An "Infodemic" with Misinformation and Mistrust among Sampled University Students during the COVID-19 Crisis

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Abstract: This study sought to examine the infodemic that occurred during the global COVID-19 pandemic. Specifically, the study attempted to explore trust vs. mistrust and information vs. misinformation related to the coronavirus among Al-Imam University administrative sciences students a month after the first case of COVID-2019 was announced by the Ministry of Health in Saudi Arabia. An electronic survey modeled after a previous study conducted in the context of the Ebola outbreak in 2018-2019 was constructed specifically for this research goal. The survey was distributed to approximately 400 male and female students and was completed and returned by 100 students. The questions covered 5 main areas: (mis)trust of authorities or information sources, types of information related to COVID-2019, types of misinformation related to COVID-2019, beliefs towards (mis)information related to COVID-2019, and finally reactions to such (mis)information. The findings indicate that although both male and female college students showed a satisfactory level of information awareness, some misinformation is likely to have affected their behaviors with respect to taking proactive measures against the virus. Two beliefs related to such misinformation are that COVID-19 does not exist in the real word and that it is just like any other undangerous flu.

Keywords: infodemic, trust, information, COVID-19.

وباء معلوماتي بمعلومات مضللة وثقة معدومة أوساط عينة من الطلبة الجامعيين خلال أزمة كوفيد-١٩

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(قدم للنشر في ١٤/ ١٠/ ١٤٤١هـ، وقبل للنشر في ٧/ ٥/ ١٤٤٢هـ)

ملخص البحث: سعت هذه الدراسة إلى التحقيق فيما عُرف بـ "الوباء المعلوماتي" خلال فترة أزمة كورونا المستجد، (كوفيد-١٩). وعلى وجه التحديد، حاولت الدراسة استكشاف مشكلتي الثقة وانعدامها، والمعلومات الصحيحة والمعلومات المضللة ذات العلاقة بفيروس كورونا، في أوساط الطلبة الجامعيين من الجنسين (طلابًا، وطالبات)، الذين يدرسون تخصص العلوم الإدارية بجامعة الإمام محمد بن سعود الإسلامية بالرياض، عقب شهر واحد من إعلان وزارة الصحة السعودية لأول حالة إصابة بالفيروس. اتخذت الدراسة استطلاعًا إلكترونيًا أتيح لقرابة (٤٠٠) طالب وطالبة، أجاب عنه (١٠٠) مشارك، وقد أجري خصيصًا للهدف البحثي الذي تسعى له الدراسة، بالاستفادة من دراسة سابقة أجريت في جامعة هارفارد بشأن انتشار فيروس "إيبولا" خلال عامي (٢٠١٨، ٢٠١٩ م). شملت أسئلة الاستطلاع خمسة مجالات، هي: الثقة (وانعدامها) في أصحاب السلطة ومصادر المعلومة، وأنماط المعلومات المتلقاة ذات الصلة بكوفيد-١٩، وأنماط المعلومات المغلوطة المتلقاة ذات الصلة بكوفيد-٢٠١٩، والاعتقادات حول تلك المعلومات الصحيحة أو المضللة، وأخيرًا ردود الأفعال تجاه تلك المعلومات، صحيحة كانت أم خاطئة. بعد تحليل النتائج كميًا، وإجراء اختبارات إحصائية، كشفت الدراسة _ بالرغم من المستوى المرضي لوعي المشاركين المعلوماتي _ عن اعتقادات بمعلومات مضللة وغير صحيحة علميًا، لا شك أنها أثرت على سلوكهم تجاه الإجراءات الاحترازية المعمول بها لمجابهة الفيروس. اثنان من هذه الاعتقادات هما: الاعتقاد بأن كوفيد-١٩ ليس له وجود على الإطلاق، والاعتقاد بأنه لا يعدو أن يكون كغيره من الأنفلونزا الموسمية غير الخطيرة.

الكلمات المفتاحية: وباء معلوماتي، الثقة، المعلومات، كوفيد-١٩.

