Original Article

DEVELOPMENT AND PSYCHOMETRIC TESTING OF KNOWLEDGE, ATTITUDE, AND PRACTICE ON COVID-19 OUTBREAK QUESTIONNAIRE (KAPCovQ) FOR GENERAL COMMUNITY

HIDAYAH KARUNIAWATI[1*], TRI YULIANTI[1], LISTIANA MASYITA DEWI[2], WIDYANA ATMA MAULIDA[1], NUR LAELA[1], SEKAR MELATI KUSUMANING AYU[1]

[1]Faculty of Pharmacy Universitas Muhammadiyah Surakarta, Indonesia, [2]Faculty of Medicine Universitas Muhammadiyah Surakarta, Indonesia
Email: hk170@ums.ac.id

ABSTRACT

Objective: To develop a valid and reliable questionnaire about knowledge, attitudes, and practices towards Covid-19 (KAPCovQ) in the general community based on psychometric properties.

Methods: This study consisted of item development, scale development, and scale evaluation. Item development was based on literature review and content validity by experts. Scale development was conducted by pre-testing ten respondents. Scale evaluation was assessed using 375 respondents. Scale evaluation included construct validity with exploratory factor analysis (EFA) followed by confirmatory factor analysis (CFA) and reliability test with Cronbach's α, composite reliability, and test-retest reliability.

Results: The final KAPCovQ consisted of 3 domains with 31 items. Twelve items of the knowledge domain met the acceptable range for item analysis. Three factors of attitude domain and one factor of practice domain showed that 59.13% and 57.97% of the total variance respectively were identified in EFA. The result of the CFA for both attitude and practices domain indicated acceptable fit indices for the proposed model. The CFA model fit indices of attitude domain were χ2/df 2.05, p-value 0.01, GFI 0.92, RMSEA 0.07, TLI 0.90, CFI 0.92, and PNFI 0.64 and practices domain were χ2/df 1.18, p-value 0.28, GFI 0.98, RMSEA 0.03, TLI 0.98, CFI 0.99, and PNFI 0.54. Knowledge and all factors in the attitude and practice domain had an acceptable range in internal consistency reliability and test-retest reliability.

Conclusion: The finding of this study demonstrated that KAPCovQ is valid and reliable for measuring the KAP on Covid-19 in the general community.

Keywords: Covid-19, Attitude, Practices, Validity, Psychometric properties, KAPCovQ, General community

INTRODUCTION

Covid-19 is a potentially fatal disease and a major global public health problem. The development of the virus is very fast, positive cases and the number of deaths continues to increase [1]. Currently, there is no specific treatment for Covid-19, therefore, non-pharmaceutical interventions, especially prevention, should be maximized to slow the transmission of the virus spreading. Socialization and intensive health promotion efforts need to be carried out intensively and thoroughly that will have an impact on changes in cognitive, affective, and psychomotor communities in preventing Covid-19 [2]. Knowledge of the mode of transmission, symptoms, and prevention of infectious diseases plays an important role in efforts to suppress the spread of the virus. Knowing the causes and sources of transmission of disease can increase people's awareness of the spread of infectious diseases and take preventive measures to slow transmission. Appropriate knowledge plays an important role in shaping beliefs and attitudes toward specific behaviors [3, 4].

Increasing the number of Covid-19 cases must be an important concern of what the increasing cases cause and how the transmission of Covid-19 occurs, including the knowledge, attitudes, and practice of the community towards Covid-19. The public community plays an important role in minimizing the spreading of Covid-19. Public knowledge, attitude, and practice (KAP) assessments of Covid-19 are very important to evaluate and design more appropriate interventions to improve public KAP and to decrease the number of Covid-19 spreads. To conduct an assessment of public KAP, a valid and reliable questionnaire is needed. However, the availability of valid and reliable questionnaires to measure KAP for the general community towards Covid-19 is still limited. Previous studies have not explained the use of valid and reliable questionnaires or there was no information about the development, validity, and reliability of the questionnaire process [5–9]. It is

necessary to develop a valid and reliable questionnaire that can measure the general community KAP towards Covid-19 (KAPCovQ) to ensure the accuracy of the data collected and ensure the validity of the measurement results of the KAP general community towards Covid-19. The objective of the study was to develop and validate a KAP general community towards Covid-19. This questionnaire could serve as an instrument to assess KAP towards Covid-19 in the public setting and as a baseline to tailor the appropriate intervention. This questionnaire could be used to evaluate the results of the intervention as well.

