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Factors Associated with Coronavirus Disease 2019 Prevention Practices in Three Zones of Southwest Ethiopia: Community-Based Cross-Sectional Study

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Background: The cases of coronavirus disease 2019 (COVID-19) and related deaths are increasing exponentially in Ethiopia. Prevention is currently available effective management, and its implementation has not been assessed adequately. This study aimed to identify the factors associated with COVID-19 prevention practices in three zones of southwest Ethiopia.

Methods: A community-based cross-sectional study was conducted in the Bench Sheko, Kafa, and West Omo zones. A multistage sampling technique was employed to select 845 study participants. The data collection tool was adapted from the WHO resources and related literature. Independent factors were identified using binary logistic regression and a p-value less than 0.05 was used to declare the level of statistical significance.

Results: In this study, 803 participants participated. About two-thirds (64.7%) of the respondents had a history of going to crowded places, while only 30.3% of the participants had a history of wearing a mask when leaving home. Two-thirds of the respondents had a history of maintaining their distance at 2 meters (64.4%) and washing their hands with soap and water or using alcohol-based hand sanitizers (64.8%). Generally, less than two-thirds (59.4%) of study participants had a good prevention practices of COVID-19. Urban residence (AOR [adjusted odds ratio] =2.34; 95% CI=1.39, 3.94), highest family size (AOR=2.95; 95% CI=1.56, 5.57), good knowledge (AOR=1.74; 95% CI=1.10, 2.77), positive attitude (AOR=1.86; 95% CI=1.27, 2.73), intention to seek care (AOR=1.73; 95% CI=1.13, 2.63), and perceived mortality (AOR=2.20; 95% CI=1.50, 3.08) were positively associated with good prevention practices.

Conclusion: The proportion of individuals who had good COVID-19 prevention practices was inadequate. For such highly infectious diseases, prevention should be the priority intervention, and improving its implementation needs further effort. Community-based interventions such as risk communication and mass education should center on scaling up community knowledge and practice by prioritizing vulnerable groups such as rural residents.

Keywords: COVID-19, coronavirus, southwest Ethiopia, prevention, community based practice, Kafa, Bench Sheko, West Omo

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Introduction

Coronavirus disease 2019 (COVID-19) is an emerging contagious respiratory infection that brings a large puzzle to global health and has become an international concern.[1] It is challenging the health system of the world, and surprisingly,

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countries with strong health systems are not spared.[2,3] In addition to its health impact, it is leading to economic, political, and social crises.[4–6]

Since its emergence, the disease has reached 216 countries/territories, infected more than 69 million people, and took 1,488,120 lives globally as of December 03, 2020.[7] In Ethiopia, the disease was first reported on March 13, 2020.[8] Following this, the government of Ethiopia took different measures, such as isolating international passengers, arranging quarantine centers in different sites to follow the suspects, closure of universities and schools, mass disinfection, complete transport lockdown, and the release of prisoners.[9] As per the Ethiopian Public Health Institute (EPHI) report of December 02, 2020, the total number of cases and deaths were 110, 984 and 1745 respectively.[10]

As occurred in high-income countries during the emergence of the outbreak, currently, in Ethiopia the number of cases and related deaths are increasing exponentially compared to those reported before a few months, which is suggestive of community transmission.[9,11]

The pandemic of COVID-19 has put health systems under immense pressure and stretch beyond their capacity, particularly those found in low-income countries are vulnerable.[2,12] As a result, different community-based interventions such as awareness creation, contact tracing, community level provision of other essential health services and home level management of non-severe COVID-19 cases are designed to reduce the burden of health facilities. These responsibilities are mainly carried out by the community health workforces and key community members because they are trusted members of the community with important links to the facilities, leaders, and organizations that are key contributors to an effective response.[13,14]

Currently, the disease has no cure, and prevention is the only available effective weapon to control it. The recommended methods to prevent the pandemic of COVID-19 include regular and thorough cleaning of hands with an alcohol-based hand rub or washing them with soap and clean water, maintaining a physical distance of at least 2 meters, avoiding going to crowded places, and wearing a facemask.[15]

Ethiopia is among the countries with a weak health system where the health professional to population ratio is only 0.96 per 1000 populations. This is much lower than the World Health Organization's recommended standards (4.45 per 1000 populations) to meet the sustainable development goal health targets.[16,17] This implies that if our globe becomes lucky and obtains effective treatment for COVID-19, Ethiopia will still be far away from providing treatment for those who will be in need. As a result, maintaining the recommended prevention methods in the country is the first available option to control the disease.

