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보건학 석사학위논문

**Development and Evaluation of
“Collective Efficacy” Questionnaire for
Infectious Disease**

감염병 관련 집단효능감 설문지
개발 및 평가

2016년 2월

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**Development and Evaluation of
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Infectious Disease**

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ABSTRACT

Development and Evaluation of “Collective Efficacy” Questionnaire for Infectious Disease

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Introduction : During the pandemic, like influenza, ebola and MERS, people experience a temporary crisis. Preparing for infectious disease, taking the rapid measure and response system is important. But equally important thing is community reciprocity and trust. Community reciprocity and trust defined as community collective efficacy which is the shared belief in the ability of a group to address problems when it acts conjointly. Collective efficacy strongly influences collective action because it can help determine whether and how the capability

of one's group might influence the behaviors of an individual. In community settings, collective efficacy is the belief held by community members is helpful for achieving infectious disease preparedness. So, proper scale and exact measurement in collective efficacy research can add depth in research, also, derives multi-dimensional results. Therefore, development of valid tool reliable in collective level is very necessary and significant. The purpose of this study was to measure group efficacy on infectious disease prevention, verify structural model, and suggest validity and reliability.

Methods : After development of questionnaire, reliability and validity was assessed. In this study, validity confirmed by content validity, construct validity and criterion validity. Also reliability identified by test-retest and Cronbach's α coefficient. A pilot study was conducted with a sample of 250 who live in Seoul and Chung-Nam, Korea.

Result : Test-retest reliability value was 0.71 to 0.95 for the domain of the collective efficacy about infectious disease preparedness. Content validity was assessed by inquiring advice of questions's suitability from the health care experts. After that, verified questionnaire was developed. Following the pilot survey, second validity and reliability assessment was conducted. Construct validity was assessed by exploratory factor analysis and confirmatory factor analysis. The result of exploratory factor analysis showed 5 factors. The validity of the questionnaire was moderately verified by the

confirmatory factor analysis (RMR=.41, RMSEA=.59, CFI=.91). Criterion validity was assessed by logistic regression. The association between collective efficacy level and infectious disease knowledge was not statistically significant but the association between collective efficacy level and infectious disease preventive behavior was statistically significant(The collective efficacy level 1, OR : 4.64, CI : 2.03-10.49 The collective efficacy level 2, OR : 3.45, CI : 1.60-7.44 The collective efficacy level 3, OR : 4.70 CI : 1.79-12.31). Lastly, internal consistency was determined with Cronbach's α . The internal consistency reliability ranged from 0.64 to 0.83.

Conclusion : This research could suggest a reliable tool that could measure infectious disease related collective efficacy. The questionnaire developed in this research was secured with reliability and validity, the researcher expects comprehension of collective efficacy level targeting the overall national people could be conducted, based on this, researches on evaluation of public health crisis confrontational ability could be progressed.

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Keywords : Infectious disease, Collective efficacy, Questionnaire, Confirmatory factor analysis, Exploratory factor analysis

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Chapter 1. Introduction

1.1 Background

In 2009, the Centers for Disease Control and Prevention(CDC) announced the first two cases of the infected humans with the 2009 influenza(H1N1) virus in the USA. Because the virus spread rapidly to other regions of the world, the World Health Organization(WHO) issued the phase 6 global influenza pandemic of the century on 11 June 2009. By 23 December 2009, more than 11,516 people were dead, however, the reported number of fatal cases is an under representation of actual numbers as many deaths are never tested or recognized as influenza-related. In Korea, the first case of human who got a H1N1 influenza was reported on 1 May 2009 and until 31 January 2010, 740,835 patients were confirmed with pandemic H1N1 2009 and 225 of them were reported to have died(1).

And the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) is an RNA virus in the family of *Coronaviridae*, which was first reported in Saudi Arabia. Information of transmission mechanism of the virus remains limited at the moment. Furthermore, there is no effective medication or vaccine against MERS, and it shows a high case fatality rate of 40%. It was May 20, 2015 when the first MERS patient was confirmed in Korea. July 26, 186 cases have been confirmed, including 36 deaths and 138 completely

recovered cases(2).

Like this, due to the 2009 influenza(H1N1) and MERS, Korea experienced explosive patients occurrence, burden of the health care system and socio-economic damage. During the pandemic, there is a temporary crisis but, thanks to the cooperation with government, medical association, people, it was finally safely settled(3). Preparing for infectious disease, taking the rapid measure and response system is important. but equally important thing is community reciprocity and trust. Community reciprocity and trust defined as community collective efficacy(4).

Collective efficacy is defined as the shared belief in the ability of a group to address problems when it acts conjointly(5),(6). Collective efficacy strongly influences collective action because it can help determine whether and how the capability of one's group might influence the behaviors of an individual(7),(8). In community settings, collective efficacy is the belief made by community members that together people can make a difference(9).

So far theorization and research on efficacy have been mostly focused on individual efficacy. However, human is a social being and the result that can be derived through collective cooperation that we aim for can be achieved through interdependent efforts with others. Therefore, in respect of infectious disease counteraction that could be solved through collective common efforts, collective efficacy research is more effective than individual efficacy.

Proper scale and exact measurement in collective efficacy research

can add depth in research, also, derives multi-dimensional results. Therefore, development of valid tool reliable in collective level is very necessary and significant.

1.2 Literature review

1.2.1 Concept of self-efficacy

Self-efficacy is a concept that appeared while social cognition rapidly emerged since 1960s, according to Bandura's initial theory, it means how much an individual has confidence in success in respect of performing a specific project. Bandura defined the belief and expectation related oneself as self-referent thought and researched by considering self-referent thought as an important factor to mediate relationship between knowledge, ability, and behavior performance(10). Also, some scholars defined self-efficacy as the determination(11) on individual's ability that can organize and perform necessary behavior to achieve a specific result, and individual determination on how capably behave in given situation was simultaneously defined as individual belief that can perform a specific behavior(12). This way, self-efficacy is the determination on self-ability in respect of how capably one can perform the necessary behavior to get the result. Therefore, one who has high self-efficacy has a tendency to willingly intervene and devote oneself to any difficult task, establish challenging goal, and invest more efforts to achieve that goal. Also, has a characteristic to adheres to the goal patiently for longer time even when any obstacle occurs(13).

1.2.2 Concept of collective efficacy

Efficacy means the belief to expect that one could achieve a specific project, majority researches related to this have shown interest in self-efficacy, the construct in individual level. Self-efficacy is individual belief in one's own ability to successfully perform one's task, however collective efficacy is the belief of an individual of collective members on the group to perform task successfully(14). According to this definition, the subject of group efficacy or self-efficacy shows difference between group and individual in respect of the object of perception, nevertheless individual level(15).

Bandura(1977) said, strength of team and organization is in group efficacy that believes group members could solve the problem and improve their life through communal efforts(16). Theoretically, group efficacy comes from interaction of team and collective perception(17).

The term collective efficacy refers to the ability of members of a community to control the behavior of individuals and groups in the community. To control people's behavior allows community residents to create a safe and orderly environment.

Collective efficacy depends on the values shared by community members. If members of a community trust each other and are willing to cooperate to prevent spreading infectious disease, it is more likely that they will be able to create a safe community environment.

Also, group efficacy influences the attitude that group members support each other and cooperate with each other and formation of

positive personal relations. Therefore, when group efficacy is high, on the whole positive and amicable atmosphere is created between the members(18).

Han Kwang-Hyun(2005) measured collective efficacy to use 'Collective efficacy beliefs scale' which was developed by Riggs et al.,(1994).(19) This scale dealt the department in which one work. This department may be an office group, a maintenance crew, an academic department, etc. When responding to that items, answer in reference to this group's work-related ability. The scale respond with "SA" for "strongly agree", "A" for "agree", "AS" for "agree somewhat", "DS" for "disagree somewhat", "D" for "disagree", and "SD" for "strongly disagree". The example of question were, "The department I work with has above average ability", "The members of this department have excellent job skills" And, Simons, Burt, Brody, and Cutrona(2005) examined collective efficacy in order to predict conduct problems among rural African American youth in Georgia and Iowa. The measure of collective efficacy was based upon previous research(20) including assessments of both cohesion and informal social control. This measure was informed by two measures of collective efficacy among adults that also focused upon social cohesion and informal social control(21) and a collective efficacy measure developed for teachers(22). A example item states "I feel like I am a part of my afterschool program"

1.3 Needs for the study

Components of public health preparedness suggested by CDC include community resilience as an important component besides surveillance or communication. Resilience is an ability to predict risk, minimize the influence of it, and restore the original state, which can be measured through the index of environment, society, economy, and infra, etc. and community collective efficacy(23).

Community efficacy is defined as the sympathy through mutual trust and solidarity on the behavior for social control(24), also, will to behave for public interest rises when mutual trust and solidarity are high.

The report of 2014 Public Health Crisis Countermeasure Business Group, also, suggested necessity of measuring community efficacy besides local government preparation response state, since community efficacy is an important component in community public health competence on public health crisis besides organizational structure and officers' managerial ability.

So far researches on community efficacy are mostly of community crime prevention(25) or educational program, and there's almost no research on public health crisis or community public health. Therefore, questionnaire to measure community efficacy on public health should be newly developed, also, pilot survey process should be conducted to raise reliability and validity after questionnaire draft development.

