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Knowledge, perception and precautions of the Lebanese population regarding the novel Coronavirus outbreak: A cross-sectional study between 18 and 22 March 2020

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ABSTRACT: In the middle of the novel coronavirus pandemic, controlling the outbreak is the global priority. Many features, such as rate and mode of transmission make the containment of the virus harder comparing with other coronaviruses. Evaluating the knowledge, perception and precautions taken by the Lebanese population is crucial in controlling the outbreak and guiding the awareness campaign. We conducted a descriptive analytical cross-sectional study on the Lebanese population using an electronic survey between 18 and 22 March, 2020. Questions concerning demographics, knowledge, risk perception, preventions, source of information and degree of trust were asked. Knowledge and perception score were calculated. Three types of analysis were performed: descriptive, bivariate and multivariate. A total of 4413 persons filled the survey. The mean knowledge score was 16.47±1.8 *SD* over 20. The mean perception score was 25.2±4.9 *SD* over 40. A proportion of 35.3% of the study participants showed that they were always wearing a facemask outside their house. The most trusted source of information for the participants was healthcare professionals (Mean = 4.2±0.9 *SD* over 5). Multivariate analysis showed that the knowledge COVID-19 was mainly affected by three factors: personal monthly income, level of education, and health care professionals. Meanwhile, higher risk perception was related to higher level of knowledge. Despite the good knowledge score of the population, efforts must be reinforced to achieve higher knowledge score by targeting older population, people with low income, low educational level, non-healthcare workers, and those living in peripheral districts in Lebanon.

Keywords: Coronavirus, public health, SARS-CoV-2, COVID-19.

Abbreviations: B: Unstandardized beta**, CDC:** Centers for Disease Control and Prevention**, COVID-19:** Coronavirus Disease 2019**, MERS:** Middle East Respiratory Syndrome**, MERS-CoV:** MERS Coronavirus**, MoPH:** Minister of Public Health**, NGO:** Non-Governmental Organization**, PPE:** Personal Protective Equipment, **R0:** Basic reproduction number**, SARS:** Severe Acute Respiratory Syndrome**, SARS-CoV-1:** SARS Coronavirus**, SPSS:** Statistical Package for the Social Sciences, **WHO:** World Health Organization.

INTRODUCTION

In the last few years, novel zoonotic coronaviruses have emerged, causing severe human disease: the SARS coronavirus (SARS-CoV-1) discovered in 2002, the Middle East respiratory syndrome (MERS) coronavirus (MERS-CoV) in June 2012 (Yin and Wunderink 2018). More recently, in December 2019, the emergence of several unexplained cases of viral pneumonia in Wuhan, China, has led to the identification of a new strain of coronavirus, the 2019 novel coronavirus (SARS-CoV-2) (Lu et al., 2020). The outbreak was declared a public health

emergency of international concern on 30 January 2020; later on, it was classified as pandemic on 11, March by WHO (World Health Organization 2020). Most patients present with fever, cough, and shortness of breath (Sohrabi et al., 2020). The course of the infection is mild or asymptomatic in about 80 to 90% of cases. However COVID-19 is more likely to cause complications in older males with comorbidities and can result in severe and even fatal respiratory diseases, such as acute respiratory distress syndrome (Chen et al., 2020). Diagnosis is mainly done using RT-PCR of a sample taking from nasopharynx or bronchoalveolar lavage (Mungroo et al., 2020). Chest X-rays reveal patchy shadows and changes in the lungs, mostly in the outer zone of the lungs, which develop into multiple ground-glass opacity, pulmonary consolidation, infiltrating shadows and infrequent pleural effusion (Wu et al., 2020).Computed tomographic (CT) scans of the chest provide clearer images of the pulmonary lesions as compared to X-rays whereby segmental consolidation and ground-glass opacity are observed, mainly in the periphery of the lungs (Wu et al., 2020).

Governments are educating the citizens to better understand COVID-19, to guide public health decisions, as well as to improve timely diagnosis, therapies and vaccines (Patel et al., 2020). Numerous organizations, including WHO and US Centers for Disease Control and Prevention (CDC) are implementing new recommendations to halt the spread of COVID-19 (World Health Organization 2020; Centers for Disease Control and Prevention 2020). Most importantly, spreading knowledge among population through awareness campaigns is a crucial measure in containing the virus (Deng and Peng 2020). In Lebanon, The Ministry of Public Health (MoPH) has launched a new campaign to provide citizens with the necessary guidance to prevent coronavirus infection and address misinformation and rumors (Ministry of Public Health 2020). In addition, the Lebanese government announced the general mobilization regarding the health sector and the closure of the airport, port and the borders starting 15 March, 2020.