The practice of available prevention methods for COVID-19 in the community should be assessed to design appropriate interventions that can reduce community transmission. However, there is a lack of community-based evidence that discovered how the community is preventing the pandemic of COVID-19 in Ethiopia. Therefore, this study aimed to identify factors associated with the community prevention practices of COVID-19 in three zones of southwest Ethiopia (Kafa, Bench Sheko and West Omo), where peoples are living far away from the center with inadequate infrastructures including health institutions.

Materials and Methods

Study Design, Setting and Period

A community-based cross-sectional study was conducted in the Bench Sheko, Kafa, and West Omo zones from May 1 to 31, 2020. These three zones are found at 585 km, 449 km and 708 km from Addis Ababa, Capital of Ethiopia, respectively, to the southwest direction. The Bench-Sheko zone is administratively divided into six woredas (districts) and two town administrations. The Kafa zone is also divided into eleven woredas and two town administrations. Likewise, the West-Omo Zone has seven woredas. The main agro-ecology of these three zones includes dega (cool and humid high lands, which account for 56.7% of the land size), kolla (warm, semi-arid lowlands, which account for 28% of the land size) and weinadega (temperate, cool and sub-humid high lands, which account for 15.3%). Their annual mean temperature ranges from 15.1°C to 27°C, and the annual mean rainfall ranges between 400 mm and 2000 mm. In these zones, there were 7 hospitals, 97 health centres and 565 health posts that provide health services for residents. According to the population projection of Ethiopia figured for 2014 to 2017, the Bench-Maji zone (the former collective name for Bench Sheko Zone and West Omo Zone before their disunion) had a total population of 847,168 (417,751 males and 429,417 females). Similarly, the Kafa Zone had a population size of 1,102,278 (541,682 males and 560,596 females).[18]

Population and Sampling Techniques

The adult population who were 18 years old and above were included in this study. Individuals who were unable to respond due to different medical problems were excluded. The sample size was determined using a single population proportion formula [$n = \frac{(Za_{/2})^2 p(1-p)}{d^2}$], where "n" stands for sample size, "$z_{\alpha/2}$" stands for the reliability coefficient of standard error at the 5% level of significance, which equals to 1.96, "p" stands for the proportion of good COVID-19 prevention practice, which was considered as 50% (since there was no previous study at comparable area), and "d" stands for the level of standard error tolerated, taken as 5%. The calculated sample was 384.16. After using the design effect of 2 and adding a non-response rate of 10%, the final sample size became 845.

A multistage sampling technique was employed to select the study participants. First, ten woredas and town administrations (three from Bench Sheko, three from West Omo and four from Kafa) were selected randomly and included in the study. Likewise, thirty percent of Kebeles (smallest administrative units) were selected from each of the selected woredas and town administrations. Then, the calculated samples were allocated to each of the selected Kebeles proportional to the size of households in the Kebeles. Finally, the households were selected using a systematic random sampling technique, and from each of the selected households, one eligible participant was selected by the lottery method.

Data Collection Technique and Data Quality Control

A pretested interviewer-administered structured questionnaire (see Additional File 1) adapted from WHO recommendations regarding COVID-19 prevention practices and a previous similar study was used to collect the data.[15,19,20] The tool includes the sociodemographic characteristics of the study participants (age, sex, religion, residence, ethnicity, marital status, occupational status, educational status, family size), knowledge questions about COVID-19 (which includes about clinical symptoms, transmission, risk factors, treatment, and vulnerable groups), attitude questions (mainly about the success of the control at an individual and national level, the effectiveness of local treatments such as hot drinks, and the probability of the occurrence of the virus in the locality), practice questions (about risky and positive behaviors practiced recently) and others. The questionnaire was prepared in English and translated to the local language (Amharic) by a language expert. It was also back-translated to English by another expert to ensure its consistency. The Amharic version questionnaire was used to collect the data. To assure the quality of the data, two days of training was given before data collection for data collectors and supervisors about the objective of the study, techniques of data collection, different ethical issues, and care to be taken regarding COVID-19 during data collection. A pretest was performed on 10% of the total sample size in the comparable Kebeles that were not included in the actual study, and some modifications were added to the tool. We have checked the internal validity of the questionnaires used in this study using Pearson's correlation coefficient (r). The knowledge, attitude and practice questionnaires were checked separately and the calculated r were significantly higher than the critical value (r=0.069 with the degree of freedom=801 and two sided α=0.05) which suggests the validity of each items. The minimum calculated r for the knowledge, attitude and practice items were 0.153 ($p<0.001$), 0.285 ($p<0.001$) and 0.424 ($p<0.001$) respectively. Data were collected by thirty diploma nurses, and the overall collection process was supervised by ten BSc nurses. The supervisors checked each filled questionnaire for completeness during the data collection.