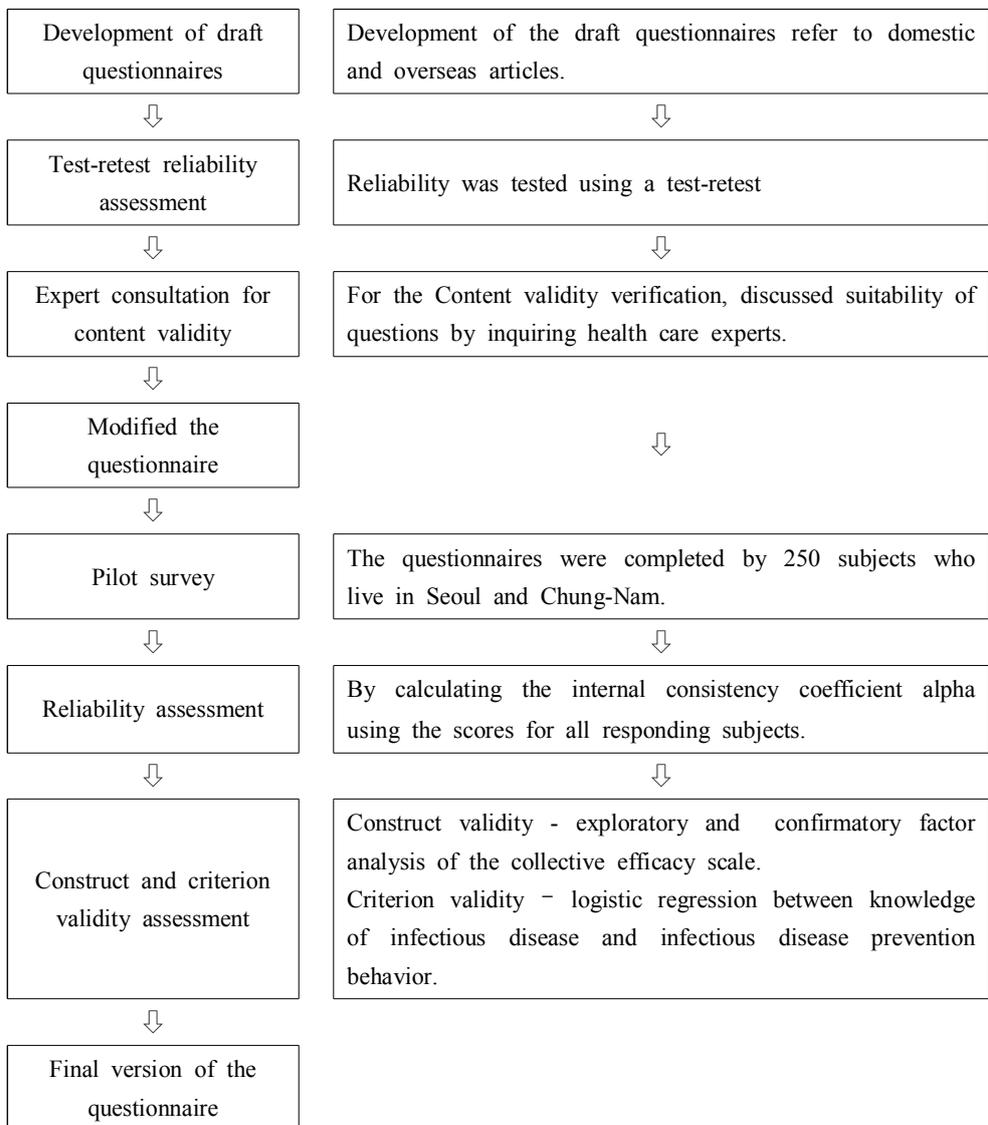
1.4 Study aims

This research aimed at developing questionnaire to measure group efficacy on infectious disease prevention, verify structural model, and suggest validity and reliability. Also, through this, intended to search a plan to raise collective efficacy and eventually raise infectious disease countermeasure ability.

When a survey tool on community efficacy is determined, community efficacy tool is expected to be utilized along with evaluation index, henceforth to evaluate Korean community public health crisis countermeasure competence.

Chapter 2. Methods

2.1 Study Process



2.2 Development of draft questionnaires

The questionnaire consists of three domains : (1) Questionnaire of demographic characteristics ; (2) Measurement of collective efficacy about infectious disease preparedness ; and (3) Measurement of knowledge of infectious disease and Measurement of infectious disease preventive behavior.

1) Domain 1 : Questionnaire of demographic characteristics.

Questionnaire was composed of the questions on basic information as gender, birth year, etc.

2) Domain 2 : Collective Efficacy Questionnaire for Infectious Disease (CEQ-ID) preparedness

In 2011, CDC identified the 15 capabilities as national standards for state and local public health preparedness planning. The contents is based on evidence-informed documents, relevant preparedness literature, and subject matter expertise gathered from across the federal government and the state and local practice community. The capabilities were as follows : Capability 1: Community preparedness, Capability 2: Community recovery, Capability 3: Emergency operations coordination, Capability 4: Emergency public information and warning, Capability 5: Fatality management, Capability 6: Information sharing, Capability 7: Mass care, Capability 8: Medical countermeasure dispensing, Capability 9: Medical material management and

distribution, Capability 10: Medical surge, Capability 11: Non-pharmaceutical interventions, Capability 12: Public health laboratory testing, Capability 13: Public health surveillance and epidemiological investigation, Capability 14: Responder safety and health, Capability 15: Volunteer management(26).

At the 2014 Public Health Crisis Countermeasure Business Group, which project the researcher was involved, selected a core scope from the 15 capabilities. For example, from the capability 1, drawing 'Education, Publicize', from the capability 4, drawing 'Public health communication', from the capability 8, drawing 'Medical service', from capability 9, drawing 'Vaccination', from the capability 11, drawing 'Quarantine, Isolation', from the capability 13, drawing 'Epidemiology, Investigation'.

Based on the advanced literature(27),(28),(29) and selected core scope newly developed collective efficacy measuring tool on infectious disease

Questionnaire was composed of 4-point scale, total 23 questions.

3-1) Domain 3 : Measurement of knowledge of infectious disease. (Ebola, Influenza(H1N1))

The researcher used Ebola virus and influenza questionnaire posted on the official internet site of the U.S. Disease Control(30) and Prevention and the World Health Organization(WHO)(31). Total 7 questions were included related to influenza, and 8 questions were included related to Ebola virus. Each question was composed to select

'yes' or 'no'. Final Korean translation version was completed through translation, compromise, reverse translation, and cognitive confirmation process on this questionnaire.

- Forward translation

Researchers and another one person translated English questionnaire into Korean. It explained basic content on the questionnaire content and development motive of this questionnaire, and they translated independently after having listened to the explanation.

- Reconciliation

By examining two translated versions, the researcher composed Korean compromised translated version. Principles of compromise were determined as follows.

- ① To translate specific words according to the fixed rule. In respect of general declarative sentence and interrogative sentence, unify into “~neunda.” and “~seumnika?”.
- ② In respect of translating questionnaire, the researcher adopted liberal translation to make realistic and natural sentence instead of literal translation.
- ③ To confirm use of words or whether of correct spelling, the researcher utilized Korean dictionary and English dictionary of “google (www.google.com)” and “daum(www.daum.net)”.

- Reverse translation

Two translators who are both fluent in English and Korean, who are Korean but have been in the U.S. over 10 years and do not know each other translated in reverse, later, internal team meeting related to infectious disease conducted comparative evaluation of original questionnaire, right order translation, and reverse translation. In case when translation does not coincide with the original copy, the researcher conducted reexamination and determined to complete reverse translation when newly made sentence was accepted.

- Cognitive debriefing

The researcher provided questionnaire completed with reverse translation to three students of Seoul National Graduate School of Public Health with the attendance of the researcher, measured required time and confirmed whether of any difficulty in understanding questions. The researcher let the examinee mark the points that they do not understand concept of the original question properly or difficult to understand, gave feedback on ambiguous question and arranged them. Based on the opinions, the researcher corrected translation and composed final Korean translation version.

3-2) Domain 4 : Measurement of infectious disease preventive behavior.

The researcher developed a questionnaire referring to infectious disease preventive regulations included in the literature, e.g. respiratory

disease prevention of infection regulations among Korea National Institute of Health infectious disease management, 2007 AI human body infection prevention and managerial guidelines, Influenza prevention national action regulations, etc.(32),(33),(34). Total 10 questions were included in the questionnaire, composed of 5-point scale.

2.3 Validity and reliability assessment

2.3.1 Test-retest reliability assessment

Reliability was tested using a test-retest design with a 2 week interval between measurements in 10 adults participants. Test-retest reliability was estimated using the Pearson's correlation coefficient method. The test-retest coefficients ≥ 0.8 are generally regarded as evidence of acceptable reliability(35).

2.3.2 Expert consultation for content validity

For the Content validity verification, this research discussed suitability of questions by inquiring 10 health care experts. The researcher showed the health care experts the draft and asked them whether each question is proper for the purpose of the survey, any additional items, and requested to compose in subjective answer.

2.4 Pilot survey

The pilot test was carried out from Feb 23, 2015, to March 6, 2015. The questionnaires were completed by 250 subjects who live in Seoul and Chung-Nam and conducted by face to face interview format. 250 subjects were extracted using quota sampling method by region, gender, age. And started a survey when the research object agreed to the purpose and process of the research, anonymity, autonomy, and confidentiality by describing them in the survey guideline. Also, this research received exemption deliberation by Clinical Research Ethics Committee(IRB).

