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Community-based observational assessment of compliance by the public with COVID19 preventive measures in the south of Saudi Arabia

Ibrahim M. Gosadi^{a,*}, Khaled A. Daghri^b, Ahmad A. Shugairi^b, Ali H. Alharbi^b, Abdullatif Z. Suwaydi^b, Mohammed A. Alharbi^b, Ali A. Majrashi^b, Ibrahim A. Sumayli^b^a Department of Family and Community Medicine, Faculty of Medicine, Jazan University, 82621 Jazan, Saudi Arabia^b Faculty of Medicine, Jazan University, 82621 Jazan, Saudi Arabia

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ABSTRACT

Background: At the end of August 2020, a surge in the number of cases in the Jazan region has been observed. The number of reported cases by 19th of August in the Jazan region was more than 300, which exceeded the number of reported cases in larger regions such as Riyadh, and Makkah. This study aims to measure compliance by the public with COVID-19 preventive measures.

Methods: This study was a cross-sectional, field-based observational assessment of compliance by individuals in public settings with COVID-19 preventive measures in the Jazan region of Saudi Arabia. The assessment was performed in the last week of July 2020. The assessment was based on observing the actual compliance of individuals and different establishments in the Jazan region with COVID-19 preventive measures. To perform the field observations, a standardised check-list was adopted from COVID-19 preventive measures in the community, which was developed by the Saudi Centre for Disease Prevention and Control (CDC).

Results: A total of 1096 individuals were observed in 69 different locations in the Jazan region. Compliance by the observed individuals was variable depending on the age group, the setting and the recommended preventive practice. The findings indicate very low compliance of specific precautionary measures within public parks in comparison to other measured settings. Proportions of individuals not compliant with mask-wearing instructions varied according to settings and age group from 5% in malls and shopping areas to nearly 83% in public parks. Additionally, Proportions of children not compliant with mask-wearing instructions was higher in comparison to adults in all observed settings.

Conclusions: The findings of this study identified variability in the levels of compliance with specific preventive measures against COVID-19. Further assessment is needed to explore factors associated with the limited observed compliance, in particular with regard to limited compliance to precautionary measures applied in specific settings and compliance of children to mask-wearing instructions.

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Abbreviations: COVID-19, Coronavirus disease 2019; GAS, General Authority for Statistics; MoH, Ministry of Health; SARS-CoV-2, Severe Acute Respiratory Syndrome Coronavirus 2; Saudi CDC, The Saudi Center for Disease Prevention and Control; WHO, World Health Organization.

* Corresponding author at: Faculty of Medicine, Jazan University, P.O. Box: 2349, 82621 Jazan, Saudi Arabia.

E-mail address: igosadi@jazanu.edu.sa (I.M. Gosadi).

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1. Introduction

Coronavirus disease 2019 (COVID-19), or severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a viral disease caused by a new strain of coronaviruses (Woo et al., 2010). At the end of 2019, the initial outbreak of COVID-19 was announced in Wuhan, China, establishing evidence of human-to-human transmission (Li et al., 2020). The World Health Organization (WHO) announced COVID-19 as a Public Health Emergency of International Concern at the end of January 2020 (WHO, 2020a).

COVID-19 has been reported to have various clinical manifestations although the main clinical presentation of the disease is characterised by fever, cough and fatigue (Huang et al., 2020).

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COVID-19 is highly infectious, and nine months after the initial outbreak in China, nearly 22 million confirmed cases in the world have been reported to WHO, including more than 770,000 deaths (WHO, 2020b). The COVID-19 pandemic implications have led to the application of public health preventive measures in different international and national scenarios.

Saudi Arabia was one of the countries that applied early preventive measures to reduce the incidence of COVID-19 where the first actions taken were related to banning direct flights between China and Saudi Arabia and suspending entry of international visitors, including international visitors to Makkah and Madinah, during February 2020. Nonetheless, the first identified case of COVID-19 in Saudi Arabia was reported in a Saudi traveller returning from Iran in March 2020, who did not declare his travel history upon his return to Saudi Arabia (Algaissi et al., 2020). Since then, more than 300,000 confirmed cases of COVID-19 and more than 3,400 related deaths were reported by the end of August 2020 (MoH, 2020).

