

## How Do Gulf Countries Inhabitants Perceive Hygienic tools and Personal Protective Equipment Against COVID-19?



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**Abstract**— COVID-19, an RNA virus that is a member of the Coronaviridae family is currently considered a global pandemic by the World Health Organization (WHO). This obligates the implementation of special universal precautions and guidelines. Saudi Arabia (SA) followed the WHO guidelines by adopting the Personal Protective Equipment (PPE) as a guard against this infection. The aim is to report the knowledge and perception about COVID-19 infection and its protective measures. These include hygienic tools and PPE. The study targeted the inhabitants of Gulf Cooperation Council (GCC) with a special emphasis on SA. A cross-sectional anonymous Arabic language questionnaire-based study was performed. It included forty-four questions to gauge the correlations between sociodemographic data, knowledge and perception of preventive tools against COVID-19. The study included 3278 participants. The majority of the sample (98.5%) lived in SA. Excellent knowledge and perception about COVID-19 prevention were noted in 16% of the respondents. Most participants (70.6%) wore gloves after a proper hand hygiene. Moreover, 97.1% had employed face masks in public. Fortunately, 98.7% followed the WHO guidelines of social distancing. The Gulf inhabitants, particularly those of SA, are more knowledgeable with a positive attitude towards the proper hygienic tools and PPE in preventing COVID-19 infection. This may be attributed to the comprehensive Ministry of Health protective guidelines.

**Keywords** COVID-19, Personal Protective Equipment (PPE), GCC, Perception

### Introduction

Coronavirus disease 2019 (COVID-19) is a recent global threatening infection that was initially reported in China by the end of 2019.<sup>1</sup> However, a rapid global viral propagation was recorded. This obligated the World Health Organization (WHO) to announce the virus as a universal pandemic.<sup>2</sup> Moreover, protective guidelines were set by the same organization to be adopted worldwide. The Saudi Ministry of Health (MOH) had implanted dynamic comprehensive measures to deal with this viral infection. They focus on scanning of infected cases, isolation, contact tracing, quarantine application, social distancing, and implementation of special hygienic protocols and application of Personal Protective Equipment (PPE).<sup>3</sup> These strategies correspond with WHO which stated that hand hygiene of at least 40 seconds, social distancing not less than one meter (3 feet), face mask usage, quarantine, and home isolation is crucial to control the viral spread.<sup>4,5</sup> Varieties of pathological and clinical disorders may take place due to COVID-19 infection. These extend from mild respiratory tract infections to more serious complications.<sup>6</sup> However, the most common clinical presentations include fatigue, fever, and dry cough. Extra manifestations may involve diffuse body ache, nasal congestion, runny nose, sore throat, abdominal pain, vomiting, diarrhea as well as some ophthalmological and cardiac manifestations.<sup>6</sup>

This study aimed to evaluate the Gulf Cooperation Council (GCC) inhabitants' knowledge and perception about COVID-19 pandemic with a special emphasis on its protective tools and guidelines.

## **Methodology**

The ethical approval was issued by our Institutional Research Board (IRB) concerning all of the study-ethically-related issues. An anonymous cross-sectional Arabic language questionnaire-based survey was conducted targeting the GCC inhabitants. The study was carried out through an online survey. The questionnaire included forty-four questions of different varieties in accordance with the study aim. It was divided into six sections (Appendix 1). Parents and caregivers were also permitted to answer the questions. Statistical analysis of data was performed using Statistical Package for Social Sciences (SPSS) for version 26.0. Armonk, NY, IBM corporation. Data were presented in tables and figures. Pearson's Chi-square test was used for finding any statistical relationship between categorical variables. A value of  $P < 0.05$  was considered to be statistically significant.

