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Knowledge, Attitudes, and Practices toward COVID-19 among Persian Birth Cohort Participants

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Abstract:

BACKGROUND: Knowledge, attitudes, and practices (KAP) toward COVID-19 play an important role in controlling the outbreak. The present study aimed to investigate the KAP of a group of women toward COVID-19 during the second wave of the outbreak in Iran.

METHOD AND MATERIAL: A cross-sectional survey of 2862 women was conducted in May and June 2020 in two centers of Persian birth cohort. The survey instrument was a self-reported questionnaire. Multivariable linear regression analysis to identify factors associated with knowledge and practice toward COVID-19 and multinomial logistic regression analyses to identify factors associated with attitudes. Unstandardized regression coefficients (β) and odds ratios and their 95% confidence intervals were used to quantify the associations between variables and KAP.

RESULT: Good knowledge and optimistic attitudes toward the successful control of COVID-19 was seen among participants. Overall, about 57.3% (1640), 41.1% (1176), and 1.6% (46) of respondents were categorized as low (score <50%), moderate (score: 50%–80%), and high (score > 80%) proper practice, respectively. Eighty-five individuals with COVID-19 experience (3.0%) had lower knowledge score (79.91 ± 17.93 vs. 83.81 ± 13.88 , $P < 0.001$) and lower proper practice score (40.22 ± 16.57 vs. 47.96 ± 16.15 , respectively, $P < 0.001$) compared to those who were not infected. A higher level of knowledge was associated with appropriate practice in both groups of positive attitudes ($\chi^2 = 32.23$, $P < 0.001$) and negative attitudes ($\chi^2 = 31.49$, $P < 0.001$).

CONCLUSION: This survey recorded good knowledge and relatively good attitudes among women. Special health policies plan should be taken for target populations among women during the COVID-19 pandemic.

Keywords:

Attitudes, COVID-19, disease outbreaks, health knowledge, Iran, practice, women

Introduction

COVID-19 was first reported in Wuhan, China, on December 31, 2019, and quickly spread worldwide. The World Health Organization (WHO) noted it a new pandemic on March 11, 2020.^[1] In Iran, 2 patients in Qom city were confirmed as COVID-19 positive on February 19, 2020. The disease spread rapidly in all provinces of the country and most cities and towns. To date (August 21,

2020), the total number of positive-infected people has reached 354,764, with 20,376 death.^[2] In the early days of the outbreak, Iran could have instituted quarantines to slow the spread of COVID-19. However, as time passed, quarantine proved more difficult to implement because of the vastness of the affected regions and economic problems. From the early days of the COVID-19 outbreak, Iran has focused on social distancing, rather than mandatory quarantine, using measures

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such as the closure of schools and universities, mosques, shrines, and Friday (Jumma) prayers; canceling sports events; and closing government jobs, except essential jobs. However, there were no mandatory restrictions on travel and commuting until the end of New Year's holidays. Finally, on March 26, 2020, the government decided to take stricter measures such as closing down shopping malls and big markets, sports places and swimming pools, parks, and museums reducing travel by interprovincial travel bans and the air, train, and intercity bus restriction. In the latest move on the last days of April, Iran has decided to implement smart distancing, provide conditions for society to gradually return to normal.^[3-5] Iran experienced various measures to struggle with COVID-19 at different time points and in the context of severe resource and health care facilities limitations, it is becoming increasingly clear that adopting the outbreak may not be feasible except through observing some preventive measures during the pandemic.^[6,7] There are also concerns around misinformation that may impact public health responses. As the WHO Director-General, Dr. Tedros Adhanom Ghebreyesus said, "we're not just fighting an epidemic; we're fighting an infodemic."^[8] The quickly COVID-19 widespread has led to a flood of information surrounding the virus, and despite the benefits of rapid information dissemination through media for public health action, misinformation can also easily be propagated through the same channels.^[9,10] Both exaggerated and underestimated measures can either fuel panic or a false sense of security among the general public.^[11,12]

We aimed to measure the knowledge, attitudes, and practices (KAP) toward COVID-19 of women who participated in the Isfahan and Semnan Birth Cohort study from May 9, to June 9, 2020 after the first wave of the outbreak in Iran.