In addition to the restriction of international travel to and from Saudi Arabia, the Saudi Arabian government, through multiple agencies, including the Ministry of Health (MoH) and the Saudi Center for Disease Prevention and Control (Saudi CDC), developed several public health protocols and applied different preventive initiatives in an effort to halt the spread of the disease. One of the early public health interventions was the implementation of a curfew on 23rd March (SPA, 2020). The curfew was terminated at the end of May 2020 when several social distancing measures were enforced (GASSEM and OBAID, 2020). In addition to developing protocols for health professionals, several protocols were developed for the public providing practical instructions ensuring appropriate implementation of social distancing measures in different settings. These settings included but were not limited to mosques, recreational areas, workplaces and shopping areas (CDC, 2020).

There are multiple studies conducted in Saudi Arabia to measure awareness, and practice of the public toward preventive precautionary measures against COVID-19 (Almutairi et al., 2020, Almotfada et al., 2020, Alahdal et al., 2020). The identified studies utilized an online approach to assess the reported levels of the compliance rather than measuring the actual practice. However, the identified findings indicated variability in the reported levels of compliance where this variability can be influenced by variation of demographics characteristics and types of measured precautionary practices. The proportion of subjects whom were labelled as having poor compliance with precautionary measures varied between 18% (Alahdal et al., 2020) to 53% (Almutairi et al., 2020). Similarly, other international studies conducted in Asia and Africa utilized a similar approach of measuring the reported level of compliance via self-administered questionnaires and the proportion of subjects identified to have a limited compliance varied between 48% and 64% according to the measured practices (Azlan et al., 2020, Hager et al., 2020).

Since the first identified case of COVID-19 in Saudi Arabia, there has been a variation in trends of the disease incidence between different regions in the country. The first identified case of COVID-19 in the Jazan region was reported in late March 2020. However, at the time of writing this report at the end of August 2020, a surge in the number of cases in the Jazan region has been observed. For example, the number of reported cases by 19th of August in the Jazan region was more than 300, which exceeded the number of reported cases in larger regions such as Riyadh, Makkah and Madinah. One of the factors that might contribute to the surge of cases by the end of August is the level of compliance with the preventive measures in the region. Currently, compliance by individuals in Jazan, Saudi Arabia with COVID-19 preventive measures in a community settings has not been measured. This study aims to

measure compliance by the public with COVID-19 preventive measures according to the Saudi CDC preventive measures protocol in public settings.

2. Materials and methods

2.1. Study context

This study was a cross-sectional, field-based observational assessment of compliance by establishments with preventive measures against COVID-19 and compliance by individuals visiting those establishments in the Jazan region of Saudi Arabia. The assessment was performed in the last week of July 2020. The assessment was conducted in major cities in the region including Jazan, Sabia, Abu-Arish, Al-Ahad, Samtah and Al-Tuwal. The selection of these cities was performed after consulting the Population Distribution In Governorates of Jazan Region Report 2014 (GAS, 2014) where the identified cities were located in governorates with larger number of individuals in comparison to other governorates and representing 65% of the total population in the Jazan region. The sampling of establishments within the identified cities was performed conveniently while ensuring equal representation of types of establishment within each selected city.

2.2. Data collection

The assessment was based on observing the actual compliance of individuals and different establishments in the Jazan region with COVID-19 preventive measures. This study did not involve any direct interaction between data collectors and observed individuals, and the targeted subjects were observed in their natural settings. This approach was implemented to reduce the risk of COVID-19 transmission to the data collection team and to reduce the probability of inducing social desirable behaviour of the observed individuals. Ethical approval to conduct the study was waived as only observations were performed, and no individuals were approached or recruited during data collection.

To perform the field observations, a standardised check-list was adopted from COVID-19 preventive measures in the community, which was developed by the Saudi CDC (CDC, 2020). Four different checklists were developed to measure compliance by individuals in the community with COVID-19 preventive measures in mosques, malls and shopping areas, public parks and barbershops. The checklists involved observations related to compliance by establishments with preventive measures against COVID-19 and compliance by individuals visiting those establishments. These settings were selected owing to ease of access and the possibility of performing observations without interference with observed individuals. Collected items were related to location and time of data collection, age group of the observed individuals and other precautionary measures summarised in Table 1 according to each setting.

The standardized check-list was developed via a consultant epidemiologist and data collection were performed via trained medical students. To ensure standardization of assessment method, a workshop was conducted to train the data collectors about definitions of measured practices as described by the Saudi CDC (CDC, 2020). Furthermore, the piloting stage involved assessment of the developed check-list and any detection of any potential variations in the performing the assessments by the data collectors.

