

Research Article

Social Distancing During the Coronavirus Disease-2019 Pandemic: A Cross-Sectional Study Among Sudanese Adults in Khartoum

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Abstract

The Sudan government-imposed restrictions on socio-economic activities to prevent the transmission of COVID-19, but the adherence to these measures by individuals is hindered by many obstacles. This study aims to estimate the prevalence of social distancing and related predictors. The study was conducted online over the course of three months among 417 Sudanese in Khartoum. Logistic regression was used to examine the association between social distancing and related predictors. High prevalence of adherence (78.8%) to social distancing was reported with age being a statistically significant predictor of adherence. Participants who used to wear masks during wedding ceremonies or refrained from attending to avoid COVID-19 were more likely to practice social distancing (Adjusted Odds Ratio [aOR] 10.1; 95% CI 2.5-41.7 and 5.0; 95% CI: 2.0-12.6), respectively. Conversely, participants who used to practice handshaking with their relatives and friends were less likely to adhere to social distancing (aOR 0.0; 95% CI 0.0-0.1). These findings provide evidence for public health authorities to formulate better understanding for the demographic and socio-cultural factors associated with human behaviors and facilitate the reliable control measures for pandemic.

Keywords: Social distancing; Personal behaviors; Lockdown; Sudanese; COVID-19.

Introduction

Since the first case of SARS-CoV-2 (COVID-19) was detected in Wuhan, China, in December 2019, novel developments of the disease have been unfolding [1]. In Sudan, the first case of COVID-19 was reported on 13 March 2020, with subsequent community transmission on 3 July 2020 [2]. As of 6 January 2021, there were 23,316 confirmed cases and 1,468 deaths, with a 6.3% Case Fatality Rate (CFR) [3]. This occurred despite the government announcing a partial lockdown of the state of Khartoum on 13 April; perhaps due to the challenge of applying governmental restriction measures on the large movement of populations across open borders of states and neighboring countries, people's non-adherence to quarantine measures, and international passengers lost to follow up under the screening program [4].

Worldwide, in the absence of effective protocols for treatment or vaccination, social distancing (aka physical distancing) has been recommended as a reliable intervention to reduce person-to-person transmission [5,6]. The idea of separating those with an infectious disease from others dates back to the earliest known plagues [7]. In the 21st century the term social distancing was suggested in 2008 by the World Health Organization as a public health intervention to control the transmission of epidemics. Before that, the concept was connected with stigma and negative implications in a socio-cultural context [8]. The primary objective of social distancing is to slow the spread of a disease, giving the healthcare systems more time for better preparedness and response. Since COVID-19 it has become a more commonly known concept to the general public [9,10].

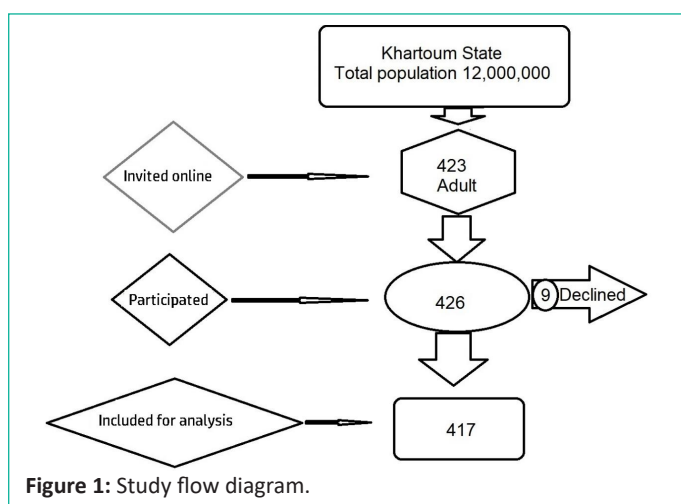
Many countries, including Sudan, have implemented policy interventions aimed at social distancing (e.g., closure of public transport, workplaces, and schools, and termination of public gatherings and events) [11-13]. Engaging in social distancing behaviors is associated with barriers and facilitators, such as the intrinsic motivation of individuals to derive pleasure from a certain behavior and extrinsic motivation of external pressures to continue an activity [14]. Although the purpose of social distancing policies is to prevent the spread of a virus within populations, these measures have had widespread socioeconomic implications [15]. Evidence from some studies suggests that age/generational, political, and cultural differences are major contributors to imperfect public compliance with public health measures for social distancing, even when mandated by governmental authorities [16-18]. Although the literature on social determinants of COVID-19 is rapidly growing up, little evidence exists on adherence of Sudanese to those policy interventions.