Introduction

In early 2020, the coronavirus (COVID-2019) crisis began affecting the entire world. The Kingdom of Saudi was no exception; the Saudi Ministry of Health reported the country's first case of COVID-19 on March 2nd (SPA, March 2nd). By that date, the total number of COVID-19 cases worldwide had largely exceeded the total number of cases of two other viruses, namely the Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) (see e.g., Arabi, Murthy and Webb, 2020; Garfin, Silver, and Holman 2020). Specifically, on March 1st, the total number of registered cases for the three viruses to date were 85,403 (COVID-19), 2,494 (MERS), and 8,437 (SARS) (Arabi, Murthy and Webb, 2020). The rapid spread of COVID-19 and the fear it caused did not only lead to a health crisis but also to an information crisis. Hence the term infodemic started to gradually appear not only in the news (see e.g., United Nations, 2020 March) but also in academic research (see e.g., Cinelli, Quattrociocchi, Galeazzi, Valensise, Brugnoli, Schmidt, and others, 2020; Eysenbach, 2020; Hua and Shaw, 2020; Tangcharoensathien, Calleja, Nguyen, Purnat, D'Agostino, Garcia-Saiso and others, 2020).

This infodemic is composed of two interrelated facets, mistrust and misinformation, against which both health authorities and technology specialists have taken some measures. For example, the World Health Organization (WHO) launched a specific website to combat misinformation about COVID-19 (Zarocostas, 2020). Social media services such as WhatsApp have imposed some limits on forwarding messages, aiming to prevent fake news (Hern, 2020). Two factors have proven important in the fight against both the pandemic and the infodemic: trust of authorities and appropriateness/accuracy of information. People's behaviors will vary depending on how much trust they put in the information sources or the authorities from which they receive information and on how accurate and appropriate they consider the information they encounter and share. This is not a new phenomenon, as similar situations were observed in the contexts of other viruses such as the 2018–19 Ebola outbreak (Vinck, Pham, Bindu, Bedford, Nilles, 2019). However, the amount and extent of misinformation regarding the COVID-19 crisis has resembled (if not surpassed) that associated with such comparable events of the past (see e.g., Acevedo, 2020: Bastani and Bahrami, 2020).

Research questions

This study seeks to answer four research questions: 1) How much do people (college students in particular) trust different authorities/information sources? 2) What types of COVID-19-related information and misinformation have they encountered? 3) What do they believe about such (mis)information? 4) How do they react to new information/misinformation?

The study was conducted in line with another previous study conducted at Harvard in 2019 regarding institutional trust and misinformation in response to the Ebola outbreak in North Kivu, DR Congo (Vinck, Pham, Bindu, Bedford, Nilles, 2019). That particular study surveyed the target community over a period of two weeks. The same methodology is therefore followed in the present study. However, the sample in the current study was obtained from only undergraduate students at Al-Imam Mohammed bin Saud University, a decision intended to follow another study which surveyed how undergraduate students engaged with/evaluated media news and dealt with misinformation (Evanson and Sponsel, 2019).

Significance of the study

The significance of this study lies in the fact that as previous studies have found (e.g., Vinck, Pham, Bindu, Bedford, Nilles, 2019), "community-level prevention and outbreak control measures appear to be dependent on public trust in relevant authorities and information" (p. 529). Hence, this study, using a sample of young male and female youths, provides a picture about how a group of Saudi people encountered and reacted to the information and misinformation spread during the first phase of the pandemic in Saudi Arabia. The findings should help authorities propose solutions for the current crisis and improve information management plans for potential future crises.

Literature Review

Two major types of studies are related to the current research. First, there have been a few studies in which mistrust and misinformation during a health crisis other than COVID-2019 were surveyed. Second, recently with a rise in the use of the term infodemic, a relatively large body of research using the same terminology has appeared. Since this research is not health-oriented, but rather information-oriented, I will only review the most closely related works, especially those that intersect with the present study.