Assessment of the compliance by establishments and visiting individuals was performed via counting each observed practice during the assessment period of each location. Each location was assessed once and the observation period for each location varied between one and three hours depending on the number individu-

Table 1
Summary of COVID-19 preventive measures in mosques, malls and shopping areas, parks and barbershops:

Mosques
Keeping a distance of 1.5 m between worshippers
Provision of hand sanitisers
Provision of tissues
Wearing masks or cloth face coverings ensuring covering nose
Bringing mat to mosque
Provision of pedal bins
Frequent ventilation with fresh air when possible
Malls and shopping areas
Checking temperature at entrance
Not allowing customers without masks or cloth face coverings to enter stores
Provision of queue stickers
Displaying store capacity
Compliance by employees with mask-wearing instruction and distancing during work
Public parks
Provision of supervisors
Disinfection of children's playgrounds every two hours
Bringing own seating
Provision of hand sanitisers
Provision of tissues
Compliance by visitors with instructions on wearing masks
Barber shops
Keeping a distance of 1.5 m between chairs
Temperature check at entrance and asking about respiratory symptoms of customers
Compliance by barbers with instructions on masks, face shields and provision of neck stickers to customers

als visiting each establishment at the time of performing the observations. Assessment of the individuals' practices was performed via counting the observed practices of each individual visiting the site during the assessment period.

2.3. Data analysis

Data was analysed via the Statistical Package for the Social Sciences (SPSS) (version 25) (IBM). Binary and categorical data were analysed using frequencies and proportions. Since four different checklists were used to measure overall compliance in community settings, the number of compliance observations for each specific preventive instruction was reported via the frequency of observations and proportion in each observed setting. The frequencies were the exact number of observed practices either applied by the establishment or performed via the observed individuals. The proportions of compliant establishment according to the measured practice were calculated via dividing the number of compliant establishment over the total number of observed establishments. The proportions of compliant individuals according to the measured practice were calculated via dividing the number of compliant individuals over the total number of the observed individuals during the observation period.

To allow comparison between the observed practices of individuals according to age groups, the analysis was performed after grouping the sample to children group and adult group. Finally, the proportion of individuals whom were wearing their masks or cloth correctly and covering their nose was assessed via dividing the number of observed individuals covering their faces correctly with masks or cloth by the total number of observed subjects covering their faces with a mask or a cloth.

3. Results

A total of 1096 individuals were observed in 69 different locations in the Jazan region. A detailed description of compliance by

public facilities with COVID-19 preventive measures is given in Table 2 according to the facility type. Within the 21 mosques observed, it was noted that in the majority of the mosques, the application of stickers with the recommended distance of 1.5 m was present (66.7%). Additionally, tissues were provided in the majority of the observed mosques (66.7%). However, around one-third of the observed mosques provided hand sanitisers and around 10% provided a pedal bin as instructed by the COVID-19 prevention measures. Finally, ventilation via opening windows or doors was reported in a minority of mosques, which can be explained by the hot weather during the month of July in the region.

Within the 22 observed shopping areas, 95% of the shops provided distance queue stickers, and 91% provided hand sanitisers. Additionally, 77% of the shops provided temperature checks of visitors upon entry. However, 41% of the observed shops allowed unmasked people to enter, and only three shops (13.6%) displayed information about their stores' visitor capacity. Within the 22 observed shops, a total of 41 employees were observed, and distancing measures between employees were maintained in 73% of the shops, but only 65.8% of the observed employees were wearing masks correctly.

Table 2
Assessment of compliance with preventive measures among public setting establishments in the Jazan region during July 2020:

Variables	Frequency	Proportion
Mosques		
Provision of hand sanitisers	7	33.3%
Provision of tissues	14	66.7%
Provision of pedal bins	2	9.5%
Provision of distance stickers		
No distance stickers	3	14.3%
Stickers are less than 1.5 m apart	4	19%
Stickers are 1.5 m or more apart	14	66.7%
Mosque ventilation		
Opening windows	3	14.2%
Doors are left open	1	4.7%
Total number of observed mosques	21	
Malls and shopping areas		
Provision of hand sanitisers	20	90.9%
Checking temperature at entrance	17	77.3%
Allowing unmasked people to enter	9	40.9%
Keeping a distance between employees	11	73.3%
Displaying stores' visitor capacity	3	13.6%
Provision of queue stickers	21	95.5%
Total number of observed shopping areas	22	
Employees wearing masks correctly	27	65.8%
Total number of employees observed	41	
Public parks		
Provision of hand sanitisers	0	0%
Provision of tissues	2	16.7%
Provision of pedal bins	2	16.7%
Temperature check	0	0%
Allowing unmasked people to enter	11	91.7%
Disinfecting children's playgrounds every two hours	0	0%
Total number of public parks observed	12	
Barbershops		
Provision of hand sanitisers	10	71.4%
Provision of tissues	14	100%
Provision of pedal bins	3	21.4%
Temperature check	1	7%
Number of observed barber shops	14	
Barbers wearing masks correctly	16	66%
Barbers wearing shields	9	37.5%
Barbers wearing gloves	12	50%
Total number of barbers observed	24	