## **Results**

Three thousand two hundred seventy-eight respondents were included in this study. Most of them were living in Saudi Arabia (98.5%). Only 1.5% of the respondents lived in other GCC nations. Two thousand two hundred forty-two participants were females, while one thousand thirty-six were males with the ratio of 2.2:1. The sociodemographic data of the studied respondents is shown in Table 1. Their mean knowledge score was  $6.77 \pm 1.72$  with 16% having excellent knowledge about PPE in controlling COVID-19 (Figure 1). The gender difference about the perception of PPE is shown in Tables 2 and 3. They also expressed the relationship between knowledge and perception to the sociodemographic particulars. Good knowledge and perception scores were encountered in 73% of the studied sample (Figure 2). The data also showed that 70.6% of the sample were wearing gloves (Figure 3). Proper and regular hand sanitization was practiced among 93.5% (Figure 4). The majority of the studied sample (97.1%) employed facemasks in public as shown in Figure 5. The importance of social distancing was highly pronounced among the respondents (98.7%). A low percentage of participants (27.5%) took off their shoes once arriving home. (Figure 6).

## **Discussion**

The role of Personal Protective Equipment (PPE) against COVID-19 has been highlighted since the ignition of the pandemic.<sup>7</sup> WHO and MOH had suggested many community protective guidelines against the viral infection,<sup>8-9</sup> they mainly aimed to protect the population against infection propagation to abort the pandemic. The precautions as per these guidelines do include varieties of items such as; proper hand hygiene protocols using soap and water and/or sanitizers, social distancing, proper coughing and sneezing etiquettes, and self-isolation in case of contracting the viral infection.<sup>4</sup> The current study reported the vast majority of studied sample to have a quite satisfactory knowledge about applying PPE to prevent COVID-19. This data is consistent with that of a previously published similar study.<sup>10</sup> COVID-19 has proven to be highly contagious during close contact.<sup>11</sup> This highlights the importance of social distancing or even lockdown/curfew as a crucial tool to control the pandemic. Most of this study participants have appraised the role of the lockdown in controlling COVID-19 spread, despite the limited information resources.

Moreover, the current study estimated that protocols for appropriate hand hygiene between participants were (93.5%) which is parallel with a recent similar study where (87.8%) of the participants have followed this protocol.<sup>12</sup> The educational level had played a great role in influencing the knowledge and perception of our questionnaire respondents. It postulated a positive relationship between education and the perception of COVID-19 information and protective measures. These data coincide with previously published reports from different resource settings.<sup>13-14</sup> Using gloves is of paramount importance in controlling COVID-19 spread. It was estimated that 82.4% of the studied population were acquainted with this concept concurring with other data.<sup>15</sup> Moreover, 97.1% of the current study sample applied facemask as a protective tool against the infection spread. These data are highly supported by many previous local and/or international recommendations.<sup>16-18</sup> The Center for Disease Control and Prevention (CDC), as well as others, have announced special guidelines for facial protection and hygienic protocols in addition to the guidelines for social distancing.<sup>19-22</sup> The current study data reported 98.7% of participants to have knowledge

about the role of social distancing in preventing viral spread. This synchronized with another study that reported a similar percentage.<sup>21</sup> Our participants practiced social distancing that was recommended by the CDC.<sup>22</sup> They also have been well oriented about sneezing and coughing etiquettes as recommended by the CDC<sup>22</sup>.

The current data expressed that female participants have a better perception and knowledge about COVID-19. This coincides with a similar local study.<sup>23</sup> The reason may be related to the intensive efforts by the GCC to promote public general awareness about COVID-19. Information was sent through Short Message Service (SMS) to carry the recommendations and brief MOH guidelines. These messages were written in different languages targeting the local population and residents.<sup>24</sup> Motion graphics, posters, and advertisements were distributed through social media and Television channels.<sup>25</sup>

## Conclusion

With the efforts of MOH and WHO, the GCC inhabitants, particularly, in Saudi Arabia possess a higher knowledge and perception about the preventive guidelines against COVID-19. This may be attributed to the intensive MOH activities and efforts to raise public awareness and enhance the perception of this viral infection. Further similar studies may be needed to encourage public participation in applying the personal protective measures against this newly emerging virus.

