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ORIGINAL PAPER

The Extent of Commitment of Saudis During Holy Ramadan to Social Distancing Measures Required for the Prevention of Transmission of COVID-19

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Abstract
Coronavirus disease (hereafter COVID-19) was declared a pandemic by the World Health Organization (WHO) in March 2020. People were admitted to hospitals complaining of fever, fatigue, cough, and difficulty breathing. Consequently, the strategy being adopted to limit the spread of COVID-19 is to encourage people in society to follow preventive measures. We aimed to estimate how the knowledge of and compliance with safe distancing measures affected the progression of the COVID-19 pandemic in Saudi Arabia during Holy Ramadan. A cross-sectional survey was implemented in the central regions of Saudi Arabia from 24th of April to 22nd May to coincide with Ramadan. The study was conducted using a Google forum distributed through social media. Participants were recruited through convenience sampling of the Saudi population. In total, 1515 participants completed the survey. A significant difference between males and females was observed in answering questions about committing to: not attending gatherings, keeping a safe distance, not making physical contact, and staying at home during partial lockdown. In general, participants in our study demonstrated excellent adherence to all social distance measures, considered essential for limiting the spread and progression of COVID-19. However, attitudes regarding reduced physical contact was poor in the Makkah region, which necessitates greater efforts to educate and inform people about the associated risks.

Keywords COVID-19 · Saudi · Ramadhan · Pandemic · Social distance

Introduction

Coronavirus disease (COVID-19) was declared a pandemic by the World Health Organization (WHO) on March 11, 2020 [1]. The newly discovered virus first emerged in Wuhan City, in the Hubei Province of China at the end of December, 2019 [2, 3]. People in Wuhan were being admitted to hospitals, complaining of fever, fatigue, cough, and difficulty breathing. Furthermore, the symptoms of the illness ranged from mild to severe, in certain cases leading to respiratory failure and death [2–6]. The main features were identified as a severe acute respiratory syndrome [1, 3, 5, 6]. The number of people infected in Wuhan increased tremendously [7], and the outbreak of the virus has continued to spread around the world with people from many countries suffering the loss of loved ones and challenging financial circumstances [6, 8, 9]. People identified with high potential risk factors for severe COVID-19 are the elderly, those with chronic lung disease, cardiovascular disease, diabetes mellitus, people who are immunocompromised, and pregnant women [7, 8, 10].

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Symptoms have been observed to appear in people 1 week following exposure to the disease who then become infected [11]. To date, there is no therapeutic cure for COVID-19 and no vaccine to prevent infection [5, 6, 12]. The National Institutes of Health are currently working to develop a vaccine [10]. In late January 2020, it was confirmed that this infection could transmit from person to person, especially when there has been close contact with infected individuals within 14 days of the onset of symptoms [5, 10, 13, 14]. In addition, it has been established that infection can transfer from a person carrying the virus without demonstrating signs or symptoms of infection (asymptomatic) [15].

To limit the spread of COVID-19 infection, the strategy being adopted is to encourage people to follow preventive measures, which include observing proper hand hygiene (every 15–20 min), refraining from hands shakes, maintaining social distancing, avoiding crowded places, and observing quarantine protocols. Furthermore, closing public places such as schools, restaurants, barbershops, and workplaces whilst letting people work remotely from home have also been introduced to reduce the spread of the virus [2, 9, 12, 13, 16, 17].

On March 2, the Saudi Ministry of Health (MOH) announced the country's first case of COVID-19. As part of an awareness campaign to prevent its spread [18], Saudi authorities announced a lockdown in mid-March 2020, banning people from all gatherings (such as gyms, malls, funerals, weddings, and other social events). This was followed by the closure of cinema theatres, coffee shops, and restaurants.

In this study, we surveyed a sample drawn from Saudi society, asking several questions to determine the extent of their commitment to social distancing measures, such as not attending gatherings outside their homes, maintaining a safe distance from others, having no physical contact (such as handshaking and hugging), not having meals with others, and staying home during partial lockdown. We aimed to determine how knowledge of and compliance with safe distancing measures would affect the progression of COVID-19 in Saudi Arabia during Holy Ramadan.