Given the effectiveness of the social distancing policies on controlling the spread of COVID-19 and their impact on health and socio-economic life nationwide, evidence is urgently required to better inform the healthcare systems and improve countries' responses. In this article, we examined the association between demographic and socio-cultural factors and the adherence of Sudanese to social distancing to prevent the transmission of COVID-19.

Methods

Design & Setting

This cross-sectional study was conducted online and was administered over the course of three months (June 7 – September 6, 2020) using google form to distribute a questionnaire among users of social media such as WhatsApp. A convenience non-random sample of Sudanese adults residing in 7 localities, namely Khartoum, Omdurman, Khartoum North, Sharq El-Nil, Jabal Awliya, Om Badda, and Karari in the most populous state of Sudan, Khartoum (Capital) were approached. A total sample size of 423 adults (age ≥ 18 years old) was calculated using the n4Studies application (Songkhla, Thailand) based on 50% population proportion, 5% marginal error, and 95% confidence level, plus 10% for non-response rate (Figure 1).



Case Definition and Measures

A structured online questionnaire guided by BMJ Best Practice COVID-19 [19] was designed by investigators and distributed via social media. A cloud-based data management tool provided by Google Inc. was used for designing and developing web-based questionnaires. The questionnaire comprised over

42 questions categorized in four sections included: 1. Sociodemographic 2. Knowledge on COVID-19; 3. Social distancing and 4. Impact of lockdown. In socio-demographic participants were asked to submit their responses on gender, age and education. They were also asked about the severity of COVID-1, its mode of transmission and prevention measures, in addition to their attitude and practice towards social distancing in daily life. Furthermore, participants were also asked about the impact of lockdown on public life, sources of support received during curfew. Initially, participants were asked to give their consent to be involved in the study. Also, they were given unconditional or absolute 'right' of withdrawal at any time during answering the questions and without giving any reason.

To achieve accurate measurement, full statements clarifying the technical terms were given prior to each question. Social distancing was defined as, "distancing oneself from others in social settings and mass gatherings and maintaining a distance of roughly 6 feet/2 meters from others, when possible, but still leaving one's home occasionally, in an attempt to slow the spread of disease" [20,21]. Followed by the question, "Are you currently practicing 'social distancing' when you engage in social gatherings?" Self-quarantine was defined as, "Refrains from any contact with other people for a period of time (such as two weeks) by remaining in one's home when a person who has had known contact with someone with a confirmed or suspected case of COVID-19 [20]. Personal Protective Equipment (PPE) was defined as, "Equipment worn to minimize exposure to a variety of hazards, such as gloves, foot and eye protection, protective hearing devices (earplugs, muffs) hard hats, respirators and full body suits" [22]. Participant's perspectives and attitudes towards prevention measures were scaled on a five-point Likert scale (1 – 5: lowest, low, neutral, higher, highest), respectively. The impact of lockdown on participants' life was measured in a dichotomous way "Are you influenced by lockdown measure" (no = 0 and yes = 1), if yes, then further questions on the type of lockdown were asked (no = 0 and yes = 1). Participants outside the Khartoum State were excluded from our analysis.