This study was conducted almost one month following the identification of the first COVID-19 case in Lebanon and three days after the general mobilization. Knowledge, perception, and preventive measures have been found to be important in controlling outbreaks as learned before regarding SARS (Vartti et al., 2009; Bell 2004), Ebola (Yang and Chu, 2018) and H1N1 (Tooher et al., 2013). In addition, on the international level, only few papers reported data concerning public knowledge and awareness about COVID-19 (Li et al., 2020; McFadden et al., 2020; Zhong et al., 2020) and on the national level, it is the first study of its kind. The study aimed to assess the knowledge, perception and precautions of the Lebanese population toward COVID-19 in this critical time frame. In addition, the study assessed the source of information and degree of trust of the population in different parties leading the awareness response.

METHODOLOGY

Participants

A cross-sectional study conducted among the Lebanese population using an electronic survey (Google form) from March 18 to March 22, 2020. Data collection using electronic survey was the only feasible method due to lockdown and the need for a rapid intervention. The population was targeted in all the five governorates in Lebanon. The questionnaire was based on the survey “Perceptions of the Adult US Population regarding the Novel Coronavirus Outbreak” executed and validated at the University of Yale and formulated by McFadden et al. (2020). Permission was granted to use the same survey. Certainly, the questions were adapted to the local population and other questions were added as explained in the next section below. The ethical committee of Al Hayat Hospital reviewed and approved the study protocol on 10, March 2020 (reference number: ETC-03-2020). This study was conducted in accordance with Good Clinical Practice ICH Section three, and the principles laid down by the 18th World Medical Assembly (Helsinki, 1964) and all applicable amendments.

The survey was broadcasted via “WhatsApp”, and posted on “Facebook” and “Twitter”. The survey included two parts: the first one was the informed consent of the participant with a brief introduction on the background, objective, procedures, voluntary nature of participation, declarations of anonymity, and confidentiality. As for the second part, it covered four major sections that will be detailed in the next section’’ Measures’’. The survey was available in Arabic and took between five to six minutes to be filled. Adults (18 years of age and older) living in Lebanon provided their informed consent by choosing “yes, I agree to participate” were included. Residents under the age of 18 and those who refused to fill the online survey were excluded from the study. To ensure anonymity, the survey did not require the names, phone numbers, emails, exact date of birth (only age was provided) of the participants.

Measures

The survey included the following main sections: demographics, knowledge of the COVID-19, risk perception, preventive measures, source of information, and degree of trust. Demographic variables included age, sex, current residence, monthly income, educational level, and profession (health care professional or not).

Knowledge section included two parts: (A) First part had two questions, one to check if the participant is aware of the outbreak and the other one about the self-assessment of the level of knowledge; (B) Second part had 20 questions addressing the knowledge about the COVID-19. Participants’ “Knowledge” was analyzed using a score that

was calculated by adding the sum of the scores related to each knowledge question. Each participant received a score of “one” on the correct answer and “zero” on the false answer to a total of 20 points. At the end, a score over 20 was calculated for each participant with a score of 15 or above was considered a cut off for good knowledge. The section of risk perception on the COVID-19 included eight questions about the participants’ perception of the risks concerning the COVID-19. The questions followed a Likert scale ranging from one to five as follows: one “strongly disagree”, two “disagree”, three “Neutral”, four “agree”, five “strongly agree” and zero “Don’t Know”, hence each question was scored over five. At the end, a mean score of perception (over five) was calculated for each participant. The section of preventive measures included 16 questions about the participants’ measures taken to prevent COVID-19. These questions were answered on a true/false basis with an additional “don't know” option. Last section included: the sources of information and their reliability in addition to the degree of trust in the organizations responsible of awareness campaigns. These questions also followed a Likert scale from one to five as follows (one “very weak”, two “weak”, three “intermediate”, four “good”, five “very good” and zero “don’t know”).

Sample size

Sample size was calculated using Slovin’s formula (n = N / (1+Ne2) with n: sample size, N: population size and e: margin of error. 400 participants were representative of the Lebanese population in each of the five governorates. A confidence level of 95 percent (giving an alpha level of 0.05) is used. As per the Index Mundi registry, the Lebanese population is 6,100,075 in 2019. The number of participants was 4413.

