

## How the public knowledge of covid 19 affects vaccine acceptance

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**Abstract:** The foundation of a nation's public knowledge is hinged on education, society, as well as culture. In this study, the extent to which the public knowledge of covid 19 influences acceptance of the vaccine will be examined through the method of comparing and contrasting the parameters that could result in variation observed in vaccine acceptance between two nations.

### 1. Introduction

Covid-19, the global pandemic that impacts approximately everyone on the planet. Notwithstanding, countries are beginning to examine the vaccine.

At the moment (**last updated Feb. 15, 2022**), "Over 4.88 billion individuals across the globe have been injected with a dose of Covid-19 vaccine, which is equivalent to approximately 63.6 percent of the world population."<sup>2</sup> Burundi has the lowest vaccination rate and U.A.E. has the highest number of vaccinations (Appendix A and B). Nevertheless, why is there a significant gap between the highest and the lowest? Is it not due to public knowledge? In my opinion, I believe it is.

### 2. The country with the highest vaccine acceptance

According to the data (Appendix A and B), the United Arab Emirates, the country with a 9.89 million population, has the highest vaccine acceptance. Generally, the United Arab Emirates recorded about 847K cases and 2,248 deaths (**last updated Jan 31, 2022**). In Total, the United Arab Emirates has given 23.8m vaccines, and 9.38m people have been completely vaccinated, which is approximately 94%. Summarizing the above information, the country does have considerable control of the pandemic, despite recording 847k cases, but only 2,248 deaths, implying about 0.2654% death rates.<sup>3</sup>

The public knowledge indicated significant proficiency of knowledge, along with expected practices.<sup>3</sup> In accordance with appendix C, 27.9% of the data collected came from males, while the female produces 72.1% of the data. Positive results were not obtained in any of them, and their ages were categorized into 3 groups, namely: 18, 29, 30, 49, 50, 50≤65, which have the respective percentages of 39.8%, 47% as well as 13.2%. 1.8% were the primary level of education or illiterate, 21.2% were high school/diploma, and 12% of them were at the postgraduate level of education. Appendix D presents residents in the country with a suitable knowledge score: 17 knowledge questions were (1.61 ± 0.48). The appropriate responses to what were asked were approximately 85%, indicating that most of them had a sufficient understanding of COVID-19. Appendix E was researched to determine if the resident followed the prevention rule of COVID-19, fortunately, the rate was actually high, 90.14%. From the results, it is demonstrated that critical assessment had been conducted on the Covid-19 issue. Furthermore, the Covid-19 information obtained by 75.2% of residents were from the ministry of health and prevention UAE (government sources), while for 42.4%, their source of information was the WHO, while 40.7%, 50.4%, 21.2%, as well as 5.75% of the residents obtained their information from the following sources namely; news, social media, family and friends and other sources respectively (the unit is 100%, notwithstanding, it is depicted in a bar graph meaning each data are separated, appendix F). Furthermore, the government demonstrates a positive attitude toward the vaccine, "Currently, according to the global ranking, the UAE is ranked second globally regarding rates of administering the vaccine. Being vaccinated is each person's responsibility in safeguarding

their health, families and general society,” by the decree of UAE ruler Sheik Mohammed bin Rashid Al Maktoum. They motivated citizens and residents to receive the vaccine. At the onset of the campaign, certain UAE ministers were equally given the COVID-19 vaccination, setting a fantastic example for the public. Resultantly, health infrastructure alongside human resources are essential determinants in the immunization rollout's effectiveness.<sup>3</sup> By implementing standard communication practices, the UAE government has performed commendably in tackling disinformation concerning the COVID-19 vaccine. The country made a declaration concerning the safety and efficacy of vaccinations. For instance, the #TogetherWeRecover campaign denotes an efficient approach for sensitizing the residents and people's awareness on the need for being immunized. "Furthermore, the government of the UAE has likewise tackled the issue of disinformation and ensure the public is updated concerning the recent developments on COVID- 19, inclusive of novel corona infections report, recovered cases, number of death cases, along with vaccine coverage."<sup>4</sup>