2.5 Validity and reliability assessment from pilot survey

2.5.1 Reliability assessment

The reliability of the questionnaire was estimated by calculating the internal consistency coefficient alpha using the scores for all responding subjects. A minimum Cronbach's α coefficient of 0.7 was considered satisfactory for group level comparisons.(36)

2.5.2 Validity assessment

1) Exploratory factor analysis about Collective Efficacy Scale

To evaluate bias and rate character of extremity on the preliminary survey objects' response on each question, kurtosis, skewness, mean, and standard deviation were utilized.

Exploratory factor analysis indicates basic numerical value on subordinate structure that shows the measuring concept of each question, however this research utilized principal components analysis and varimax rotation method to maximize load value on each factor.

In order to investigate whether the size of sampling is proper for factorial analysis, this research conducted KMO-test(sample adequacy test) and sphericity verification of Bartlett. According to Kaiser(1974), it was described most ideal when over 0.9, ideal when over 0.8, medium when 0.7, and insufficient when below 0.6, according to the size of KMO value.

Eigen values over 1 were selected as the factor, and extracted questions based on factor loadings and over .40 as the standard.

2) Confirmatory factor analysis about Collective Efficacy Scale

To assess the validity of the factors confirmatory factor analysis was conducted.

To test whether the 5-factor model provided a good fit to data, structural equation modeling was used to estimate the model and assess its fit to the data.

Confirmatory factor analysis involves the specification and estimation of one or more putative models of factor structure, each of which proposes a set of latent variables to account for covariance among a set of observed variables.

Validity tested construct validity and criterion validity, this research conducted confirmatory factor analysis for confirmation of construct validity, and analyzed criterion-related validity with the content regarding, 'knowledge of infectious disease and preventive behavior are well done when collective efficiency is high', among the advanced researches, as the gold standard. All the analyses were performed using SAS 9.3 and SPSS Amos 23.

In confirmatory factor analysis, confirm the convergent validity and discriminant validity is use to verify the validity. Convergent validity method use the average variance extracted, construct reliability, standardized factor loading are correct.

Standardized factor loading should be more than 0.5 below 0.95,

but it is desirable over 0.7. At this time, C.R(Critical Ratio) sure to over 1.965.

The value of average variance extracted over 0.5 and the value of construct reliability over 0.7 is regarded to get a convergent validity. The following formula is how to calculate to AVE and C.R(37).

$$\text{Formula 1. } AVE = \frac{\sum \text{factor loading}^2}{\sum \text{factor loading}^2 + \sum \text{error variance}} \geq 0.5$$

$$\text{Formula 2. } C.R. = \frac{(\sum \text{factor loading})^2}{(\sum \text{factor loading})^2 + \sum \text{error variance}} \geq 0.7$$

Next important thing is the discriminant validity of convergent validity. In this study, comparing the AVE(average variance extracted) between two construct and square of the correlation value of two construct. If AVE value is higher than the square of correlation value v, it may be judged to the validity is reasonable. Another method of verify the discriminant validity is whether the result of multiply the standard error by ± 2 and the correlation between two constructs. The other, the discriminant validity is determined to see the $\Delta \chi^2$ value between the non-constrained model and constraint model.

Chapter 3. Results

3.1 Translation and development of draft questionnaire

Official title of the questionnaire was determined Infectious related collective efficacy survey.

After completing the questionnaire, as the result of conducting cognitive confirmation, time taken for responding to the survey was average 17 minutes, no case took over 30 minutes. As the result of survey, on the whole sentences were composed simple and no big difficulty occurred in understanding and composing the questionnaire. Below is a draft questionnaire. [\[Appendix 1\]](#)

3.2 Validity and reliability assessment

3.2.1 Test-retest reliability assessment

The test-retest reliability (Pearson's correlation coefficient) was for the domain of infectious disease knowledge. 0.89-0.94 for the domain of infectious disease knowledge, 0.76-0.95 for the domain of infectious disease preventive behavior, 0.71-0.95 for the domain of the collective efficacy about infectious disease preparedness.

3.2.2 Expert consultation for content validity

This research corrected the draft of questionnaire as follows by reflecting the result of inquiring 10 health care experts.

This research changed the response examples of Infectious disease preventive behavior measuring area, 'Always', 'Sometimes', 'Rarely', to 5-score scale, i.e. 'Always', 'Mostly', 'Frequently', 'Sometimes' and 'Rarely'. Also, added a clause, 'Usually wear mask when having respiratory symptoms as cough, etc.', and changed the question, 'I use soap while washing my hands' to 'I use soap and hand cleaning agent while washing my hands'. And changed the question, 'I eat soup or stew together with other people in one pot when I go to a restaurant' to 'I eat food by putting food on an individual plate'. Also, definitized the question, 'I often go to crowded places' to 'I stay a long time (over 3 hours a day) at crowded places as market or restaurant.'

In respect of measurement of collective efficacy about infectious disease preparedness, this research added 'Don't know' to the response examples by collecting the opinion that worried about lots of content difficult to answer for general citizens. This research deleted the question, 'Our city or City Town and Province properly conduct quarantine and preventive measures on entry · exit passengers at the airport or port to prevent infectious disease and spread thereof, since it is limited to the region with airport of port.

3.3 Modified the draft questionnaire

Based on the validity and reliability test result, the draft questionnaire was modified. [\[Appendix 2\]](#)

3.4 Demographic characteristics of pilot survey subjects

Dispersion of gender and age of the research targets were 122 males (48.8%), 128 females (51.2%). In respect of age, over 60 were 81 (32.4%), the most, 50s were 49 (19.6%), 40s were 45(18%), 20s were 38 (15.2%), 30s were 37 (15.2%), etc. In respect of highest level of schooling, high school graduates were 102 (38.1%), the most, and university graduates were 93 (37.2%) in the second place. In respect of occupation, technical post, sales position, and housewives were 79 (31.6%), 75 (30%), the most, and office job, administrative position were in the second place.

[Table 1] shows general demographic characteristics and distribution of pilot test subjects.

[Table 1] Demographic characteristics of pilot survey subjects

		(N=250)	
		N	%
Gender	Men	122	48.8%
	Women	128	51.2%
Age	20-34	51	20.4%
	35-49	69	27.6%
	50-64	91	36.4%
	≥65	39	15.6%
Education	Under Middle School	55	22.0%
	High School	102	40.8%
	Over university	93	37.2%
Occupation	White collar	105	42.0%
	Blue collar	36	14.4%
	etc.	109	43.6%

3.5 Validity and Reliability assessment

3.5.1 Validity assessment

1) Exploratory factor analysis about Collective efficacy scale

1-1) Each question's mean, standard error and normal distribution

The Mean, standard error, kurtosis, skewness value of each questions are in [\[Table 2\]](#).

[Table 2] Descriptive statistics about collective efficacy questions

Question	Mean	S.D	Kurtosis	Skewness
Q01	4.30	.583	-.582	-.160
Q02	4.34	.676	3.353	-1.156
Q03	3.96	.796	1.499	-.748
Q04	3.75	.762	.761	-.316
Q05	4.36	.700	1.432	-.995
Q06	4.12	.765	2.092	-.960
Q07	4.24	.738	1.234	-.897
Q08	4.04	.768	3.330	-1.190
Q09	4.12	.825	2.447	-1.169
Q10	4.14	.820	1.769	-1.006
Q11	4.07	.773	3.397	-1.230
Q12	4.00	.758	3.660	-1.277
Q13	4.14	.775	3.916	-1.390
Q14	4.04	.879	2.580	-1.265
Q15	3.91	.975	2.175	-1.333
Q16	3.72	1.126	.878	-1.173
Q17	3.99	1.012	2.272	-1.453
Q18	4.07	.768	4.485	-1.466
Q19	3.16	.989	.074	-.753
Q20	3.51	.932	1.665	-1.147
Q21	3.68	.971	2.383	-1.540
Q22	3.75	.951	3.116	-1.737
Q23	3.59	.945	1.918	-1.305

1-2) Exploratory factor analysis result

Results of exploratory factor analysis are as in [Table 3].

KMO(Kaiser-Meyer-Olkin Measure) value that verifies sample goodness on the whole material is between 0~1, however good when it's near to 1. KMO index appeared 0.869 in this research analysis result, and Bartlett's sphericity, that indicates goodness of the factor, is to test null hypothesis, correlation matrix is unit matrix, it could be determined that test value on 23 variables of this model is 2109.028 and level of significance is .000 level, accordingly, common factor proper for factor analysis can be said to exist. That is, variables can be said to have relationship without being independent.

As the factor analysis result, 5 major factors were classified. Purpose of factor analysis is in reduction of material, i.e. reducing the number of variables. Therefore, number of factors should be comprehended based on a certain standard, of which standard becomes eigenvalues.

In this research, the factors with eigenvalues over 1 are 5, e.g. Factor 1=6.48, Factor 2=2.87, Factor 3=1.59, Factor 4=1.38, and Factor 5=1.00, accordingly, factors of 23 questions that measure group efficacy could be divided into 5. Also, to see the explanation power of each factor displays Factor 1=28.21, Factor 2=12.47, Factor 3=6.92, Factor 4=6.01, Factor 5=4.35, on the whole 57.97. Which showed significant result. Eigenvalues of 5 factors appeared 1.00~6.48, and predictable variation appeared 4.35~28.21. Load value of Factor 1

appeared 0.50~0.81, Factor 2, 0.64~0.84, Factor 3, 0.48~0.71, Factor 4, 0.50~0.78, and Factor 5 displayed 0.44~0.80.

