics Commission. The participants filled out a free and informed consent form; all answers were anonymous, with no identification of the participants.

## Results

A total of 47,184 people participated in this study, and 2,023 (4.3%) of the questionnaires were excluded because the information needed to calibrate the data had not been completed. These questionnaires presented no information regarding state, sex, age, race/color, or education. The final number of interviewees was 45,151 people throughout the country.

Most of the participants were females (53.6%; 95% CI: 52.0 – 55.0), 45.7% was between 18 and 39 years of age (95% CI: 44.2 – 47.1), 72.4% had completed High School (95% CI: 71.3 – 73.5), 45.7% were light-skinned black (95% CI: 44.2 – 47.2), and 45.2% were white-skinned (43.8 – 46.6) (Table 1).

The prevalence of one or more NCD was 33.9% (95% CI: 32.5 – 35.3), which was higher among the elderly (58.6%; 95% CI: 55.3 – 61.9)

and among individuals with incomplete High School education (39.3%; 95% CI: 34.4 – 44.5). The previous self-reported diagnosis of hypertension, diabetes, respiratory disease, heart disease, and cancer was reported by 19.3%, 7.2%, 11.3%, 4.3%, and 2.4% of the participants, respectively, which was higher among the elderly, except for respiratory diseases, where the prevalence was higher among young adults (18 to 39 years). Individuals with higher education (Complete College) showed a lower prevalence of a self-reported diagnosis of hypertension, diabetes, and heart disease. Prevalences were similar for both males and females (Table 2).

When analyzing adherence to intense social distancing, it was observed that individuals who had one or more NCD were those who declared greater adherence (aPR: 1.07; 95% CI: 1.03 – 1.11) as compared to those with no NCDs (Figure 1).

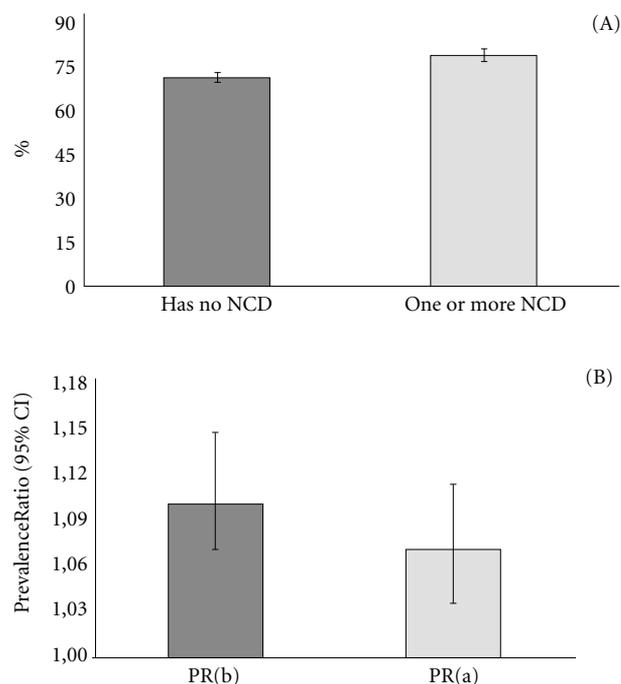
Table 3 shows the prevalence and the measures of association of having one or more NCD, as well as the search for and difficulty in using

**Table 1.** Sociodemographic characteristics of the participants in the study. Brazil, ConVid - Behavior Survey, 2020.

Variables	% (95% CI)
Sex	
Male	46.4 (45.0 – 47.9)
Female	53.6 (52.1 – 55.0)
Age Group	
18 to 39 years	45.7 (44.2 – 47.1)
40 to 59 years	34.0 (32.7 – 35.4)
60 years or older	20.3 (19.1 – 21.6)
Education	
Incomplete High School	11.1 (10.1 – 12.3)
Complete High School	72.4 (71.3 – 73.5)
Complete College	16.5 (16.0 – 17.0)
Race/Color	
White	45.2 (43.8 – 46.6)
Dark-skinned Black	8.3 (7.5 – 9.2)
Light-skinned Black	45.7 (44.2 – 47.2)
Other	0.8 (0.6 – 0.9)

Note: 95% CI = 95% confidence interval.

Source: Author's elaboration.



**Figure 1.** Prevalence (A) and prevalence ratio (B) of adherence to intense social distancing, according to the presence of NCD. Brazil, ConVid - Behavior Survey, 2020.