All standardized questions in English were translated into Arabic and back translated into English by independent bilingual expert familiar with Sudanese sociocultural aspects. A pilot study was conducted on a small sample representative of the study populations to test the clarity of the questions and make necessary modifications.

Statistical Analysis

Analysis was done using Statistical Package for the Social Sciences (SPSS) version 26, IBM Corp. (NY, United States). Descriptive analysis was reported in number and percentage formats. The association between social distancing and socio-demographic factors (sex, age, education and employment status) and difference by sex in the impact of lockdown, sources of support received by participants during COVID-19, and attitudes towards prevention measures were assessed using Pearson chi square test with significance level ($p \leq 0.05$). Univariate and logistic regression analyses were done to estimate the association between the predicting factors and social distancing practice using 0 = reference value and 1= outcome value ($p \leq 0.05$).

Ethics Statement

The study protocol was reviewed and approved by the Ethical Review Committee (ERC) of University of Khartoum, Sudan. The objectives of this study were clarified for all invited partici-

pants, giving them the chance to participate or decline before or during the data collection process. Written informed consent was received from all participants who declared an interest to participate. The information obtained in this study does not represent harm to the individual or community and anonymity was preserved for all participants.

Results

Socio-demographic characteristics of the study participants are shown in Table 1. Nearly two-thirds (65.5%) were female, while the dominant age group was 26-35 years old (46.2%). More than half of participants (55.3%) reported an education level of college and nearly one-third (31.7%) were employed at private sector. Overall, 78.8% of participants reported practicing social distancing. Statistically significant associations were found between age group, employment status, and practicing social distancing ($p = 0.014$ and $p = 0.039$), respectively.

Distribution of social distancing, by sex and employment status among study participants are shown in Figure 2. Among the employment statuses, higher proportions of practicing social distancing were shown for housekeepers, healthcare professionals, and other job statuses such as humanitarian workers and pensioners (89.3%, 97.1%, and 100.0%), respectively. Females reported a higher percentage of practicing social distancing compared to males (79.8% vs. 77.3%).

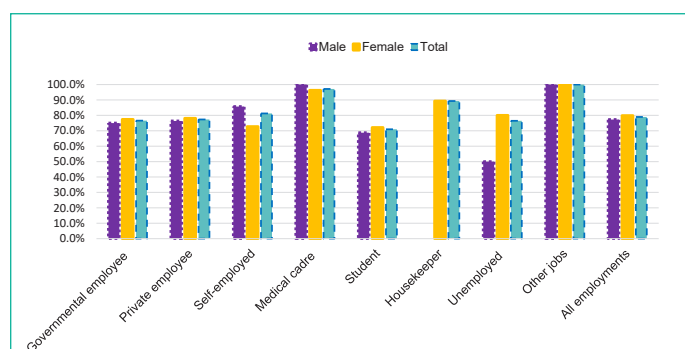


Figure 2: Percentages of physical distancing, by sex and employment status among study participants.

Table 2 shows the personal impact of lockdown, sources of support received by participants during COVID-19, and attitudes towards prevention measures, by sex group. The majority of participants (85.6%) reported passive impact for the measures of national lockdown on their public life. The most common impacts of lockdown measures reported were psychological (70.1%), social (53.2%), academic (43.9%), and economic (43.8%). Significantly higher impacts for lockdown measures were reported in males compared to females regarding livelihood, economic, and occupation (43.1 vs. 30.2% $p = 0.016$, 56.9 vs. 36.5% $p = 0.000$, and 46.3 vs. 34.5% $p = 0.031$), respectively, while significant higher psychological and academic impacts were reported by females compared to males (75.7 vs. 59.8% $p = 0.002$ and 48.0 vs. 36.6% $p = 0.041$).