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## Appendix 1

The distributed questionnaire

- Biographical data
  - Gender
    1. Male
    2. Female
  - Age
    1. Less than 18
    2. 18-30
    3. 30-40
    4. 40-50
    5. 50-60
    6. Over than 60
  - Educational level
    1. Elementary school
    2. Middle school
    3. High school
    4. Bachelor's degree / diploma
    5. Postgraduate
  - Marital status
    1. Single
    2. Married
    3. Divorced
    4. Widowed
  - Country of origin
    1. Kingdom of Saudi Arabia
    2. Bahrain
    3. United Arab Emirates
    4. Kuwait
    5. Qatar
    6. Oman
  - Province
    1. Eastern province
    2. Central region
    3. Northern province
    4. Western province
    5. Southern province
  - Area of living
    1. City
    2. Industrial city
    3. Village
    4. Rural area
  - Job
    1. Health sector

2. Educational sector
  3. Engineering sector
  4. Office / administrative job
  5. Student
  6. Unemployed
  7. Other
- Socioeconomic status
    1. Above average
    2. Average
    3. Less than average
  - Importance of staying at home
    - Do you think sitting at home and social distancing are important factors in protecting you from the emerging COVID-19 virus?
      1. Important
      2. Not important
      3. I don't know
  - Masks
    - Do you always wear face mask when going out to public places?
      1. Yes
      2. No
    - If yes, what kind of masks do you wear?
      1. Medical mask
      2. Cloth mask/fabric/homemade mask
      3. Respirators (FFR, N95, N99, FFP2)
    - Do you always make sure that the face mask covers the nose and mouth when wearing it at all times?
      1. Yes
      2. No
    - In your opinion, who of these groups are not obligated to wear a face mask when leaving the house?
      1. Children less than 2 years of age
      2. People with respiratory problems (asthma, lung disease, or heart disease patients)
      3. Incapacitated/unable to remove the mask on their own
      4. Elderly
      5. Children older than 2 years of age
      6. I don't know
    - How satisfied are you with this phrase: the medical mask should only be worn by health personnel and people in contact with patients with COVID-19.
      1. Agree
      2. Disagree
      3. I don't know
    - When taking off the mask
      1. Taking it off from the back while taking care not to touch any part of the front side of the mask
      2. Taking it off by pulling the front side of the mask
      3. I don't know
    - Do you replace the mask?
      1. Yes
      2. No
    - If yes, when do you replace it?
      1. After few hours
      2. When the mask gets wet, dirty, or damaged
      3. Whenever taking it off regardless of the time
      4. I reuse it

- How interested are you in that the cloth/fabric mask should be made out of 3 layers
  1. Important
  2. Not important
  3. I don't know
- If you use a cloth/fabric mask, do you wash/clean it after each use?
  1. Yes
  2. No, I wash it after reusing it twice or more
  3. I neither wash it nor clean it
- What do you use to clean and wash the cloth mask?
  1. Water only
  2. Bleach/chlorine
  3. Disinfectant (e.g. Dettol)
  4. Water and soap
  5. I don't know
- While washing and cleaning the cloth/fabric mask, do you care if the water temperature is high to make sure the germs are killed?
  1. Yes
  2. No
  3. I don't know
- How do you dry the cloth/fabric mask after washing and cleaning it?
  1. Clothes Dryer
  2. Sun drying
  3. Ironing
  4. Air drying
  5. I don't know
- How do you verify the efficiency of the mask when purchasing it?
  1. Blowing on a torch
  2. Depending on its source (e.g. from a pharmacy or a specific brand)
  3. I don't know
- If you wear a niqab, do you think the niqab provides adequate protection compared to the masks?
  1. No, a mask must be worn beside the niqab
  2. Yes, niqab is enough
- Gloves
  - How often should a pair of gloves be worn?
    1. Once
    2. Twice or more
    3. I don't know
  - Do you wear gloves in public places?
    1. Yes, with sterilizing my hands regularly
    2. Yes, without sterilizing my hands
    3. I don't wear gloves in public places
  - How do you dispose gloves and medical masks after using them?
    1. Throwing it in an open trash can
    2. Throwing it in a closed trash can
    3. Throwing it in the street
  - Do you make sure not to touch your nose, mouth, and eyes while wearing gloves in public places?
    1. Yes
    2. No
    3. I don't know
  - Do you make sure not to touch personal items while wearing gloves in public places?
    1. Yes
    2. No