Within the 12 observed public parks, none of the parks provided hand sanitisers or temperature checks upon entry. Additionally, only two parks provided tissues or pedal bins (16.7%). Only one park applied measures of not allowing unmasked people to enter parks, and none of the parks performed disinfection of children's playgrounds every two hours.

Within the observed 14 barbershops, all shops provided tissues, and 71% provided hand sanitisers. Only three shops provided pedal bins (21.4%), and only one barbershop performed temperature checks on the entry of their customers. Within the observed barbershops, a total of 24 barbers were observed, and only 66% of them wore masks correctly. Only 37.5% were wearing face shields at the time of observation, and only half of them wore gloves.

Table 3 displays observations on compliance by individuals with COVID-19 prevention in public areas and divided according to age groups. A total of 372 individuals were observed in mosques where 95% of them were adults. Among the mosque attendees, only 75.4% of them were wearing masks or a cloth face covering, and of these, where half of the children were not wearing any face coverings. Additionally, among adults whom were wearing a mask

Table 3
Observations concerning compliance by individuals with COVID-19 preventive measures in public settings in the Jazan region during July 2020 according to age groups:

Variables	Age groups: n [%]	
	Children	Adults
Setting:		
Mosques		
Face covering		
None	9 [50%]	71 [20.2%]
Mask	8 [44.4%]	248 [70.2%]
Cloth	1 [5.6%]	35 [9.6%]
Subjects wearing masks or cloth incorrectly (nose not covered)*	1 [11.1%]	52 [18.4%]
Own prayer mat brought	12 [66.7%]	262 [74%]
Total number of observed individuals at mosques	18	354
Malls and shopping areas		
Face covering		
None	14 [33.4%]	13 [5%]
Mask	25 [59.5%]	178 [68.7%]
Cloth	3 [7.1%]	68 [26.3%]
Subjects wearing masks or cloth incorrectly (nose not covered)*	5 [17.9%]	54 [22%]
Total number of observed individuals at shopping areas	42	259
Public parks		
Face covering		
None	55 [83.3%]	98 [51.6%]
Mask	10 [15.2%]	62 [32.6%]
Cloth	1 [1.5%]	30 [15.8%]
Subjects wearing masks or cloth incorrectly (nose not covered)*	5 [45.4%]	42 [45.6%]
Using own seating	18 [27.2%]	67 [35%]
Total number of observed individuals at recreational areas	66	191
Barbershops		
Face covering (during waiting)		
None	14 [50%]	30 [41.1%]
Mask	12 [42.9%]	33 [45.2%]
Cloth	2 [7.1%]	10 [13.7%]
Subjects wearing masks or cloth incorrectly (nose not covered)*	0 [0%]	12 [27.9%]
Using nick stickers	8 [28.5%]	21 [28.8%]
Total number of observed individuals at barbershops	28	73

* Among those covering their faces with a mask or a cloth.

or a cloth, 18.4% of them were not covering their nose. Majority of the worshippers were observed to bring their own mat to the mosques.

Within the observed shopping areas, 301 individuals were observed, of whom 86% were adults. Among individuals observed in shopping areas, the proportion of children not wearing any face covering was higher in comparison than adults. However, the overall proportions of those wearing face covering in malls and shopping areas was than higher than the proportion observed in mosques. Additionally, about a fifth of those observed wearing masks or cloth face coverings were wearing them incorrectly.

Within the observed public parks, 257 individuals were observed, of whom 74% were adults. Majority of the observed children and more than half of the adults were not wearing any face covering. Additionally, among adults and children wearing masks or cloth, 45% of them were not covering their noses. Among the public park attendees, only about 31% of them were using their own seating.

Finally, 101 visitors to barbershops were observed, of whom 72.3% were adults. Among individuals attending barbershops, about 54% of the customers were wearing masks or cloth face coverings. Around one third of the adults were observed to wear masks or cloth in correctly. Among the attending customers, about 29% had the recommended nick stickers where the proportions of those wearing nick stickers were similar among children and adults.

