RESEARCH ARTICLE

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COVID-19 Awarenessscale (Cas) Turkish Form: A Validity and Reliability Study

ABSTRACT

Objective: In this study, we aimed to develop a valid and reliable scale to measure the level of awareness of people about COVID-19.

Materials and Methods: A total of 244 people participated in the research. The item pool was created in line with the literature and expert opinions. The prepared items were examined by four experts in terms of content validity, language, and expression, and a 28-item scale form was created. Following these stages, the first form consisting of 28 items was applied to 29 people as a pilot study. Explanatory and confirmatory factor analyses were employed to test the construct validity.

Results: As a result of the explanatory factor analysis, it was determined that the scale consisted of 15 items and 3 sub-dimensions. These sub-dimensions were respectively named "Protection", "Knowledge of COVID", and "Effort to Obtain Information". When the fit indices obtained from the confirmatory factor analysis results were examined, we saw that the three-factor scale construct had a high fit at an acceptable level.

Conclusions: Based on the data obtained from this study, we concluded that the COVID-19 awareness scale was valid and reliable to evaluate the awareness level of people. The COVID-19 awareness scale we have devised can be employed by researchers who seek to measure individuals' awareness levels regarding a pandemic similar to COVID-19.

Keywords: Awareness, COVID-19, Validity, Reliability, Scale.

COVİD-19 Farkındalık Ölçeği (CAS)Türkçe Formu: Geçerlik Ve Güvenirlik Çalışması

ÖZET

Amaç: Bu çalışmada, insanların COVİD-19 hakkındaki farkındalık düzeylerini ölçecek geçerli ve güvenilir bir ölçeğin geliştirilmesi amaçlanmaktadır.

Gereç ve Yöntem: Araştırmaya toplam 244 kişi katılmıştır. Madde havuzu literatür ve uzman görüşleri doğrultusunda oluşturulmuştur. Hazırlanan maddeler dört uzman tarafından kapsam geçerliliği, dil ve anlatım açısından incelenerek 28 maddelik bir ölçek formu oluşturulmuştur. Bu aşamaların ardından 28 maddeden oluşan ilk form 29 kişiye pilot çalışma olarak uygulanmıştır. Yapı geçerliliğini test etmek için açıklayıcı ve doğrulayıcı faktör analizleri kullanılmıştır.

Bulgular: Açımlayıcı faktör analizi sonucunda ölçeğin 15 madde ve 3 alt boyuttan oluştuğu belirlenmiştir. Bu alt boyutlar sırasıyla "Korunma", "COVID Bilgisi" ve "Bilgi Edinme Çabası" olarak adlandırılmıştır. Doğrulayıcı faktör analizi sonuçlarından elde edilen uyum indeksleri incelendiğinde üç faktörlü ölçek yapısının kabul edilebilir düzeyde yüksek bir uyuma sahip olduğu görülmüştür.

Sonuç: Bu çalışmadan elde edilen verilere dayanılarak, COVID-19 farkındalık ölçeğinin kişilerin farkındalık düzeyini değerlendirmede geçerli ve güvenilir olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Farkındalık, COVID-19, Geçerlilik, Güvenilirlik, Ölçek.

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INTRODUCTION

The COVID-19 pandemic, which started in 2019 in the city of Wuhan, China and spread all over the world in a short time, continues to be a problem, affecting almost all parameters of social life, especially the socioeconomic and sociocultural ones. Much important topics such as health, education, economy, tourism, trade, digitalization, culture, and technology can be counted among these parameters. Leading health institutions in the world, especially the World Health Organization (WHO) and the US Centers for Disease Control and Prevention (CDC), have shared the current data obtained about the coronavirus disease (number of cases, number of recovered, number of deceased, etc.) over their official websites with the public. We can assert that the introduction of the disease by national and international health authorities in the light of scientific data, effective communication, and interaction with the public in terms of effective fight against the disease and ways to prevent the disease are very important in terms of informing the public correctly.

The transition to vaccination, as a result of intense efforts shown during the COVID-19 pandemic process, has been an important step in the fight against the disease. However, when the latest data shared by the health authorities about the disease are evaluated, we can state that the disease continues to be a current problem in terms of the number of cases, especially the number of deaths.