MATERIALS AND METHODS

This cross-sectional study was conducted in three districts in Central Java consist of Pemalang, Pati, and Temanggung district, Indonesia from August to October 2020. The inclusion criteria were a member of the general community who was equal or more than 17 y old, having ability in writing and reading, and willing to be respondents by signing the inform concern and completing the questionnaire. The exclusion criteria were having a health-related education background or working in health care facilities. The development and validation of the questionnaire took place in several steps. This study consisted of the item and scale development, and scale evaluation.

Item and scale development

This step consisted of item generation, content validity, and pilot study. Identification of domain and item generation were based on the deductive methods: extensive literature and previous studies about KAP towards Covid-19. Content validity examined by panel experts consists of a physician, a community pharmacist, and an academician by reviewing the pool items. Panel experts evaluated for representativeness, content relevancy, clarity, simplicity, and technical quality of each item. The assessment of experts was quantified using a formula with a content validity ratio (CVR) [10,

11]. Content validity ratio range from–1.0 (total disagreement) to 1.0 (total agreement). The number of panel experts in this study was three, the items pertain if the CVR≥0.99 [10, 12]. Before the survey is administered, a pilot study was conducted on ten target populations to ensure that all items are meaningful and can be understood by the target population.

Scale evaluation

This step included item analysis, internal consistency with Cronbach's α, and test-retest reliability for the knowledge domain. Construct validity with exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), internal consistency with Cronbach's α, composite reliability, and test-retest reliability were run for the attitude and practice domain.

Item analysis

Item analysis is one of the bases used to maintain or remove the items based on the item difficulty index (IDI) and discrimination index (DI). The item difficulty index determines the proportion of correct answers given per item by respondents. IDI is calculated by comparing the number of respondents who answered correctly with the total number of respondents. IDI score<20% or>90% was recommended to be dropped because of too easy or too difficult [11, 12]. The higher the DI score, the better the item can determine the difference performance between two groups of respondents (higher and lower performance). Items that have a DI score<0.2 should be dropped or rewritten [12, 13].

Construct validity

The construct validity test measures the extent to which a research instrument can measure the construct (the framework of a concept) which is analyzed using EFA and CFA [14]. The minimum sample size for EFA and CFA is 100 and 200, respectively, or a 1: 5-10 ratio per item [12, 15–18]. In this study, 175 respondents were analyzed for EFA and 200 respondents for CFA. EFA was conducted for the attitude and practice section using principal component analysis and Varimax rotation. Knowledge items were not meant for factor analysis because of known facts and were not abstract ideas [19]. The appropriateness for conducting factor analysis was based on the Kaiser-Meyer-Olkin (KMO) with range 0.5-1.0 and Bartlett's test of sphericity score should be<0.05. Retaining the number of the factors was considered by the eigenvalue>1, loading factor>0.400, scree plot, and reliability of factor [18]. The assessment of the goodness of fit the proposed model was based on the result of χ2/df≤2 or ≤5, p -value>0.05, goodness of fit index (GFI)>0.90, root mean square error of approximation (RMSEA)<0.08, Tucker-Lewis index (TLI)>0.90, comparative fit index (CFI)>0.90, and parsimonious normal fit index (PNFI)>0.60 [20].

Reliability test

Reliability is a measure of the consistency of a research instrument if it is used with different methods, conditions (place and time) [21]. The reliability test used in this study was internal consistency with Cronbach's and composite reliability. The intraclass correlation coefficient (ICC) was used to analyze test-retest reliability. The test-retest reliability was evaluated by correlating between the first and second questionnaire scores from the same respondents in a two-week interval [22]. The minimum sample for test-retest is more than one over ten of the total respondents. Forty-two respondents participated in fulfilling the questionnaire twice. To reduce bias, forty-four respondents were not notified when they fill out the questionnaire twice. Respondents were taken randomly.