Statistical analysis

Data was analyzed using the SPSS version 22 (Statistical Package for the Social Sciences). Three types of analysis were performed: (A) Descriptive analysis: the primary endpoint “knowledge” was presented as the frequency, mean and standard deviation of participants. (B) Bivariate analysis: The primary endpoint “knowledge” was statistically correlated to the demographic variables and secondary variables using ANOVA test and Student t-Test; (C) Multivariate analysis: A linear regression model was used in order to predict factors affecting the knowledge score in the Lebanese population and for the correlation between the level of knowledge and perception. The factors, which were statistically correlated in the bivariate settings, were added in the model. A statistical significant correlation was set at five percent (p-value less than 0.05).

RESULTS

A total of 4413 persons participated in this study, 25 participants under 18 years of age were excluded and 20 participants refused to fill the survey, so, a total of 4368 persons participated in the survey. Participants were distributed between females 2988 (68.4%) and males 1373 (31.4%) mainly, in addition, there was no statistically significant correlation between the knowledge score and the participants’ gender (ANOVA test; *P*-value > 0.05). Concerning age, the mean was 30.5±11.5 *SD* years. The results showed that participants aged between 26 and 33 years had the best knowledge about COVID-19 (Mean = 16.6±1.8 *SD* over 20) comparing to others (ANOVA test; *P*-value = 0.0001). The knowledge score was the highest in participants having a monthly income more than 4,500,000 LL (Mean = 16.86±1.65 *SD* over 20). It was shown that the knowledge score is increasing when the monthly income is increasing. In addition, multivariate analysis proved that the knowledge concerning the COVID-19 in the Lebanese population is increasing when the personal monthly income is higher (*P*-value =0.000 B = 0.119). About educational level, 2124 (48.6%) of the participants had bachelor and 531 (12.2%) have PhD or MD diploma. The knowledge score was the highest in participants having PhD or equivalent (Mean = 17.3±1.59 *SD* over 20). The results showed that the knowledge score is increasing when the educational level is increasing. Furthermore, multivariate analysis indicated that the knowledge concerning the COVID-19 in the Lebanese population is increasing when the level of education is higher (p-value =0.000 unstandardized beta (B) = 0.333). The knowledge score was higher in healthcare worker (Mean = 17.1 ± 1.8 *SD* over 20) comparing to other professions (Mean = 16.2 ± 1.9 *SD* over 20). Similarly, multivariate analysis showed that the knowledge concerning the COVID-19 in the Lebanese population increased when the person is a health care professional (*P*-value =0.000 B = -0.741). The knowledge score was the highest in participants living in Mount of Lebanon (Mean = 16.59 ± 1.8 *SD* over 20) and in Beirut (Mean = 16.58 ± 1.8 *SD* over 20). On the other hand, it was the lowest in participants living in Bekaa (Mean = 16.37 ± 1.7 *SD* over 20) and in North of Lebanon (Mean = 16.47 ± 1.9 *SD* over 20) (Table 1). Multivariate analysis results are shown in Table 2.

Among the 4368 participants, 1037 (54.3%) rated their knowledge on COVID-19 as good, 2370 (23.7%) as average, and 884 (20.2%) stated that they have very good knowledge about COVID-19. It is important to mention that those who rated their knowledge about COVID-19 as poor have the lowest knowledge score 15.21 and participants who rated their knowledge as very good have the highest knowledge score 17.12 (*P*-value =0.0001) (Table 1). Participants’ information was provided from different sources: media (69.6%), social media (69.6%), MoPH (61.4%), scientific sites and journals (45.0%), friends/

Table 1. Analytical analysis of knowledge score with age, gender, place of residence, income, educational level, profession and personal assessment of knowledge.