Materials and Methods

Study design and setting

This cross-sectional study was performed on women members of the national birth cohort study in Iran in the two centers of Isfahan and Semnan. The birth cohort study in Iran is an ongoing, multidisciplinary, longitudinal project linked to a multicenter PERSIAN study running in 5 different cities of Iran (Isfahan, Yazd, Semnan, Sari, and Rafsanjan). It takes its subjects from Iranian currently pregnant women and aims to investigate the impact of socioeconomic status, lifestyle, diet, occupational, and environmental exposures before and during pregnancy and also during early life, on some major health concerns in their ongoing child.^[13]

Study participants and sampling

In 4 weeks since May 9, 2020, all members of the two birth cohort centers were called in, and if they were satisfied,

they were asked to participate in a short telephone interview about COVID-19. The statistical population was about 4000 people (about 3000 in Isfahan and 1000 in Semnan) who all were invited to participate. To increase the participation rate project-related social networks and media were used to inform them about the study. Overall 2862 women (2029 from Isfahan and 833 from Semnan) were conducted in the study.

Data collection tool and technique

The tool of the research was a shortened form a questionnaire which had been developed in the Persian language as a self-administered researcher-made questionnaire by birth cohort investigators in Sari center at Mazandaran University of Medical Sciences based on scientific articles and guidelines for clinical and community management of COVID-19^[14-16] that applied there as an online questionnaire in early weeks of COVID-19 outbreak from March to April 2020. After obtaining the permission of the mentioned researchers, the questionnaire was qualitatively revised and summarized by an independent panel of experts in Isfahan and Semnan centers and applied in a pilot study to re-evaluate its validity and reliability. The approved tool was a 20-item questionnaire including 11 knowledge, 2 attitudes, and 7 practice questions. The item content validity index (I-CVI) ranged from 0.68 to 1 and the scale CVI (S-CVI/Ave) ranged from 0.83 to 0.92. The instrument is assessed with high content validity that was suitable for completion using a telephone interview.

The knowledge questionnaire consists of 11 items question regarding clinical presentations, transmission routes, and prevention and control of COVID-19. For knowledge questions, there were three options, including "correct," "incorrect" or "do not know," which only gave 1 point for the correct answer, while 0 points were given for the incorrect/do not know answers. The sum of scores was calculated ranged from 0 to 11, with a higher score indicating better knowledge. Internal consistency of the knowledge measures was tested using Cronbach's alpha for knowledge (11 items) was 0.62 indicating acceptable internal consistency.^[17]

To measure practice, participants were asked 7 questions about preventive measures, which were given a score of 1 for each person if they performed good practice and otherwise a score of zero. The overall score range was 0-7, with a higher score indicating better performance. Cronbach's alpha coefficient for practice (7 items) was 0.72.

To make better comparisons, each summation of practice and knowledge scores transformed to the range of 0-100 and for inference the Bloom's criteria was used, so that

transformed scores below 50% and above 80% were considered low and high, respectively (50–80 medium).^[18]

The questions used to measure attitudes toward COVID-19 were two questions that asked participants about their success in controlling the disease, whether they agreed, disagreed, or were unsure whether the epidemic was successfully controlled.

During the interview, participants were also asked about the occurrence of COVID-19 disease in themselves or their family members until then, and the main source of being informed about it. For the demographic and personal information, archived data were used.

Ethical consideration

All of participants were satisfied to take part in the study. After obtaining approval from Research Ethics Committees in Isfahan and Semnan Universities of Medical Sciences telephone interviews were used to achieve the objectives of the research.

Statistical analysis

Frequencies of correct knowledge answers and various attitudes and proper practices were described. Knowledge and practice scores and frequency of attitudes of different persons according to demographic characteristics were compared with independent samples *t*-test, one-way analysis of variance, or Chi-square test as appropriate. Multivariable linear regression analysis using all of the demographic variables as explanatory variables and knowledge and practice scores as the outcome variable was conducted to identify factors associated with knowledge and practice toward COVID-19. Similarly, multinomial logistic regression analyses were used to identify factors associated with attitudes. Collinearity diagnostic of the explanatory variable was examined using the variance inflation factor and correlation matrix of coefficient regression. Unstandardized regression coefficients (β) and odds ratios (ORs) and their 95% confidence intervals (CIs) were used to quantify the associations between variables and KAP. The statistical significance level was set at $P < 0.05$ (two-sided).