Ethical approval

Health Research Ethics Committee of Faculty Medicine of Universitas Muhammadiyah Surakarta approved the protocol of study with reference number 3011/B.1/KEPK-FKUMS/VIII/2020. All respondents were asked to obtain and sign the informed concern form before they conducted the study.

Data collection and statistical analysis

The sampling method used was non-probability sampling with an incidental sampling technique. Data were analyzed using Statistical Package for the Social Sciences (SPSS) software version 20 and International Business Machines (IBM) Analysis of Moment Structure (AMOS) 22 version. Descriptively analysis was used for demographic characteristic respondents. Content validity was evaluated by CVR. Item analysis was computed by IDI and DI. Construct validity was examined by EFA and CFA. Internal consistency reliability was determined by Cronbach α coefficient and composite reliability. Test-retest was accounted for by the ICC. Items were retained based on CVR value, IDI and DI score for knowledge domain, factor analysis (EFA and CFA) for attitude and practice domain, internal consistency reliability analysis, and test-retest analysis. p-values<0.05 were considered statistically significant.

RESULTS

The initial draft consisted of demographic information (7 closed-ended and multiple-choice questions) and three domains namely knowledge (30 items), attitude (18 items), and practice domain (7 items). The response option of knowledge was yes/no/don't know with a score of 1 for the correct answer. Five Likert scales were used for attitude from strongly disagree to strongly agree with the score from 1 to 5 and practice domain from never/seldom/sometimes/often/always with the score 1 to 5. Several items were reverse scoring.

Three items of knowledge and two items of attitude were removed because they were not valid and CVR<0.99 based on the result of content validity [10, 12]. In the pilot study, ten community members completed the questionnaire within 10-15 min and provided feedback. Some items were modified and reworded to make the respondent easier to understand without changing the meaning. Ambiguity or fuzzy expression of items was revised and changed, for example quarantine was revised to be "isolation" because "quarantine" is not familiar for some respondents.

Three hundred and seventy-five respondents participated in this study for analysis of item analysis, construct validity, and reliability tests. The response rate of this study was 98.68%. Male respondents were more than women and a quarter of the respondents were 40-49 y old, almost 35% of their background education was in elementary school, and 70% worked. The demographic characteristic of respondents is displayed in table 1.

Table 1: Demographic characteristic of participants

Demographic variable	Number (375)	Percentage
Gender		
Male	208	55.47
Female	167	44.53
Age (year)		
17-20	34	9.07
20-29	72	19.20
30-39	79	21.07
40-49	97	25.87
50-59	57	15.20
≥60	36	9.60
Level education		
No formal education	5	1.33
Elementary school	131	34.93
Junior High School	64	17.07
Senior High School	91	24.27
Diploma	15	4.00
Undergraduate	61	16.27
Postgraduate	8	2.13
Marital status		
Single	48	12.8
Married	299	79.7
Divorce	4	1.07
Widow/widower	24	6.40
Occupation		
Work	264	70.40
unemployed	28	7.47
Retired	8	2.13
Housewife	75	20.00

Based on the IDI and DI result, fourteen items (item number 2, 3, 4, 5, 6, 12, 13, 15, 19, 20, 21, 22, 23, 24) in the knowledge domain were removed because didn't meet the IDI (0.2-0.9) or DI score (>0.2). Meaning that those items were too difficult or too easy and not able to measure the difference performance between two groups (lower and upper level of knowledge). Item number 27 was also deleted because Covid-19 vaccinates have been discovered. The final knowledge domain consisted of twelve items with good internal consistency (Cronbach's α 0.775) and test-retest reliability (ICC 0.883). The result of the item analysis is described in table 2.