Variables and Measurement

The outcome variable of this study was the practice of COVID-19 prevention methods. The independent variables were sociodemographic characteristics (age, sex, residence, ethnicity, marital status, occupational status, educational status, family size), knowledge about COVID-19, attitude toward COVID-19 prevention methods, intention to seek care and perceived mortality.

The participants were asked 14 knowledge questions, 9 attitude questions, and 8 practice questions. Participants who scored at least the mean score of the above questions for each category were considered to have good knowledge, a positive attitude, and good practice.

Data Entry, Processing and Analysis

Data were entered into Epi data manager version 4.0.2.101 and exported to Statistical Packages for Social Science (SPSS) version 20 for analysis. Data were cleaned to check for outliers and miscoded variables. Furthermore, negatively worded items were reverse scored. Data were presented as tables and proportions (percentages). Binary logistic regression was used to assess the association between the independent variables and an outcome

variable. The outcome variable (prevention practice) was categorized in to good practice (coded as 1) and poor practice (coded as 0). The odds ratio (OR) with its respective 95% confidence interval (CI) and the p-value was used to measure the strength of the association. In the bivariable analysis, variables with p-values <0.25 were considered as candidates for a multivariable analysis. The final significance was declared at a p-value <0.05.

Result

Characteristics of the Study Participants

In this study, out of the 845 total samples, 803 fully participated, resulting in a response rate of 95%. Among the total study participants, more than half were males (57.8%), Orthodox Tewahido religion followers (56.4%), and found in the age category of 18–30 years old (52.8%). Similarly, approximately one-third of the respondents had Kafa ethnicity (31.1%) and single marital status (32.1%). Furthermore, approximately two-thirds of the study participants had urban residence (67.7%), good knowledge about COVID-19 (64.6%), and a positive attitude toward COVID-19 (66%). [Table 1]

Practice of COVID-19 Prevention Methods Among Study Participants

Approximately two-thirds (64.7%) of the respondents had a history of going to crowded places. However, only approximately one-third (30.3%) of the total study participants had a history of wearing a mask when leaving home. The majority (68.1%) of the study participants had a history of covering their mouth and nose when coughing and sneezing. Two-thirds of the respondents had a history of maintaining their distance at 2 meters (64.4%) and washing their hands with soap and water or using alcohol-based hand sanitizers (64.8%). However, a significant proportion (45.6%) of them had a history of eating raw/uncooked foods. Generally, less than two-thirds (59.4%) of study subjects had a good practice of COVID-19 prevention methods. [Table 2]

Factors Associated with Prevention Practices of COVID-19

In bivariable logistic regression, residence, educational status, occupation, marital status, family size, knowledge, attitude, intention to seek care and perceived mortality were statistically significant at p-values less than 0.25. After controlling for confounders, in multivariable logistic regression, residence, knowledge status, attitude status, intention to seek care, and perceived mortality were significantly associated with the COVID-19 prevention practices of the participants at a p-value less than 0.05.