In all, 29.0% of participants received support from different sources to endure the adverse effects of lockdown measures, percentages significantly higher in females compared to males (33.5% vs. 20.6% $p = 0.006$). Sources for the support were highest from family and relatives (54.7%) followed by friends and neighbors (43.8%). Support received by male and female participants, were from family and relatives (34.5% vs. 61.4% $p = 0.012$), friends and neighbors (46.4% vs. 42.9% $p = 0.741$), charity organizations (17.9% vs. 0.0% $p = 0.000$), government (3.6% vs. 4.8% $p = 0.792$), employers (10.7% vs. 4.8% $p = 0.260$) and

self-sources (7.1% vs. 14.3% $p = 0.322$), respectively. Overall, 76.0% reported that their local community was very committed to applying prevention measures, nearly half (47.5%) were not satisfied by the management of the government regarding the COVID-19 crisis and 71.8% reported that the quarantine measures were very necessary to control the disease.

Bivariate and multivariable analyses are shown in Table 3. The age groups 26-35 and 46-55 years old were significantly more likely statistically to practice social distancing compared to the referent group (adjusted odds ratio [aOR] 3.6; 95% CI 1.5-8.9) and (aOR 6.6; 95 % CI: 1.1-40.8), respectively. Participants who practiced handshaking with their relatives and friends were less likely to adhere to social distancing (aOR 0.0; 95% CI 0.0-0.1). Similarly, those who disinfected hands after shaking (aOR 0.1; 95 % CI: 0.0-0.4) were also less likely to practice social distancing compared to those refraining shaking hands.

Participants did not attend weddings due to COVID-19 and those attending wedding ceremonies with masks were more likely to practice social distancing compared to those who attended without masks (aOR 5.0; 95 % CI: 2.0-12.6) and (aOR 10.1; 95% CI 2.5-41.7), respectively.

Table 1: Socio-demographic characteristics of participants practicing social distancing.

	Social distancing			
	Total (n=417)	No (n=88; 21.2%)	Yes (n=328; 78.8%)	P value
	no.(%)*	no.(%)*	no.(%)*	
Sex	n=417	n=88	n=328	
M	144 (34.5)	32 (36.4)	112 (34.1)	.698
F	273 (65.5)	56 (63.6)	216 (65.9)	
Age groups, y	n=416	n=88	n=328	.014
≤ 25	121 (29.1)	39 (44.3)	82 (25.0)	
26-35	192 (46.2)	29 (33.0)	163 (49.7)	
36-45	62 (14.9)	13 (14.8)	49 (14.9)	
46-55	21 (5.0)	3 (3.4)	18 (5.5)	
56-65	13 (3.1)	2 (2.3)	11 (3.4)	
≥ 66	7 (1.7)	2 (2.3)	5 (1.5)	
Education level	n=416	n=88	n=328	.257
Primary school	3 (0.7)	2 (2.3)	1 (0.3)	
Secondary school	14 (3.4)	3 (3.4)	11 (3.4)	
College	230 (55.3)	50 (56.8)	180 (54.9)	
Postgraduate	169 (40.6)	33 (37.5)	136 (41.5)	
Employment status	n=404	n=85	n=319	.039
Government employee	47 (11.6)	11 (12.9)	36 (11.3)	
Private employee	128 (31.7)	29 (34.1)	99 (31.0)	
Self-employed	32 (7.9)	6 (7.1)	26 (8.2)	
Healthcare sector	35 (8.7)	1 (1.2)	34 (10.7)	
Student	93 (23.0)	27 (31.8)	66 (20.7)	
Housekeeper	28 (6.9)	3 (3.5)	25 (7.8)	
Unemployed	34 (8.4)	8 (9.4)	26 (8.2)	
Other Jobs	7 (1.7)	0 (0.0)	7 (2.2)	

*(%), percentage of respondents per subcategory. †p Values were obtained from χ^2 tests comparing categorical variables between presence and absence of social distancing.

Table 2: Impact of lockdown, sources of support received by participants during COVID-19, and attitudes toward prevention measures, by sex.