3. I don't know
- When do you wash/sterilize your hands?
  1. Before/after wearing the gloves
  2. Before leaving home
  3. At the arrival to home
  4. When using personal items
  5. Before entering public places
  6. After entering public places
  7. I don't know
- When leaving, do you wear any of the following?
  1. Hand watches
  2. Bracelets
  3. Accessories
  4. Rings
  5. None
- Do you make sure to clean and trim your nails periodically to prevent germs from accumulating?
  1. Yes
  2. No
- Hand sanitizer
  - Do you continuously sterilize your hands?
    1. Yes
    2. No
    3. I wear gloves only without sterilizing my hands
  - What is your source for buying hand sanitizers?
    1. Pharmacies
    2. Personal care shops
    3. Other (e.g. supermarkets or online shopping)
  - Do you make sure when buying a hand sanitizer that it is FDA approved?
    1. Yes
    2. No
    3. I don't know
  - In your opinion, what is the ideal time for washing hands or sterilizing them?
    1. 10 seconds
    2. 20 seconds
    3. 30 seconds
    4. 40 seconds
    5. 50 seconds
    6. 60 seconds
    7. I don't know
- In public places
  - Do you make sure to keep a safe distance between you and other people around you in public places?
    1. Yes
    2. No
  - If yes, how long is the safe distance that should be kept between you and others around you in public places?
    1. 1 meter
    2. 2 meters
    3. 3 meters
    4. I don't know
  - When returning from a public place, do you make sure to take off your shoes before entering the house? And Do you sterilize them?
    1. Yes, I take them off and sterilize them

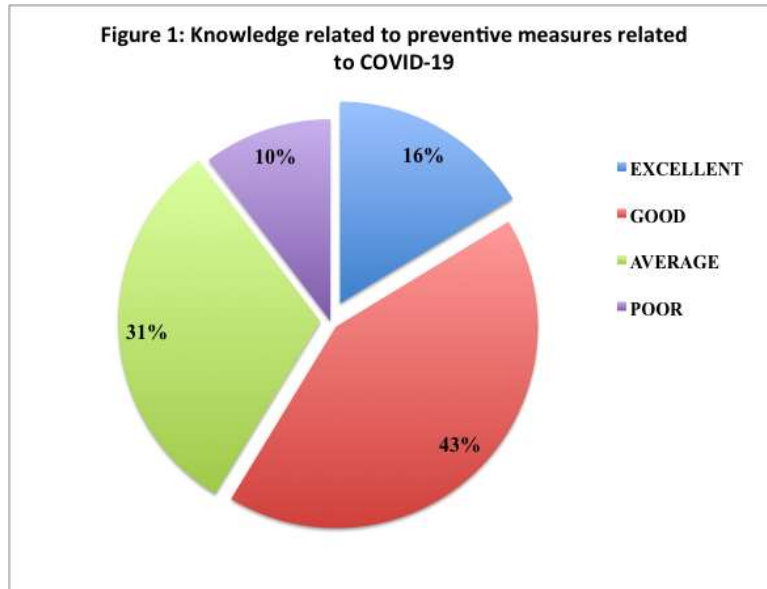
2. Yes, I take them off but I don't sterilize them
  3. No, I neither take them off nor sterilize them
  4. I don't know
- When returning home, do you change outer clothing before getting in close contact with anyone or something?
    1. Yes
    2. No
  - If yes, do you take a shower when returning home?
    1. Yes
    2. No
  - When purchasing items or receiving a package, which method do you prefer to sterilize?
    1. I don't sterilize them
    2. Washing them with water only
    3. Washing them with water and soap
    4. Using sterilizing sprays
    5. Using bleach/chlorine and water
    6. I don't know