[Table 3] Exploratory factor analysis about collective efficacy questions

Question	Factor1	Factor2	Factor3	Factor4	Factor5	h ²
Q16	.817	-.051	.065	-.018	.059	.678
Q17	.762	.019	.062	.115	.077	.604
Q14	.632	.079	.254	.314	.033	.570
Q15	.620	.033	.165	.230	-.037	.467
Q18	.553	.194	.291	.367	.165	.591
Q13	.505	.139	.319	.445	.182	.607
Q23	.103	.840	-.052	.018	.033	.720
Q22	.024	.772	.138	.075	.002	.622
Q20	-.063	.770	-.013	.102	.004	.608
Q21	.060	.720	.047	-.017	-.085	.531
Q19	.045	.649	-.026	-.042	.100	.435
Q08	.220	.049	.710	-.033	.079	.562
Q02	-.010	.030	.705	.237	.127	.571
Q07	.344	-.072	.693	.129	-.098	.631
Q09	.256	.046	.558	.339	.100	.504
Q01	-.040	.024	.489	.463	.251	.519
Q05	.229	-.050	.104	.780	-.007	.675
Q10	.424	.063	.131	.559	.047	.516
Q06	.204	.031	.412	.509	-.058	.475
Q04	-.050	.028	-.109	.101	.809	.679
Q03	.146	-.131	.323	-.155	.718	.682
Q11	.342	.166	.176	.415	.452	.551
Q12	.344	.259	.312	.247	.441	.538
Eigen value	6.488	2.870	1.593	1.382	1.002	
Exp Var	28.210	12.478	6.925	6.010	4.355	
CUM Var	28.210	40.688	47.613	53.624	59.979	
Factor name	Community service	Education, Publicize	Belonging, Response	Rapidity, Trust	Reciprocity	

2) Confirmatory factor analysis about Collective efficacy scale

2-1) Confirmatory factor analysis result

The final model fit verdict was done by RMR, GFI, AGFI, RMSEA, NFI, TLI, CFI value. RMR, RMSEA, CFI value was suitable for goodness of fit, but the rest values are not suitable [Table 4].

Final model of collective efficacy measuring standard related to infectious disease in confirmatory factorial analysis is as in [Figure 1,2].

Standardized factor loading appeared Community service 0.58~0.77, Education, Publicize 0.49~0.84, Belonging, Response 0.47~0.68, Rapidity, Trust 0.54~0.65, Reciprocity 0.24~0.76

Also the coefficient of correlation between each factors were 0.38 to 0.86, that Community service and Belonging, Response factors coefficient of correlation was the highest, 0.86 and Education, Publicize and Belonging, Response factors coefficient of correlation was the lowest, 0.38 [Table 6].

[Table 4] Confirmatory factor analysis model fit

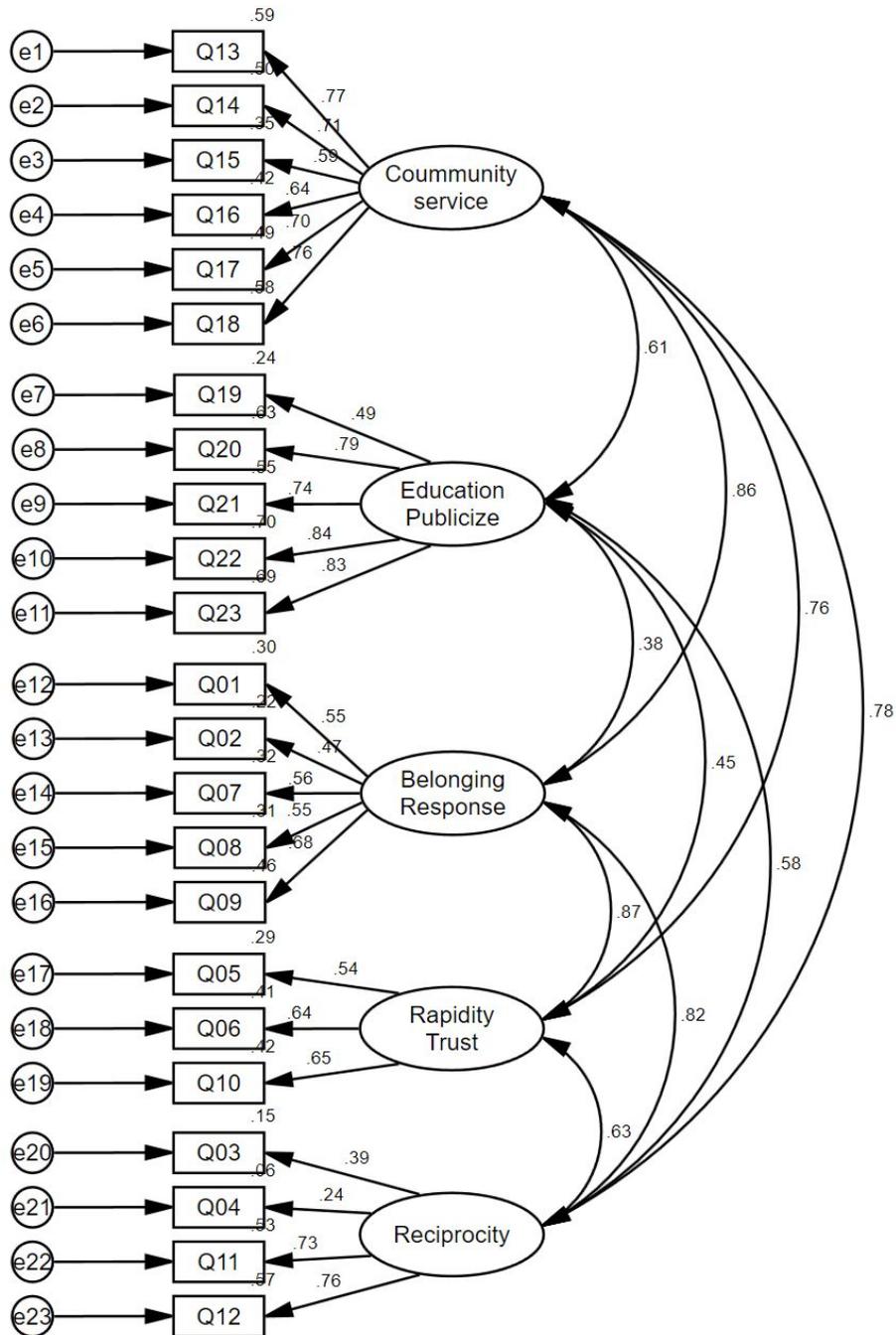
Absolute fit index	RMR (Root mean-square residual)	.041
	GFI (Goodness of fit index)	.879
	AGFI (Adjusted GFI)	.848
	RMSEA (Root mean squared error of approximation)	.059
Incremental fit index	NFI (Normed fit index)	.831
	TLI (Tucher-Lewis index)	.899
	CFI (Comparative fit index)	.912

2-2) Convergent validity assessment

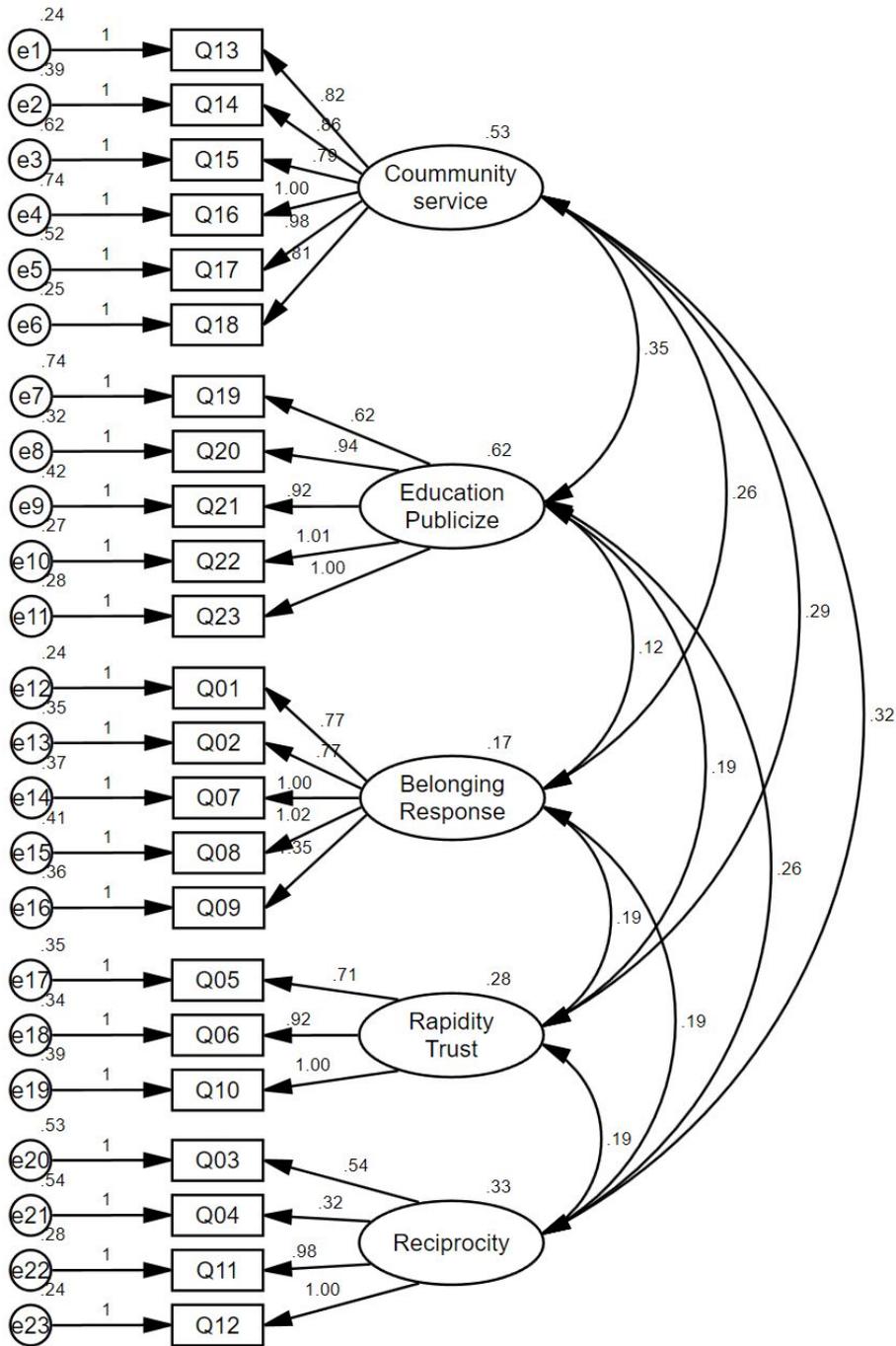
AVE(Average Dispersion Extract) was calculated, 0.56 in Community service area, 0.58 in Education, Publicize area, 0.48 in Belonging, Response area, 0.51 in Rapidity, Trust area, and 0.45 in Reciprocity area. Since almost all AVE values were over 0.5, accordingly, it is considered to have concentrative validity.