Note: NCD (Noncommunicable Disease; PR(b) = Gross Prevalence Ratio; PR(a) = Prevalence ratio adjusted by sex, age group, and education; 95% CI = 95% confidence interval.

Source: Author's elaboration.

healthcare services during the pandemic. It was verified that self-reported diagnoses of NCDs was associated with higher rate of seeking out-health care with a doctor, dentist or other health care professional (APR: 1.24; 95% CI:1.11 – 1.38), with a higher difficulty of accessing health services, for example, scheduling an appointment (APR: 1.52; 95% CI: 1.35 – 1.71), receiving health care service (APR: 1.50; 95% CI:1.22 – 1.84); obtaining medication (APR: 2.17; 95% CI:

**Table 2.** Prevalence of self-reported diagnosis of one or more NCDs: hypertension, diabetes, respiratory disease, heart disease, or cancer, according to sex, age group, and education. Brazil, ConVid - Behavior Survey, 2020.

Variables	Have one or more NCD	Hypertension	Diabetes	Respiratory Disease	Heart Disease	Cancer
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Total	33.9 (32.5-35.3)	19.3 (18.2-20.4)	7.2 (6.5-8.0)	11.3 (10.4-12.2)	4.3 (3.7-5.0)	2.4 (2.1-2.9)
Sex						
Male	33.3 (31.0-35.7)	19.7 (17.9-21.7)	7.7 (6.5-9.1)	10.2 (8.8-11.8)	4.8 (3.8-6.1)	2.0 (1.4-2.8)
Female	34.4 (32.8-35.9)	18.9 (17.6-20.2)	6.8 (5.9-7.8)	12.3 (11.3-13.3)	3.9 (3.2-4.8)	2.8 (2.4-3.3)
Age Group						
18 to 39 years	19.6 (18.0-21.3)	4.7 (3.9-5.6)	1.7 (1.3-2.3)	13.4 (12.1-14.8)	1.6 (1.2-2.2)	0.7 (0.4-1.1)
40 to 59 years	38.3 (36.0-40.6)	25.4 (23.4-27.5)	8.8 (7.6-10.3)	9.6 (8.4-10.8)	3.9 (3.20-4.8)	2.2 (1.8-2.8)
60 years or older	58.6 (55.3-61.9)	41.8 (38.5-45.2)	16.9 (14.4-19.7)	9.5 (7.4-12.0)	11.2 (8.8-14.1)	6.7 (5.3-8.4)
Education						
Incomplete High School	39.3 (34.4-44.5)	28.6 (24.3-33.4)	9.7 (7.4-12.6)	7.9 (5.5-11.4)	5.4 (3.8-7.6)	3.0 (2.1-4.3)
Complete High School	34.0 (32.3-35.7)	18.5 (17.2-20.0)	7.2 (6.3-8.3)	12.1 (11.0-13.3)	4.4 (3.7-5.4)	2.3 (1.8-2.9)
Complete College	29.8 (29.2-30.5)	16.2 (15.7-16.7)	5.4 (5.1-5.7)	10.0 (9.6-10.4)	3.1 (2.9-3.4)	2.7 (2.5-2.9)

Note: NCD = Non Communicable Disease; 95% CI = 95% confidence interval.

Source: Author's elaboration.

**Table 3.** Prevalence and Prevalence Ratio - gross and adjusted - of searching for and difficulty in using health services, according to the presence of NCDs. Brazil, ConVid - Behavior survey, 2020.

Variables	Has no NCD % (95% CI)	Has one or more NCD % (95% CI)	GrossPR* (95% CI)	AdjustedPR† (95% CI)
Sought an appointment with doctor, dentist or other healthcare professional	20.4 (19.0 – 21.8)	24.2 (22.2 – 26.2)	1.18 (1.06 – 1.31)	1.24 (1.11 – 1.39)
Difficulty to schedule an appointment	16.7 (15.4 – 18.1)	23.6 (21.7 – 25.6)	1.41 (1.25 – 1.59)	1.52 (1.35 – 1.71)
Difficulty to receive health care	8.2 (7.2 – 9.4)	11.2 (9.6 – 12.9)	1.36 (1.11 – 1.65)	1.50 (1.22 – 1.84)
Difficulty in obtaining medication	5.8 (5.0 – 6.7)	11.3 (9.7 – 13.1)	1.94 (1.57 – 2.39)	2.17 (1.77 – 2.67)
Difficulty to receive prescribed examination	9.3 (8.2 – 10.4)	16.5 (14.7 – 18.5)	1.78 (1.51 – 2.10)	1.78 (1.50 – 2.10)
Difficulty in having scheduled interventions	2.4 (1.9 – 3.0)	3.6 (2.8 – 4.6)	1.49 (1.08 – 2.05)	1.65 (1.16 – 2.34)
Difficulty to be hospitalized	0.7 (0.3 – 1.5)	0.8 (0.4 – 1.6)	1.20 (0.42 – 3.47)	1.70 (0.60 – 4.79)