**Appendix 2**

Tables and Graphs

<b>Table 1: Sociodemographic details</b>			
		Frequency	Percent
Gender	Female	2243	68.4
	Male	1035	31.6
Age	<18	80	2.4
	>60	140	4.3
	18-30	1145	34.9
	30-40	719	21.9
	40-50	707	21.6
	50-60	487	14.9
Educational level	Primary school	20	.6
	Middle school	81	2.5
	High schools	679	20.7
	Bachelors	2212	67.5
	Post graduate	286	8.7
Marital status	Single	1108	33.8
	Married	2052	62.6
	Divorced	73	2.2
	Widowed	45	1.4
Nationality	KSA	3228	98.5
	Bahrain	7	.2
	Kuwait	8	.2
	Oman	10	.3
	Qatar	10	.3
	UAE	15	.5
Province in KSA	Central	476	14.52
	East	2250	68.64
	North	82	2.50
	South	118	3.60
	West	352	10.74
Residence location	City	2986	91.1
	Industrial city	84	2.6
	Rural area	5	.2

	Village	203	6.2
Occupation	Educational sector	867	26.4

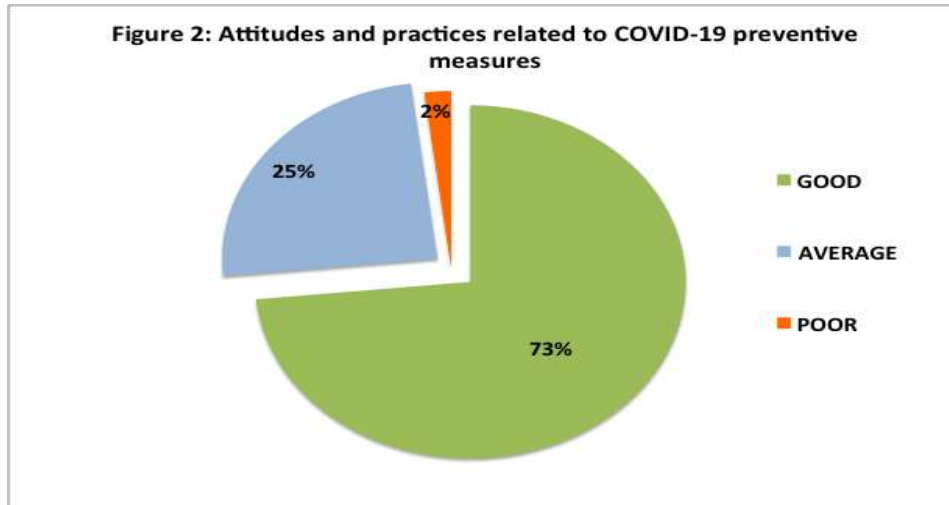


	Engineering sector	99	3.0
	Health sector	216	6.6
	Other	43	1.3
	Retired	114	3.5
	Student	695	21.2
	Unemployed	1244	37.9
Socioeconomic status	Above average	685	20.9
	Average	2348	71.6
	Less than average	245	7.5

**Table 2: Relationship of Knowledge with sociodemographic details**

		KNOWLEDGE				Total	P value
		EXCELLENT	GOOD	AVERAGE	POOR		
Gender	Female	N	344	932	720	247	0.007
		%	15.3%	41.6%	32.1%	11.0%	
Gender	Male	N	191	459	295	90	1035
		%	18.5%	44.3%	28.5%	8.7%	
Age	<18	N	7	33	27	13	80
		%	8.8%	41.3%	33.8%	16.3%	
	18-30	N	187	483	355	120	1145
		%	16.3%	42.2%	31.0%	10.5%	
	30-40	N	125	292	223	79	719
		%	17.4%	40.6%	31.0%	11.0%	
	40-50	N	108	333	195	71	707
%		15.3%	47.1%	27.6%	10.0%	100.0%	
50-60	N	78	198	169	42	487	
	%	16.0%	40.7%	34.7%	8.6%		100.0%
>60	N	30	52	46	12	140	
	%	21.4%	37.1%	32.9%	8.6%		100.0%
Education level	Primary school	N	3	6	10	1	20
		%	15.0%	30.0%	50.0%	5.0%	