Vinck, Pham, Bindu, Bedford, and Nilles (2019):

Prior to conducting their studies, the researchers searched several databases for publications from 1950 to 2018 using different terms and different combinations of terms such as preventive behaviors and trust, in order to come up with similar studies that examined mistrust and misinformation in the context of infectious diseases. They found that both mistrust and misinformation were "obstacles to public health interventions" (p. 530). However, they concluded that none of the few studies they found were successfully able to characterize and quantify the issues under investigation, with the exception of one study during the Ebola outbreak.

Their methods involved a population-based survey one month after the declaration of the Ebola outbreak. The survey was originally in English but

was translated into French and Swahili. The current study used many of their questionnaire questions translated into Arabic. One portion of the study focused on three dimensions: the types of information the participants encountered, the types of misinformation the participants encountered, and the beliefs the participants had towards the misinformation they encountered (see Appendix A for a table showing subcategories of this information/misinformation). The results show that the respondents received information from different sources such as friends, families, national radios, and religious leaders, as well as health professionals. Surprisingly, most participants reported that Ebola does not really exist and only a few respondents reported avoidance of social interaction (currently known as social distance). Their conclusion indicates that a belief in misinformation was widespread and that institutional trust was low.

Vinck and colleagues' study is particularly relevant to the current study. First, both studies share a similar context, namely a crisis of information during a health crisis. However, the scale of information crisis has been greater in the current pandemic outbreak, as it is a global rather than a regional crisis. The current study followed Vinck and colleagues in some methodological aspects.

Evanson and Sponsel (2019):

Evanson and Sponsel's study sought to evaluate how students perceive digital information and misinformation (or fake news) in particular. The authors distributed a survey consisting of 9 to 14 questions to college students, followed by three exercises to observe students' engagement with fake news. One of the key findings was that students believe that fake news presents a problem to society more than to themselves. Using a Likert-scale, almost 45% of the participants thought that misinformation is an "extreme" barrier to society while 41% of them thought it is an "intermediate" one. Overall, it was found that most students use social media to obtain information, and that those who obtain information from media platforms are more likely to encounter misinformation than those who obtain information outside social media.

This research is relevant to the current study for one reason in particular. Specifically, it surveys first-year college students' interaction with information and misinformation on social media platforms. The current study also examines information (and misinformation) in an educational with a sample of undergraduates in their first year at a university.

Datta and Litt (2020):

In their study, Datta and Litt (2020) sought to identify and classify different categories of misinformation at a global level. They stated that in India, misinformation was spread by visual presentations (such as videos and images) and emotional manipulation rather than through authorial and instrumental facts. They also indicated that the unprecedented spread of misinformation included some allegations against different communities and countries. One widespread piece of misinformation was associated with China and Russia; that is, the two countries were blamed for deliberately spreading fake news and false information about COVID-19. In South Sudan, WhatsApp was a means for circulating some fake news about the Chief Justice's family being infected with COVID-19. In Malaysia, many users on Facebook shared a fake claim that neem leaves can cure coronavirus and relieve symptoms, a claim that was not based on any scientific evidence.

The current study similarly seeks to find different patterns of information and misinformation among undergraduate students.

Islam, Sarkar, Khan, Mostofa Kamal, Hasan, Kabir, and others (2020):

Islam and colleagues (2020) conducted a global social media analysis to explore the infodemic during the COVID-19 pandemic and its impact on public health. They covered more than 2,300 reports in 25 languages for more than 85 countries and found that misinformation is related to three elements: rumors, stigma, and conspiracy. The categories of misinformation included (but were not limited to) transmission of the disease, treatment and cure, cause of disease, and origin of the disease. The key finding in their study is that misinformation could have a high potential impact on both individuals and communities if unauthorized sources are trusted and scientific evidence is ignored. Thus, authorities must debunk misinformation as rapidly as possible.

This analysis of global content is important for the current study since it categorizes the flood of the infodemic as it has occurred in many countries including Saudi Arabia.