As a matter of fact, the information shared by the World Health Organization (WHO) on its official website regarding the disease on February 21, 2022, is remarkable. In the data shared about the disease, it is seen that the total number of cases worldwide is 423,437,674, while the total number of deaths is 5,878,328 and the number of new cases in the last 24 hours is 1,248,920 (1). In the light of these data, we can state that the COVID-19 pandemic is still a current issue. Therefore, in this study, we aimed to develop a scale to reveal the awareness level of the COVID-19 pandemic in the society regarding its socioeconomic and sociocultural consequences and its effects on almost every aspect of social life, with the prediction that it will go down in history as one of the most important events of the 21st century.

MATERIAL AND METHODS

Creation of the Item Pool: First, a commission was established by the researchers to determine the items. The commission included 1 communication, 1 law, 1 management, and 1 biostatistics expert. After examining the literature regarding the subject, the commission prepared 28 items related to the scale to be developed. The prepared items were examined by four experts in terms of content validity, language, and expression. The experts stated that the prepared items were valid to examine whether an awareness of COVID-19 has been sufficiently formed in the society during the COVID-19 pandemic, adding that some items had to be developed in terms of language and expression. The changes made in line with the suggestions of the experts were finally checked by another person who is an expert in teaching Turkish. After these stages, the first form consisting of 28 items was applied to 29 people as a pilot study. Item analyses, including arithmetic averages of the items, item-total statistics, item discrimination coefficients, were performed on the data obtained because of the pilot application. In line with the item analysis and the suggestions of the researchers, 8 items were removed from the scale and necessary language corrections were made. After these stages, the scale consisting of 20 items was ready for application.

Application of the Scale: The 20-item scale form created by the researchers was applied in a province in the Southeastern Anatolia Region of Turkey using a convenience sampling method. Participants were determined completely randomly, and the scale was applied to a total of 244 participants on a completely voluntary basis. The ethics committee approval of the study was obtained from Siirt University Ethics Committee (Ethics code: 10.09.2021-1165). Then, the researchers took 250 printouts of the scale form. Using these printouts, the scale was applied on a face-to-face basis by the researchers. Since the same answers were checked in all questions in 6 of these forms, they were left out of the evaluation.

Ethics Approval: Approval was obtained from the ethics committee of Siirt University (Ethics code: 10.09.2021-1165). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the Helsinki declaration and its later amendments or comparable ethical standards.

Data Analysis: We utilized the Statistical Package for Social Sciences version 29.0 software for Windows (IBM SPSS Statistics for Windows, Version 29.0. Armonk, NY: IBM Corp., USA) and AMOS for statistical calculations. For the analysis of the 20 items applied in the scale, the item averages and standard deviations were examined. The arithmetic mean of the item averages was 3.95, while the standard deviation was 0.61. The smallest mean of the items is 3.59 and the largest is 4.29. The differences between the item averages were tested with the Friedman test. According to the Friedman test results, the item averages were found to be similar to each other ($p>.05$). The corrected item total correlation coefficients of the items were also examined. Alpar reported that a correlation coefficient above 0.30 distinguished individuals well, while items between 0.20-0.30 would be taken to the test if deemed necessary, and that items below 0.20 should be removed from the scale (2).

The corrected item total correlation of Item 4 was found 0.15. If Item 4 is removed, Cronbach's alpha coefficient, which gives information about the reliability of the scale, also increases. Based on these results, Item 4 was removed from the scale.

As a result of the comparison of the group averages of the lower and upper 27% (item discrimination power index), another test method for item discrimination, the item discrimination power indices of the items were found to be statistically significant (p<.001). This shows that these items are sufficient to distinguish participants that have high COVID awareness from those with low awareness.

Split-half reliability was also performed for the reliability of the test. As a result of the split-half reliability test, the Spearman-Brown correlation coefficient was found 0.80. This result shows that the reliability of the scale is excellent. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were also performed on the 244 scale forms collected by the researchers. While determining the number of factors in the exploratory factor analysis, the fact that the eigenvalues are above 1 and the breaks in the line plot (scree plot) were taken into account. At this stage, Item 4, with a loading value below 0.40, was excluded from the analysis. Similarly, Tsai and Chai also removed items with factor loading values below 0.40 in their scale development study (3). After the removal of these items, the new data consisting of 19 items was retested using 3 factors. Afterwards, it was checked whether there was conceptual integrity between the items divided into 3 factors according to the data set and it was observed that the 3 factors formed consisted of items that were conceptually closely related to each other and could be evaluated under the same group, however, Item 6, Item 7, Item 8, and Item 18 disrupted this conceptual integrity. For this reason, Article 6, Article 7, Article 8, and Article 18 were removed from the scale. The three-factor construct was reanalyzed with the remaining 15 items, and the loads of the items included in each factor were calculated. The 3-factor construct of the remaining 15-item scale was found to be appropriate in terms of factor loadings. Then, the corrected item total correlation of each item with the 15-item scale was examined and it was observed that the correlations of all items were well above 0.20.