And construct reliability was calculated, 0.86 in Community service area, 0.87 in Education, Publicize area, 0.82 in Belonging, Response area, 0.75 in Rapidity, Trust area, and 0.73 in Reciprocity area. Since all construct reliability values were over 0.7, it is considered to have concentrative validity [Table 5].

[Fig 1] Measurement Model for CFA (Standardized estimates)



[Fig 2] Measurement Model for CFA (Unstandardized estimates)



[Table 5] Convergent validity assessment result

	Estimate	S.E.	C.R	P	Standardized coefficients	AVE	Construct Reliability
Community service → Q13	.823	.081	10.172	***	.771	0.561	0.864
Community service → Q14	.856	.090	9.497	***	.707		
Community service → Q15	.790	.097	8.147	***	.588		
Community service → Q16	1.00	-	-	-	.645		
Community service → Q17	.980	.104	9.463	***	.703		
Community service → Q18	.805	.080	10.076	***	.762		
Education, Publicize → Q19	.618	.079	7.794	***	.491	0.582	0.871
Education, Publicize → Q20	.942	.067	14.049	***	.794		
Education, Publicize → Q21	.920	.071	12.908	***	.745		
Education, Publicize → Q22	1.01	.067	15.058	***	.837		
Education, Publicize → Q23	1.00	-	-	-	.831		
Belonging, Response → Q01	.769	.112	6.882	***	.549		
Belonging, Response → Q02	.766	.125	6.130	***	.471		
Belonging, Response → Q07	1.00	-	-	-	.564		
Belonging, Response → Q08	1.02	.148	6.915	***	.553		
Belonging, Response → Q09	1.35	.170	7.956	***	.680		
Rapidity, Trust → Q05	.707	.103	6.832	***	.539	0.511	0.757
Rapidity, Trust → Q06	.918	.118	7.786	***	.641		
Rapidity, Trust → Q10	1.00	-	-	-	.651		
Reciprocity → Q03	.544	.097	5.595	***	.393	0.450	0.736
Reciprocity → Q04	.321	.093	3.444	***	.241		
Reciprocity → Q11	.977	.097	10.073	***	.725		
Reciprocity → Q12	1.00	-	-	-	.757		

2-3) Discriminant assessment

- χ^2 difference between non-restrictive model & Restrictive model

The result of analysing non-restrictive model that was applied with no restriction between Rapidity, Trust and Belonging, Response was $\chi^2=413.4$ and the analysis result of restrictive model fixed with covariance by 1 between Rapidity, Trust and Belonging, Response was $\chi^2=529.3$.

When comparing χ^2 of non-restrictive model and restrictive model, meaningful difference appears between two models as $\Delta\chi^2=115.9$ when $df=1$, accordingly, discriminant validity is considered to exist. (Generally, χ^2 is compared to verify difference between non-restrictive model and restrictive model. When degree of freedom differs by 1, when difference of χ^2 is over 3.84, statistically significant)

- Whether the result of equation [$\emptyset \pm 2 \times S.E.$] include 1 or not

This method is to use of correlation coefficient and standard error. In case of assessment of discriminant validity, it was difficult to verify between all the variables, for the following reason, conceptually similar or selecting the highest pair of the correlation between the variables.

The reason why selecting the most high correlation between pairs of variables was that if the correlation is high, the discriminant validity would low.

The correlation coefficient between 'Belonging, Response' and 'Rapidity, Trust' was 0.87 [Table 6]. And the standard error between

two latent variables was 0.03 [Table 7]. Assign these figure as [$\emptyset \pm 2 \times \text{S.E.}$], the result was [$0.875 \pm 2 \times 0.03 = 0.93 \sim 0.84$]. It was not include 1, so discriminant validity was considered to exist.

[Table 6] Correlations between factors

	Community service	Education, Publicize	Belonging, Response	Rapidity, Trust	Reciprocity	AVE	Construct Reliability
Community service	1					0.561	0.864
Education, Publicize	.612	1				0.582	0.871
Belonging, Response	.859	.381	1			0.482	0.821
Rapidity, Trust	.758	.455	.875	1		0.511	0.757
Reciprocity	.776	.576	.818	.627	1	0.450	0.736

[Table 7] Covariance between latent variables

	Estimate	S.E.	C.R	P
Community service ↔ Education, Publicize	.348	.055	6.273	***
Community service ↔ Belonging, Response	.259	.042	6.100	***
Community service ↔ Rapidity, Trust	.293	.048	6.080	***
Community service ↔ Reciprocity	.322	.048	6.654	-
Education, Publicize ↔ Belonging, Response	.124	.030	4.169	***
Education, Publicize ↔ Rapidity, Trust	.190	.040	4.760	***
Education, Publicize ↔ Reciprocity	.259	.042	6.137	***
Belonging, Response ↔ Rapidity, Trust	.193	.033	5.931	***
Belonging, Response ↔ Reciprocity	.195	.031	6.197	***
Rapidity, Trust ↔ Reciprocity	.191	.035	5.539	***

3) Logistic regression

In accordance with the collective efficacy level and infectious disease knowledge was no statistically significant differences in the odds ratios. But there was positive association between collective efficacy and infectious disease preventive behavior. When the collective efficacy level 1, the odds ratio was 4.64, CI 2.03-10.49, and level 2, the odds ratio was 3.45, CI 1.60-7.44, and level 3 the odds ratio was 4.70, CI 1.79-12.31. [Table 8,9,10]

[Table 8] The frequency between infectious disease knowledge, preventive behavior and collective efficacy

		Knowledge (High)			Behavior (High)		
		N	%	P-value	N	%	P-value
Collective efficacy	0	75	25	33.33	28	37.33	0.003
	1	57	17	29.82	38	66.67	
	2	86	29	33.72	48	55.81	
	3	32	14	43.75	21	65.63	
Gender							
	Men	122	46	37.70	56	45.90	0.012
	Women	128	39	30.47	79	61.72	
Age							
	20-34	51	13	25.49	22	43.14	0.141
	34-49	69	19	27.54	34	49.28	
	50-64	91	32	35.16	55	60.44	
	≥65	39	21	53.85	24	61.54	
Education							
	≤Middle school	55	31	56.36	35	63.64	0.237
	High School	102	25	24.51	54	52.94	
	≥University	93	29	31.18	46	49.46	
Occupation							
	Manual	105	38	36.19	54	51.43	0.564
	Non-manual	36	20	55.56	18	50.00	
	Etc.	109	27	24.77	63	57.80	
Region							
	Seoul	100	27	27.00	57	57.00	0.437
	Chung-Nam	150	58	38.67	78	52.00	

[Table 9] Infectious disease knowledge according to Collective efficacy level

Level of the infectious disease knowledge (Low/High)									
	Crude OR	95% CI		P-value	Adjusted OR	95% CI		P-value	
Collective efficacy 0	REF	-	-	-	REF	-	-	-	-
Collective efficacy 1	0.85	0.40	1.79	0.668	0.56	0.23	1.31	0.181	
Collective efficacy 2	1.10	0.53	1.96	0.958	0.63	0.28	1.39	0.258	
Collective efficacy 3	1.55	0.67	3.63	0.306	1.42	0.55	3.63	0.458	
Gender									
Men	REF	-	-	-	REF	-	-	-	
Women	0.72	0.43	1.22	0.228	0.93	0.48	1.80	0.849	
Age									
20-34	REF	-	-	-	REF	-	-	-	
34-49	1.11	0.48	2.52	0.800	0.82	0.34	1.98	0.663	
50-64	1.58	0.73	3.39	0.236	1.07	0.45	2.54	0.864	
≥65	3.40	1.39	8.30	0.006	1.76	0.58	5.35	0.318	
Education									
≤Middle school	REF	-	-	-	REF	-	-	-	
High School	0.25	0.12	0.50	0.000	0.31	0.13	0.74	0.008	
≥University	0.35	0.17	0.70	0.002	0.36	0.12	1.09	0.072	
Occupation									
Manual	1.72	0.95	3.10	0.070	2.42	1.13	5.16	0.022	
Non-manual	3.79	1.72	8.35	0.000	2.30	0.85	6.21	0.097	
Etc.	REF	-	-	-	REF	-	-	-	
Region									
Seoul	0.58	0.33	1.01	0.057	0.73	0.36	1.48	0.393	
Chung-Nam	REF	-	-	-	REF	-	-	-	