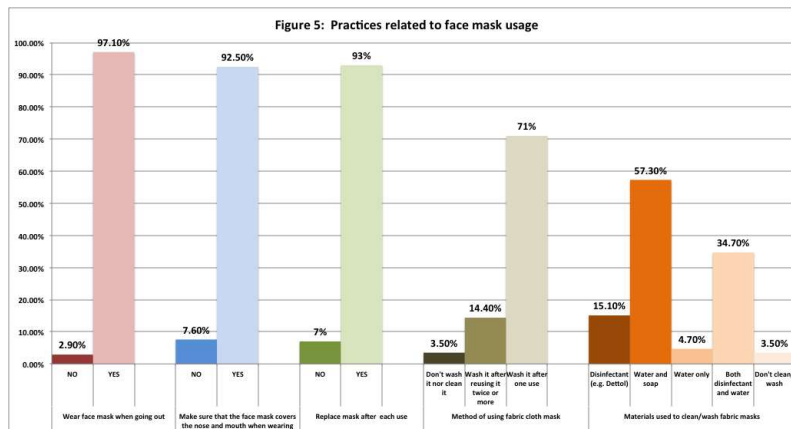
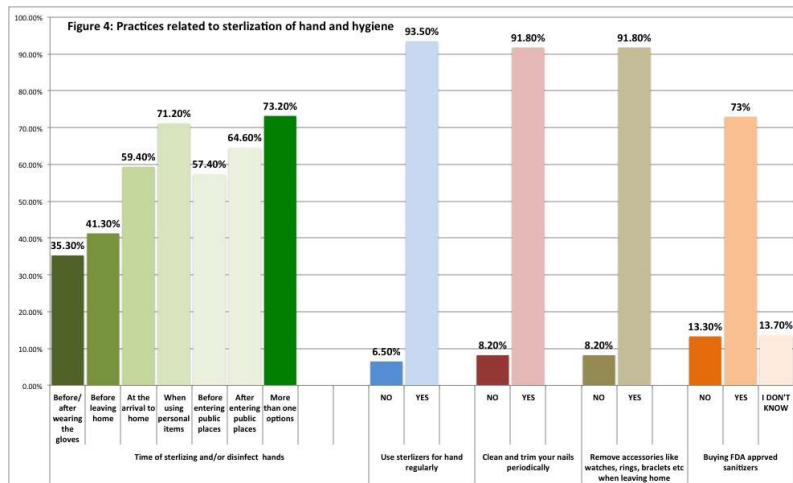
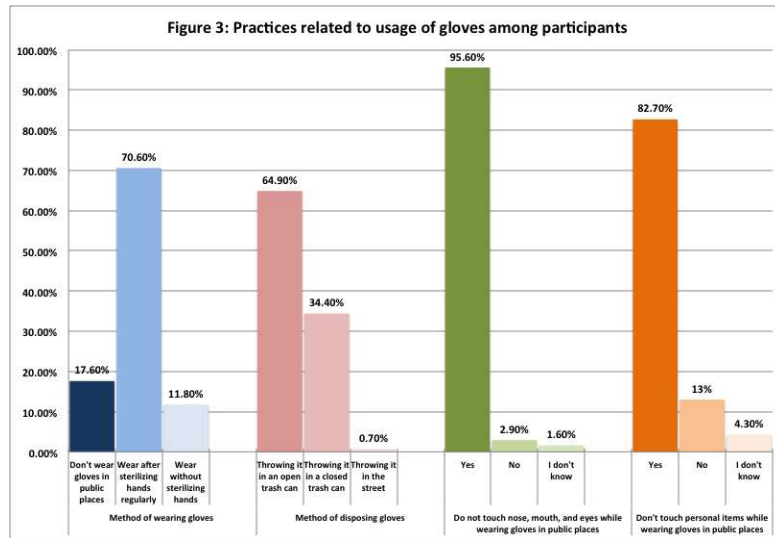
	Middle school	N	11	33	27	10	81	
		%	13.6%	40.7%	33.3%	12.3%	100.0%	
	High schools	N	110	272	212	85	679	
		%	16.2%	40.1%	31.2%	12.5%	100.0%	
Bachelors	N	357	950	688	217	2212		
	%	16.1%	42.9%	31.1%	9.8%	100.0%		
Post graduate	N	54	130	78	24	286		
	%	18.9%	45.5%	27.3%	8.4%	100.0%		
Marital status	Single	N	177	449	350	132	1108	0.003
		%	16.0%	40.5%	31.6%	11.9%	100.0%	
	Married	N	338	877	640	197	2052	
		%	16.5%	42.7%	31.2%	9.6%	100.0%	
Divorced	N	14	46	12	1	73		
	%	19.2%	63.0%	16.4%	1.4%	100.0%		
Widowed	N	6	19	13	7	45		
	%	13.3%	42.2%	28.9%	15.6%	100.0%		
Nationality	Saudi	N	530	1370	1001	327	3228	0.109
		%	16.4%	42.4%	31.0%	10.1%	100.0%	
Non-Saudi	N	5	21	14	10	50		
	%	10.0%	42.0%	28.0%	20.0%	100.0%		
Province in KSA	Central	N	74	187	157	58	476	<0.001
		%	15.5%	39.3%	33.0%	12.2%	100.0%	
	East	N	373	944	713	220	2250	
		%	16.6%	42.0%	31.7%	9.8%	100.0%	
	North	N	33	25	15	9	82	
		%	40.2%	30.5%	18.3%	11.0%	100.0%	
South	N	10	53	41	14	118		
	%	8.5%	44.9%	34.7%	11.9%	100.0%		
West	N	45	182	89	36	352		
	%	12.8%	51.7%	25.3%	10.2%	100.0%		
Residence location	City	N	484	1271	921	310	2986	0.835
		%	16.2%	42.6%	30.8%	10.4%	100.0%	
	Industrial city	N	11	35	29	9	84	
		%	13.1%	41.7%	34.5%	10.7%	100.0%	
Rural area	N	1	1	3	0	5		
	%	20.0%	20.0%	60.0%	0.0%	100.0%		
Village	N	39	84	62	18	203		
	%	19.2%	41.4%	30.5%	8.9%	100.0%		
Occupation	Educational sector	N	133	383	266	85	867	<0.001
		%	15.3%	44.2%	30.7%	9.8%	100.0%	
	Engineering sector	N	19	35	38	7	99	
		%	19.2%	35.4%	38.4%	7.1%	100.0%	
	Health sector	N	59	99	53	5	216	
		%	27.3%	45.8%	24.5%	2.3%	100.0%	
	Other	N	3	20	14	6	43	
		%	7.0%	46.5%	32.6%	14.0%	100.0%	
Retired	N	20	51	37	6	114		
	%	17.5%	44.7%	32.5%	5.3%	100.0%		
Student	N	112	278	225	80	695		
	%	16.1%	40.0%	32.4%	11.5%	100.0%		
Unemployed	N	189	525	382	148	1244		
	%	15.2%	42.2%	30.7%	11.9%	100.0%		
Socioecon	Above	N	115	297	205	68	685	0.613