### 3. The country with the low vaccine acceptance

Contrastingly, the data with the lowest rate was not selected since the country was indeed under poverty, which might cause the data to be insignificant and unreliable. Pakistan, a developing nation with a total 220.9 million population (some might consider them under-developed, however, based on the improving economy I will consider them as a developing country) has 53% vaccine acceptance which is approximately 194m people, and 41% (89.9m) of them are fully vaccinated. In Pakistan, the total number of cases is approximately 1.48M, with the recorded death toll around 29,687, and from the computation, the rate is approximately 1.966% (last updated Jan 10, 2022). As a matter of fact, in contrast with the death rate of 0.265% recorded in the United Arab Emirates, (which recorded the total number of 847K cases and 2,248 deaths) is about seven times higher in proportion, which precisely after calculation will amount to 7,419). **Why is vaccine acceptance in Pakistan considerably low? Does it have to do with the low rate of public knowledge?** It is assumed by health authorities that through vaccination, it will be possible to curb the COVID-19 epidemic, nevertheless, it is unfortunate that the majority of individuals are not willing to receive the vaccine. According to the health officials, they believe that the COVID-19 vaccine will assist in curbing the outbreak, although the majority of individuals are not willing to become vaccinated. In Muslim-majority states, conspiracy theories grow similar to wildfire. In accordance with a survey, even though vaccination is free, 49 percent of Pakistanis are still hesitant to receive the vaccination. False religious beliefs coupled with misinformation, according to health experts, are fostering anti-vaccine sentiment. The epidemic is considerably regarded to be non-existent, and there is equally speculation that Western governments have implanted the 4 Surveillance microchips into the vaccination. Lack of trust in the vaccine is expressed by a cab driver, who speculates that the vaccine was a plot by a Western power to spy on residents of Pakistan and the adverse impact of the vaccine is capable of altering his DNA and subsequently affecting his progeny. A certain section of Pakistani equally believes that Islam forbids the vaccine due to the fact that part of its constituents includes pig 1 gelatin, alcohol, fetal tissue, as well as other ingredients. The major source of this misinformation denotes a social networking program known as WhatsApp, which is utilized by 39% of Pakistanis, alongside other falsehoods on YouTube and Facebook. In Pakistan, mythology, conspiracy theories, misinformation, and stigma denote the main ideas that drive people.<sup>5</sup>

### 4. Compare and Contrast two countries

#### 4.1 Culture

Generally, the common belief in both countries is similar, Islamic. Notwithstanding, Pakistani culture is distinct as regards its social ideals, which revolve around Islam. From the beginning, the country has established a separate cultural unit within the larger cultural complex of South Asia, the Middle East, as well as Central Asia, inclusive of features from several invading cultures Pakistani people overall comply with the values of Islam, meanwhile, in the UAE (especially in Dubai), the

commitment of people to norms of Islam are lesser compared to Pakistan, and wines alongside other alcoholic beverages are available for consumption. In addition, foreigners occupied about 89% of the population in the UAE, thus it tolerates various religions and enables expatriates to practice their religion freely. Hinduism, Christianity, Sikhism, and Buddhism represent the most common of these religions.<sup>8</sup>

Certain Muslims are concerned that vaccines alongside other medications may not be Halal, and hence are less inclined to become vaccinated. In Muslim-majority countries, considerable diversity exists in religious impact on vaccine administration habits. Local tales with religious overtones wrongly stated that the polio vaccination induces sterilization and constitutes porcine products in Pakistan, which is only second to Indonesia as the nation with the highest population of Muslims worldwide. In Pakistan, the issue of polio is a persistent challenge. Halal commodities are items deemed acceptable under Sharia law. Mostly, Halal implies permission on what should be eaten, drinking, or practiced based on the law and morals uphold in Islam. Substances obtained from certain animals, for instance, pigs' direct products or derivatives, dead animals, or blood could be utilized during the manufacturing of the vaccine, which is generally regarded in Islam as Haram (6, 22). Muslims must comply with Sharia law, which within the Islamic context is authoritative. Swine is among the creatures that Sharia law has designated Haram. The utilization of their constituents alongside derivatives in medications tends to make them ineligible for Muslim ingestion. Porcine trypsin and porcine gelatine are extensively utilized in the manufacture of vaccines. Although are simply found in minutes dosage, a label stating "Its constituents are minor amounts of porcine content" is occasionally demanded by local product registration policy.<sup>7</sup>

#### **4.2 Education level**

The literacy rate of the male adult population in 2021 was 93.13% (approximately 5,434,602 individuals), while the numbers of illiterate are 400,836 individuals. The literacy rate of the adult female population is 95.76 percent (amounting to 2,045,062 people), while those who are illiterate are 90, 639 individuals.<sup>8</sup> Contrarily, the level of education in Pakistan is 62.3%, indicating that the country has 60 million individuals who are literate.<sup>9</sup>