Parameters	N	%	Mean	Std. Deviation	Minimum	Maximum	p-value
Age (Years)							
18 - 25	2005	45.9%	16.40	1.976	9	20	
26 - 35	1225	28.0%	16.63	1.788	10	20	
36 - 45	578	13.2%	16.51	1.868	6	20	0.003*
46 - 55	366	8.4%	16.43	1.712	11	20	
> 55	194	4.4%	16.19	1.711	11	20	
Gender							
Male	1373	31.4%	16.39	1.894	9	20	
Female	2988	68.4%	16.51	1.874	6	20	0.146*
Other	7	0.2%	16.43	1.618	14	19	
Place of residence							
North	606	13.9%	16.47	1.925	10	20	
Mount of Lebanon	1510	34.6%	16.59	1.874	6	20	
Bekaa	416	9.5%	16.37	1.738	10	20	0.000*
Beirut	804	18.4%	16.58	1.879	11	20	
South	1032	23.6%	16.27	1.904	9	20	
Income (Lebanese Lira)							
0-750,000	1854	42.4%	16.26	1.984	6	20	
751,000-1,500,000	1061	24.3%	16.46	1.885	9	20	
1,501,000-3,000,000	864	19.8%	16.79	1.689	10	20	0.000*
3,001,000-4,500,000	320	7.3%	16.61	1.746	10	20	
More than 4,500,000	269	6.2%	16.86	1.649	10	20	
Educational Level							
Uneducated	3	0.1%	15.33	1.155	14	16	
Elementary school	6	0.1%	12.83	3.764	6	17	
Middle school	84	1.9%	15.21	1.945	11	19	
Secondary school	442	10.1%	15.96	1.993	9	20	0.000*
License	2124	48.6%	16.32	1.879	9	20	
Master's degree	1178	27.0%	16.70	1.770	10	20	
PhD or MD diploma	531	12.2%	17.27	1.592	12	20	
Profession							
Health care professional	1220	27.9%	17.09	1.761	10	20	0.000**
Other Profession	3148	72.1%	16.23	1.871	6	20	
Personal assessment of knowledge							
Very poor	2	0.0%	15.50	.707	15	16	
Poor	75	1.7%	15.21	2.440	6	20	
Average	1037	23.7%	15.74	1.919	10	20	0.000*
Good	2370	54.3%	16.59	1.806	9	20	
Very Good	884	20.2%	17.12	1.641	11	20	

N: number of participants; Std.deviation: standard of deviation. *P-value significant if <0.05; calculated using ANOVA test. ** P-value significant if <0.05; calculated using t-test.

neighbors/relatives (23.5%), and other sources (8.9%).

Table 3 reported knowledge concerning COVID-19. The vast majority of the participants knew that the novel coronavirus is a respiratory disease caused by a viral infection, is transmitted through coughing or sneezing, it takes a few days to two weeks for the virus to start showing its symptoms. The mean knowledge score was 16.47±1.8 SD over 20 with a minimum of six over 20 and a maximum

Table 2. Linear regression for Knowledge predicting factors.

Model	Unstandardized Coefficients		Standardized Coefficients	t	p-value	95% Confidence Interval	
	B	Std. Error	B			Lower	Upper
(Constant)	15.711	0.217		72.447	0.000	15.281	16.131
Personal monthly income	0.119	0.024	0.076	5.022	0.000	0.073	0.163
Level of education	0.333	0.032	0.161	10.372	0.000	0.270	0.396
Health care professional (doctor - pharmacist - nurse...)	-0.741	0.063	-0.177	-11.812	0.000	-0.863	-0.622

B: unstandardized beta; Std.deviation: standard of deviation; t:t-test.

Table 3. Knowledge statements about COVID-19.

Questions	Responses	Frequency	Percentage
Which of the following is correct about the definition of novel coronavirus?	Novel coronavirus is a respiratory disease caused by a viral infection	4126	94.5%
	Displayed symptoms usually include respiratory symptoms accompanied by fever, but novel coronavirus is not contagious	80	1.8%
	Novel coronavirus can progress to a severe illness but never leads to death.	93	2.1%
	Don’t know	69	1.6%
Which of the following is correct about transmission route of novel coronavirus?	Novel coronavirus is transmitted through coughing or sneezing	4247	97.2%
	Novel coronavirus is not transmitted by close contact with people	58	1.3%
	A person without symptoms cannot transmit the infection to another person	51	1.2%
	Don’t know	12	0.3%
Which of the following is true about the transmission of the new Coruna virus?	The virus needs an incubation period at least five weeks for its symptoms to appear	50	1.1%
	It takes a few days to two weeks for the virus to start showing its symptoms	4297	98.4%
	I don’t know	21	0.5%
Which one is correct about the treatment or vaccine for the novel coronavirus?	There is a curative treatment for novel coronavirus	260	6.0%
	Currently, there is neither a curative treatment nor a vaccine	3735	85.5%
	Currently, there isn’t a curative treatment, but there is a vaccine	285	6.5%
	I don’t know	88	2.0%
Is “washing your hand” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4344	99.5%
	No	18	0.4%
	Don’t Know	6	0.1%
Is “Avoiding touching your eyes, nose, and mouth with unwashed hands” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4230	96.8%
	No	132	3.0%
	Don’t Know	6	0.1%

Table 3. Contd.