* Adjusted with gender, age, education, occupation, region

[Table 10] Infectious disease preventive behavior according to Collective efficacy level

Level of the infectious disease preventive behavior (Low/High)									
	Crude OR	95% CI		P-value	Adjusted OR	95% CI		P-value	
Collective efficacy 0	REF	-	-	-	REF	-	-	-	-
Collective efficacy 1	3.35	1.63	6.91	0.001	4.64	2.03	10.49	0.000	
Collective efficacy 2	2.12	1.12	3.99	0.019	3.45	1.60	7.44	0.001	
Collective efficacy 3	3.20	1.34	7.62	0.008	4.70	1.79	12.31	0.001	
Gender									
Men	REF	-	-	-	REF	-	-	-	-
Women	1.90	1.14	3.14	0.012	1.70	0.91	3.15	0.091	
Age									
20-34	REF	-	-	-	REF	-	-	-	-
34-49	1.28	0.61	2.65	0.505	1.30	0.58	2.91	0.522	
50-64	2.01	1.00	4.03	0.048	1.73	0.78	3.84	0.173	
≥ 65	2.10	0.90	4.93	0.085	1.71	0.58	5.02	0.326	
Education									
≤ Middle school	REF	-	-	-	REF	-	-	-	-
High School	0.64	0.32	1.26	0.198	0.57	0.24	1.35	0.203	
Over university	0.55	0.28	1.10	0.095	0.45	0.15	1.32	0.149	
Occupation									
Manual	0.77	0.45	1.32	0.349	1.29	0.64	2.60	0.475	
Non-manual	0.73	0.34	1.55	0.414	0.67	0.25	1.79	0.434	
Etc.	REF	-	-	-	REF	-	-	-	-
Region									
Seoul	1.22	0.73	2.03	0.437	2.65	1.33	5.27	0.005	
Chung-Nam	REF	-	-	-	REF	-	-	-	-

* Adjusted with gender, age, education, occupation, region

3.5.2 Reliability assessment

Internal consistency was determined with Cronbach's α . The internal consistency reliability (Cronbach's α coefficient) ranged from 0.64 to 0.83 for all scales show the Cronbach's α coefficient of the collective efficacy question [Table 11].

[Table 11] Cronbach's α coefficient

Factor	Questions	number	Cronbach's alpha	Standardization
Community service	Q13, Q14, Q15, Q16, Q17, Q18	6	0.83	0.83
Education, Publicize	Q19, Q20, Q21, Q22, Q23	5	0.80	0.81
Belonging, Response	Q1, Q2, Q7, Q8, Q9	5	0.74	0.75
Rapidity, Trust	Q5, Q6, Q10	3	0.65	0.66
Reciprocity	Q3, Q4, Q11, Q12	4	0.64	0.65
Total			0.85	0.86

4. Discussion and Conclusion

4.1 Discussion

This research produced a questionnaire by referring the existing books to evaluate collective efficacy related to infectious disease, and intended to provide the questionnaire to utilize with reliability. Research on collective efficacy has been primarily conducted within the business, athletic and educational settings. This way, the tool to measure collective efficacy was suggested in the advanced research, however it is difficult to measure collective efficacy related to infectious disease. The questionnaire that measures collective efficacy related to infectious disease was not developed in domestic as well as overseas, accordingly, it could be utilized as a good material to determine whether countermeasure for infectious disease along with efficacy level henceforth with this research.

Test-retest reliability of this research was conducted on 10 health care experts, and content validity, on 10 health care experts. Also, tested criterion validity and construct validity with the result of preliminary research targeting total 250 residents, 100 residents in Seoul and 150 residents in Chungcheongnam-do district. The reason why this research divided the sample group into Seoul and Chungcheongnam-do district was, because big cities as Seoul have good advertisement and education on infectious disease compared to

the suburb (country), accordingly, the researcher considered there would be difference in ability to counteract and cognition degree when infectious disease outbreaks.

Generally if a researcher directly develops a questionnaire, a procedure to verify reliability and validity for standardization. Among them, reliability is an index that indicates consistency of measured result, test-retest method is conducted to statistically test using internal consistency, or check whether the same measured value is gained when conducting the same measurement several times. This research checked internal consistency between each questionnaire by gaining Cronbach's α value and verified reliability with test-retest, Cronbach's α value was over 0.8, which could determine high internal consistency, also, correlation index between test-retest was evaluated as over 0.9, which confirmed to be a questionnaire with very high reliability.

Validity is a scale that indicates how close is the characteristic to be measured to the true value, which includes construct validity, criterion validity, content validity, etc. Construct validity can verify utilizing exploratory factor analysis or confirmatory factor analysis, standard validity verifies validity with correlation analysis with well-known gold standard. This research could confirm high construct validity as the result of confirmatory factorial analysis. For standard validity verification, this research checked consistency with the result of the existing literature, where this research could determine correlation with collective efficacy and infectious disease preventive action, however no correlation appeared between collective efficacy and infectious disease

related knowledge level.

Content validity can utilize statistical measured value called 'Content validity index' that can objectively quantifies the content to determine and define the content of test questions by the experts' thorough and planned but subjective who have knowledge about test content field to be measured, however this research utilized a method to subjectively inquire the 10 health care experts about how to get advice. This method has disadvantages that quantitative proof of verification is difficult and it can show different result along with experts' opinion, however the researcher requested to review the questionnaire from utmost objective viewpoint, and considered this point was reflected enough, accordingly, determined no problem in validity verification.

4.2 Conclusion

This research could measure knowledge level about infectious disease, preventive action degree, and collective efficacy of the research objects by developing a questionnaire related to infectious disease. This research intended to suggest collective efficacy measurement questionnaire limited to infectious disease differently from previously developed collective efficacy measurement tool. For this, the researcher conducted translation and reverse translation on some questions, also, preliminary investigation with the overall questionnaire. As the result, this research could suggest a reliable tool that could measure infectious disease related collective efficacy. However, this research limited preliminary investigation targets to the residents in Seoul and Chungcheongnam-do district, therefore, the researcher suggests to conduct a research on expanded research objects. Lastly, the questionnaire developed in this research was secured with reliability and validity, the researcher expects comprehension of collective efficacy level targeting the overall national people could be conducted, based on this, researches on evaluation of public health crisis confrontational ability could be progressed.

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[Appendix 1 - Draft Questionnaire (Korean version)]

항목 1. 인적사항

- Q01 귀하의 성별은 무엇입니까? 남 여
- Q02 귀하의 나이는 어떻게 되십니까? _____ 세
- Q03 귀하가 거주하고 있는 지역은 어디입니까?
- Q04 귀하는 학교를 어디까지 다니셨습니까?
- Q05 귀하께서 종사하고 계신 직업은 무엇입니까?
- 서울특별시
 - 충청남도
 - 무학
 - 서학/한학
 - 초등학교
 - 중학교
 - 고등학교
 - 2/3년제 대학교
 - 4년제 대학교
 - 대학원 이상
 - 관리자
 - 전문가 및 관련종사자
 - 사무종사자
 - 판매종사자
 - 농업/임업/어업
 - 기능원 및 관련기능종사자
 - 장치, 기계조작 및 조립종사자
 - 단순노무종사자
 - 군인
 - 학생/재수생
 - 주부
 - 무직
 - 기타

항목 2. 감염병 대응에 대한 집단효능감 측정

	전혀 그렇지않다	그렇지 않다	그렇다	매우 그렇다
Q01	나는 우리 시도 또는 시군구의 구성원(일원)이라는 생각이 든다.			
Q02	감염병 발생 시, 시도 또는 시군구의 지시 시항에 따를 것이다.			
Q03	우리 지방자치단체 주민들은 이웃 중에서 감염병 환자가 생겼을 때 이를 수습하는 과정에 자원하여 도움을 줄 것이다.			
Q04	우리 집 근처에 있는 병원이 감염병 지정 병원이 된다고 하면 동의할 수 있다.			
Q05	감염병으로 치료가 필요한 환자가 있다면 보건소 또는 의료기관에 연락을 해준다.			
Q06	우리 시도 또는 시군구에서는 감염병이 발생하는 것을 예방하기 위해 체계적으로 대응한다.			
Q07	우리 시도 또는 시군구에서는 감염병 발생 시, 신속한 격리를 통해 확산을 방지한다.			
Q08	우리 시도 또는 시군구에서는 감염병을 대응하기 위해 전문가들이 적극적으로 참여한다.			
Q09	감염병과 관련하여 궁금한 점이 있을 때 담당자들이 즉각적으로 응답해준다.			
Q10	신문이나 뉴스에서 보도되는 내용은 믿을만하다/사실이다.			
Q11	우리 시도 또는 시군구 담당자들은 감염병 대응을 위하여 시도 내 다른 기관 및 민간단체들과 적절히 협력하고 있다. (예시 : 소방서, 학교, 의사단체, 자원봉사 단체 등)			
Q12	우리 시도 또는 시군구 담당자들은 감염병 대응을 위하여 중앙정부 및 다른 시도와 적절히 협력하고 있다.			
Q13	우리 시도 또는 시군구에서는 감염병 대응을 위하여 공공집회 연기, 휴교 등의 조치가 적절히 행해진다.			