#### **4.3 Government**

The UAE is already regarded as a "tribal autocracy," with tribal rulers presiding over the 7 constituent kingdoms in an autocratic manner. There are no institutions that are elected through democratic means, and there is no formal protection of free expression. The election of the Federation's president is through the Supreme Council of Rulers under the United Arab Emirates' political system. The Supreme Council represents the UAE's highest policy-making organization, and the President and Vice President are both selected for five-year terms from its membership. The governance method practiced in the United Arab Emirates is dictatorial.<sup>10</sup> In contrast with UAE, Pakistan is a republic that operates a democratic parliamentary system of government, with an elected form of government in accordance with the constitution. Pakistan possesses one of the youngest democracies in the world, due to the fact that it started a current system of democratic governance in 2003. Under this system, the president is empowered to issue ordinances and pass bills under the constitution. The President serves as a ceremonial representative, while the Prime Minister, who is elected by the people, function in the capacity of the Chief Executive and is in charge of the federal government.<sup>11</sup>

#### **4.4 Government policy towards Covid and Vaccine**

The UAE government acted swiftly and actively in response to the epidemic. Efficient public health approaches were rapidly implemented, including the establishment of an emergency response framework, the distribution of risk communication instructions to the public, the building of field hospitals, as well as providing quick drive-through PCR assessment. The proportion of PCR assessment conducted has over quadrupled the population by January 2021. The UAE was among the pioneer nations to actively advocate and encourage the engagement of people to vaccination effectiveness and immunogenicity trials. For the first time in its history, the United Arab Emirates recorded the inaugural launching of a clinical trial, inclusive of the 4 Humanity phase 3 study utilizing

the inactivated SARS-CoV-2 vaccine in July 2020 along with the Sputnik V-UAE phase 3 trial in January 2021. This situation offered a significant chance for scientists in carrying out outstanding research in a range of areas, for instance, epidemiology, diagnostics, and therapies.<sup>12</sup>

Pakistan denotes a resource-constrained country with no emergency planning measures, spends below 1% of GDP on healthcare, and possesses a weak health framework that is ill-equipped in handling the strenuous effort involved in COVID-19's exponential spread. For instance, emergency response tools that are adjudged as ineffective are the National Disaster Management Authority and Provincial Management Authorities. Since there is no collaboration between the federal and provincial government ministries, it has consequently led to inadequacy in disease surveillance, as well as response procedures. The regions most affected by the epidemic in the country are Punjab and Sindh, with more than 115 districts affected. Pakistan proactively commences preventive measures through the reinforcement of extant resources, inclusive of the development of a highly intensive surveillance plan, as well as a responsive case management system having solid institutional backing. Pakistan's surveillance system was equally reinforced, with standard operating procedures, mandatory mask use, as well as the introduction of a trace, test, and quarantine method. Pakistan enhanced its COVID-19 preparedness through the development and implementation of a national emergency preparedness policy and program, requiring mandatory thermal scanning at every facet of entry, as well as conducting monitoring and contact tracing through data gathering.<sup>13</sup>

## 5. Conclusion

In general, it seems as if the government policy of Pakistan lacks considerable numbers of personnel that can solve problems. Therefore, I believe that the significant factors that bring about the low covid vaccine acceptance are not only the misinformation and conspiracy but likewise the culture. With the commencement of vaccination measures, the media adopts the role of disseminating vaccine misinformation. Various conspiracy ideas invaded social networking sites, for instance, the virus being bioengineered and the introduction of surveillance microchips for controlling human beings via vaccines. Moreover, there is extensive disinformation concerning anti-vaccination information about vaccine safety, inefficacy, fallacies concerning infertility, as well as other misleading information ideas, resulting in anti-vaccine behavior among the general public. Consequently, several individuals questioned the virus's existence and the gravity of the issue. These conspiracy theories were particularly prevalent in Pakistan's rural communities.<sup>14</sup>

Religious reasons equally adversely impact vaccine uptake. According to certain religious leaders, vaccines do not imply 'Halal' and are therefore forbidden under the Shariah law. In addition, vaccine uptake is hindered through safety concerns. The hesitancy to attempt it is because of concerns about its efficacy and side effects. Lack of desire to receive the vaccination is due to concerns about its efficacy and negative effects.<sup>14</sup>