Is “Use of disinfectants” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4317	98.8%
	No	32	0.7%
	Don’t Know	19	0.4%
Is “Staying home when you are sick” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4261	97.6%
	No	98	2.2%
	Don’t Know	9	0.2%
Is “Herbal supplements” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	757	17.3%
	No	2941	67.3%
	Don’t Know	670	15.3%
Is “Covering your cough” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4289	98.2%
	No	59	1.4%
	Don’t Know	20	0.5%
Is “A balanced diet” a direct effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	2681	61.4%
	No	1326	30.4%
	Don’t Know	361	8.3%
Is “Avoiding close contact with someone who is sick” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4345	99.5%
	No	18	0.4%
	Don’t Know	5	0.1%
Is “Take precautions when trading money” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4185	95.8%
	No	102	2.3%
	Don’t Know	81	1.9%
Is “Avoid eating raw meat” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	3224	73.8%
	No	662	15.2%
	Don’t Know	482	11.0%
Is “Getting the flu vaccine” a direct effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	520	11.9%
	No	3037	69.5%
	Don’t Know	811	18.6%
Is “Regular exercise” a direct effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	2113	48.4%
	No	1668	38.2%
	Don’t Know	587	13.4%
Is “Wearing a facemask by everyone” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	2946	67.4%
	No	1284	29.4%
	Don’t Know	138	3.2%
Is “taking antibiotics” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	285	6.5%
	No	3624	83.0%
	Don’t Know	459	10.5%
Is “home quarantine” an effective preventive measure for yourself and/or others against the novel coronavirus?	Yes	4356	99.7%
	No	6	0.1%
	Don’t Know	6	0.1%
There is "no preventive measures” for yourself and/or others against the novel coronavirus?	True	139	3.2%
	False	4123	94.4%
	Don't know	106	2.4%

of 20 over 20. The results showed that 672 participants (15.4%) had a score less than 15 over 20.

Concerning the perception of the Lebanese population of COVID-19, answers are presented in Table 4. About half of the population agreed that their health will be severely damaged if they contract the novel coronavirus (mean=3.64 over 5), The majority agreed that it is more severe than flu (mean=4.02 over 5) and believed that they could protect themselves against it (mean=4.09 over 5) but lesser people believed that they can protect themselves better than others (mean=3.92 over 5). The mean perception score was 25.2±4.9 SD over 40 with a minimum of four over 40 and a maximum of 40 over 40.

Concerning the measures taken to prevent COVID-19 (Table 5), the vast majority of the population were applying most of preventive measures. A proportion of 92% stayed home when falling sick or when will be sick. A percentage of 19.4% take herbal supplements and 24.4% did exercise regularly to prevent being infected with the novel coronavirus. Also note that 35.3% of the study participants wore always a facemask outside their house and 64.4% eat balanced diet.

As per the trust, the most trusted source of information for the participants were the healthcare professionals (Mean = 4.2±0.9 *SD* over 5) and MoPH (Mean = 4.1±1.1 *SD* over 5). The least trusted source of information was friends/family (Mean = 2.3±1.0 *SD* over 5). Note that participants had confidence in NGO (Mean = 4.2 ± 0.9 *SD* over 5) and WHO (Mean = 4.1 ± 1.2 *SD* over 5) more than MoPH (mean=4.08±1.025 *SD* over 5) and their own doctor (mean=3.77±1.47 *SD* over 5).

Finally, level of knowledge and risk perception were found to be correlated with a Pearson score of 0.037.

DISCUSSION

A good participants' response was achieved in a short timeframe reflecting the high concern of the Lebanese population regarding this topic. The knowledge score was 16.47, with the majority having a good knowledge level. However, a higher level is intended in this critical phase. Study conducted at the end of January 2019 by Zhong et al. (2020) showed a good knowledge among the Chinese population. Comparing the level of knowledge with that of other studies targeting this topic should take in consideration the difference between time of data collection and outbreak peak in each country. While the outbreak started in early January in China (ALJAZEERA, 2020), it took till early March to reach the peak in Lebanon.

The knowledge score among the healthcare workers (mean 17.09) was higher than the non-health workers (16.23) which was predicted. Knowledge of healthcare workers concerning COVID-19 was also acceptable as shown by other studies(Shi et al., 2020; Nemati et al., 2020).

Most of the population (above 95%) had good knowledge concerning the nature, transmission and characteristics of COVID-19, however responses related to the role of: herbs, diet, flu vaccine, exercise, raw meat, and facemasks use as preventive measures were controversial. The role of diet, herbs and exercise as direct prevention of COVID-19 is not yet established.

Based on the multivariate analysis, individuals with high income, high educational level, and working in healthcare had higher level of knowledge. The relation between educational level and knowledge was found also in the Chinese population (Zhong et al., 2020).These relations were studied also in other outbreaks such as SARS (Brug et al., 2004; Vartti et al. 2009), MERS (Nooh et al., 2020), and H1N1 (Tooher et al., 2013).