Note: \*Gross Prevalence Ratio; †Prevalence Ratio adjusted by sex, age group and education; NCD: Noncommunicable disease; 95% CI: 95% confidence interval.

Source: Author's elaboration.

1.77 – 2.67), performing prescribed examinations (APR: 1.78; 95% CI: 1.50 – 2.10), and undergoing scheduled interventions (APR: 1.65; 95% CI: 1.16 – 2.34) (Table 3).

## Discussion

This study identified that approximately 34% of the participants reported one or more NCDs: hypertension, diabetes, cancer, cardiac disease, or respiratory disease. In general, the prevalence of these diseases increased with age and was higher in population groups with lower levels of education. Individuals with NCDs reported a greater adherence to measures of intense social distancing and sought out health care more frequently, but they also reported greater difficulty in accessing health services, for instance, in receiving medical care, scheduling appointments, obtaining medication, doing exams, and undergoing scheduled interventions.

The prevalence of a prior self-reported diagnosis of one or more NCDs found in the present study (34%) was below that indicated by another published study, which analyzed data from the National Health Survey (NHS) from 2013 (45%)<sup>14</sup>. This discrepancy can be explained by the fact that this study has evaluated only five NCDs, while the NHS investigated a higher number. Still, according to the NHS 2013, in adults, the prevalence of hypertension, diabetes, heart disease, and cancer were, respectively, 21.4%, 6.2%, 4.8%, and 1.8%<sup>14</sup>, close to those found in the current study.

Similar to the present study, another publication, which analyzed data from the NHS 2013 identified that the prevalence of NCDs increased with age, afflicting more often individuals above 60 years of age, not including asthma, and those who have a lower level of education, not including cancer<sup>15</sup>. Beyond the changes in lifestyle inherent within contemporary society and factors intrinsic to the individuals, noncommunicable diseases also have a connection with population aging<sup>16</sup>. Population aging is a global phenomenon caused by the decline in fertility rates and increase in longevity, and is happening more rapidly in underdeveloped countries, although more developed countries still have a higher contingent of elderly population<sup>17–18</sup>. It is estimated that the NCDs represent 87% of the burden of diseases among the population aged 60 years and older, and more in low, middle and high-income countries<sup>17</sup>.

Concerning the social determinants, such as education, income, and environment, these also contribute to the increase and seriousness of the NCDs, of their risk factors, and their morbidity<sup>19</sup>. Individuals or groups with low income and less education are more likely to be more exposed to the risk factors associated with NCDs, since they have less access to or receive a lower quality healthcare service, and have less access to balanced nutrition and to healthy environments<sup>20–21</sup>, which reduces these individuals' opportunities to lead a healthier life and to prevent diseases<sup>22</sup>.

It is worth mentioning that the COVID-19 pandemic is taking place in a scenario of social and economic inequalities, which can increase morbidity caused by NCDs, aggravating inequalities in access to health services<sup>23</sup>. The prevalence and seriousness of the COVID-19 pandemic is intensified with the unequal distribution of NCDs and their risk factors, more directly affecting the most vulnerable population groups, which indicates a close relationship with the social determinants of health<sup>23–25</sup>.

Adherence to intense social distancing was higher among individuals with NCDs. These findings can be explained by the fear of getting sick and the feeling of vulnerability of that population, which chooses to follow the orientations for social distancing more accurately, seeking to protect themselves<sup>7</sup>. Social distancing measures do contribute to a reduction in the risk of COVID-19 transmission for the entire population, especially for those who have NCDs, who have a higher risk of having more serious cases of the disease and greater mortality<sup>2,26</sup>.