Methods

A descriptive, cross-sectional, survey was conducted from 24th of April to 22nd May (Ramadan: 9th month of the Islamic calendar), as many gatherings usually occur during this month. The survey commenced from five mean points concurrently (Riyadh, Makkah, Almadinah, Jeddah, and others) randomly representing the central regions of Saudi Arabia. The survey was disseminated through links on social networking sites. We surveyed a convenience sample of participants drawn from the Saudi population.

Survey questions were developed in Arabic, the native language of Saudi Arabia; however, questions were also available in English language. The survey addressed socio-demographic characteristics of the participants and their knowledge regarding social distancing measures during the COVID-19 outbreak.

First, a survey was developed based on reviews of social distancing recommendations issued by the Saudi MOH and the World Health Organization (WHO). Second, a draft of the study survey was revised by three academic specialists who reviewed it for any recommendations or modifications. Questions about social distancing were then revised according to the feedback.

The next step was to conduct a pilot study that was intended to test the questionnaire with 20 participants who were later eliminated from the overall sample. The initial pilot phase was conducted before the distribution of the main survey to assess the reliability and validity of the questionnaire. The data were used to assess the internal consistency (reliability) using Cronbach's alpha. The outcomes showed acceptable internal reliability (Cronbach's alpha = 0.82).

An online Google form was generated, and participants were asked to fill out and submit the survey.

The sample size was determined using the Cochran's sample size formula as follows: n0 = Z2 pq / e2. Because there have been no similar studies related to coronavirus disease, the calculations were based on an assumption that the probability of having good knowledge of COVID-19 social distancing guidance was 50% [19] at a 99% confidence interval, with Z2 as the square of confidence level at 99% from the normal table (2.575), and a margin of error of 3.31. The required sample size was calculated to be 1513 participants, and we recruited 1515 participants. The survey portal was then closed.

Descriptive statistics were used to summarise socio-demographic characteristics of the data and the responses to questions concerning knowledge about social distancing guidance. The data were summarised as frequencies (n) and percentages (%) for the categorical variables. A chi square test was used where appropriate. All data analyses were performed using Statistical Package for the Social Sciences (SPSS) software, version 26. A value of $P < 0.05$ was considered statistically significant.

This study was approved by the Ethics Committee of Umm Al-Qura University. Respondents' concealment and confidentiality were ensured. Submission of a completed questionnaire was considered consent to participate in the study.

Results

In total, 1515 participants completed the survey. Table 1 presents the demographic data for participants, of whom 403 (26.6%) were male and 1112 (73.4%) were female. In

terms of age, the largest proportion of participants was from the age group 19–40 years ($n=1287$; 85%), while only 2 participants (0.1%) were aged older than 65 years. With regard to educational level, 1090 participants (71.9%) had a bachelor's degree, while only 31 (2%) had a Ph.D. Most participants were from Riyadh ($n=632$; 41.7%) and 334 (22%) were health workers, while 1181 (78%) participants were not health providers.

Table 2 demonstrates the frequencies and rates of responses for the survey questions. It was evident from participant responses that the majority were highly committed to all social distancing measures presented in the survey.

Table 3 illustrates differences in answers based on gender. A significant difference was observed between males and females when asked about committing to: not attending gatherings, keeping a safe distance, not making physical contact, and staying home during partial lockdown ($p=<0.001$, $p=<0.001$, $p=0.002$, and $p=<0.001$, respectively).

A demonstration of differences in responses based on age group are presented in Table 4. There was no observed significant differences between age groups for any of the questions.

Table 5 displays differences in answers based on educational level, indicating whether a significant difference between groups could be observed. A significant difference was observed when asked about commitment to: not attend gatherings ($p=0.002$), not having meals with others ($p=0.035$), and staying at home during partial lockdown ($p=0.005$).

Table 6 presents differences in answers of based on the city in which participants are living. A significant difference was evident when asked about a commitment to: keeping a safe distance, not making physical contact, and staying at home during partial lockdown, ($p=<0.014$, $p=<0.001$, and $p=<0.049$, respectively).

Table 7 demonstrates differences between health workers and non-health workers. A significant difference was only observed when answering about commitment to not making physical contact ($p=0.001$).