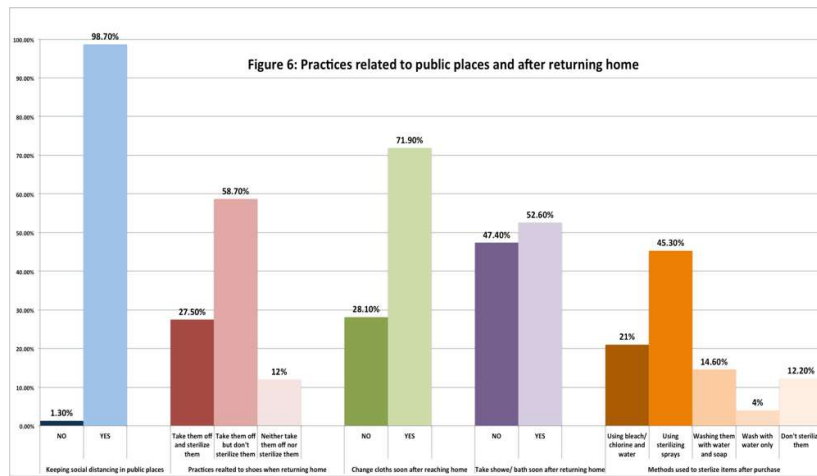


omic status	average	%	16.8%	43.4%	29.9%	9.9%	100.0%
	Average	N	386	990	723	249	2348
		%	16.4%	42.2%	30.8%	10.6%	100.0%
Less than average	N	34	104	87	20	245	
		%	13.9%	42.4%	35.5%	8.2%	100.0%