Table 2: Result of item analysis for knowledge domain

No	Statements	IDI	DI	Decision
1	Coronavirus disease (Covid-19) is caused by a bacterial infection	0.43	0.22	√
2	The incubation period (the entry of Covid-19 into the body until it causes symptoms) lasts 1-14 d	0.85	0.08	X
3	An asymptomatic carrier of Covid-19 is a person who does not has any symptoms but has the risk of getting the infection from Covid-19 patients because of physical contact	0.74	0.13	X
4	A person under investigation (PUI) is a person who gets a fever (the body temperature is ≥38 °C) or has gotten fever, followed with respiratory disease, the last 14 d before showing the symptoms, the person has physical contact with Covid-19 patients	0.62	0.14	X
5	A patient under investigation is a person who gets a fever (the body temperature is ≥38 °C) or has gotten fever, followed by respiratory disease, and needed to be hospitalized	0.78	0.13	X
6	Covid-19 spreads directly through saliva droplets when Covid-19 patients cough or sneeze	0.95	0.08	X
7	A person can get infected by touching saliva droplets of Covid-19 patients cling to the things	0.80	0.31	√
8	Covid-19 can transmit through patient feces	0.29	0.35	√
9	Covid-19 can transmit from a person to other(s)	0.86	0.26	√
10	Covid-19 patients without fever symptoms can spread viruses to other people	0.68	0.59	√
11	Covid-19 can infect the human body through the nose only	0.72	0.31	√
12	Isolating Covid-19 patients is effective in reducing transmission of Covid-19	0.93	0.14	X
13	A Person who has physical contact with a Covid-19 patient must be isolated for 14 d	0.96	0.06	X
14	The Symptoms of Covid-19 include fever, cough, sore throat, and shortness of breath	0.85	0.21	√
15	Sneezing, stuffy nose and runny nose are symptoms of Covid-19	0.59	0.01	X
16	Infectious people of Covid-19 show the symptoms of fever, cough, and shortness of breath	0.41	0.23	√
17	Elder has a high risk of getting the worse symptoms of Covid-19	0.81	0.25	√
18	The worse symptoms of Covid-19 can happen to people with comorbid diseases such as diabetes, stroke, and heart disease	0.63	0.46	√
19	The spread of Covid-19 can be prevented by wearing a mask when going out of the house	0.97	-0.02	X
20	Washing hand with soap or hand sanitizer can kill Covid-19 viruses	0.94	-0.06	X
21	Avoiding crowds can prevent transmission of Covid-19	0.98	0.03	X
22	Nutritious foods, fruits, and vegetables can boost the immune system	0.99	0.01	X
23	Vitamin C, ginger, or other herbs can boost immunity	0.94	0.11	X
24	Not touching the eyes, nose, and mouth when hands are dirty can reduce Covid-19 infection	0.89	0.07	X
25	Physical contact with other people do not have a risk of transmitting Covid-19	0.61	0.38	√
26	Children and teenagers do not have a risk to be infected by Covid-19	0.58	0.25	√
27	Covid-19 vaccinates have not been discovered	0.51	0.44	X

√: retain, x: removed

Construct validity was analyzed with EFA and CFA. KMO was 0.818 and Bartlett's test of sphericity was 0.001 meaning that EFA could be conducted. A three-factor solution resulted from EFA with a cumulative contribution of 59.13%. Fourteen items were retained and two items (numbers 3 and 9) were removed because of not valid or reliable. The name of those factors: 1. prevention, 2. fear, 3. Optimism. The three-factor model was then examined by CFA. The result of three-model after re-specification based on the modification indices suggestion was an acceptable fit model. with χ2/df=2.053, χ2=100.604, df=49, *p*-value=0.001, GFI=0.921, RMSEA=0.073, TLI=0.902, CFI=0.927, and PNFI=0.646. EFA, CFA, and reliability of attitude are described in table 3 and fig. 1.

Table 3: Result of the EFA and CFA attitude domains (n=200)

Factors and item	EFA		CFA		ICC
	λ	Reliability[a]	λ	Reliability[b]	
Factor 1 Prevention (7 items):					
I will often wash my hands with soap or hand sanitizer to protect myself from covid-19	0.812	0.852	0.877	0.802	0.909
Before washing my hands, I would not touch my eyes, nose, and mouth	0.789		0.501		
I will consume nutritional food to boost my immune systems	0.750		0.611		
I will wear a mask when going out of the house	0.733		0.810		
I will keep my physical distance a minimum of 1 meter when meeting other people	0.654		0.534		
I will shake friends' or relatives' hands or hugs them when meeting them	0.600		0.291		
I will stay at home to prevent the spread of Covid-19	0.552		0.541		
Factor 2 Fear (3 items):					
I am worried my family or I will get infected by covid-19	0.772	0.778	0.615	0.627	0.793
If my body shows the symptoms of covid-19, I will report it to the doctor or pharmacist or go to the hospital	0.651		0.412		
I think covid-19 is a dangerous disease	0.629		0.752		
Factor 3 Optimism (2 items):					
I believe the pandemic of covid-19 will pass soon	0.833	0.659	0.581	0.671	0.900
I believe my country can fight against covid-19 well	0.771		0.829		