Confirmatory factor analysis (CFA) was performed to test the suitability of the three-factor construct, determined as a result of the EFA. Attention was paid to ensure that the CMIN/DF value was less than three in order to accept the accuracy of this construct. Apart from these, CFI, AGFI, GFI, NFI, IFI and TLI fit statistics were employed to evaluate the suitability of the proposed model within the scope of CFA. An RMSEA value below 0.08 was determined as a criterion. It was also decided that GFI, CFI, NFI, NNFI (TLI) and IFI fit indices above 0.90 as stated in the literature would be accepted as a criterion. An AGFI index between 0.85 and 0.90 indicates an acceptable fit, while a range between 0.90 and 1.00 indicates a perfect fit (4-5).

Finally, Cronbach's alpha, McDonald's omega (Ω), construct reliability (CR), and average variance extracted (AVE) coefficients were calculated to test the convergent and divergent validity, internal consistency, and construct reliability of the 15-item scale.

RESULTS

In the scale, 4 demographic characteristics were examined. 50.6%(n=123) of the participants were females, 49.4%(n=120) were males. 79.8%(n=194) of the participants were single. The highest number of participants was in the age range of 18-25 years. 76.5%(n=186) of the participants were university graduates.

First, the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity were conducted to determine whether the data group collected within the scope of the research was suitable for analysis. For the sample to be suitable for explanatory factor analysis, the KMO value should be greater than > 0.5. The fact that the p value of Bartlett's test statistic (chi-square statistic) is less than< 0.05 shows that the correlation matrix is suitable for explanatory factor analysis **(6)**. The KMO value in this analysis was found 0.80. Bartlett's test statistic (chi-square=1020.56, p<.001) also showed that the -data set used was suitable for EFA (7,8,9,10). Following this stage, Varimax rotation and principal component analysis were performed to determine the number of factors that comprised the scale. In examination of the EFA results, we noticed that the scale was divided into three factors with an eigenvalue greater than 1 according to the scree plot (**Fig 1**), 15 items in the scale were also grouped under 3 factors.

The EFA results are given in Table 1 According to Table 1, the eigenvalues of the 3 factors were greater than 1. The eigenvalue of the first factor was 3.76, the second factor was 2.19, and the third factor was 1.680. The variance explained by Factor was 34.08%, while the variance explained by Factor 2 was 20.62% and by Factor 3 16.20%. The total explained variance was 70.90%. When the variances explained by the factors were evaluated for the factors with eigenvalues greater than and the scree plot together, we concluded that the scale consisted of three factors. We also found that the lowest factor loading was 0.54. When the values in the 'corrected item-total correlation' column, which gives the correlation of the items forming the scale with the whole scale, were examined, we observed that the lowest correlation was in Item 5, with a value of 0.43. Thus, the condition that these values should be above 0.20 was met. As a result of explanatory factor analysis,

the scale consisting of 15 items was divided into 3 sub-dimensions. Taking the expressions measured by the items in these sub-dimensions into account, the sub-dimensions were named Protection (Items 14, 9, 12, 11, 19, 13, 15, 10, 17, and 16), Knowledge of COVID (Items 1, 2, and 3) and Effort to Obtain Knowledge (Items 5 and 20) by the researchers.