Results

In this study, 2862 women with mean \pm standard deviation age of 30.9 ± 5.2 years participated (2029 from Isfahan and 833 from Semnan) (response rate: 71.5%). Most of them (89.2%) were homemakers, and of the others who were employed, 50 were in the medical and paramedical fields (nurse or health-care staff). Among all 1486 (51.9%) were educated until high school level (diploma) and had no academic education. The main source of information about COVID-19 was declared to be television by 78.8% of participants (2254).

Table 1 shows the characteristics of the participants. Eighty-five people had a history of getting infected with COVID-19 (3.0%) [Table 1].

The frequency distribution of correct answers to knowledge questions and proper practices declared by participants is presented in Table 2. The lowest percentage of correct answers belonged to questions “People with coronavirus are only carriers when they have a fever” (52.4%), and “Unlike colds, runny nose and sneezing are less common in people infected with the coronavirus at the onset of the disease” (74.0%). The highest percentage belonged to the item “To prevent coronavirus infection, people should avoid going to crowded places as much as possible and not use public transportation” (94.6%). As can be seen, the mean score

Table 1: Characteristics of the participants

Characteristics	Count (%)
Center	
Isfahan	2029 (70.9)
Semnan	833 (29.1)
Age (years)	
<25	331 (11.6)
25-29	757 (26.5)
30-34	1050 (36.7)
≥ 35	724 (25.3)
Job	
Homemaker	2553 (89.2)
Employee	113 (3.9)
Nurse or Health Care Staff	50 (1.7)
Teacher	74 (2.6)
Nongovernmental job	53 (1.9)
Other	19 (0.7)
Education	
Illiterate	16 (0.6)
Elementary	351 (12.3)
Diploma (high school)	1119 (39.1)
Postdiploma (technician)	264 (9.2)
Bachelor	938 (32.8)
Master	160 (5.6)
Ph.D	14 (0.5)
Living place	
Urban	2785 (97.3)
Rural	77 (2.7)
Get infected	
Yes	85 (3.0)
No	2777 (97.0)
The main source of information	
Television	2254 (78.8)
Medical sites (WHO, etc.)	118 (4.1)
Newspaper	6 (0.2)
Radio	7 (0.2)
Social media (Telegram, WhatsApp, Instagram, etc.)	444 (15.5)
Family and friends	27 (0.9)
Colleagues	6 (0.2)
Total	2862 (100)

WHO=World Health Organization

Table 2: Questionnaire of knowledge, attitudes, and practice toward coronavirus disease 2019

Questions	Count (%)
Knowledge (correct answer, percentage of the total sample)*	
To prevent coronavirus infection, people should avoid going to crowded places as much as possible and not use public transportation	2708 (94.6)
The main clinical symptoms of coronavirus include fever, fatigue, dry cough, and muscle aches	2686 (93.9)
People who come in contact with a person with coronavirus should be quarantined for 14 days	2630 (91.9)
Older people, who have a chronic illness, or immune system defects, and obese people are more likely to have the disease	2595 (90.7)
Children and young people also need to take steps to prevent coronavirus infection	2588 (90.4)
Coronavirus is spread through the respiratory droplets of infected people	2529 (88.4)
There is currently no effective treatment for coronavirus, but early symptomatic and supportive treatment can help most patients recover from infection	2521 (88.1)
Ordinary people can use masks to prevent coronavirus	2457 (85.8)
Smokers and addicts are infected with the coronavirus	2355 (82.3)
Unlike colds, runny nose and sneezing are less common in people infected with the coronavirus at the onset of the disease	2118 (74)
People with coronavirus are only carriers when they have a fever	1500 (52.4)
Attitude (agree, disagree, I don't know, percentage of the total sample)	
Do you agree that coronavirus is finally being successfully controlled in the world?	
Agree	2279 (79.6)
I don't know	328 (11.5)
Are you sure that Iran can win the battle against the coronavirus?	
Agree	2054 (71.8)
I don't know	419 (14.6)
Practice (proper practice, percentage of the total sample)†	
Do you wash your hands with soap for 20 s when you enter the house?	2780 (97.1)
In recent days, do you wear a mask and gloves when leaving the house?	2521 (88.1)
Do not go to crowded places and shopping centers	1651 (57.7)
Avoid sick people	1436 (50.2)
Do not travel	1421 (49.7)
Not using public transportation	1175 (41.1)
Do not go to the hospital	949 (33.2)

*The score of each correct answer is 1. Mean score (range: 0-11):9.3±1.6; Mean score/100: 84.8, †The score of each proper practice is 1. Mean score (range: 0-7):2.5±1.8; Mean score/100: 35.2

of knowledge was 9.3 ± 1.6 (range: 0–11), and from 100, it was 83.7.