λ factor loading/standardized loading, [a]Cronbach's alpha, [b]Composite reliability, ICC intraclass correlation
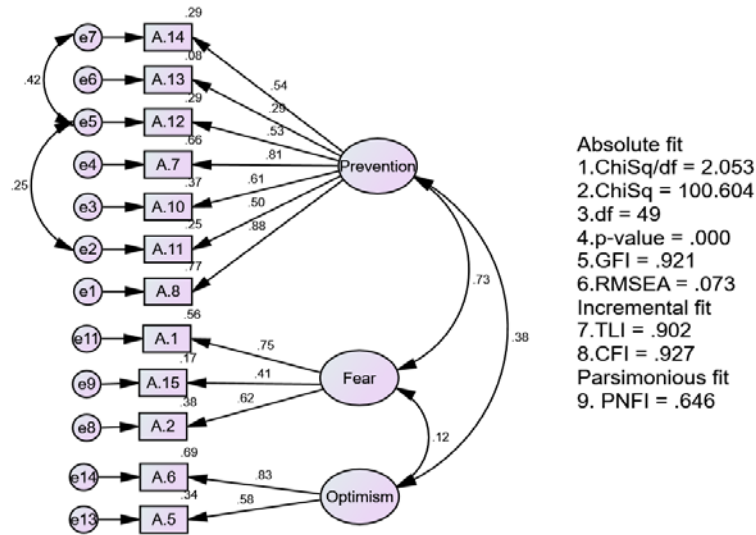
Fig. 1: Final model of attitude domain

Only one factor resulted from the final EFA on practices towards Covid-19 with a cumulative contribution of 57.97% with a name was the prevention of Covid-19. The CFA showed a good fit with χ2/df 1.182, *p*-value 0.289, GFI 0.981, RMSEA 0.030, TLI 0.988, CFI 0.993, and PNFI 0.547. EFA, CFA, and reliability of practices towards antibiotics are explained in table 4 and fig. 2.

Table 4: Result of the EFA and CFA practice domains (n=200)

Factor and items	EFA		CFA		ICC
	λ	Reliability[a]	λ	Reliability[b]	
Factor 1. Prevention (7 items)					
I wash my hands with soap or use a hand sanitizer to prevent Covid-19 transmission	0.826	0.741	0.637	0.698	0.880
I wear a mask when going out of the house	0.767		0.448		
I make a psychical distancing minimum of 1 meter with other people	0.747		0.833		
I consume vitamin C, ginger, or other herbs that can boost my immune system	0.699		0.562		
I consume more nutritional food, vegetables, and fruits	0.695		0.527		
I don't touch my eyes, nose, and mouth if my hands are not clean	0.469		0.284		
I visit public places, such as markets, social gatherings, reunions, wedding party	0.978		0.116		

λ factor loading/standardized loading, [a]Cronbach's alpha, [b]Composite reliability, ICC intraclass correlation
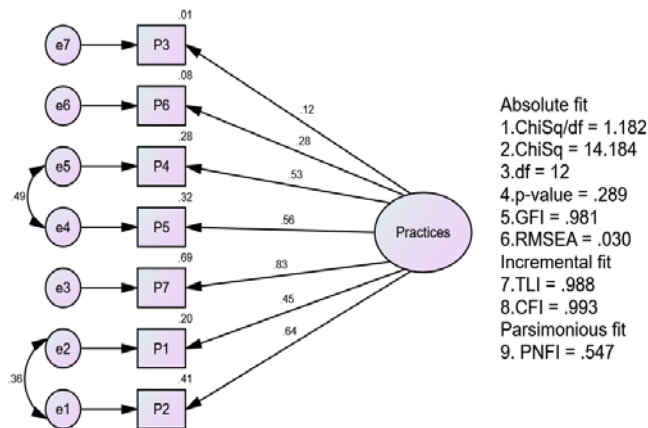