Methodology

The aim of this study is to examine trust vs. mistrust and information vs. misinformation related to the coronavirus among undergraduate students at Al-Imam University. The study therefore adopts some methodological aspects such as survey questions and population sample (i.e., university students) from two previous studies, namely Vink et al. (2019) and Evanson and Spnonel (2019). The present study made necessary changes to previous methods both by adjusting question content to be more relevant to the community in question as well as adjusting the sampling procedure. The subsequent sections divide these methodological considerations into three major components: survey construction, participants, and survey distribution.

Survey construction

The current research benefited from the questions utilized in Vinck et al.'s study (see Appendix A for their questions and Appendix B for the Arabic version). Since the participants of the current study were speakers of Arabic, it was necessary to translate and present the survey in Arabic. The survey consisted of 6 parts. Part 1 was

intended to seek some demographic and contact information about the participants, such as age, email, and university major. Part 2 was devoted to "trust/mistrust in information authorities/sources". The essential question in this part was about how much trust the respondents put in different sources of information such as the Ministry of Health, the university at which they pursued their degree, social media, friends, and family members. Part 3 was concerned with the types of information they received from such sources regarding the number of cases, treatments, protective measures, symptoms, and other considerations. This was very similar to the questions found in Table 3 in Vinck et al. (2019, p. 533). Part 4 was intended to learn more about the misinformation the participants had been exposed to, similar to the questions in Vink et al. Likewise, Part 5 was intended to explore the participants' beliefs about the misinformation they heard, similar to Vinck et al.'s survey. Finally, Part 6 elicited the participants' reactions to the information/misinformation they encountered.

Participants

The current survey targeted university students, specifically undergraduate male and female students in their first year at Al-Imam Mohammed ibn Saudi Islamic University, Riyadh. The male and female students were matched in terms of major; that is, all participants were majoring in administrative sciences. The electronic survey was made accessible to roughly 400 students. The number of survey returns among male students quickly reached 49, but returns from female students gradually reached 48 over the allowed period of time. The researcher then announced that the survey would soon close and there would be a need for three more returns, two from females and one from males. This elicited the necessary number of participants (50 male students and 50 female students) and the survey was then closed automatically.

Survey distribution

The survey was circulated in an electronic form a month after the Saudi Arabian Ministry of Health reported the first case of COVID-19. The survey was revealed in early April 2020 to first-year students with a track in administrative sciences (roughly 400 students). It remained available to potential participants for two successive weeks. Both the one-month lag and the duration of the survey availability were deliberately almost identical to those in Vinck et al. (2020).
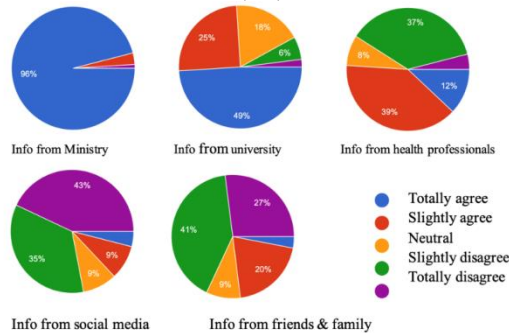
Data Analysis, Results, and Discussions

The data were analyzed quantitatively and necessary statistical tests were performed. The results are divided and presented based on the category of questions posed to the participants.

### Category 1: Trust/Mistrust in information authorities/sources

As depicted in Figure 1, the survey revealed that 96% of the responses totally agree with the statement "I trust the information reported by the Saudi Ministry of Health about the virus". Only 1% of the responses show that they totally disagree with this statement while 3% report that they slightly agree with the statement. However, the proportions differed when the statement was changed to "I trust the information reported by the university about the virus". Only 45% agree with this second statement, while 25% slightly agree, 18% are neutral, 6% slightly disagree, and 2% totally disagree. Responses to the statement "I trust information I hear from health professionals even if they are not official" show that 12% totally agree with the statement, 39% slightly agree, 37% slightly disagree, 8% are neutral, and 4% totally disagree.