The lowest percentage of proper practices belonged to items “Do not go to the hospital” (33.2%), and “Not using public transportation” (41.1%). The highest percentage belonged to the item “Do you wash your hands with soap for 20 s when you enter the house?” (97.1%). The mean score of attitude was 2.5 ± 1.8 (range: 0–7), and the mean score of 100 was 35.2.

The frequency of the answers to the attitude items toward the danger of disease and overcoming it is as well presented in Table 2. More than 70.0% of the respondents agreed that COVID-19 will finally be successfully controlled. Rates of reporting “disagree” and “I don't know” were 11.5%–14.5% and 9.0%–13.9%, respectively [Table 2].

Table 3 shows the distribution of knowledge and practice scores as well as attitude items across the subgroups. Knowledge scores significantly differed across categories of job status and education level ($P < 0.001$ and $P < 0.001$, respectively) [Table 3]. Furthermore, those

who got infected with COVID-19 had significantly lower knowledge scores ($P = 0.010$). The practice score significantly was higher among women with an academic degree ($P = 0.028$).

The attitude toward the final success in controlling COVID-19 significantly differed across education levels and job status ($P < 0.05$). Besides, respondents reporting “I don't know” had significantly lower knowledge scores than those reporting “agree” ($P < 0.001$). Practice scores were not associated with attitude items ($P > 0.05$) [Table 3].

The results of regression models regarding the associations between participants' main characteristics and demographics with the knowledge and practice scores/100 as well as attitude are demonstrated in Table 4. Based on multivariate linear regression, although age was not associated with knowledge, its increase was associated with a decrease in practice score ($\beta = -0.12$, $SE = 0.06$, $P = 0.040$). Being employed and having an academic degree were associated with increased scores of knowledge and practice ($P < 0.05$). Getting infected to COVID-19 was associated with

Table 3: Demographic characteristics of participants and knowledge, practice scores/100, and attitude toward coronavirus disease 2019

	Knowledge score			Practice score			Attitude: A1			Attitude: A2				
	Mean±SD	P		Mean±SD	P		Agree (%)	I don't know (%)	Disagree (%)	P	Agree (%)	I don't know (%)	Disagree (%)	P
Age group														
<25	82.18±15.39	0.121	47.71±15.04	0.157	265 (80.1)*	42 (12.7)	24 (7.3)	0.064	233 (70.4)	55 (16.6)	43 (13.0)	0.206		
25-29	83.39±14.49		48.03±15.96		577 (76.2)	105 (13.9)	75 (9.9)		521 (68.8)	125 (16.5)	111 (14.7)			
30-34	84.15±13.28		48.31±16.38		854 (81.3)	111 (10.6)	85 (8.1)		776 (73.9)	144 (13.7)	130 (12.4)			
35 and more	84.05±13.94		46.59±16.72		583 (80.5)	70 (9.7)	71 (9.8)		524 (72.4)	95 (13.1)	105 (14.5)			
Job-status														
Housewife	83.29±14.16	<0.001	46.94±16.10	<0.001	2033 (79.6)	294 (11.5)	226 (8.9)	0.927	1851 (72.5)	366 (14.3)	336 (13.2)	0.039		
Nonhousewife	87.03±12.48		54.29±15.72		246 (79.6)	34 (11.0)	29 (9.4)		203 (65.7)	53 (17.2)	53 (17.2)			
Education level														
High school or lower	82.74±14.40	<0.001	46.29±15.92	<0.001	1201 (80.8)	173 (11.6)	112 (7.5)	0.028	1090 (73.4)	216 (14.5)	180 (12.1)	0.048		
Academic degree	84.72±13.56		49.29±16.39		1078 (78.3)	155 (11.3)	143 (10.4)		964 (70.1)	203 (14.8)	209 (15.2)			
Region														
Urban	83.67±14.01	0.60	47.43±16.15	<0.001	2217 (79.6)	318 (11.4)	250 (9.0)	0.709	1990 (71.5)	414 (14.9)	381 (13.7)	0.061		
Rural	84.52±14.95		58.50±15.11		62 (80.5)	10 (13.0)	5 (6.5)		64 (83.1)	5 (6.5)	8 (10.4)			
Get infected														
Yes	79.91±17.93	0.01	40.22±16.57	<0.001	71 (83.5)	4 (4.7)	10 (11.8)	0.108	60 (70.6)	10 (11.8)	15 (17.6)	0.456		
No	83.81±13.88		47.96±16.15		2208 (79.5)	324 (11.7)	245 (8.8)		1994 (71.8)	409 (14.7)	374 (13.5)			
Knowledge score					84.42±13.67	79.24±16.45	82.90±14.03	<0.001	85.01±12.97	75.86±16.73	85.17±13.52	<0.001		
Practice score					47.70±16.2	48.65±15.61	47.73±16.22	0.392	48.10±16.25	47.52±14.97	46.02±17.23	0.064		