Due to the aforementioned factors, there is a lack of trust in vaccines among the general public. The first approach for resolving this issue would be to gain the trust of people through conveying that the benefit of the virus is not simply in preventing virus infection but likewise lack significant side effects capable of harming individuals. The sole means of actualizing this is through the creation of public awareness. This could be accomplished by broadcasting advertisements and podcasts that feature healthcare specialists, which address the concerns of individuals on multiple platforms. Influencers on social media could share their immunization experiences and motivate others to do so.<sup>14</sup> Pakistan can follow what the UAE government performed, in which they announce the vaccine is safe and effective. Another effort to promote vaccination is through the launching of the #TogetherWeRecover campaign, which is impactful in encouraging the citizens and residents to become vaccinated.<sup>4</sup>

Appendix A

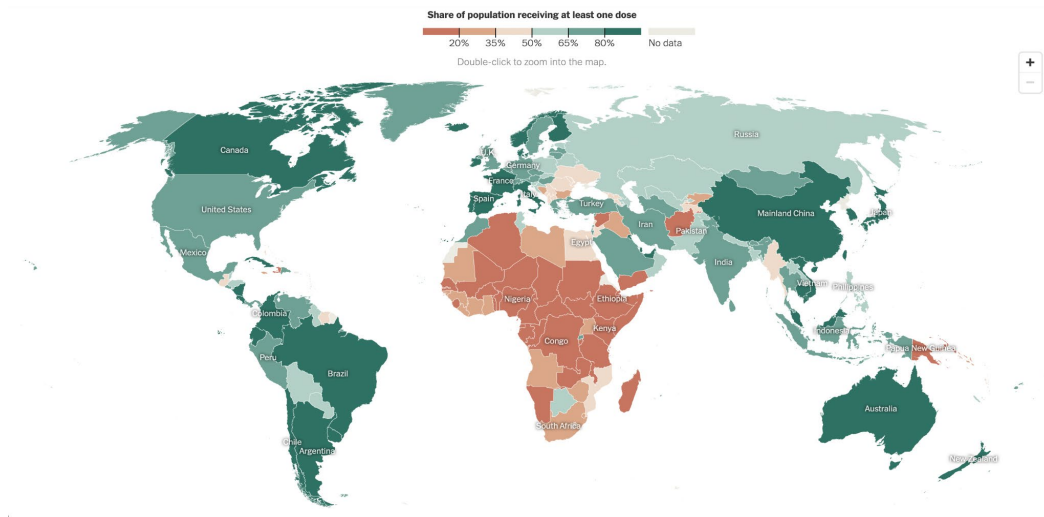


Figure 1. vaccination map

Appendix B

Vaccinations by country

Search countries

	Pct. of population			Doses administered		
	▼ Vaccinated	Fully vaccinated	Additional dose	Per 100 people	Total	Additional doses
U.A.E.	>99%	96%	46%	243	23,781,095	4,514,897
Pakistan	53%	41%	1.6%	90	194,492,475	3,361,160

Figure 2. Comparison between U.A.E and Pakistan

Appendix C

Demographic factors		Frequency (n)	Percentage (%)	Mean	Std. Deviation
Gender	Male	378	27.9	1.7212	0.44856
	Female	978	72.1		
Age-group (years)	18–29	540	39.8	1.7338	0.67801
	30–49	637	47		
	50–≤65	179	13.2		
Marital status	Single	510	37.6	1.6504	0.52978
	Married	810	59.7		
	Other*	36	2.7		
Place of residence	Abu Dhabi	99	7.3	3.2692	0.976
	Ajman	215	15.9		
	Dubai	264	19.5		
	Sharjah	778	57.4		
Education level	Illiterate/primary	24	1.8	2.8732	0.62197
	High school/Diploma	287	21.2		
	College level	882	65		
	Postgraduate	163	12		
Employment status	Employed	486	35.8	1.8768	0.76087
	Unemployed	551	40.6		
	Student	319	23.5		
Nationality	Emirati	258	19	1.8097	0.39266
	Non- Emirati	1098	81		
COVID-19 test result	Positive	0	0	2.1195	0.32446
	Negative	1194	88.1		
	I don't know	162	11.9		

\* Other included divorced, and widows.