	Sex groups			
	Total (n=417)	M (n=144)	F (n=273)	P value†
	no.(%)*	no.(%)*	no.(%)*	
Lockdown Impact				
Impact on public life	n=404	n=141	n=263	
Yes	346 (85.6)	123 (87.2)	223 (84.8)	0.504
No	58 (14.4)	18 (12.8)	40 (15.2)	
Livelihood impact	n=345	n=123	n=222	
Yes	120 (34.8)	53 (43.1)	67 (30.2)	.016
No	225 (65.2)	70 (56.9)	155 (69.8)	
Economic impact	n=345	n=123	n=222	
Yes	151 (43.8)	70 (56.9)	81 (36.5)	.000
No	194 (56.2)	53 (43.1)	141 (63.5)	
Social impact	n=344	n=122	n=222	
Yes	183 (53.2)	71 (58.2)	112 (50.5)	.168
No	161 (46.8)	51 (41.8)	110 (49.5)	
Occupational impact	n=346	n=123	n=223	
Yes	134 (38.7)	57 (46.3)	77 (34.5)	.031
No	212 (61.3)	66 (53.7)	146 (65.5)	
Psychological impact	n=344	n=122	n=222	
Yes	241 (70.1)	73 (59.8)	168 (75.7)	.002
No	103 (29.9)	49 (40.2)	54 (24.3)	
Academic impact	n=346	n=123	n=223	
Yes	152 (43.9)	45 (36.6)	107 (48.0)	.041
No	194 (56.1)	78 (63.4)	116 (52.0)	
Receiving support to confront lockdown measures	n=404	n=141	n=263	
Yes	117 (29.0)	29 (20.6)	88 (33.5)	.006
No	287 (71.0)	112 (79.4)	175 (66.5)	
Source of Support				
Family and relatives' support	n=117	n=29	n=88	
Yes	64 (54.7)	10 (34.5)	54 (61.4)	.012
No	53 (45.3)	19 (65.5)	34 (38.6)	
Friends' and neighbors' support	n=112	n=28	n=84	
Yes	49 (43.8)	13 (46.4)	36 (42.9)	.741
No	63 (56.3)	15 (53.6)	48 (57.1)	
Charitable support	n=112	n=28	n=84	
Yes	5 (4.5)	5 (17.9)	0 (0.0)	.000
No	107 (95.5)	23 (82.1)	84 (100.0)	
Governmental support	n=112	n=28	n=84	
Yes	5 (4.5)	1 (3.6)	4 (4.8)	.792
No	107 (95.5)	27 (96.4)	80 (95.2)	
Employers' support	n=112	n=28	n=84	
Yes	7 (6.3)	3 (10.7)	4 (4.8)	.260
No	105 (93.8)	25 (89.3)	80 (95.2)	
Self-support	n=112	n=28	n=84	
Yes	14 (12.5)	2 (7.1)	12 (14.3)	.322
No	98 (87.5)	26 (92.9)	72 (85.7)	

Adherence of community to prevention measures	n=404	n=141	n=263	
Somewhat committed	97 (24.0)	41 (29.1)	56 (21.3)	.081
Very committed	307 (76.0)	100 (70.9)	207 (78.7)	
Management of COVID-19 by government	n=404	n=141	n=263	
Not satisfied	192 (47.5)	67 (47.5)	125 (47.5)	.919

COVID-19, coronavirus disease.

*(%), percentage of respondents in examined factors per sex.

[†]p Values were obtained from χ^2 tests comparing categorical variables between males and females

Table 3: Factors associated with practicing social distancing among study participants during COVID-19.