Table 1 Demographic profile of the participants (N = 1515)

Demographic characteristics	*n*	%
Gender		
Male	403	26.6
Female	1112	73.4
Age		
19–40	1287	85
41–65	198	13.1
18 and younger	28	1.8
Older than 65	2	0.1
Educational level		
High school	243	16
Bachelor's	1090	71.9
Masters	151	10
Ph.D.	31	2
City		
Riyadh	632	41.7
Jeddah	157	10.4
Makkah	249	16.4
Madinah	43	2.8
Other	434	28.6
Health worker		
Yes	334	22
No	1181	78

Discussion

The novel coronavirus disease COVID-19 was first identified during the outbreak of severe acute respiratory syndrome in Wuhan, China, in December 2019 [2, 20]. To date, more than 34 million people have been infected with COVID-19, with mortality of more than 1 million cases [21]. The first identified case in Saudi Arabia was on March 2, and by the end of May more than 85,000 cases had been identified with 503 deaths [22].

Saudi Arabia is the biggest country in the Gulf region, with a population of more than 34 million people [23]. Ramadan is the month during which the community reconnects with family, friends, and neighbours, showing appreciation and bonding together for a common spiritual cause.

Ramadan's holy month is a distinct social and religious gathering where Muslims families and friends around the world unite to break their fast together in the evening at sundown (iftar) or before sunrise during (suhour). Many Muslims increase their attendance at mosques during the month and assemble for extended prayers (Taraweeh and qiyam). Some Muslims also spend days and nights at mosques for prayers, especially during the last days of Ramadan (i'tikaf). These spiritual practices are frequently observed throughout the month. This year, Ramadan falls between the 24th of April and the 23rd of May, just as the COVID-19 pandemic continues.

Transmission of COVID-19 occurs through contact between people as the virus is spread via respiratory droplets and contact with surface contaminants. To reduce the effect on public health, many countries have employed physical distancing actions intended to interrupt virus transmission by mitigating interaction between people. These measures present essential mechanisms to control the spread of infection, particularly respiratory infections, associated with large gatherings of people.

These distancing measures (including but not limited to the closure of mosques) prohibit public congregations and

Table 2 Participants answers to survey questions (N = 1515)

Question	*n*	%
Q1/How much are you committed to the social distancing measure of not attending gatherings out of home?		
Always	1127	74.40
Often	334	22.00
Sometimes	46	3.00
Never	8	0.50
Q2/How much are you committed to the social distancing measure of maintaining a safe distance from other people?		
Always	981	64.80
Often	368	24.30
Sometimes	116	7.70
Never	50	3.30
Q3/How much are you committed to the social distancing measure of no physical contact (like hand shaking, hugging)?		
Always	1087	71.70
Often	268	17.70
Sometimes	106	7.00
Never	54	3.60
Q4/How much are you committed to the social distancing measure of not having meals with others?		
Always	1296	85.50
Often	125	8.30
Sometimes	52	3.40
Never	42	2.80
Q5/How much are you committed to the social distancing measure of staying at home during partial lockdown?		
Always	1263	83.40
Often	207	13.70
Sometimes	33	2.20
Never	12	0.80

other limits on movement and will have direct consequences for the social and spiritual gatherings fundamental to Ramadan [24, 25]. In this paper, we present the results of our survey about the knowledge and adherence to social distancing during Holy Ramadan.

In our study, participants showed a generally positive attitude towards social distance measures, as almost three quarters of participants said they would never attend gatherings out of home after the lockdown, while 22% said they often stayed home, 3% said they would sometimes stay home, while just 0.5% took no precautionary measures. Approximately two thirds (64%) of participant maintained a safe distance from people, while almost 4% never take this precaution. More than 70% of our study population said they avoided handshaking and hugging during the virus outbreak period, while almost 4% did not avoid physical contact during the same period. Moreover, 85% of participants did not share meals with others, while almost 3% said they gathered and shared meals without any precautions. Regarding the partial lockdown, only 0.8% ($n = 12$) of participants said they left their homes, which may indicate negligence concerning the importance of these precautions in limiting the viral outbreak.