4. Discussion

This study was a cross-sectional observational assessment of compliance by establishments with preventive measures against COVID-19 and compliance by individuals visiting those establishments in the Jazan region of Saudi Arabia. Compliance by the establishments was variable depending on the measured practices where the lowest compliance proportions were observed in public park. Additionally, compliance by the observed individuals was variable depending on the setting and the recommended preventive practice. The findings indicate very low compliance within public parks to recommendations pertaining to face covering in comparison to other measured settings. Additionally, compliance in prayer areas to face covering recommendations was lower in comparison to malls and shopping areas. Proportions of children not compliant with mask-wearing instructions was higher in comparison to adults in all observed settings. Additionally, among those who were observed covering their faces, the proportions of individuals seen not covering their faces correctly was variable and highest proportion was observed in public parks. Although control over the presence of children in public settings was advised, the findings of our assessment indicate variability according to the settings where the highest proportion of children was observed in barbershops and public parks.

Although no similar observational assessment conducted in Saudi Arabia was found in the literature, this study can be compared to multiple online studies measuring the reported practice of individuals in the country concerning the prevention of COVID-19. In a study measuring knowledge of, attitude to and practice of individuals in Saudi Arabia concerning COVID-19, a total of 3388 participants responded to the online questionnaire. The overall findings of the study indicate a good knowledge and an appropriate practice toward the prevention of COVID-19 where the overall score of the reported practice was 4.34/5 (Standard deviation: 0.87). However, an extensive variation in the level of participation from each region was observed where only 19 respondents (less than 1%) were from the Jazan region (Al-Hanawi et al., 2020).

In another similar online assessment conducted in Saudi Arabia with a total of 6000 respondents, it was reported that the majority of their respondents were knowledgeable about the virus and its methods of transmission. However, assessment of preventive practice was limited to how the respondents would protect themselves from being infected rather than measuring the reported practice of the respondents (Almofada et al., 2020). Two similar, smaller online studies targeting subjects in Saudi Arabia indicated high overall compliance rates and higher compliance among females in Saudi Arabia in comparison to males (Alshammery et al., 2020, Alahdal et al., 2020). Finally, in contrast, an online assessment by Almutairi et al. involving 1232 participants in Saudi Arabia indicated that 53.3% of their respondents were considered as showing poor compliance with precautionary measures against COVID-19 (Almutairi et al., 2020). However, the study by Almutairi et al. did not provide elaboration on distribution of their respondents according to the regions. Although the methodologies and concept of the reviewed studies are different from the current investigation, it is possible to argue that, with the exception of the study by Almutairi et al., the high reported compliance rates noted in these studies are likely to be higher than the actual compliance as detected in our investigation.

The findings of our study can be compared to other international investigations measuring practice concerning prevention of COVID-19. In a Chinese study measuring knowledge of, attitude to and practice in the disease, almost all of their participants reported wearing masks (Zhong et al., 2020). However, a similar Malaysian study reported different findings where nearly half of their respondents reported not wearing masks (Azlan et al., 2020). Additionally, in a similar study conducted in Egypt and Nigeria, only 36% of the participants reported compliance with health recommendations concerning the disease (Hager et al., 2020).

This study has several strengths and limitations. The strength of this study stems from measuring the actual practice of observed individuals via real-time field assessment rather than relying on reported preventive practices. Additionally, the assessment was made without interference with the observed individuals and therefore measured the practice in natural settings. The major limitation of this study was related to the inability to accurately measure the age of the respondents so the classification of the respondents as adults or children was subjective. Finally, observations on females in the studied community were very limited due to cultural reasons as the majority of the females in the region were wearing veils and were less likely to attend specific settings such as mosques.

5. Conclusion

The findings of this study identified variability in the levels of compliance with specific preventive measures against COVID-19 developed by the Saudi CDC. Further assessment is needed to explore factors associated with the limited observed compliance, in particular with regard to limited compliance to precautionary measures applied in parks and mosques and compliance of children to mask-wearing instructions. Additionally, performing similar observational assessment in other regions in the country may help to assess the variability in the in levels of compliance with the preventive measures against COVID-19 and to have better understanding of behaviour of different communities toward prevention of the disease.

Declaration of Competing Interest

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

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Nothing to declare.

Contributors

IG: Study concept and drafting of manuscript.
 KD: Study design and analysis.
 AS: Data analysis.
 AA: Data collection and analysis.
 AS: Drafting and revision of manuscript.
 MA: data collection and analysis.
 AM: Drafting and revision of manuscript.
 IS: Drafting and revision of manuscript.

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