Urban residents had more than two (AOR=2.34) times higher odds of good practice compared to rural residents. Similarly, participants who were from the highest family size (more than six) had three (AOR=2.95) times higher odds of good practice than those from the lowest (one to three) family size. Good knowledge status (AOR=1.74) and positive attitude (AOR=1.86) had a positive influence on COVID-19 prevention practices compared to their counterparts (poor knowledge and negative attitude, respectively). Furthermore, respondents who had the intention to seek care for COVID-19 symptoms had 73% (AOR=1.73) increased odds of good practice than those who had no intention. Lastly, individuals who had a perception of COVID-19-related death had double (AOR=2.20) odds of good practice than those who had no such perception. [Table 3]

Discussion

This study revealed that approximately two-thirds (64.7%) of the respondents had a history of going to a crowded place, which is comparable to the finding of the study conducted at Jimma University Medical Center (JUMC).[21] However, it is very high compared to the study conducted in China,[19] where only 3.6% visited crowded places. The discrepancy might be due to the differences in socio-economic and demographic characteristics between the two countries. Compared to Chinese, Ethiopians' lower economic status may increase their probability of going to crowded places since there is difficulty in accessing technologies to communicate virtually and to use online businesses. Moreover, the strong social interactions in Ethiopian society may oblige people to go to crowded areas.[22] Since COVID-19 has a higher potential of person-to-person transmission, exposure to crowded places is risky behavior and should be discouraged.

One of the important findings in this study is that only one-third (30.3%) of the study participants had a history of wearing a protective mask when leaving home. This is very low compared to the finding from China,[19] and it is also contrary to the WHO recommendations.[21] This figure is very frustrating in the case of Ethiopia, where the community transmission of COVID-19 is more likely.[9,11] An additional finding that magnifies the problem of COVID-19 prevention practice is that a significant proportion

Table 1 The Characteristics of the Study Participants in the Bench Sheko, Kafa, and West Omo Zones, South West Ethiopia, 2020

Variables	Category	Frequency (803)	Percentage (%)
Sex	Male	464	57.8
	Female	339	42.2
Residence	Urban	544	67.7
	Rural	259	32.3
Age	18–30	423	52.8
	31–40	223	27.8
	>40	156	19.4
Ethnicity	Bench	133	16.6
	Sheko	102	12.7
	Amhara	112	13.9
	Kafa	150	31.1
	Oromo	94	11.7
	Others[a]	112	13.9
Marital status	Single	258	32.1
	Married	435	54.2
	Divorced/ widowed	74	9.2
	Separated	36	4.5
Occupational status	Unemployed	93	11.6
	Farmer	161	20
	Daily laborer	96	12
	Merchant	135	16.8
	Government employee	141	17.6
	Private business	113	14.1
	Students	64	8
Educational status	Cannot read and write	155	18.3
	Can read and write	149	18.6
	Primary (grade 1–8)	176	21.9
	Secondary or preparatory	142	17.7
	Diploma and above	181	22.5
Religion	Orthodox Tewahido	453	56.4
	Muslim	99	12.3
	Protestant	207	25.8
	Other[b]	44	5.5
Family size	One to three	390	48.6
	Four to six	341	42.5
	Seven and more	72	9
Perceived mortality of COVID-19	Yes	347	43.2
	No	456	56.7
Knowledge	Good	519	64.6
	Poor	284	35.4
Attitude	Positive	530	66
	Negative	273	34
Intend to seek care	Have intention	458	57
	Have no intention	345	43

Notes: [a]Menit and Dizu; [b]Catholic and traditional belief.

(35.6%) of people did not maintain appropriate physical distance. As a result, efforts should be made to encourage the public to use a protective mask and maintain appropriate physical distance as per the WHO recommendations.

Our findings show that only three of five participants had good COVID-19 prevention practices. This is very low compared to the Iranian finding,[23] and the discrepancy might be attributable to the differences in socio-economic statuses and attention given by the community. The better socio-economic status of Iranians may enable them to access different inputs required to prevent COVID-19. The increased number of cases and deaths in Iran could also bring more attention to prevent COVID-19 among Iranians compared to Ethiopians.[24,25]

This finding is highly public health important for Ethiopia, which was grouped as among vulnerable African countries to COVID-19.[26] This is because the provision of important health services to COVID-19 patients requires expensive resources, and in Ethiopia, the majority of the health services are substandard mainly due to resource scarcity.[16,17] For instance, Ethiopia had 557 mechanical ventilators and 570 intensive care unit (ICU) beds for a population of 110 million.[9] Thus, a major emphasis on prevention is mandatory, and sustainable intervention should be made to increase its implementation.