Knowledge of Social Distancing Measures Regarding Not Attending Gatherings Out of Home

In general, participants in our study were highly committed to all the social distancing measures, especially abstaining from gatherings out of home. Females were more committed to staying at home than males, as were people aged 41–64 years (92.8%) and people older than 65 years (100%), which may be because of a heightened risk of age-associated chronic diseases making them more likely to suffer severely from coronavirus, which increases the risk of corona-related morbidity and mortality—proven from multiple studies published about the disease in China [8, 9, 26, 27].

There were no differences identified between the educational level of the participants, region, and healthcare worker status regarding staying at home.

Knowledge of Social Distancing Measures Regarding Maintaining a Safe Distance from Other People

Participants aged 41 years and over were committed to maintaining a safe distance with other people (75%); however,

Table 3 Gender-based comparison of answers (N = 1515)

Answer	Male ($n=403$)		Female ($n=1112$)		Chi-square	P-value
	n	%	*n*	%		
Q1/How much are you committed to the social distancing measure of not attending gatherings out of home?						
Always	261	64.76	866	77.88	32.168	< 0.001*
Often	125	31.02	209	18.79		
Sometimes	12	2.98	34	3.06		
Never	5	1.24	3	0.27		
Q2/How much are you committed to the social distancing measure of maintaining a safe distance from other people?						
Always	210	52.11	771	69.33	48.877	< 0.001*
Often	148	36.72	220	19.78		
Sometimes	33	8.19	83	7.46		
Never	12	2.98	38	3.42		
Q3/How much are you committed to the social distancing measure of no physical contact (like hand shaking, hugging)?						
Always	315	78.16	772	69.42	15.345	0.002*
Often	61	15.14	207	18.62		
Sometimes	22	5.46	84	7.55		
Never	5	1.24	49	4.41		
Q4/How much are you committed to the social distancing measure of not having meals with others?						
Always	331	82.13	965	86.78	5.170	0.160
Often	41	10.17	84	7.55		
Sometimes	17	4.22	35	3.15		
Never	14	3.47	28	2.52		
Q5/How much are you committed to the social distancing measure of staying at home during partial lockdown?						
Always	299	74.19	964	86.69	48.877	< 0.001*
Often	77	19.11	130	11.69		
Sometimes	18	4.47	15	1.35		
Never	9	2.23	3	0.27		

*Significant at level 0.05

this reduced to almost 60% for those younger than 40 years. Regarding educational level, participants with a Ph.D. degree were more aware of and adhered to safe distancing guidelines.

Interestingly, only 61% of healthcare workers have been maintaining a safe distance measure compared to 65% of non-healthcare workers.

There is no difference in terms of knowledge of and adherence to safe distancing in different regions of Saudi Arabia, all of which showed almost 65% of participants.

Knowledge of Social Distancing Measures Regarding Maintaining No Physical Contact (Like Handshaking, Hugging)

More than three-quarters of male participants (78%) maintain no physical contact, while a lower proportion was observed among females (69%). Participants less than 40 years old demonstrated good knowledge and attitude toward physical contact, with almost 80% having no physical contact at all.

In Makkah province, only 48% committed to no physical contact, which could account for the higher number of COVID-19 cases witnessed in Makkah.

More than 80% of healthcare workers committed to no physical contact.

Knowledge of Social Distancing Measures Regarding Not Having Meals with Others and Staying at Home During Partial Lockdown

In general, all participants in our study were committed to and aware of not having meals with others with no differences evident regarding gender, educational level, region, healthcare worker status, and age group.

Females generally committed more to staying at home, or during allowed time of the partial lockdown.

Table 4 Age group-based comparison of answers (N = 1515)