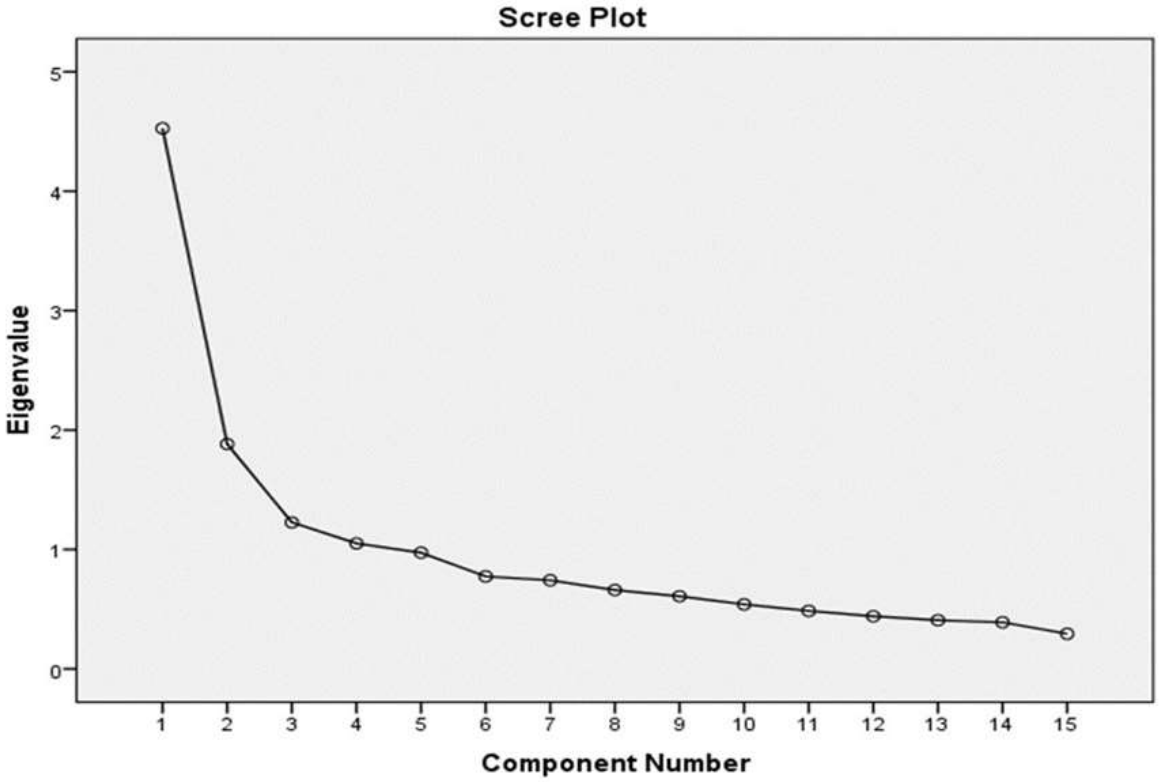

Fig.1. The scree plot of the extracted factors.

Table 1. Exploratory factor analysis of the COVID-19 awareness scale

	Items	New Number	Factor loading	h^2 *	Corrected Item-total Correlation	Eigenvalue	%Variance	Cumulative % Variance
Factor 1 (Protection)	14	1	.68	.72	0.55	3.76	34.08	70.90
	9	2	.67	.49	0.49			
	12	3	.66	.50	0.54			
	11	4	.62	.55	0.48			
	19	5	.60	.47	0.55			
	13	6	.60	.48	0.56			
	15	7	.55	.65	0.46			
	10	8	.55	.50	0.47			
	17	9	.54	.54	0.51			
	16	10	.54	.40	0.49			
Factor 2 (Knowledge of COVID)	2	11	.84	.75	0.66	2.19	20.62	
	3	12	.79	.66	0.55			
	1	13	.73	.59	0.51			
Factor 3 (Effort to obtain information)	5	14	.83	.71	0.43	1.68	16.20	
	20	15	.73	.68	0.52			

* Communalities

Cronbach's alpha, McDonald's omega (Ω), construct reliability (CR), and average variance extracted (AVE) coefficients of the sub-dimensions of the scale are given in Table 2. Assessing the Cronbach's Alpha, McDonald's omega (Ω), Construct Reliability (CR) and Average Variance Extracted (AVE), also indicated that the scale had good convergent and divergent validity.

Table 2. Convergent and divergent validity, internal consistency, and construct reliability of the COVİD-19 Awareness Scale

Factors	Cronbach's alpha (CI: 95.0%)	Ω	CR	AVE
Protection	0.82	0.82	0.85	0.36
Knowledge of COVID	0.74	0.75	0.83	0.62
Effort to Obtain Information	0.61	0.65	0.76	0.61

Ω: McDonald's omega, CR: Construct Reliability; AVE: Average Variance Extracted.

As a result of the EFA, we concluded that the awareness of people about COVID-19 could be measured with a total of 15 items in 3 sub-dimensions. CFA was conducted to test the validity of the sub-dimensions that resulted from the EFA. The goodness of fit indices obtained as a result of the CFA and the values that these indices should take are given in Table 3. The goodness of fit indices obtained in the first model were slightly below the recommended values, and covariances were detected between some error values. In line with the recommendations of the CFA, covariances between the errors were defined in the first model, thus the modified model was obtained. In case the CMIN/DF value of the modified model was <3 (X^2=157,16, p<.001), the CFI, GFI, NFI, IFI, and TLI coefficients were >0.90, and the AGFI index was between 0.85 and 0.90, the final model was considered to have acceptable compatibility. **Fig. 2** shows the final model of the scale.