Table 2 Practice of COVID-19 Prevention Methods Among Study Participants in Bench Sheko, Kafa and West Omo Zones, South West Ethiopia, 2020

Question/Variables/	Response/Categories/	N (%)
Recent history of going to any crowded place	Yes No	518 (64.7) 283 (35.3)
Recent history of wearing a mask when leaving home	Yes No	243 (30.3) 558 (69.7)
Recent history of washing hands with soap and water frequently or using alcohol-based hand sanitizers	Yes No	520 (64.8) 283 (35.2)
A recent habit of touching eye, nose, and mouth	Yes No	503 (62.6) 300 (37.4)
Recent history of covering mouth and nose when coughing and sneezing	Yes No	547 (68.1) 256 (31.9)
Recent history of maintaining physical distance at 2 meters	Yes No	515 (64.4) 285 (35.6)
Recent history of eating raw/uncooked foods	Yes No	366 (45.6) 437 (54.4)
Recent history of shaking hands of others	Yes No	308 (38.4) 495 (61.6)
Overall practice	Good Poor	477 (59.4) 326 (40.6)

In this study, participants from urban residents had more than two times higher odds of practice than those from rural residents. This might be because urban residents had better access to COVID-19-related information and resources needed to prevent COVID-19, such as alcohol-based sanitizers, soap, water, and protective masks. In addition, the rural community may not obtain adequate information regarding COVID-19 due to limited access to phone and/or internet, which is common for the rural community of Ethiopia.[9]

One of the opportunities during the era of COVID-19 is an increased time for discussion and interaction among family members.[27] This opportunity enables the parents to implement different innovations to protect themselves and their family members from the pandemic of COVID-19 and its impacts such as mental health problems.[28] In our study higher family size (more than six) had three times higher odds of practice compared to those with lower family size. Members of an increased family size probably bring information related to COVID-19 prevention from different sources and discuss it, which could enable them to change it into practice.

Participants with good knowledge status about COVID-19 had more than one and a half times higher odds of practice compared to those with poor knowledge status. This is also supported by the previous finding where knowledge and practice were associated with direct proportionality.[19] Most of the time, it is straightforward that having knowledge enables people to practice what they know. People who have good knowledge about the disease, its severity, transmission methods, and prevention methods can value their lives and take appropriate measures.

Likewise, individuals with a positive attitude regarding the success of COVID-19 prevention methods had 86% increased odds of good practice compared to those with a negative attitude. It is obvious that when people rely on the success of prevention methods, their interest in applying these methods will be high. Therefore, the information should be disseminated continuously to increase the trust of the community in prevention methods and to avoid their concentration on fake news that discourages preventive behaviors.

In our study, respondents who perceived that COVID-19 can lead to death, had two times higher odds of good practice of preventive measures against COVID-19 compared to their counterparts. People in the world prefer to

Table 3 Factors Associated with Prevention Practices of COVID-19 Among the Study Participants in Bench Sheko, Kafa and West Omo Zones, South West Ethiopia, 2020