*Frequency (%). Comparisons were performed using the Chi-square test or ANOVA. SD=Standard deviation, ANOVA=Analysis of variance

Table 4: Multivariate association of participants' main characteristics and demographics with the knowledge, practice scores/100, and attitude

	Knowledge			Practice			Attitude: A1			Attitude: A2			
	β (SE)	P		β (SE)	P		Disagree versus agree	I don't know versus agree	OR (95% CI)	P	Disagree versus agree	I don't know versus agree	OR (95% CI)
Age	0.08 (0.05)	0.107	-0.12 (0.06)	0.040	1.00 (0.98-1.03)	0.907	0.98 (0.96-1.00)	0.055	1.00 (0.98-1.02)	0.902	0.99 (0.96-1.00)	0.045	
Nonhousewife	3.01 (0.88)	0.001	6.62 (1.00)	<0.001	0.91 (0.59-1.39)	0.654	0.98 (0.66-1.45)	0.917		0.125	1.58 (1.12-2.23)	0.009	
Academic degree	1.44 (0.54)	0.008	2.04 (0.62)	0.001	1.45 (1.10-1.89)	0.008	1.00 (0.78-1.27)	0.994	1.25 (1.00-1.57)	0.055	1.06 (0.85-1.32)	0.618	
Rural place	1.16 (1.62)	0.473	11.81 (1.84)	<0.001	0.77 (0.30-1.93)	0.575	1.16 (0.58-2.29)	0.677	0.69 (0.33-1.45)	0.323	0.38 (0.14-0.97)	0.044	
Get infected	-3.67 (1.54)	0.017	-7.49 (1.75)	<0.001	1.34 (0.68-2.63)	0.399	0.38 (1.38-1.05)	0.063	1.38 (0.77-2.47)	0.274	0.67 (0.33-1.35)	0.266	
Knowledge score			0.09 (0.02)	<0.001	0.99 (0.98-1.00)	0.067	0.98 (0.97-0.98)	<0.001	1.00 (0.99-1.01)	0.992	0.96 (0.96-0.97)	<0.001	

β=Regression coefficient, SE=Standard error, OR=Odds ratio, CI=Confidence interval

lower knowledge ($\beta = -3.67$, $SE = 1.54$, $P = 0.017$) and practice scores ($\beta = -7.49$, $SE = 1.75$, $P < 0.001$). Living in a rural environment was shown to be only concerning increasing the practice score ($\beta = 11.81$, $SE = 1.84$, $P < 0.001$). The knowledge score had a positive association with the practice score ($\beta = 0.09$, $SE = 0.02$, $P < 0.001$).

Multivariate association of participants' characteristics with attitude items was investigated using a multinomial regression model, in which "agree" response to successful control of COVID-19 was considered as the reference category. Those women with an academic degree had a more negative attitude about controlling COVID-19 in the world ($OR = 1.45$, $95\%CI: 1.10-1.89$). Residency in the rural area was associated with a more positive attitude toward successful control of COVID-19 in Iran ($OR = 0.38$, $95\% CI: 0.14-0.97$). Higher knowledge score was associated with a positive attitude about prospering to control COVID-19 in the world ($OR = 0.98$, $95\% CI: 0.97-0.98$) in Iran ($OR = 0.96$, $95\% CI: 0.96-0.97$) [Table 4].