Table 3. The fit model indices of CFA of the COVID-19 Pandemic Awareness Scale

Model Fit Indices	Recommended Criteria	First model	Modified model
X^2		213.37	157.16
DF		87	84
P Values	<.005	<.001	<.001
CMIN/DF	<3	2.45	1.87
CFI	≥0.90	0.87	0.92
AGFI	≥0.80	0.86	0.90
GFI	≥0.90	0.90	0.93
NFI	≥0.90	0.85	0.90
IFI	≥0.90	0.87	0.92
TLI	≥0.90	0.83	0.90
RMSEA	<0.08	0.08	0.06

X^2: Chi-Square Value, DF: the number of degrees of freedom for testing the model, CMIN: Chi-square Minimum, CFI: Comparative Fit Index, AGFI: Adjusted Goodness of Fit Index, GFI: Goodness of Fit Index, NFI: Normed Fit Index, IFI: Incremental Fit Index, TLI: The Tucker-Lewis coefficient, RMSEA: Root Mean Square Error of Approximation

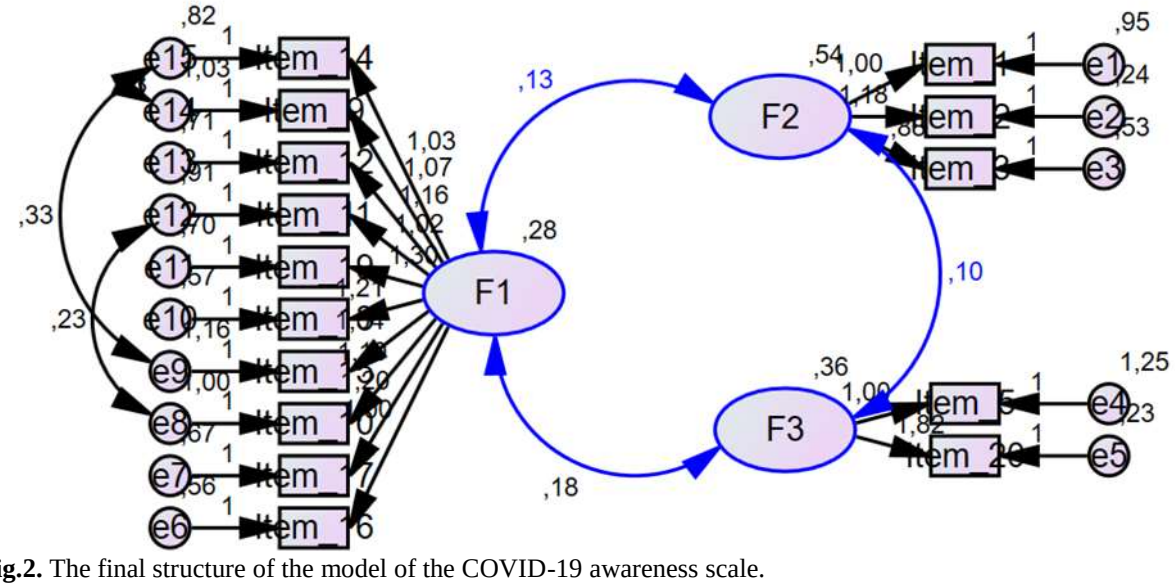

Fig.2. The final structure of the model of the COVID-19 awareness scale.

The increase in the scale scores of the participants indicates that their awareness of COVID-19 has increased. The average score of the participants for the whole scale was 3.92∓0.24. The Knowledge of COVID sub-dimension had the highest mean score (4.09∓0.46). final form of the 15-item COVID-19 awareness scale, created because of this study, is given in the appendix at the end of the study.

DISCUSSION

It has been observed that there are very important scale development studies to reveal

whether there is the necessary awareness in the society about the Covid-19 pandemic (11,12, 13, 14, 15). After the research and analyses conducted in the study titled "Covid-19 Awareness Scale (Covfö) Development Study", it was stated that the 21-item measurement tool COVFÖ, which consists of "Mask, Distance, Hygiene" dimensions, is a valid and safe measurement tool (11).