In response to the statement "I trust the information I receive from different social media platforms about the virus", 43% totally disagree, 35% slightly disagree, 9% slightly agree, 4% totally agree, and 9% were neutral. Finally, when the participants were presented with the statement "I trust the information I hear from my friends and relatives", the figures started to show slightly different patterns. Only 3% totally agree with the statement while 27% totally disagree, 41% slightly disagree, and 9% stayed neutral. However, 21% slightly agree with the statement.

Inspection of the proportions of responses made by both male and female students showed a very high level of similarity between the two groups. In other words, gender did not seem to be a factor. To make sure that this is the case, an ordinal regression model with gender as a predictor variable and response as a dependent variable was performed and the output indicated that gender was a statistically insignificant explanatory factor, $\chi^2(1) = 1.42$, p= 0.23. This simply means that both males and females have similar trust/mistrust in all of the sources of information investigated here. However, the source of information (e.g., the Ministry vs. the university) was a statistically a significant predictor factor, $\chi^2(4) = 390.74$, p< 0.001. This indicates that both male and female participants trust (or mistrust) sources of information differently and that people's attitudes towards information are influenced by the authority or source of such information.

Figure 1. Representation of responses to the five statements about (mis)trust

Info from Ministry   Info from university   Info from health professionals

- Totally agree
- Slightly agree
- Neutral
- Slightly disagree
- Totally disagree

Info from social media   Info from friends & family

Category 2: Types of information encountered

As displayed in Figure 2, the main type of information the participants encountered was the number of cases, deaths, and recoveries (96%). On the other hand, information about interventions to combat COVID-19 was the least likely type of information encountered by the students (only 9%). These figures show different patterns from those in Vinck et al.'s study in which information about how to protect oneself was the most frequent type of information (91%). This type of information was instead found second most frequent in the current study (42%). In their study, information about the number of cases was by comparison less frequent (63%), showing how people are more glued to information about new cases during this global crisis than ever before.

Figure 2. Types of information encountered by the participants
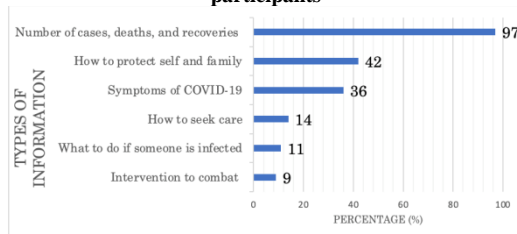
**Category 3: Types of misinformation encountered**

In response to the statement "I believe that people distribute misinformation about the pandemic", 71% and 29% responded with "yes" and "no", respectively. Both males and females showed a very similar pattern and a binary logistic regression showed no statistical differences between the two groups, $\chi^2(1) = 0.7$, p= 0.78.

Figure 3. Proportions of responses to whether misinformation is being spread
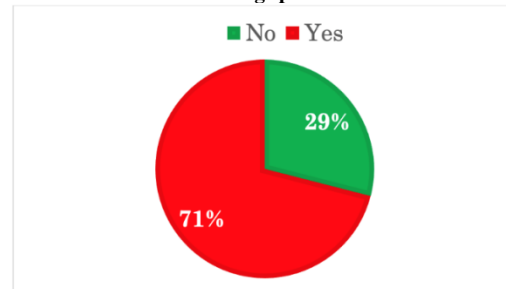
As shown in Figure 4, 57% of the participants were exposed to some misinformation, for example that COVID-19 is identical to any seasonal flu and is not dangerous, while 28% of them heard that the virus does not exist at all. Such claims are extremely problematic and can stifle efforts to prevent the virus. In Vinck et al.'s study, an even a higher percentage (86.5%) of respondents reported exposure to misinformation regarding the existence of the disease. Students' beliefs about these statements are different in this study and will be explored in the next sub-section.