According to Bloom's criteria, 3.4%, 27.7%, and 68.9% of respondents were categorized as low, moderate, and high knowledge group, respectively. About 57.3%, 41.1%, and 1.6% of respondents were categorized as low, moderate, and high proper practice, respectively. Positive attitude defined as "agree" response to both questions A1 and A2 in Table 1, was seen among 64.4% of participants. Figure 1 illustrates the rate of low, moderate, and high proper practice in different levels of knowledge and attitude. By increasing the knowledge level, the rate of participants with proper practice is increasing in both the groups of positive attitudes ($\chi^2 = 32.23$, $P < 0.001$) and negative attitudes ($\chi^2 = 31.49$, $P < 0.001$). On the other hand, a higher knowledge level was associated with a positive attitude toward successful control of COVID-19 ($\chi^2 = 89.00$, $P < 0.001$) [Figure 1].

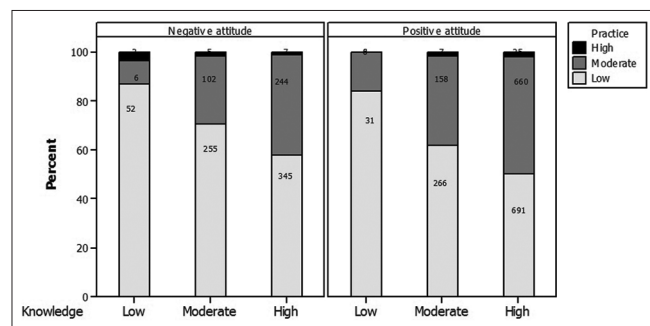


Figure 1: Frequency of participants based on levels of knowledge, practice, and attitude (according to Bloom's criteria, transformed practice and knowledge scores below 50% and above 80% were considered low and high, respectively (50–80 moderate)). [Positive attitude was defined as the "agree" response to both questions A1 and A2 in Table 1]

Discussion

When our survey started on May 9, 2020, there were 1529 daily new cases and 48 daily deaths in Iran; by the end of the survey on June 9, there were 2095 cases and 74 deaths. Based on the epidemiological trend of COVID-19, our survey coincided with the second wave of COVID-19 in Iran.^[2] Besides, the worldwide outbreak was increasing at a rate of 140% more new cases daily during the months of the interviews.^[19] Thus, our findings provide a rare snapshot of how a Birth Cohort study participants adapted to this unprecedented time and took action, or not. This survey provides a timely insight into the level of knowledge, attitude, and practices toward COVID-19 of Iranian women who participated in the Persian Birth Cohort study.

In this predominantly young adult, urban and female population, our study revealed that most respondents were knowledgeable about COVID-19. The majority of the participants also held an optimistic attitude towards the successful control of COVID-19. Despite good knowledge and a relatively good attitude, most participants were categorized in the low proper practice group. Although nearly all, practiced proper hand hygiene and wore masks and gloves when leaving home, some other behaviors such as avoiding crowded places, traveling, and not using public transportation were less observed. In the first study that evaluated the KAP toward COVID-19 during the rapid rise of the COVID-19 outbreak, the knowledge, and attitude level reported almost similar to our findings, however, the practices of nearly all Chinese residents were very cautious; avoided crowded places and wore masks when leaving the home probably.^[16] In addition, the KAP survey of Sari Birth Cohort showed proper practice among women in the early weeks of the outbreak.^[20] Whereas, our findings were agreed with the study evaluated the KAP toward COVID-19 among poor-income households in the Philippines which was held from February to March.^[21] It seems that our findings are partly reflected the government's decisions since the end of April, to implement smart social distancing, which was in line with social distancing and provides conditions for society to gradually return to normal. Based on this decision, low-risk and essential jobs with low crowds and low traffic, such as production and industrial units, distribution, food, technical, and household services, were to be resumed gradually and could start after obtaining a license from the Ministry of Health and Medical Education and observing health protocols. According to the plan, two-thirds of government employees started working in rotation.^[4] Thus, people had to be in crowded places, travel, and use public transportation to return to normal work during the period of our survey. In addition, we should consider