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Figure 3. Socio-demographic characteristics of participants, UAE (n = 1356) <sup>3</sup>

Appendix D

Questions		Yes	No	Not sure	Mean	St. Deviation	
K1	COVID-19 is caused by Virus.	N	<b>1219</b>	36	101	1.1755	0.54212
		%	<b>89.9</b>	2.7	7.4		
K2	Incubation period range of COVID-19 is 2–14 days.	N	<b>1218</b>	36	102	1.177	0.54436
		%	<b>89.8</b>	2.7	7.5		
K3	The main clinical symptoms of COVID-19 are fever, tiredness, dry cough, and breathing difficulty	N	<b>1296</b>	24	36	1.0704	0.34407
		%	<b>95.6</b>	1.8	2.6		
K4	Is there a vaccine of COVID-19?	N	102	<b>1080</b>	174	2.0521	0.44795
		%	7.5	<b>79.6</b>	12.8		
K5	Is there an active treatment for COVID-19?	N	168	<b>858</b>	330	2.1167	0.59517
		%	12.4	<b>63.3</b>	24.3		
K6	Are the COVID-19 spreads via respiratory droplets (from coughing, sneezing) of infected people?	N	<b>1255</b>	30	71	1.1262	0.46326
		%	<b>92.6</b>	2.2	5.2		
K7	Can COVID-19 have transmitted through the eyes, in addition to the nose and mouth?	N	<b>1122</b>	109	125	1.2641	0.61486
		%	<b>82.7</b>	8	9.2		
K8	Can COVID-19 spreads via through touching contaminated surfaces?	N	<b>1164</b>	78	114	1.2245	0.58449
		%	<b>85.8</b>	5.8	8.4		
K9	A person with COVID-19 having no fever cannot infect others.	N	180	<b>919</b>	257	2.0565	0.56361
		%	13.3	<b>67.8</b>	19		
K10	Hand washing should be at least 20 minutes.	N	<b>1110</b>	162	84	3.823	0.71335
		%	<b>81.9</b>	11.9	6.2		
K11	We can use hand sanitizer or disinfectant to clean our hands when water is not available.	N	<b>1254</b>	96	6	1.9336	0.26621
		%	<b>92.5</b>	7.1	0.4		
K12	The minimum distance should you keep it between you and others when go outside is 6 feet (2 meters)?	N	<b>864</b>	132	360	1.9292	0.80643
		%	<b>63.7</b>	9.7	26.5		
K13	To prevent the spread of COVID-19, individuals should avoid going to crowded places if it's not necessary.	N	<b>1332</b>	0	24	1.0352	0.26314
		%	<b>98.2</b>	0	1.8		
K14	People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place.	N	<b>1338</b>	6	12	1.022	0.1979
		%	<b>98.7</b>	0.4	0.9		
K15	It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19.	N	96	<b>1206</b>	54	1.9677	0.3325
		%	7.1	<b>88.9</b>	4		
K16	The virus may be more dangerous in patients with chronic diseases and elderly.	N	<b>1344</b>	0	12	1.0176	0.1869
		%	<b>99.1</b>	0	0.9		
K17	Smokers are likely to be more vulnerable to COVID-19.	N	<b>1008</b>	60	288	1.4666	0.81974
		%	<b>74.3</b>	4.4	21.2		
<b>Total</b>			<b>84.96</b>			<b>1.6151</b>	<b>0.4874</b>

The correct responses for each item are bolded.

<https://doi.org/10.1371/journal.pone.0255408.t002>

Figure 4. Descriptive statistics of general knowledge with of participants about COVID-19, UAE (n = 1356)<sup>3</sup>