	Practicing social distancing			
	Crude OR	P value	Adjusted OR	P value
	(96% CI)		(96% CI)*	
Sex				
M	Reference		Reference	
F	1.1 (0.7-1.8)	.698	0.8 (0.4-1.6)	.466
Age groups, y		.018		.069
≤ 25	Reference		Reference	
26-35	2.7 (1.5-4.6)	.000	3.6 (1.5-8.9)	.005
36-45	1.8 (0.9-3.7)	.112	2.3 (0.7-7.6)	.166
46-55	2.9 (0.8-10.3)	.108	6.6 (1.1-40.8)	.042
56-65	2.6 (0.6-12.4)	.225	9.2 (0.9-94.7)	.062
≥ 66	1.2 (0.2-6.4)	.840	1.6 (0.0-294.1)	.860
Education level		.391		.257
Primary school	Reference		Reference	
Secondary school	7.3 (0.5-111.2)	.151	10.4 (0.4-289.3)	.168
College	7.2 (0.6-81.0)	.110	20.1 (0.9-462.8)	.061
Post graduate	8.2 (0.7-93.7)	.089	16.3 (0.7-402.4)	.088
Employment status		.207		.657
Government employee	Reference		Reference	
Private employee	1.0 (0.5-2.3)	.917	0.9 (0.3-2.9)	.912
Self-employed	1.3 (0.4-4.0)	.622	1.9 (0.4-8.6)	.420
Healthcare sector	10.4 (1.3-84.8)	.029	5.5 (0.5-56.2)	.149
Student	0.7 (0.3-1.7)	.480	1.8 (0.5-7.2)	.393
Housekeeper	2.5 (0.6-10.1)	.183	2.7 (0.4-19.9)	.317
Unemployed	1.0 (0.4-2.8)	.990	1.0 (0.2-3.7)	.943
Other jobs	4.9E8-(0.0-)	.999	6.1E8 (0.0---)	.999
Disease is virulent		.000		.040
Disagree	Reference		Reference	
Neutral	1.8 (0.3-11.0)	.552	0.6 (0.0-8.9)	.679
Agree	9.4 (1.7-52.7)	.010	2.4 (0.2-35.0)	.514
Strongly agree	3.3 (0.4-30.7)	.228	NA	
PPEs are effective for control		.000		.147
Disagree	Reference		Reference	
Neutral	1.1 (0.1-13.8)	.946	0.8 (0.0-26.2)	.918
Agree	13.1 (1.3-127.8)	.027	4.3 (0.2-78.3)	.328
Strongly agree	12.0 (0.5-280.1)	.122	NA	
Staying at home or 'self-quarantine' is effective for disease control		.007		.400
Disagree	Reference		Reference	
Neutral	2.4 (0.6-9.0)	.194	1.0 (0.1-8.6)	.999

Agree	5.3 (1.6-18.0)	.007	1.8 (0.2-14.6)	.597
Strongly agree	6.0 (0.5-69.8)	.152	NA	
Social distancing is necessary for community protection		.001		.786
Disagree	Reference		Reference	
Neutral	3.4 (0.6-20.9)	.185	2.9 (0.1-113.0)	.568
Agree	11.1 (2.1-58.5)	.004	3.4 (0.1-127.6)	.502
Strongly agree	3.3 (0.4-30.7)	.288	NA	
Attitudes towards handshaking		.000		.000
Apologize for not shaking	Reference		Reference	
Handshake relatives & friends	0.0 (0.0-0.1)	.000	0.0 (0.0-0.1)	.000
Sanitize hands after shaking	0.1 (0.0-0.4)	.001	0.1 (0.0-0.4)	.003
Response to funerals		.000		.001
Attend without hesitation	Reference		Reference	
Stay at home (not attend)	4.4 (2.5-7.8)	.000	1.847 (0.7-5.0)	.230
Response to weddings		.000		.001
Attend without hesitation	Reference		Reference	
Attend with mask	18.6 (5.9-59.2)	.000	10.1 (2.5-41.7)	.001
Stay at home (not attend)	8.5 (4.5-15.7)	.000	5.0 (2.0-12.6)	.001

Discussion

This is the first evidence from Sudan on social distancing against COVID-19. Our findings show that 78.8% of the study participants practiced social distancing, of them, more than two-thirds were female. Compared to the findings of the USA National Tracking Poll where 82% of adults (87% female and 76% male) reported practicing social distancing [20]. In contrast, study findings from neighboring Egypt reported that only 18.1% of surveyed individuals were practicing social distancing [23].