Answer	18 and younger (*n* = 1287)		19–40 (*n* = 198)		41–65 (*n* = 28)		Older than 65 (*n* = 2)		Chi-square	P-value
	n	%	*n*	%	*n*	%	*n*	%		
Q1/How much are you committed to the social distancing measure of not attending gatherings out of home?										
Always	942	73.19	157	79.29	26	92.86	2	100.00	16.461	0.058
Often	298	23.15	35	17.68	1	3.57	0	0.00		
Sometimes	40	3.11	6	3.03	0	0.00	0	0.00		
Never	7	0.54	0	0.00	1	3.57	0	0.00		
Q2/How much are you committed to the social distancing measure of maintaining a safe distance from other people?										
Always	833	64.72	125	63.13	21	75.00	2	100.00	6.273	0.712
Often	313	24.32	51	25.76	4	14.29	0	0.00		
Sometimes	95	7.38	19	9.60	2	7.14	0	0.00		
Never	46	3.57	3	1.52	1	3.57	0	0.00		
Q3/How much are you committed to the social distancing measure of no physical contact (like hand shaking, hugging)?										
Always	910	70.71	157	79.29	19	67.86	1	50.00	10.838	0.287
Often	239	18.57	22	11.11	6	21.43	1	50.00		
Sometimes	90	6.99	13	6.57	3	10.71	0	0.00		
Never	48	3.73	6	3.03	0	0.00	0	0.00		
Q4/How much are you committed to the social distancing measure of not having meals with others?										
Always	1089	84.62	179	90.40	26	92.86	2	100.00	9.097	0.428
Often	111	8.62	14	7.07	0	0.00	0	0.00		
Sometimes	48	3.73	3	1.52	1	3.57	0	0.00		
Never	39	3.03	2	1.01	1	3.57	0	0.00		
Q5/How much are you committed to the social distancing measure of staying at home during partial lockdown?										
Always	1072	83.29	164	82.83	26	92.86	1	50.00	6.414	0.698
Often	175	13.60	29	14.65	2	7.14	1	50.00		
Sometimes	28	2.18	5	2.53	0	0.00	0	0.00		
Never	12	0.93	0	0.00	0	0.00	0	0.00		

*Significant at level 0.05

Conclusion

In general, participants in our study demonstrated excellent adherence to all social distancing measures, which is essential to limit the spread and progression of COVID-19. However, attitudes regarding physical contact was low in the Makkah region, which necessitates greater effort in educating and warning people about the risks.

Table 5 Education level comparison of answers (N = 1515)

Answer	High school (*n* = 243)		Bachelor's (*n* = 1090)		Masters (*n* = 151)		Ph.D (*n* = 31)		Chi-square	P-value
	n	%	*n*	%	*n*	%	*n*	%		
Q1/How much are you committed to the social distancing measure of not attending gatherings out of home?										
Always	203	83.54	803	73.67	98	64.90	23	74.19	25.713	0.002*
Often	31	12.76	253	23.21	42	27.81	8	25.81		
Sometimes	7	2.88	30	2.75	9	5.96	0	0.00		
Never	2	0.82	4	0.37	2	1.32	0	0.00		
Q2/How much are you committed to the social distancing measure of maintaining a safe distance from other people?										
Always	161	66.26	710	65.14	86	56.95	24	77.42	7.869	0.547
Often	56	23.05	261	23.94	45	29.80	6	19.35		
Sometimes	19	7.82	81	7.43	15	9.93	1	3.23		
Never	7	2.88	38	3.49	5	3.31	0	0.00		
Q3/How much are you committed to the social distancing measure of no physical contact (like hand shaking, hugging)?										
Always	193	79.42	759	69.63	108	71.52	27	87.10	15.177	0.086
Often	32	13.17	203	18.62	29	19.21	4	12.90		
Sometimes	11	4.53	85	7.80	10	6.62	0	0.00		
Never	7	2.88	43	3.94	4	2.65	0	0.00		
Q4/How much are you committed to the social distancing measure of not having meals with others?										
Always	218	89.71	931	85.41	119	78.81	28	90.32	18.001	0.035*
Often	14	5.76	85	7.80	24	15.89	2	6.45		
Sometimes	6	2.47	42	3.85	3	1.99	1	3.23		
Never	5	2.06	32	2.94	5	3.31	0	0.00		
Q5/How much are you committed to the social distancing measure of staying at home during partial lockdown?										
Always	217	89.30	909	83.39	117	77.48	20	64.52	23.532	0.005*
Often	20	8.23	150	13.76	28	18.54	9	29.03		
Sometimes	6	2.47	23	2.11	3	1.99	1	3.23		
Never	0	0.00	8	0.73	3	1.99	1	3.23		

*Significant at level 0.05

Table 6 City-based comparison of answers (N = 1515)