Knowing that most of the population have taken good precautionary measures, it is important to highlight that more than one third of population (35.3%) used facemasks outside their house in opposition to the WHO recommendations (Feng et al., 2020). This percentage was remarkably higher (96.4%) in the study conducted by Zhong et al. (2020). This huge difference could be related to the variation in recommendations between different countries. While WHO limited the use of facemasks in the community for people taking care of a person suspected to have COVID-19, China recommended the use of facemasks based on the infection risk (Feng et al., 2020). This behavior is very important to be addressed in Lebanon specially in the current crisis related to the lack of medical equipment and increase in demands among the Lebanese population (Human Rights Watch, 2020).

Unfortunately, this study showed that eight percent did not or will not consider to stay at home when sick. This is very crucial to be addressed since 'basic reproduction number' (R0) of SARSCOV-2 suggests that each infected person can pass the virus to an average of two–two and half people surpassing the SARS and MERS numbers (Callaway et al., 2020). Hence every single infected person can widely spread the disease and initiate a new outbreak.

Perception risk of the population was low (25/40), but still higher than the result reported by McFadden et al. (2020) who recorded (20/40) and lower than the risk found among the Chinese population (32.72/40) (Li et al., 2020). This could be related to the difference in the outbreak's timeframe between the USA, China and Lebanon leading to higher risk perception among the Lebanese and Chinese. In addition, the direct relation between the risk perception and the level of knowledge toward COVID-19 demonstrated in this study, was in agreement with another study (Li et al., 2020). Increasing the knowledge level appeared to be an efficient way to increase the risk perception leading to more precautionary behaviors. This relationship was highlighted during previous SARS outbreak (Brug et al., 2004; Dorfan and Woody, 2011; Vartti et al., 2009). On the other hand, a high precautionary level showed to be an efficient method to control outbreaks (Bell, 2004).

Table 4. Risk perception statements and score.

Statements	Scale	Frequency	Percentage	Mean (Over 5)
My health will be severely damaged if I contract novel coronavirus	Strongly Disagree	102	2.3%	3.64
	Disagree	879	20.1%	
	Neutral	832	19.0%	
	Agree	1597	36.6%	
	Strongly Agree	593	13.6%	
	Don't Know	365	8.4%	
I think novel coronavirus is more severe than flu	Strongly Disagree	74	1.7%	4.02
	Disagree	436	10.0%	
	Neutral	372	8.5%	
	Agree	2050	46.9%	
	Strongly Agree	1335	30.6%	
	Don't Know	101	2.3%	
Even if I fall ill with another disease, I will not go to hospital because of risk of getting novel coronavirus in the hospital	Strongly Disagree	1033	23.6%	2.47
	Disagree	1696	38.8%	
	Neutral	649	14.9%	
	Agree	677	15.5%	
	Strongly Agree	148	3.4%	
	Don't Know	165	3.8%	
Novel coronavirus will cause large numbers of deaths	Strongly Disagree	69	1.6%	3.87
	Disagree	539	12.3%	
	Neutral	643	14.7%	
	Agree	2075	47.5%	
	Strongly Agree	744	17.0%	
	Don't Know	298	6.8%	
Novel coronavirus will spread widely in Lebanon	Strongly Disagree	76	1.7%	3.77
	Disagree	660	15.1%	
	Neutral	1188	27.2%	
	Agree	1378	31.5%	
	Strongly Agree	419	9.6%	
	Don't Know	647	14.8%	
I am more likely to get the novel coronavirus than other people	Strongly Disagree	508	11.6%	3.01
	Disagree	1604	36.7%	
	Neutral	876	20.1%	
	Agree	615	14.1%	
	Strongly Agree	233	5.3%	
	Don't Know	532	12.2%	
I believe I can protect myself against the novel coronavirus	Strongly Disagree	15	0.3%	4.09
	Disagree	117	2.7%	
	Neutral	597	13.7%	
	Agree	2526	57.8%	
	Strongly Agree	956	21.9%	
	Don't Know	157	3.6%	
I believe I can protect myself against the novel coronavirus better than other people	Strongly Disagree	12	0.3%	3.92
	Disagree	217	5.0%	
	Neutral	1127	25.8%	
	Agree	2085	47.7%	
	Strongly Agree	608	13.9%	
	Don't Know	319	7.3%	
Risk Perception total score (over 40)				25.2