The gender variance between adherence to social distancing percentages may be explained by gender-specific behaviors [24] and generally lower risk tolerance in women [25]. In an article published in Behavioral Science & Policy, researchers from New York University and Yale University reported that women are more likely to follow medical guidelines and reported to embrace expert-backed tips on practicing preventive measures to prevent the spread of COVID-19, such as social distancing, hand washing and wearing a mask than men [26,27].

Based on logistic regression models which examined the independent associations between demographic and socio-cultural, perceptual and behavioral predictors and adherence to social distancing, we found that participants of age categories (> 26-35 and 46-55 years old) were more likely than their younger counterparts to practice social distancing. These findings are consistent with another study which found that older individuals were more compliant with sheltering-in-place rules, might have a greater awareness about the risk, and less need to socialize in daily life [14]. Furthermore, among other factors, the collective behaviors of some peers or homogenized age group living as a community in the same environment such as university students in dormitories might provide additional explanation for adherence to social distancing.

Our findings show evidence of the negative association between practicing social distancing and participants' behavior of handshaking for relatives and friends, even followed by disinfection. Study on barriers and facilitators of adherence to social distancing during COVID-19 published on PLOS ONE highlighted

a high rate of behaviors within one's control including handshaking associated with social distancing [14]. Furthermore, other study findings from Egypt reported significant associations between practicing social distancing and some sociodemographic factors such as sex, education, age, employment, and residence [23].

In this study, participants who showed positive behavior of refraining from attending weddings to avoid COVID-19 or wearing masks while attending, were more likely to practice social distancing compared to those who attended weddings without masks. These findings may be attributed, among other factors, to predictors of personal behaviors, such as anticipated regret, frequency of performance, and perceived behavioral control [28-31]. Evidence from an outbreak investigation on COVID-19 carried out by the Maine Center for Disease Control and Prevention (MeCDC) linked weddings to a high risk for transmission of SARS-CoV-2, in addition to other behaviors, such as failure to practice physical distancing, wear masks, and self-quarantine after exposure to confirmed SARS-CoV-2 infection [32].

Measuring predictors and outcome variables at one point in time through cross-sectional design is not enough to concretely establish causal inference between social distancing and related predictors [33,34]. Even so, potential confounders were adjusted to establish independent association between each predictor and outcome. The questionnaire was administered during an enforced state of social distancing; therefore, the insufficient administrative procedures and the use of a convenience sample and recruitment of study participants through social media might affect the diverse characteristics of the participants, approaching large enough sample size and the generalizability of the study findings. Although a norm-referenced definition was used for social distancing, still there is a lack of brief self-report measures and scales assessing adherence to social distancing due to unavailability of psychometric assets. Hence, more methodological studies on social distancing and its predictors are required to provide accurate measurements using satisfactory psychometric properties with sound internal consistency and appropriate validity [35].

Conclusions

Overall, predicting the factors associated with human behavior and prevention measures will help formulate better understanding and compliance for communities and facilitate the mission of governments and public health authorities to control pandemics. In hindsight, we believe that conducting large scale studies with sound methodologies on social distancing and related predictors will provide good evidence for decision makers on motivators and barriers associated with adherence of citizens to social distancing, facilitating better understanding for human behavior and public health interventions against COVID-19 and future emerging diseases.

Author Statements

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Author's Contribution

IFA was the one who came up with the idea for the study, performed the key statistical analyses, and wrote the first draft of the manuscript. AFA, JNA and MR provided feedback on the statistical analyses as well as the draft manuscript. The final study was read and approved by all contributors.

Conflict of Interest Statement

The authors state that the work was carried out in the absence of any commercial or financial relationships.

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