	Riyadh (*n* = 632)		Jeddah (*n* = 157)		Makkah (*n* = 249)		Madinah (*n* = 43)		Other (*n* = 434)			P-value
Answer	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	Chi-square	
Q1/How much are you committed to the social distancing measure of not attending gatherings out of home?												
Always	473	74.84	120	76.43	193	77.51	33	76.74	308.00	70.97	17.263	0.140
Often	134	21.20	35	22.29	52	20.88	9	20.93	104.00	23.96		
Sometimes	24	3.80	2	1.27	3	1.20	1	2.33	16	3.69		
Never	1	0.16	0	0.00	1	0.40	0	0.00	6	1.38		
Q2/How much are you committed to the social distancing measure of maintaining a safe distance from other people?												
Always	399	63.13	108	68.79	159	63.86	29	67.44	286.00	65.90	25.072	0.014*
Often	150	23.73	44	28.03	72	28.92	10	23.26	92.00	21.20		
Sometimes	58	9.18	3	1.91	16	6.43	2	4.65	37	8.53		
Never	25	3.96	2	1.27	2	0.80	2	4.65	19	4.38		
Q3/How much are you committed to the social distancing measure of no physical contact (like hand shaking, hugging)?												
Always	434	68.67	121	77.07	121	48.59	29	67.44	299.00	68.89	36.999	< 0.001*
Often	120	18.99	31	19.75	31	12.45	7	16.28	79.00	18.20		
Sometimes	49	7.75	3	1.91	3	1.20	6	13.95	34	7.83		
Never	29	4.59	2	1.27	2	0.80	1	2.33	22	5.07		
Q4/How much are you committed to the social distancing measure of not having meals with others?												
Always	544	86.08	138	87.90	215	86.35	35	81.40	364.00	83.87	15.402	0.220
Often	55	8.70	10	6.37	23	9.24	5	11.63	32.00	7.37		
Sometimes	16	2.53	7	4.46	9	3.61	2	4.65	18	4.15		
Never	17	2.69	2	1.27	2	0.80	1	2.33	20	4.61		
Q5/How much are you committed to the social distancing measure of staying at home during partial lockdown?												
Always	539	85.28	126	80.25	216	86.75	35	81.40	347.00	79.95	21.120	0.049*
Often	77	12.18	27	17.20	30	12.05	6	13.95	67.00	15.44		
Sometimes	14	2.22	3	1.91	3	1.20	2	4.65	11	2.53		
Never	2	0.32	1	0.64	0	0.00	0	0.00	9	2.07		

*Significant at level 0.05

Table 7 Health care workers comparison of answers (N = 1515)

Answer	Yes ($n=334$)		No ($n=1181$)		Chi-square	P-value
	n	%	*n*	%		
Q1/How much are you committed to the social distancing measure of not attending gatherings out of home?						
Always	248	74.25	879	74.43	3.304	0.347
Often	73	21.86	261	22.10		
Sometimes	13	3.89	33	2.79		
Never	0	0.00	8	0.68		
Q2/How much are you committed to the social distancing measure of maintaining a safe distance from other people?						
Always	207	61.98	774	65.54	2.629	0.452
Often	91	27.25	277	23.45		
Sometimes	27	8.08	89	7.54		
Never	9	2.69	41	3.47		
Q3/How much are you committed to the social distancing measure of no physical contact (like hand shaking, hugging)?						
Always	268	80.24	819	69.35	17.560	0.001*
Often	44	13.17	224	18.97		
Sometimes	18	5.39	88	7.45		
Never	4	1.20	50	4.23		
Q4/How much are you committed to the social distancing measure of not having meals with others?						
Always	281	84.13	1015	85.94	7.263	0.064
Often	34	10.18	91	7.71		
Sometimes	15	4.49	37	3.13		
Never	4	1.20	38	3.22		
Q5/How much are you committed to the social distancing measure of staying at home during partial lockdown?						
Always	278	83.23	985	83.40	1.484	0.686
Often	48	14.37	159	13.46		
Sometimes	7	2.10	26	2.20		
Never	1	0.30	11	0.93		

*Significant at level 0.05

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no known competing financial interests or personal relationships that could influence the work reported in this paper.

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