the “quarantine fatigue” phenomenon which means experiencing the profound burden of extreme physical and social distancing and economic hardship can severely damage psychological well-being, especially for people who were already suffered from mental illness and psychological disorders before the crisis started.^[22,23] What everyone needs now is a manual on how to have a life in a pandemic while not forgetting preventive measures and act effectively toward COVID-19.^[24,25] As hypothesized above, this inconsistency in the practice status of the participants in our survey with the quick online cross-sectional survey on Chinese residents could be relevant to the different survey time points, the governmental decision in each country, also the “quarantine fatigue” phenomenon which is important now, after about 8 months of COVID-19 outbreak in Wuhan, China.^[1,16] Future studies should investigate the effect of time, governmental decisions, and “Quarantine fatigue” phenomenon as effective factors on knowledge, attitude, and especially practice toward COVID-19.

We also analyzed the characteristics of KAP toward COVID-19 and identified some demographic factors including job, education, and living place (urban or rural) associated with KAP; these findings are useful for public health policy-makers and health workers to recognize target populations among women who may face greater dangers during COVID-19 pandemic based on previous studies.^[26-28]

The main source of information obtained about COVID-19 was declared to be through traditional media sources, such as television in our study. Also, in other studies, television is still the most popular media among populations, despite the expansion of virtual networks and social media in recent years.^[16,21,29] This finding highlights the need for public health communication strategies to avoid a singular focus on social media and virtual networks as a source of information.

We revealed that knowledge and practice score and attitude toward the final success in controlling COVID-19 significantly differed across categories of job and education level. Surprisingly, the practice score significantly was higher among rural women, despite lower socioeconomic status. Also, this gap was reported in the practice of primary healthcare providers in Pakistan and households in Kenya.^[30,31] However, a similar study conducted among Sari Birth Cohort women in the early weeks of the COVID-19 outbreak did not demonstrate this gap.^[20] This result showed a high risk of infection in women in urban regions, maybe because of population dispersion or psychological aspects in cities. We suggest that public health policymakers should consider special health services for this population to promote practice toward COVID-19 particularly at this time point after

the first wave of the outbreak in Iran. Another study evaluated KAP in North-Central Nigeria suggested planning for KAP assessment regarding COVID-19 and associated public health, and psychological burdens within the gradual easing of the lockdown.^[32]

Not surprisingly that those who got infected to COVID-19 had significantly lower knowledge and practice scores. This result confirms the important preventive role of KAP toward COVID-19.

Our study showed that beyond the attitude point of view, by the increment in the knowledge level, the rate of participants with proper practice was raised. This finding demonstrated the importance of knowledge in societies toward pandemics; however, we should not ignore the effect of health policies on population practices toward COVID-19 outbreak.

Limitations and recommendation

Our study, working to quickly capture the knowledge, attitude, and practice of a specific population during the second wave of COVID-19 in Iran, clearly has limitations. First, this survey was done among a selected group of women who were all active participants in the Persian Birth Cohort study and were pregnant or have a child under about 3.5 years old in 2 centers of Isfahan and Semnan. The KAP survey of Sari birth cohort study performed at the early weeks of COVID19, thus findings were explained elsewhere.^[20] Second, these findings may have limited generalizability, especially for the male gender and old age population. Third, our outcomes revealed only the initial fundamental knowledge of COVID-19, attitudes, and a limited set of practices through a self-reported questionnaire. Data capture on psychological conditions and behaviors, the effect of time and governmental decisions on the KAP during a pandemic period, suggest being considered in future studies.

Along with all limitations, to the best of our knowledge, this is the first survey conducted on a group of multicenter participants of women in the reproductive age group. Another strength of our study was the rare condition during the coincidence of our survey with the second wave of COVID-19 outbreak in Iran, provided a timely insight into the level of knowledge, attitude, and practices toward COVID-19. Also, we tried our best to recruit a large population as possible by calling all women recruited in the PERSIAN Birth Cohort study in both Isfahan and Semnan centers.

Conclusion

This survey recorded good knowledge and relatively good attitudes among women, however, the practices

of participants, especially those who were homemakers, with low educational levels and lived in urban regions was not appropriate. Health policies should plan specifically for target populations among women who may face greater health hazards during the COVID-19 pandemic.

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Conflicts of interest

There are no conflicts of interest.

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