## Appendix E

Questions		Frequency			Mean	St. Deviation	
		Always	Sometimes	Never			
P1	Do you stay at home and go out only when it is necessary?	N	<b>1278</b>	12	66	1.1062	0.43864
		%	<b>94.2</b>	0.9	4.9		
P2	Have you started to wash or sanitize your hands regularly?	N	<b>1302</b>	12	42	1.0708	0.35753
		%	<b>96</b>	0.9	3.1		
P3	Do you wear a mask when you go outside?	N	<b>1308</b>	6	42	1.0664	0.35214
		%	<b>96.5</b>	0.4	3.1		
P4	Do you keep distance between you and other when you go outside?	N	<b>1278</b>	36	42	1.0885	0.37778
		%	<b>94.2</b>	2.7	3.1		
P5	Did you stop going to crowded places recently?	N	<b>1285</b>	42	36	1.0841	0.36083
		%	<b>94.3</b>	3.1	2.6		
P6	Did you stop visiting your relatives and friends during the outbreak?	N	<b>1200</b>	30	126	1.208	0.5923
		%	<b>88.5</b>	2.2	9.3		
P7	Did you stop kissing your relatives and friends when you meet them?	N	<b>1296</b>	12	48	1.0796	0.37974
		%	<b>95.6</b>	0.9	3.5		
P8	Do you use a credit/debit card or other non-cash modes methods for payment transactions?	N	<b>960</b>	180	216	1.4513	0.75275
		%	<b>70.8</b>	13.3	15.9		
P9	Did you stop sharing your eating utensils and food with others?	N	<b>1205</b>	72	79	1.1696	0.5075
		%	<b>88.9</b>	5.3	5.8		
P10	Did you stop hand shaking with others?	N	<b>1276</b>	8	72	1.1121	0.45374
		%	<b>94.1</b>	0.6	5.3		
P11	Do you follow regular updates on COVID 19?	N	<b>1065</b>	123	168	1.3385	0.68706
		%	<b>78.5</b>	9.1	12.4		
<b>Total</b>			<b>90.14</b>			<b>1.1613</b>	<b>0.4781</b>

The correct responses for each item are bolded.

<https://doi.org/10.1371/journal.pone.0255408.t003>

Figure 5. Descriptive statistics of practices of participants towards COVID-19, UAE (n = 1356)<sup>3</sup>

## Appendix F

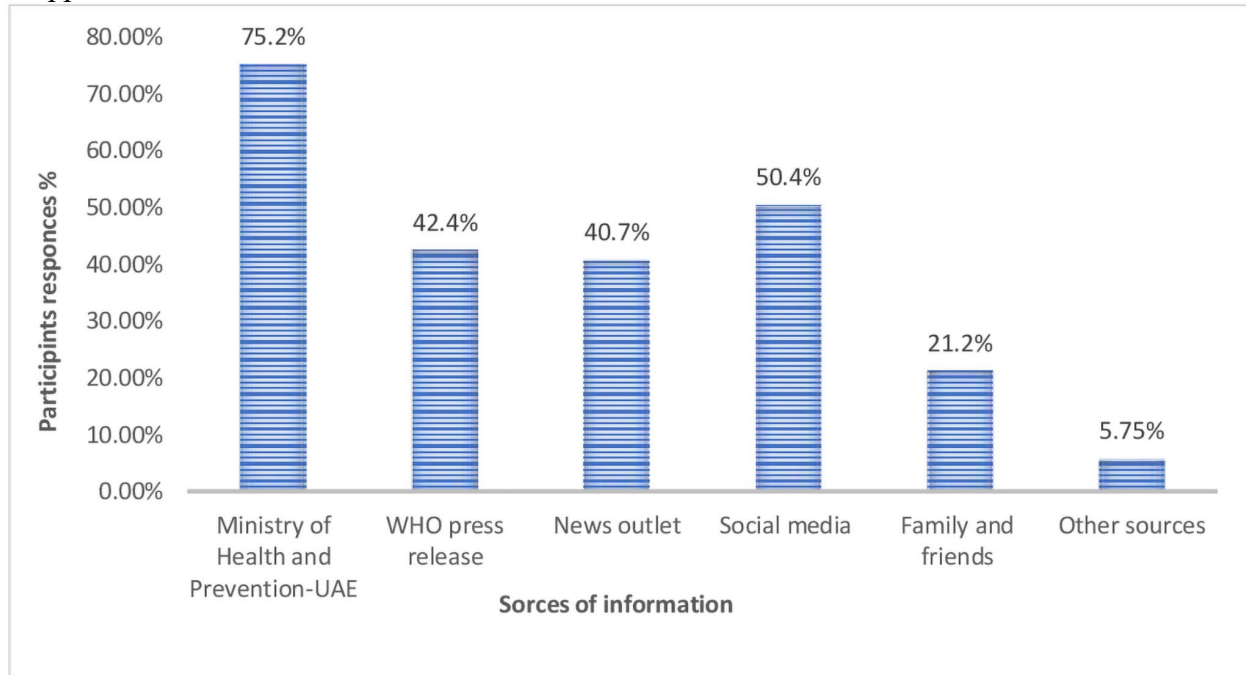


Figure 6. Source of information about COVID-19 among general public in UAE, (n = 1356) <sup>3</sup>

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