- Q14 우리 시도 또는 시군구에서는 감염병 발생 및 확산을 막기 위해 공항이나 항만에서 입·출국자에 대한 검역 및 방역을 적절히 시행한다.
- Q15 감염병 유행 시, 우리 시도와 타 시도 간에 이동하는 차량 소독이 적절히 이루어진다.
- Q16 평소에 학교나 공공장소에서 주기적으로 소독을 시행한다.
- Q17 우리 시도 또는 시군구에서는 감염병 대응을 위해 감염병 발생 현황에 대한 적절한 감시 및 보고가 이루어진다.
- Q18 우리 시도 또는 시군구에서는 감염병 대응을 위해 의심환자 및 환자 발생 시, 원인 규명을 위한 역학조사가 실시된다.
- Q19 만약 내가 감염병에 걸린다면, 나는 우리 시도 또는 시군구 내 의료기관에서 적절한 치료를 받을 수 있다.
- Q20 우리 시도 또는 시군구에서 제공하는 감염병 교육 또는 홍보를 받은 적이 있다.
(예시: 손씻기, 에이즈, 식중독 예방교육 등)
- Q21 우리 시도 또는 시군구에서 제공하는 감염병 교육 또는 홍보에 만족한다.
- Q22 우리 시도 또는 시군구는 감염병 관련 정보나 자료를 신속하고 적절하게 배부한다.
(예시: 감염병 대응 요령 및 감염병에 대한 정보 등)
- Q23 우리 시도 또는 시군구에서 제공하는 감염병 관련 리플렛이나 포스터 등은 이해하기 쉽게 설명되어 있다.
- Q24 우리 시도 또는 시군구에서 제공한 감염병 관련 정보나 자료가 도움이 된다.
- Q25 우리 시도 또는 시군구는 다양한 방법으로 감염병에 대한 정보를 지역 주민에게 전달하려고 힘쓴다.
(예시: 포스터, 소책자, 리플렛, 인터넷 홈페이지 등)
-

항목 3. 감염병 지식 측정

	그렇다	그렇지 않다
Q01	인플루엔자 백신은 인플루엔자를 옮기지 않는다.	
Q02	12월 또는 그 이후에 인플루엔자 백신을 맞기에 늦지 않다.	
Q03	매년 인플루엔자 예방접종을 맞아야 한다.	
Q04	인플루엔자는 일반적으로 기침 또는 재채기로 퍼진다.	
Q05	인플루엔자는 심각한 질병이 아니다.	
Q06	인플루엔자 증상이 나타나기 이전에 다른 사람에게 옮길 수 있다.	
Q07	인플루엔자의 치료법은 없다.	
Q08	증상이 없는 사람이 에볼라를 옮길 수 있습니까?	
Q09	에볼라는 공기 중으로 감염됩니까?	
Q10	에볼라에 걸린 사람은 생존이 가능합니까?	
Q11	모기가 에볼라를 전파시킬 수 있습니까?	
Q12	에볼라 바이러스는 물에서는 생존 가능하고 물과 강을 오염시킬 수 있습니까?	
Q13	<input type="checkbox"/> 7일	<input type="checkbox"/> 14일 <input type="checkbox"/> 21일
Q14	에볼라 백신을 구할 수 있습니까?	
Q15	에볼라로 사망한 사체로 다른 사람을 감염시킬 수 있습니까?	

항목 4. 감염병 예방행동 측정

	항상 그렇다	가끔 그렇다	거의 그렇지않다
Q01			
Q02			
Q03			
Q04			
Q05			
Q06			
Q07			

[Appendix 2 - Modified Questionnaire]

항목 2. 감염병 대응에 대한 집단효능감 측정

	전혀 그렇지않다	그렇지 않다	그렇다	매우 그렇다	모르겠다
Q01	나는 우리 시도 또는 시군구의 구성원(일원)이라는 생각이 든다.				
Q02	감염병 발생 시, 시도 또는 시군구의 지시 시항에 따를 것이다.				
Q03	우리 지방자치단체 주민들은 이웃 중에서 감염병 환자가 생겼을 때 이를 수습하는 과정에 자 원하여 도움을 줄 것이다.				
Q04	우리 집 근처에 있는 병원이 감염병 지정 병원이 된다고 하면 동의할 수 있다.				
Q05	감염병으로 치료가 필요한 환자가 있다면 보건소 또는 의료기관에 연락을 해준다.				
Q06	우리 시도 또는 시군구에서는 감염병이 발생하는 것을 예방하기 위해 체계적으로 대응한다.				
Q07	우리 시도 또는 시군구에서는 감염병 발생 시, 신속한 격리를 통해 확산을 방지한다.				
Q08	우리 시도 또는 시군구에서는 감염병을 대응하기 위해 전문가들이 적극적으로 참여한다.				
Q09	감염병과 관련하여 궁금한 점이 있을 때 담당자들이 즉각적으로 응답해준다.				
Q10	신문이나 뉴스에서 보도되는 내용은 믿을만하다/사실이다.				
Q11	우리 시도 또는 시군구 담당자들은 감염병 대응을 위하여 시도 내 다른 기관 및 민간단체들과 적절히 협력하고 있다. (예시 : 소방서, 학교, 의사단체, 자원봉사 단체 등)				
Q12	우리 시도 또는 시군구 담당자들은 감염병 대응을 위하여 중앙정부 및 다른 시도와 적절히 협 력하고 있다.				
Q13	우리 시도 또는 시군구에서는 감염병 대응을 위하여 공공집회 연기, 휴교 등의 조치가 적절히 행해진다.				

- Q14 감염병 유행 시, 우리 시도와 타 시도 간에 이동하는 차량 소독이 적절히 이루어진다.
- Q15 평소에 학교나 공공장소에서 주기적으로 소독을 시행한다.
- Q16 우리 시도 또는 시군구에서는 감염병 대응을 위해 감염병 발생 현황에 대한 적절한 감시 및 보고가 이루어진다.
- Q17 우리 시도 또는 시군구에서는 감염병 대응을 위해 의심환자 및 환자 발생 시, 원인 규명을 위한 역학조사가 실시된다.
- Q18 만약 내가 감염병에 걸린다면, 나는 우리 시도 또는 시군구 내 의료기관에서 적절한 치료를 받을 수 있다.
- Q19 우리 시도 또는 시군구에서 제공하는 감염병 교육 또는 홍보를 받은 적이 있다.
(예시: 손씻기, 에이즈, 식중독 예방교육 등)
- Q20 우리 시도 또는 시군구는 감염병 관련 정보나 자료를 신속하고 적절하게 배부한다.
(예시: 감염병 대응 요령 및 감염병에 대한 정보 등)
- Q21 우리 시도 또는 시군구에서 제공하는 감염병 관련 리플렛이나 포스터 등은 이해하기 쉽게 설명되어 있다.
- Q22 우리 시도 또는 시군구에서 제공한 감염병 관련 정보나 자료가 도움이 된다.
- Q23 우리 시도 또는 시군구는 다양한 방법으로 감염병에 대한 정보를 지역 주민에게 전달하려고 힘쓴다. (예시: 포스터, 소책자, 리플렛, 인터넷 홈페이지 등)
-

항목 4. 감염병 예방행동 측정

	항상 그렇다	대부분 그렇다	자주 그렇다	가끔 그렇다	거의 그렇지않다
Q01					
Q02					
Q03					
Q04					
Q05					
Q06					
Q07					
Q08					
Q09					
Q10					

[Appendix 3 - English version of Questionnaire]

Domain 1. Questionnaire of demographic characteristics.

- Q01 Your gender? Male Female
- Q02 What is your age? _____ year-old
- Q03 Where do you live? Seoul
 Chung-Nam
 Uneducated
 Village school/Chinese literature
 Elementary school
 Middle school
 High school
 2/3 year college
 4 year college
 Over graduate school
- Q04 What is your final educational level?
- Q05 What is your occupation? Administrator
 Professions
 Clerks
 Merchandiser
 Farming/Forestry/Fishery
 Technician
 Operator/Assembler
 Simple labor worker
 Soldier
 Student/Repeater
 Housewife
 Unemployed
 Etc.
-

Domain 2. Measurement of collective efficacy about infectious disease preparedness

	Strongly disagree	Disagree	Agree	Strongly agree	No idea
Q01	I feel I'm a member(unit) of our city and province of city, district or county.				
Q02	If infectious disease occurs, I would follow the instructions of city, province, or city, district, or county.				
Q03	Our local government residents will voluntarily help in the process of settling when infectious disease patients occurs in neighborhood.				
Q04	I can agree if a hospital nearby my house is designated as a infectious disease hospital.				
Q05	If there's a patient who requires treatment with infectious disease, I contact the health center or the medical institution.				
Q06	Our city or province or city, district, or county systematically respond to prevent infectious disease.				
Q07	Our city or province or city, district, or county prevent spread when infectious disease occurs, through prompt isolation.				
Q08	In our city or province or city, district, or county, experts actively participate in prevention of infectious disease.				
Q09	When there's any curiosity about infectious disease, the personnel related thereto immediately responds.				
Q10	The contents reported in newspaper or TV news are reliable/ true.				
Q11	The personnel of our city or province or city, district, or county are properly cooperating with other institutions and private organizations within other city or province to prevent infectious disease.				
Q12	The personnel of our city or province or city, district, or county are properly cooperating with the central government and other city and province to prevent infectious disease.				
Q13	Our city or province or city, district, or county are properly conducting countermeasure for				

infectious disease, such as postponement of public gathering, close of school, etc.