Fig. 2: Final model of practices domain

DISCUSSION

In this study, researchers produced a 31-item KAPCovQ and showed that KAPCovQ was feasible, valid, and reliable for measuring the KAP towards Covid 19 on the general public population. The final questionnaire is available on the supplement. To our knowledge, KAPCovQ is the first developed instrument with psychometric testing to assess KAP on the Covid-19 outbreak in the public community. The process of development of the questionnaire was based on the literature review and assessed the content validity by experts. A pilot study was conducted with ten members of the general community. The draft questionnaire was then tested on 375 respondents to examine the construct validity (EFA and confirmed with CFA) and reliability (Cronbach's Alfa, composite reliability, and

test-retest reliability) to produce a valid and reliable questionnaire based on the psychometric properties [11, 12, 20]. The use of questionnaires in previous studies has no information or inadequate information on the validation and reliability test process [8, 9]. Validation in Abdelhafiz, 2020, and Tamornpark, 2020 study consisted of content validity by three experts and pretesting on 10 to 20 participants for assessing the internal consistency with Cronbach's alfa and test-retest reliability [5, 6]. Rahman's study explained the Cronbach's alfa was 0.64 and no information on the process of validation and test of the questionnaire [7].

All of the items met content validity with CVR>0.99 after removing three items of knowledge and two items of attitude, suggesting that all items could well reflect, be relevant, and representative to assess the KAP in the public community [11]. Based on the item analysis result, 12 items have an IDI score of 20% to 90%. As many as 23.08%, 30.77%, and 46.15% of all items were excellent (DI≥0.4), good (DI: 0.30-0.39), and acceptable (DI: 0.2-0.29) DI score, respectively. It means that those items are qualified; those items are not too difficult or not too easy and can measure the difference performance between two groups (lower and upper performance) [11–13]. The construct validity test used exploratory factor analysis (EFA). In this study, EFA was feasible because of KMO>0.5 and Sphericity<0.05. EFA was used to determine the optimal number of factors and domains that fit a set of items [11]. The eigenvalue>1, loading factor>0.40, and scree plot are considered for retaining the number of the factors and items [18]. A three-factor solution has resulted from EFA with a cumulative contribution of 59.13% for the attitude domain and one factor with a cumulative contribution of 57.97% for the practices domain. In general, the acceptability of factor and meaningfulness of the relationship between the items and factors based on the cumulative contribution of more than 40%, and each item on the corresponding factor owns enough loading (>0.4) [23].

To validate or confirm whether the previous hypothetical structure from the EFA result fits the items and to estimate the independent cluster model, the researcher conducted CFA [11]. The assessment of the goodness of fit the proposed model based on the result of $\chi 2/df \leq 2$ or ≤ 5, p -value>0.05, GFI>0.90, RMSEA<0.08, TLI>0.90, CFI>0.90, and PNFI>0.60 [20]. The result of the three-model of attitude domain and one-model of practices domain after re-specification based on the modification indices suggestion was an acceptable fit model. Meaning that all of the factors and items of attitude and practices domain met the goodness of fit indices.

Cronbach's α reflects the internal consistency of the questionnaire. Cronbach α of 0.65-0.70; 0.70-0.80; and 0.80-0.90 considered as minimum acceptable value, good, and best respectively [24, 25]. In this study, Cronbach's α of knowledge was 0.775, the attitude domain ranged, 0.659 to 0.852, and the practice domain was 0.741, revealing that KAPCovQ had an acceptable and best internal consistency reliability. The composite reliability of the attitude domain ranged from 0.627 to 0.802 and the composite reliability of the practice domain was 0.698 meaning that all factors had acceptable or good composite reliability. Composite reliability 0.60-0.70 is the minimum acceptable value and>0.70 is good composite reliability [20]. The test correlation coefficient of this study ranged from 0.793 to 0.909, 0.880, and 0.883 for the attitude, practice, and knowledge domain respectively, revealing that the test-retest reliability of the questionnaire was up to the requirements of psychological measurement and showing good stability for testing in the different time. Intraclass correlation coefficient 0.60-0.74 categorized good and>0.75 categorized excellent reliability [26].