			PRACTICES AND ATTITUDES			Total	P Value	
			GOOD	AVERGAE	POOR			
Gender	Female	N	1683	517	43	2243	0.010	
		%	75.0%	23.0%	1.9%	100.0%		
Male	N	725	288	22	1035			
	%	70.0%	27.8%	2.1%	100.0%			
Age	<18	N	43	31	6	80		<0.001
		%	53.8%	38.8%	7.5%	100.0%		
	18-30	N	757	358	30	1145		
		%	66.1%	31.3%	2.6%	100.0%		
	30-40	N	553	151	15	719		
		%	76.9%	21.0%	2.1%	100.0%		
40-50	N	562	139	6	707			
	%	79.5%	19.7%	0.8%	100.0%			
>60	N	114	25	1	140			
	%	81.4%	17.9%	0.7%	100.0%			
Educational level	Primary school	N	16	3	1	20	0.713	
		%	80.0%	15.0%	5.0%	100.0%		
	Middle school	N	64	16	1	81		
		%	79.0%	19.8%	1.2%	100.0%		
	High schools	N	486	181	12	679		
		%	71.6%	26.7%	1.8%	100.0%		
Bachelors	N	1634	532	46	2212			
	%	73.9%	24.1%	2.1%	100.0%			
Postgraduate	N	208	73	5	286			
	%	72.7%	25.5%	1.7%	100.0%			

Marital status	Single	N	722	347	39	1108	<0.001
		%	65.2%	31.3%	3.5%	100.0%	
	Married	N	1590	436	26	2052	
		%	77.5%	21.2%	1.3%	100.0%	
	Divorced	N	62	11	0	73	
		%	84.9%	15.1%	0.0%	100.0%	
	Widowed	N	34	11	0	45	
		%	75.6%	24.4%	0.0%	100.0%	
Nationality	Saudi	N	2378	790	60	3228	<0.001
		%	73.7%	24.5%	1.9%	100.0%	
	Non-Saudi	N	30	15	5	50	
		%	60.0%	30.0%	10.0%	100.0%	
Province in KSA	Central	N	342	119	15	476	<0.001
		%	71.8%	25.0%	3.2%	100.0%	
	East	N	1644	574	32	2250	
		%	73.1%	25.5%	1.4%	100.0%	
	North	N	68	12	2	82	
		%	82.9%	14.6%	2.4%	100.0%	
	South	N	84	24	10	118	
		%	71.2%	20.3%	8.5%	100.0%	
West	N	270	76	6	352		
	%	76.7%	21.6%	1.7%	100.0%		
Residence location	City	N	2183	745	58	2986	0.456
		%	73.1%	24.9%	1.9%	100.0%	
	Industrial city	N	63	20	1	84	
		%	75.0%	23.8%	1.2%	100.0%	
	Rural area	N	5	0	0	5	
		%	100.0%	0.0%	0.0%	100.0%	
	Village	N	157	40	6	203	
		%	77.3%	19.7%	3.0%	100.0%	
Occupation	Educational sector	N	684	174	9	867	<0.001
		%	78.9%	20.1%	1.0%	100.0%	
	Engineering sector	N	72	26	1	99	
		%	72.7%	26.3%	1.0%	100.0%	
	Health sector	N	182	32	2	216	
		%	84.3%	14.8%	0.9%	100.0%	
	Other	N	31	12	0	43	
		%	72.1%	27.9%	0.0%	100.0%	
	Retired	N	83	30	1	114	
		%	72.8%	26.3%	0.9%	100.0%	
	Student	N	434	236	25	695	
		%	62.4%	34.0%	3.6%	100.0%	
Unemployed	N	922	295	27	1244		
	%	74.1%	23.7%	2.2%	100.0%		
Socioeconomic status	Above average	N	555	123	7	685	<0.001
		%	81.0%	18.0%	1.0%	100.0%	
	Average	N	1683	613	52	2348	
		%	71.7%	26.1%	2.2%	100.0%	
	Lessthan average	N	170	69	6	245	
		%	69.4%	28.2%	2.4%	100.0%	





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