Table 5. Preventive measures toward COVID-19

Measures	Frequency	Percentage
Avoid traveling to novel coronavirus outbreak areas	4319	98.9%
Washing hands with soap and water	4357	99.7%
Using disinfectants	4266	97.7%
Avoid touching eyes, nose, and mouth with unwashed hands	4026	92.2%
Avoid eating outside your house	4089	93.6%
Staying home when you were sick or when you will be sick	4020	92.0%
Covering face with a tissue when sneezing or coughing, then threw the tissue in the trash	4084	93.5%
Avoid closing contact with people who are sick	4197	96.1%
Taking herbal supplement	847	19.4%
Doing Exercise regularly	1501	34.4%
Eating balanced diet	2814	64.4%
Being careful when touching money	3789	86.7%
Avoid eating raw meat	3890	89.1%
Always Wearing a facemask outside the house	1542	35.3%
Not Using Antibiotics to prevent infection by the novel coronavirus	4117	94.3%
Taking any action to prevent infection by the novel Coronavirus	3963	90.7%

The findings in this study showed that media and social media were the main sources of information, which is consistent with other studies on COVID-19 (Shi et al., 2020; McFadden et al., 2020).The media and social media were also reported to be the major source of information during previous major outbreaks (Vartti et al., 2009; Hou et al. 2018; Brug et al., 2004). In this study, there was more trust in the information provided by healthcare workers which was similar to the result of McFadden et al. (2020).

The limitations of this study were mainly related to the study design that was based on an online survey (due to the quarantine and limited time available) which limited the ability to reach the population that was not active on internet, with a very low educational socioeconomic level. In addition compared to the most recent national population statistics (Central Administration of Statistics 2020), the population was over-representative of women, educated, and young people. Thus, the results can be only generalized to young well-educated Lebanese population and especially women. On the other hand, the study is the first study to assess and reflect the response and practice of the Lebanese during a serious outbreak. In addition, the results were valuable for the MoPH and other parties and helped them to address the gap in knowledge among specific groups (older population, people with low income, low educational level, non-healthcare professionals and those living in peripheral districts).

Conclusion

Most of the population had good knowledge level regarding the COVID-19 outbreak, however efforts must be reinforced to achieve higher knowledge, thus higher risk perception especially during this critical situation. Campaigns should target older population, people with low income, low educational level, non-healthcare professionals and those living in peripheral districts. Media should provide more trusted material since it represented the main source of information for the Lebanese population. The population showed a strict adherence to most of the preventive measures. Nevertheless, facemask use among the Lebanese population should be addressed and corrected according to the most recent recommendations.

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CONFLICT OF INTERESTSTATEMENT

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

REFERENCES

ALJAZEERA. 2020. Timeline: How the new coronavirus spread. Retrieved from https://www.aljazeera.com/news/2020/01/timeline-china-coronavirus-spread-200126061554884.html.

Bell, D. M. (2004). Public health interventions and SARS spread, 2003. *Emerging Infectious Diseases*, 10(11), 1900.

Brug, J., Aro, A. R., Oenema, A., De Zwart, O., Richardus, J. H.,

& Bishop, G. D. (2004). SARS risk perception, knowledge, precautions, and information sources, the Netherlands. *Emerging Infectious Diseases*, 10(8), 1486-89.

Callaway, E., Cyranoski, D., Mallapaty, S., Stoye E., & Tollefson, J. (2020) The coronavirus pandemic in five powerful charts. *Nature,* 579(7800), 482–83.

Centers for Disease Control and Prevention (2020). Coronavirus (COVID-19). Retrieved from https://www.cdc.gov/coronavirus/2019-ncov/index.html.

Central Administration of Statistics (2020). Demographic and Social. Retrieved from http://www.cas.gov.lb/index.php/demographic-and-social-en.

Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F., Han, Y., Qiu, Y., Wang, J., Liu, Y., Wei, Y., & Yu, T. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The Lancet*, 395(10223), 507-513.

Dorfan, N. M., & Woody, S. R. (2011). Danger appraisals as prospective predictors of disgust and avoidance of contaminants. *Journal of Social and Clinical Psychology*, 30(2), 105-132.

Feng, S., Shen, C., Xia, N., Song, W., Fan, M., & Cowling, B. J. (2020). Rational use of face masks in the COVID-19 pandemic. *The Lancet Respiratory Medicine*, 8(5), 434-436.

Hou, Y. A., Tan, Y. R., Lim, W. Y., Lee, V., Tan, L. W. L., Mark, I., Chen, C., & Yap, P. (2018). Adequacy of public health communications on H7N9 and MERS in Singapore: insights from a community based cross-sectional study. *BMC Public Health*, 18, Article number 436.