The strength of this study was the process of developing and validating the questionnaire has been conducted comprehensively. On the other hand, because Indonesia consists of many islands with different cultures, this result may not be generalized to all populations in Indonesia. Modifying the items adapted to the local culture are suggested if this questionnaire is used in a different place or country.

CONCLUSION

The final KAPCovQ consisted of 3 domains with 31 items. The result of validity and reliability analysis demonstrated that the KAPCovQ had strong psychometric properties. The KAPCovQ supplements the limitation of the currently available KAP towards the Covid-19 questionnaire and this questionnaire can be used to identify the KAP general community especially in the Central Java population towards Covid-19. The data may be used as a baseline of the general community KAP and assess the result of intervention on improving the KAP in the general community especially in preventing and controlling the increasing spreading of the Covid-19 infection.

AUTHORS CONTRIBUTIONS

All the authors contributed equally.

CONFLICT OF INTERESTS

All authors report no conflicts of interest.

REFERENCES

1. WHO. Coronavirus disease 2019 (COVID-19) Situation [report]. Vol. 70 [internet]; 2020. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200330-sitrep-70-covid-19.pdf?sfvrsn=7e0fe3f8_4. [Last accessed on 07 Sep 2020]
2. Saqlain M, Munir MM, Rehman SU, Gulzar A, Naz S, Ahmed Z, Tahir AH, Mashhood M. Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: a cross-sectional survey from Pakistan. J Hosp Infect. 2020;105(3):419-23. doi: 10.1016/j.jhin.2020.05.007, PMID 32437822.
3. Harapan H, Rajamoorthy Y, Anwar S, Bustamam A, Radiansyah A, Angraini P, Fasli R, Salwiyadi S, Bastian RA, Oktiviyari A, Akmal I, Iqbalamin M, Adil J, Henrizal F, Darmayanti D, Pratama R, Setiawan AM, Mudatsir M, Hadisoemarto PF, Dhimal ML, Kuch U, Groneberg DA, Imrie A, Dhimal M, Muller R. Knowledge, attitude, and practice regarding dengue virus infection among inhabitants of Aceh, Indonesia: A cross-sectional study. BMC Infect Dis. 2018;18(1):96. doi: 10.1186/s12879-018-3006-z, PMID 29486714.
4. Al-Hanawi MK, Angawi K, Alshareef N, Qattan AMN, Helmy HZ, Abudawood Y, Alqurashi M, Kattan WM, Kadasah NA, Chirwa GC, Alsharqi O. Knowledge, attitude and practice toward COVID-19 among the public in the Kingdom of Saudi Arabia: A cross-sectional study. Front Public Health. 2020;8(May):217. doi: 10.3389/fpubh.2020.00217, PMID 32574300.
5. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, Sultan EA. Knowledge, perceptions, and attitude of Egyptians towards the novel coronavirus disease (COVID-19). J Community Health. 2020 Apr 21;45(5):881-90. doi: 10.1007/s10900-020-00827-7, PMID 32318986.
6. Tamornpark R, Yeemard F, Upala P, Apidechkul T. Readiness in response the epidemic of coronavirus disease-2019 (COVID-19) among young adults in Chiang Rai Province. Thailand 2020 Apr 28;2(1):25-30.
7. Rahman A, Sathi NJ. Knowledge, attitude, and preventive practices toward COVID-19 among Bangladeshi internet users. Electron J Gen Med. 2020 Apr 30;17(5). doi: 10.29333/ejgm/8223.
8. Rugarabamu S, Byanaku A, Ibrahim M. Knowledge, attitudes, and practices (KAP) towards COVID-19: A quick online cross-sectional survey among Tanzanian residents. medRxiv; 2020.
9. Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, Li Y. 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. Int J Biol Sci. 2020 Mar 15;16(10):1745-52. doi: 10.7150/ijbs.45221, PMID 32226294.
10. Lawshe CH. A quantitative approach to content validity. Personnel Psychology; 1975.
11. Boateng GO, Neilands TB, Frongillo EA, Melgar-Quiñonez HR, Young SL. Best practices for developing and validating scales for health, social, and behavioral research: A primer. Front Public Health. 2018;6:149. doi: 10.3389/fpubh.2018.00149, PMID 29942800.