Figure 4. Types of misinformation encountered by participants
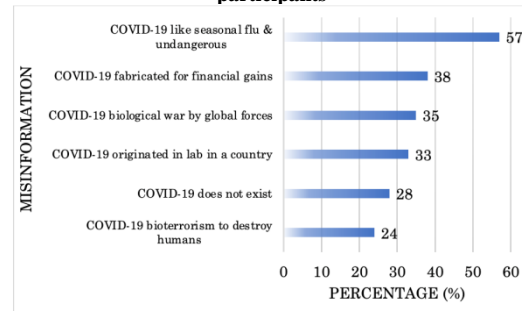
Category 4: Beliefs about misinformation

25% of respondents in the current study report beliefs that COVID-19 is just a seasonal flu that does not present any risk, and 19% of respondents report thinking that it does not exist at all. Other beliefs, for example regarding the origin of the virus, are shown in Figure 4.

Figure 4. Beliefs about misinformation encountered by participants
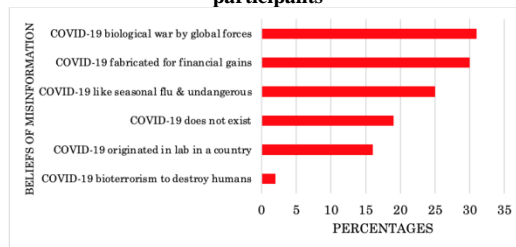
Category 5: Reactions to information/misinformation

When participants were presented with the statement: "I double check the information I encounter before I distribute it on social media platforms such as WhatsApp," both male and female participants showed a high level of information awareness (85% and 94%, respectively). An ordinal regression model revealed no significant association between gender and responses, $\chi^2(1) = 2.09$ p= 0.14.

Figure 5. Reactions to information encountered by respondents
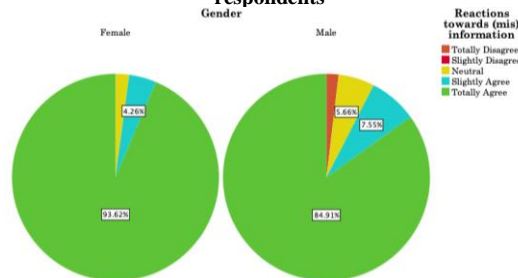
Conclusions

This study sought to answer four major questions related to the COVID-19 infodemic in the early stage of the coronavirus outbreak in Saudi Arabia. The study drew on a previous study on the Ebola outbreak of 2018-2019 and focused on five categories: institutional trust/mistrust, types of information related to COVID-19, types of misinformation related to COVID-19, beliefs about such misinformation, and reactions to such new (mis)information.

Recommendations

The overall results show that college students have a relatively high level of information awareness. However, beliefs such as the claim that COVID-19 does not exist present difficulties to both health authorities and society as a whole. Hence, based on the current results, we recommend that:

- Universities and schools should present the sources of information they broadcast, typically the Ministry of Health. This is because the findings of this study indicate that college students trust the Ministry more than they trust their institution.
- It is important for authorities to issue reports that fight against misinformation. The current findings show that college students have some scientifically inaccurate thoughts about the virus which have likely impacted their behaviors.
- Some mandatory courses about information awareness and intelligence in the early semesters of students' university life may be recommended.
- Finally, this study has some limitations that must be acknowledged. The study was conducted during April 2020. It may be that college students' informational behaviors have since changed now that the crisis has persisted for months throughout the entire world. A follow-up study is thus recommended.