Human Rights Watch (2020). Lebanon: COVID-19 worsens medical supply crisis. Retrieved from https://www.hrw.org/news/2020/03/24/lebanon-covid-19-worsens-medical-supply-crisis.

Li, J. B., Yang, A., Dou, K., Wang, L. X., Zhang, M. C., & Lin, X. Q. (2020). Chinese public's knowledge, perceived severity, and perceived controllability of the COVID-19 and their associations with emotional and behavioural reactions, social participation, and precautionary behaviour: A national survey. BMC Public Health (In press)

Lu, H., Stratton, C. W., & Tang, Y. W. (2020). Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. *Journal of Medical Virology*, 92(4), 401-402.

McFadden, S. M., Malik, A. A., Aguolu, O. G., Willebrand, K. S., & Omer, S. B. (2020). Perceptions of the adult US population regarding the novel coronavirus outbreak. *PloS one*, 15(4), e0231808.

Ministry of Public Health (2020). Announcement. Retrieved from https://www.moph.gov.lb/userfiles/files/Prevention/nCoV-2019/Announcement.pdf.

Mungroo, M. R., Khan, N. A., & Siddiqui, R. (2020). Novel coronavirus: Current understanding of clinical features, diagnosis, pathogenesis, and treatment options. *Pathogens*, 9(4), 297.

Nemati, M., Ebrahimi, B., & Nemati, F. (2020). Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. *Archives of Clinical Infectious Diseases* (In Press), e102848.

Deng, S. Q., & Peng, H. J. (2020). Characteristics of and public health responses to the coronavirus disease 2019 outbreak in China. *Journal of Clinical Medicine*, 9(2), 575.

Nooh, H. Z., Alshammary, R. H., Alenezy, J. M., Alrowaili, N. H., Alsharari, A. J., Alenzi, N. M., & Sabaa, H. E. (2020). Public awareness of coronavirus in Al-Jouf region, Saudi Arabia. *Journal of Public Health*, 1-8. Retrieved from https://doi.org/10.1007/s10389-020-01209-y.

Patel, A., Jernigan, D. B., & 2019-nCoV CDC Response Team (2020). Initial public health response and interim clinical guidance for the 2019 novel coronavirus outbreak—United States, December 31, 2019–February 4, 2020. *Morbidity and Mortality Weekly Report*, 69(5), 140-146.

Shi, Y., Wang, J., Yang, Y., Wang, Z., Wang, G., Hashimoto, K., Zhang, K., & Liu, H. (2020). Knowledge and attitudes of medical staff in Chinese psychiatric hospitals regarding COVID-19. *Brain, Behavior, & Immunity-Health*, 4(April), 100064.

Sohrabi, C., Alsafi, Z., O'Neill, N., Khan, M., Kerwan, A., Al-Jabir, A., Iosifidis, C., & Agha, R. (2020). World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19). *International Journal of Surgery*, 76(April), 71-76.

Tooher, R., Collins, J. E., Street, J. M., Braunack-Mayer, A., & Marshall, H. (2013). Community knowledge, behaviours and attitudes about the 2009 H1N1 Influenza pandemic: a systematic review. *Influenza and other Respiratory Viruses*, *7*(6), 1316-1327.

Vartti, A. M., Oenema, A., Schreck, M., Uutela, A., de Zwart, O., Brug, J., & Aro, A. R. (2009). SARS knowledge, perceptions, and behaviors: a comparison between Finns and the Dutch during the SARS outbreak in 2003. *International Journal of Behavioral Medicine*, 16, 41-48.

World Health Organization (2020). Coronavirus Disease (COVID-19) Pandemic. https://www.who.int/emergencies/diseases/novel-coronavirus-2019.

Wu, D., Wu, T., Liu, Q., & Yang, Z. (2020). The SARS-CoV-2 outbreak: what we know. *International Journal of Infectious Diseases,* 94, 44-48.

Yang, J. Z., & Chu, H. (2018). Who is afraid of the Ebola outbreak? The influence of discrete emotions on risk perception. *Journal of Risk Research*, 21(7), 834-853.

Yin, Y., & Wunderink, R. G. (2018). MERS, SARS and other coronaviruses as causes of pneumonia. *Respirology*, 23(2), 130-137.

Zhong, B. L., Luo, W., Li, H. M., Zhang, Q. Q., Liu, X. G., Li, W. T., & Li, Y. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *International Journal of Biological Sciences*, 16(10), 1745-1752.