The present study indicated that individuals with NCDs reported searching more often and having more difficulties in using health services during the pandemic. The determinants of the use of health services are related to, among other factors, the health needs of the population, defined by morbidity and the seriousness of the disease or its urgency.<sup>27</sup> NCDs, given their high burden and level of chronicity, are among those which demand more actions, procedures, and health services<sup>28</sup>. In that sense, one, which used data from the NHS 2014, identified that the presence of at least one chronic disease was associated with a greater use of health services (25.6%), in comparison to the absence of NCDs (10.8%)<sup>29</sup>. Moreover, the presence of NCDs was associated with an increase in hospitalization<sup>29</sup>. The COVID-19 pandemic has made it evident that the NCDs represent a high burden to health services and resources, demanding from authori-

ties a more serious implementation of actions to control the consumption of tobacco, alcohol, and sugar, as well as investments in the improvement of physical activities and a healthy diet<sup>30</sup>.

The difficulties in using health services mentioned by the participants of this study may be explained by a lesser availability of services by public and private healthcare facilities during the pandemic. Efforts to deal with COVID-19 have also interrupted the regular care required for individuals with NCDs<sup>30</sup>. One survey conducted by the WHO noted that 75% of the countries that responded reported interruption in health services and treatment of NCDs<sup>31</sup>.

The interruption of the reduction in routine health services and the providing of medical supplies made it more difficult to follow and handle NCDs, thus causing an increase in morbidity, disability, and avoidable mortality<sup>2</sup>. Another study done by PAHO, in May 2020, among countries of the American continent, also identified that, although the ambulatory NCD services had been maintained, the access to these was limited in several countries (64%)<sup>8</sup>. The interruption of services, completely or partially, affected various types of medical care for people with NCDs, even dental and rehabilitation care.<sup>8</sup> The main reasons mentioned in the answers by the member states, regarding the interruption of NCD health care services, included: canceling elective services (58%), relocating medical teams in response to COVID-19 (50%), and the reduced embracement of individuals by health services (50%)<sup>8</sup>. The reduction in public transportation, which occurred during the pandemic, may also have increased the difficulty in using health services and may have interrupted the continuity of medical care for NCDs patients<sup>2</sup>. Regarding patients/customers/users who do not seek out medical care through health services, one publication, which investigated the use of health services in the first two months of the pandemic by the population with health insurance in the United States, identified a significant reduction in the use of elective and prevention services and an increase in telemedicine<sup>32</sup>. A possible explanation for not seeking out medical care through health services may be the fear of exposure on the part of the patients/customers/users of being contaminated by COVID-19<sup>33</sup>.

Among the limitations of this study is the data collection performed through the Internet, a strategy which may not reach all the population

groups, considering that not everyone has access to this means of communication. This problem can result in an under or overestimation of the proportion of the investigated indicators. This limitation, however, was minimized by the large sample size and the calibration of the sampling with data from the PNAD 2019. It should also be mentioned that the collection of data through the Internet and the process of chain sampling is the only method that is ethically plausible, in the context of the pandemic, to evaluate the relevant questions. It is also a survey method which has a low cost in operational terms. The online surveys are becoming a promising method to evaluate and track information, behaviors, lifestyles, and perceptions during outbreaks of infectious diseases, and it is evolving quickly.

Another issue concerns data collection during the beginning of the pandemic, (more precisely, in the third month), thus reflecting the scenario of a specific moment, which is subject to conjuncture changes during the temporal evolution of the COVID-19 pandemic in Brazil. Additionally, due to the fact that the information is self-reported, information bias concerning the previous diagnosis of NCDs may have occurred. We should also consider that the use of only sociodemographic variables to adjust the models may result, potentially, in residual confusion.

## Conclusion

The pandemic resulted in an important adherence of individuals with NCDs to social distancing. However, this group searches for health services more often and has greater difficulty in using them. Therefore, the importance of discussing policies for reducing NCD becomes more evident, as do the actions to provide health care, when faced with the COVID-19 pandemic scenario. NCD prevention measures should not be interrupted, and health services, especially those of primary care, must adapt to the new reality to support and manage the increase in risk and to provide a continuity of medical care to NCD patients. Health professionals must be involved in the planning of strategies to respond to COVID-19 in order to ensure that the needs of the patients are provided. Specific counselling must be made available nationally and locally for NCD patients, as well as for their families and caretakers.

**Collaborations**

All authors worked in the conception and planning of the study, data analysis, writing and critical revision of the article, and approval of the version to be published.

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