12. Miller LA, Lovler RL. Foundations of psychological testing: A practical approach. SAGE Publications; 2018. p. 593.
13. Stubbings S, Robb K, Waller J, Ramirez A, Austoker J, Macleod U, Hiom S, Wardle J. Development of a measurement tool to assess public awareness of cancer. Br J Cancer. 2009 Dec 3;101;Suppl 2:S13-7. doi: 10.1038/sj.bjc.6605385, PMID 19956157.
14. Alipour A, Ghadami A, Farsham A, Dorri N. A new self-reported assessment measure for COVID-19 anxiety scale (CDAS) in Iran: A web-based study. Iran J Public Health. 2020 Jun 30;49(7):1316-23. doi: 10.18502/ijph.v49i7.3585, PMID 33083298.
15. Gaskin CJ, Happell B. On exploratory factor analysis: a review of recent evidence, an assessment of current practice, and recommendations for future use. Int J Nurs Stud. 2014;51(3):511-21. doi: 10.1016/j.ijnurstu.2013.10.005, PMID 24183474.
16. Penyusunan Skala Psikologi AS. 2nd ed. Yogyakarta: Pustaka Pelajar; 2017.
17. Amir MT. Merancang kuesioner, konsep dan panduan untuk penelitian sikap, kepribadian, dan perilaku. 1st ed. Jakarta: Kencana. Rawamangun; 2015.
18. Field A. Discovering statistics using IBM SPSS. SAGE Publications; 2013.
19. Trochim WMK. Research methods knowledge base; 2006.
20. Ghozali I, Struktur Konsep MP. Aplikasi Dengan Program AMOS 19.0. 5th ed. Semarang, Indonesia: Badan penerbit. Semarang: Universitas Diponegoro; 2011.
21. Budiastuti D, Validitas BA, Penelitian R. Jakarta: Mitra Wacana Media; 2018. p. 1-232.
22. WHO. Program on Mental Health, WHOQOL User manual [Internet]. Available from: https://apps.int/iris/bitstream/handle/10665/77932. [Last accessed on 14 May 2020].
23. Swisher LL, Beckstead JW, Bebeau MJ. Factor analysis as a tool for survey analysis using a professional role orientation inventory as an example. Phys Ther. 2004 Sep;84(9):784-99. doi: 10.1093/ptj/84.9.784, PMID 15330692.
24. Fan Y, Zhang S, Li Y, Li Y, Zhang T, Liu W, Jiang H. Development and psychometric testing of the knowledge, attitudes and practices (KAP) questionnaire among student Tuberculosis (TB) Patients (STBP-KAPQ) in China. BMC Infect Dis. 2018 May 8;18(1):213. doi: 10.1186/s12879-018-3122-9, PMID 29739363.
25. Zahiruddin WM, Arifin WN, Mohd-Nazri S, Sukeri S, Zawaha I, Bakar RA, Hamat RA, Malina O, Jamaludin TZMT, Pathman A, Mas-Harithulfadhli-Agus AR, Norazlin I, Suhailah BS, Saudi SNS, Abdullah NM, Nozmi N, Zainuddin AW, Aziah D. Development and validation of a new knowledge, attitude, belief and practice questionnaire on leptospirosis in Malaysia. BMC Public Health. 2018 Mar 7;18(1):331. doi: 10.1186/s12889-018-5234-y, PMID 29514645.
26. Lopez Vazquez P, Vazquez Lago JM, Gonzalez Gonzalez C, Pineiro Lamas M, Lopez Duran A, Herdeiro MT, Figueiras A, GREPHEPI Group. Development and validation of the knowledge and attitudes regarding antibiotics and resistance (KAAR-11) questionnaire for primary care physicians. J Antimicrob Chemother. 2016 Oct 1;71(10):2972-9. doi: 10.1093/jac/dkw238, PMID 27353468.