Variables	Category	Practice		COR (95% CI)	AOR (95% CI)	P-value
		No	Yes			
Residence	Urban	146	398	6.21 (4.49, 8.60)	2.34 (1.39, 3.94)	0.001*
	Rural	180	79	1	1	
Educational status	Cannot read and write	101	54	1	1	
	Can read and write	60	89	2.77 (1.74, 4.42)	1.04 (0.58, 1.87)	0.904
	Primary	71	105	2.77 (1.77, 4.33)	1.12 (0.62, 2.01)	0.707
	Secondary	56	86	2.87 (1.79, 4.60)	1.08 (0.58, 2.01)	0.813
	Diploma and above	38	143	7.04 (4.33, 11.45)	1.65 (0.82, 3.33)	0.160
Occupation	Unemployed	42	51	1	1	
	Farmer	121	40	0.27 (0.16, 0.47)	0.68 (0.35, 1.33)	0.264
	Daily labor	30	66	1.81 (1.00, 3.28)	1.72 (0.84, 3.51)	0.136
	Merchant	38	97	2.10 (1.21, 3.66)	1.54 (0.81, 2.93)	0.191
	Government employee	31	110	2.92 (1.65, 5.17)	1.64 (0.78, 3.48)	0.194
	Private business	44	69	1.29 (0.74, 2.25)	0.99 (0.51, 1.93)	0.976
	Students	20	44	1.81 (0.93, 3.53)	1.50 (0.69, 3.24)	0.303
Marital status	Single	94	164	1	1	
	Married	190	245	0.74 (0.54, 1.01)	0.70 (0.46, 1.05)	0.081
	Divorced/Widowed	30	44	0.84 (0.50, 1.43)	0.93 (0.49, 1.77)	0.832
	Separated	12	24	1.15 (0.55, 2.40)	0.94 (0.40, 2.17)	0.877
Family size	One to three	166	224	1	1	
	Four to six	137	204	1.10 (0.82, 1.48)	1.37 (0.94, 1.99)	0.098
	More than six	23	49	1.58 (0.93, 2.69)	2.95 (1.56, 5.57)	0.001*
Knowledge status	Poor	189	95	1	1	
	Good	137	382	5.55 (4.05, 7.60)	1.74 (1.10, 2.77)	0.019*
Attitude status	Negative	167	106	1	1	
	Positive	159	371	3.68 (2.71, 4.99)	1.86 (1.27, 2.73)	0.001*
Intend to seek care	No intention	210	135	1	1	
	Have intention	116	342	4.59 (3.39, 6.20)	1.73 (1.13, 2.63)	0.011*
Perceived mortality	Yes	171	176	1	1	
	No	155	301	1.89 (1.42, 2.51)	2.20 (1.50, 3.08)	0.000*

Note: *Statistically significant at p-value <0.05.
Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odds ratio.

live long on the earth and invest to alleviate the risk of death as much as possible. Educating the community about the severe outcome of the COVID-19 could benefit them to have appropriate prevention behaviors. However, this should be done in a manner that will not bring an exaggerated panic to the community.

Limitations

This is the self-reported practice of COVID-19 prevention methods, and there may be the probability of social desirability bias. Since we have used a cross-sectional study design it may be difficult to establish the temporal relationship between the outcome variable and some of the independent variables. Lastly, the findings can be generalizable to the comparable settings in Ethiopia; but to the other parts, this should be done with cautions.

Conclusion

The proportion of individuals who had good COVID-19 prevention practices was inadequate in our study area. Moreover, the practice of wearing a protective mask and maintaining recommended physical distance is very low,

and these all need immediate interventions. It was also demonstrated that urban residents had good practice compared to rural residents. This gap should be addressed by educating rural dwellers and availing important inputs for COVID-19 prevention methods, keeping in mind that 79% of Ethiopians are living in rural areas with weak transportation and communication links.[9] The respondents had moderate knowledge and attitudes about COVID-19, which had a positive influence on good practice. Thus, it is also important to center the interventions on updating the knowledge and attitude of respondents. This can also enhance the community's perceived mortality, which was recognized as a significant predictor of good practice. Overall, for such highly infectious disease prevention should be a priority intervention, and the prevention practice of the community in our study area needs further effort.

Abbreviations

AOR, adjusted odds ratio; CI, Confidence Interval; COVID-19, Coronavirus Disease 2019; EPHI, Ethiopian Public Health Institute; ICU, Intensive Care Unit; JUMC, Jimma University Medical Center; OR, Odds Ratio, SPSS, Statistical Package for Social Sciences; WHO, World Health Organization.

Data Sharing Statement

The datasets used during the current study are available with authors and can be obtained from the corresponding author on reasonable request.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki. The study protocol was approved by the ethical review committee of the health science college of Mizan Tepi University, and the approval letter with a reference number HSC/0032/20 was obtained. In addition, the support letter was obtained from Mizan Tepi University and given to the zonal administrations of Kafa, Bench-Sheko and West Omo zones. Then permission letter was obtained from local authorities (each zonal administrations) to conduct the study in the selected Kebeles of each zones. The study participants were briefed about the purpose of the study, their right to participate or not, and the quitting of participation at any point of time during the data collection. Written informed consent was obtained from each participant. The possible prevention methods of COVID-19 (wearing a protective facemask and keeping at least 2 meters of physical distance) were implemented during data collection. The data were collected anonymously and kept confidential.

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Disclosure

The authors have declared no conflicts of interest for this work.

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