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Appendices

Appendix A: Original questions from Vinck et al.'s study

	Unweighted (n)	Weighted (% [95% CI])
Total	961	..
Type of information received		
Cases of Ebola in the province	605	63·7% (54·3–72·2)
Intervention to combat Ebola in the province	641	63·7% (54·5–72·1)
Symptoms of Ebola	831	85·0% (81·2–88·2)
How to protect oneself	896	91·6% (89·1–93·5)
Where to seek care	824	80·3% (77·0–83·2)
What to do if a relative has Ebola	747	72·3% (68·8–75·7)
Heard misinformation		
Ebola does not exist	850	86·5% (82·9–89·4)
Ebola is fabricated for financial gains	826	84·7% (80·2–88·3)
Ebola is fabricated to destabilise the region	837	86·1% (81·8–89·4)
Heard any of the three statements	899	92·2% (88·8–89·4)
Heard all three statements	768	78·0% (73·0–82·4)
Belief in misinformation		
Ebola does not exist	230	25·5% (21·7–29·6)
Ebola is fabricated for financial gains	312	32·6% (28·2–37·3)
Ebola is fabricated to destabilise the region	371	36·4% (32·1–41·0)
Believe any of the three statements	446	45·9% (41·7–50·2)
Believe all three statements	171	18·2% (14·3–22·7)

Table 3: Respondents who had received or heard information or believed misinformation about Ebola

Appendix B: Survey questions in Arabic (adopted from Vinck et al.'s study with slight modifications)

Section 3 of 7

⋮ ✕ المعلومات المتلقاة

Description (optional)

* المعلومات التي تصلني حول فايروس كورنا عادة تكون حول

☐ عدد الحالات/الإصابات/الوفيات/المتعافين

☐ التدخل البشري لمكافحة الجائحة/الفايروس

☐ أعراض الإصابة بالفايروس

☐ كيف تحمي نفسك وأسرتك من الإصابة

☐ كيف تحصل على الرعاية الصحية

☐ كيف للتعامل مع المصابين

After section 3   Continue to next section

Section 4 of 7

⋮ ✕ مصداقية المعلومات

Description (optional)

* أعتقد أن الناس تتداول معلومات خاطئة حول هذه الجائحة

○ نعم

○ لا

* أعتقد أن نسبة المعلومات الخاطئة التي يتداولها الناس حول هذا الفايروس قد تشكل:

○ ٠%

○ ١% إلى ٢٠%

○ ٢١% إلى ٤٠%

○ ٤١% إلى ٦٠%

○ ٦١% إلى ٨٠%

○ ٨١% إلى ١٠٠

* من المعلومات الخاطئة التي سمعتها:

☐ فايروس كورونا غير موجود إطلاقاً

☐ فايروس كورونا كالإنفلونزا ولا يشكل خطراً فعلياً

☐ فايروس كورونا قضية مفبركة لأغراض اقتصادية

☐ فايروس كورونا قامت إحدى الدول بتعميله في أحد معاملها

☐ فايروس كورونا حرب بايولوجية بين قوى عالمية معينة

☐ فايروس كورونا هو إرهاب بايولوجي لتدمير البشرية

Section 5 of 7

⋮ ✕ اعتقادات حول المعلومات

Description (optional)

* أنا فعلا أعتقد أن:

☐ فايروس كورونا غير موجود إطلاقاً

☐ فايروس كورونا كالإنفلونزا ولا يشكل خطرا فعليا

☐ فايروس كورونا قضية مفبركة لأغراض اقتصادية

☐ فايروس كورونا قامت إحدى الدول بتعميله في أحد معاملها

☐ فايروس كورونا حرب بايولوجية بين قوى عالمية معينة

☐ فايروس كورونا هو إرهاب بايولوجي لتدمير البشرية

After section 5   Continue to next section

Section 6 of 7

⋮ ✕ ردات الفعل حول المعلومات

Description (optional)

عندما أسمع معلومة خاطئة حول الفايروس أو ما يتعلق به فإنني

○ أتجاهل المعلومة

○ أصحح المعلومة

○ أؤيد المعلومة

○ أنشر المعلومة

○ أتأكد من صحة المعلومة

* أتأكد جيدا من المعلومة قبل نشرها في سائل التواصل كتطبيق الوتس اب

○ أتفق كليا

○ أتفق نوعا ما

○ لا أعرف

○ أختلف نوعا ما

○ أختلف كليا