In the study titled "Turkish Validity and Reliability Study of Knowledge, Attitude,and Behavior Scale Towards COVID-19", it was stated that the 16-item scale consisting of "Clinical Presentations, Routes of Transmission, Prevention and Control, Attitudes, Behaviour" dimensions was reliable and valid after the analyses (12). In the study titled "Multi-Dimensional COVID-19 Scale Development, Validity and Reliability Study"; as a result of the statistical analyses, it was stated that a 22-item scale consisting of three factors as "feelings and behaviours related to COVID-19, thoughts related to COVID-19, and measures taken related to COVID-19" was valid and reliable (13). In the study titled "Scale Development Study Attitude Covid-19 Pandemic", it was stated that the 19item, 5 (five) Likert-type scale consisting of three factors as "Covid-19 Pandemic Precaution, Covid-19 Pandemic Awareness, Covid-19 Pandemic Immunity" was valid and reliable (14). "Development of Coronavirus (Covid-19) Awareness Scale: Validity and Reliability Study", it was stated that the 17-item, 5 (five) Likert-type scale consisting of three factors as "Awareness of Contagion Precautions, Awareness of Following Current Developments, Awareness of Hygiene Precautions" was valid and reliable (15).

It can be stated that the sub-dimensions (factors) obtained in the scales and the statements in the item pools in the scale development studies conducted above in order to reveal whether the necessary awareness has been formed in the society regarding the Covid-19 pandemic overlap with the subdimensions and statements in the item pool obtained in this study. In this study, as in the scale development studies mentioned above, it was preferred to apply a 5 (five) Likert scale (16). In addition, care was taken to ensure that the items of the developed scale were simple and understandable (17).

In this study, we aimed to develop a valid and reliable test in order to evaluate people's awareness of COVID-19. After ensuring the content validity, language, and expression compatibility of the items, they were filled in by 244 participants. After factor loadings, conceptual integrity, and items that could be evaluated under two factors were removed, the 15-item scale form was finalized. The resulting 15-item scale form had three factors and the items under these factors were conceptually compatible with each other. The values obtained as a result of the explanatory factor analysis were at the desired level. The factors obtained as a result of the EFA were named "Protection", "Knowledge of COVID", and "Effort to Obtain Information" respectively.

A confirmatory factor analysis (CFA) was conducted to determine whether the three factors and the 15-item scale resulting from the explanatory factor analysis formed a compatible model. The fit indices obtained from the CFA were within the recommended ranges.

CONCLUSIONS

After analyzing the results of both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), we have determined that the COVID-19 Awareness Scale (CAS) is a reliable and valid instrument for assessing people's awareness levels. The COVID-19 awareness scale we have devised can be employed by researchers who seek to measure individuals' awareness levels regarding a pandemic similar to COVID-19. The outcomes of this study will lay the groundwork for researchers intending to develop similar scales in their respective studies.

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Appendix

	Items	**Scoring** I strongly disagree (1), I disagree (2), I have no opinion (3) I agree (4), I strongly agree (5)
1	I do not go to home visits due to the risk of transmission during the covid-19 process.	Protection
2	In the process of Covid 19, shopping malls, markets, etc., where the disease has the highest risk of transmission. I try not to go to mass shopping centers.	Protection
3	In the process of Covid-19, in mass shopping environments, elevators, stairs, streets, parks, etc. I wear my mask in common living areas.	Protection
4	Due to the risk of contamination during the Covid 19 process, I make my payments with tools such as contactless credit card and internet banking.	Protection
5	During the covid-19 process, I keep my meetings in social life as short as possible due to the risk of contamination.	Protection
6	I disinfect my hands to protect myself from Covid-19.	Protection
7	During the covid-19 process, I take care not to use public transport if possible.	Protection
8	I buy the products I need from the internet during the Covid 19 process.	Protection
9	Due to the risk of contamination during the Covid-19 process, I carry out my official transactions over the internet.	Protection
10	I wash my hands periodically to protect myself from Covid-19 disease.	Protection
11	There are vaccines developed by foreign countries that are being applied to protect against Covid-19.	Disease information
12	Covid-19 vaccines are made in 2 and 3 doses.	Disease information
13	Covid-19 is an infectious disease that can cause death.	Disease information
14	I follow the number of Covid-19 patients and cases daily.	Getting information
15	I follow information and current developments about Covid-19 on the official websites of health institutions.	Getting information