- Q14 When infectious disease prevails, car sterilization is properly conducted which move between our city or province and other city or province.
- Q15 Usually sterilization is periodically conducted in school or public places.
- Q16 Our city or province or city, district, or county conduct proper monitoring and report on infectious disease outbreak state to prevent infectious disease.
- Q17 Our city or province or city, district, or county conduct epidemiological investigation to search the cause in case of occurrence of suspected case or patient, to prevent infectious disease.
- Q18 If I'm taken with an infectious disease, I can be properly treated at the medical institution within our city or province or city, district, or county.
- Q19 I received education or PR on infectious disease provided by our city or province or city, district, or county.
- Q20 Our city or province or city, district, or county promptly and properly distribute information or material related to infectious disease.
- Q21 Leaflet or poster, etc. related to infectious disease, provided by our city or province or city, district, or county are easy to understand.
- Q22 Information or material related to infectious disease, provided by our city or province or city, district, or county are helpful.
- Q23 Our city or province or city, district, or county exert efforts to deliver information related to infectious disease to regional residents through various methods.
-

Domain 3. Measurement of infectious disease knowledge

		Yes	No
Q01	A flu vaccine can't give you the flu.		
Q02	Getting a flu vaccine in December or later is not too late.		
Q03	People should be vaccinated against that flu each and every year.		
Q04	The flu is typically spread through coughs and/or sneezes.		
Q05	The flu is not a serious illness.		
Q06	You can spread the flu to others before you have symptoms.		
Q07	There is no treatment for flu.		
Q08	Can someone without symptoms spread Ebola?		
Q09	Is Ebola an airborne disease?		
Q10	Can people survive from Ebola?		
Q11	Can mosquitoes spread Ebola?		
Q12	Can the Ebola virus survive in water and contaminate water and rivers?		
Q13	I was in close contact with an Ebola infected person. How long should I check my health for?	<input type="checkbox"/> 7days	<input type="checkbox"/> 14days <input type="checkbox"/> 21days
Q14	Can I get vaccinated for Ebola?		
Q15	Can people who have died from Ebola infect others?		

Domain 4. Measurement of infectious disease preventive behavior

	Always	Almost every time	Often	Occasionally	Almost never
Q01	I cover the mouth with sleeve, tissue, or handkerchief whenever I cough.				
Q02	I cover the mouth with hands when I cough.				
Q03	I wear a mask when I have symptom on respiratory organ such as cough, etc.				
Q04	I preserve food in the refrigerator instead of freezer over 1 month. (except kimchi refrigerator.)				
Q05	Usually I use soap or hand cleaner when I wash my hands.				
Q06	When I eat food, I put it on individual dish separately.				
Q07	When I eat food, I cook or boil it.				
Q08	Usually I boil water to drink.				
Q09	I use enclosed spaces such as PC room, song room, or reading room, etc, where ventilation is not properly done.				
Q10	I stay at the places where many people gather, such as market or restaurant, for a long time (over 3 hours a day).				

SUMMARY IN KOREAN

국문초록

감염병 관련 집단효능감 설문지 개발 및 평가

한수정

보건학과 역학전공

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연구배경 및 목적 : 2009년, 2015년 인플루엔자(H1N1)와 메르스(MERS)가 한국사회를 강타하면서 급속한 환자발생, 사회경제적인 피해 등을 경험하였다. 이처럼 언제 어디서든 발생할 수 있는 감염병에 대응하기 위해서 대응체계와 대책을 신속하게 마련하는 것이 중요한 과제로 떠올랐지만 그에 못지않게 감염병 해결에 중요한 것이 국민(지역사회 구성원)의 호혜성과 지자체에 가지는 신뢰와 믿음이다. 구성원들이 지역사회에 갖는 부정적인 믿음과 스스로가 갖는 신념은 저하는 감염병의 대응을 감소시키는 요인이 될 수 있기 때문에 구성원들의 지역사회에 대한 믿음의 수준을 확인 한 뒤 긍정적으로 변

화시키고 기대를 높이는 위한 노력이 필요하다.

Bandura(1997)는 이러한 행동에 대한 기대와 그 행동을 일으킬 수 있는 자신의 능력에 대한 기대를 자기효능감(self-efficacy)이라고 하였고, 목표에 도달하기 위하여 요구되는 행동을 수립하고, 실행하는 집단의 능력에 대해 집단이 공유하고 있는 믿음을 집단효능감(collective efficacy)라고 하였다. 집단효능감은 개인수준의 효능감과 달리 자신이 속해 있는 집단이 유능하다고 믿는 정도로 정의 될 수 있다. 개인효능감과 집단효능감이 성과 및 유효성 등에 긍정적인 영향을 미친다는 주장이 여러 연구를 통해 끊임없이 제기되고 있으나 이러한 연구들 역시 기업계에서 주로 이루어지고 있으며, 특히 국내에서 감염병 관련 집단효능감을 측정하는 도구가 마련되고 있지 않기 때문에 그와 관련한 연구는 없다. 그리고 집단효능감과 감염병 예방 행동 및 감염병 지식에 관련성 여부에 대한 연구는 미비한 실정이다. 따라서 본 연구의 목적은 감염병과 관련된 지역사회 구성원의 집단효능감을 측정하는 설문지를 개발하고, 개발한 측정도구의 신뢰성과 타당성을 검증하는데 있다.

연구방법 : 국내, 국외 문헌을 참고하여 설문지 초안을 개발하였고 신뢰도 검사를 위해 성인 10명을 대상으로 첫 번째 설문 후 14일 후에 재 설문을 실시하였다. 내용타당도 검증을 위해 총 10명의 보건전문가에게 자문을 구하여 문항의 적합성 여부를 논의하였다. 앞선 신뢰도와 타당도 검사를 바탕으로 설

문지를 수정하였고 수정된 설문지를 가지고 서울 및 충청남도 지역의 만 19세 이상 성인 남녀 250명을 대상으로 예비조사를 시행하였다. 신뢰도 검사를 위해 문항내적 일관성을 Cronbach' α 계수로 확인하였고 구성타당도 검증을 위해 '감염병 대응에 대한 집단효능감 측정설문 문항'의 탐색적 요인분석과 확인적 요인분석을 시행하였다. 준거타당도 검증을 위해서는 집단효능감과 감염병 예방행동 및 지식간의 로지스틱 회귀분석을 시행하였다.

결과 : 감염병에 관련한 집단 효능감 항목에서의 검사-재검사 신뢰도는 0.71-0.95로 높았고 내용타당도를 위한 보건전문가 자문을 통해 본 설문지의 문항이 설문을 함에 있어 적합함을 검증받았다. 예비조사결과를 가지고 시행한 집단효능감 항목에서의 Cronbach' α 계수는 0.64-0.83이었다. 탐색적 요인분석을 통해서 지역사회 서비스, 교육 및 홍보, 소속감 및 대응, 신속함 및 신뢰, 호혜성 5가지 요인으로 나눌 수 있었고 이를 가지고 확인적 요인분석을 시행한 결과 5요인 23문항 집단효능감 설문지는 승인 가능한 수준에서 타당한 것으로 나타났다 (RMR=.41, RMSEA=.59, CFI=.91). 준거타당도 검증을 위한 집단효능감과 감염병 예방행동 및 지식간의 로지스틱 회귀분석 결과 집단효능감 수준과 감염병 지식간은 통계적으로 유의하지 않았으나 집단효능감 수준과 감염병 예방행동은 통계적으로 유의한 연관성 (집단효능감 수준이 1일 때 OR : 4.64, CI : 2.03-10.49 집단효능감 수준이 2일 때 OR : 3.45, CI :

1.60-7.44 집단효능감 수준이 3일 때 OR : 4.70 CI : 1.79-12.31)을 보였다.

결론 : 감염병과 관련한 설문지를 개발함으로써 대상자들의 감염병 지식수준과 예방행동 정도 및 집단효능감을 측정할 수 있었다. 본 연구는 기존에 개발되었던 집단효능감 측정 도구와는 다르게 감염병에 한정된 집단효능감 측정 설문지를 제시하기 위해 시도하였고 그 결과 감염병 관련 집단효능감을 측정하는 신뢰할만한 도구로 제시할 수 있게 되었다. 본 연구에서 개발된 설문지는 신뢰성과 타당성이 확보된 것이므로 국민 전체를 대상으로 조사하여 집단효능감의 수준을 파악하고 이를 가지고 공중보건위기 대응역량 평가를 위한 연구로까지 발전을 시킬 수 있을 것이다.

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주요어 : 감염병, 집단효능감, 설문지 개발, 확인적 요인분석, 탐색적 요인분석

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