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Effects of Women's Empowerment and Media Use on the Maternal Acceptance of Non-Pharmaceutical Interventions

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Non-pharmaceutic interventions (NPIs; handwashing, wearing mask, or maintaining social-distances) used to delay the peak of the epidemic, allowing time for vaccines distribution. We investigated determinants affecting NPIs in terms of maternal health. The datasets came from computer-assisted web survey that was conducted on married women who aged from 20-40 years old and who are living in Seoul, Beijing and Tokyo with underage children (n=1,571). We applied multi-logistic regression analysis after adjusting for

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potential confounders. In Seoul, mothers with high-empowerment are more likely to practice handwashing (95% CI: 1.234-2.097) and more likely to wear masks (95% CI: 1.009-1.542). In Beijing, mothers with high-empowerment are more likely to practice social-distancing (95% CI: 1.040-1.727), handwashing (95% CI: 1.813-3.343), and to wear masks (95% CI: 1.054-1.756). In Tokyo, mothers with high-empowerment are more likely to practice social-distancing (95% CI: 1.214-1.976), handwashing (95% CI: 1.113-1.776), and to wear masks (95% CI: 1.046-1.660). The moderating effect of media use was only partially identified. In Beijing, the more mothers watched TV, the more likely they were to practice social-distancing (95% CI: 1.180-1.969), and more likely to wear a mask (95% CI: 1.183-2.015). We found that women's empowerment is the strongest and most consistent factor determining whether NPIs are accepted. Therefore, in order to cope with Covid-X, health education and media literacy campaigns that enhance women's empowerment from the perspective of maternal health may be necessary.

Key words : Emerging infectious diseases, Non-pharmaceutical intervention, Women's empowerment

Epidemics of emerging respiratory infectious diseases such as H1N1, SARS, MERS (Middle East respiratory syndrome), and COVID-19 remain among the most serious health risks facing the world's population (Chew, Wei, Vasoo, Chua & Sim, 2020). Therefore, non-pharmaceutical interventions (NPIs), i.e., hand washing, wearing a mask, or maintaining proper social distances, can have a significant impact on the course of an

emerging infectious diseases epidemic (also known as an EID epidemic). NPIs include all measures or actions, other than the use of vaccines or medicines, which can be implemented to slow the spread of illnesses such as influenza in a population. In the early stage of EID epidemics and pandemics, NPIs are often the most accessible interventions owing to the time it takes to make specific vaccines available and because most locations do not have large stockpiles of antiviral drugs. Therefore, these mitigation measures will play a major role in reducing transmission in community settings (Center for Disease Control and Prevention [CDC], 2019; Noh et al., 2020; Ayouni et al., 2021).

Once an epidemic has started, NPIs may also be used to delay the peak of the epidemic, again allowing time for vaccines to be distributed or for health care providers to better prepare for a surge in cases (Smith, Keogh-Brown, Barnett & Tait, 2009). By reducing transmission in the community, the epidemic may spread out over a longer period, with a reduced epidemic peak. This can be particularly important if the health system has limited resources or a limited capacity (e.g. in terms of hospital beds and ventilators). Also, overall morbidity and mortality can be reduced even if the total number of infections across the epidemic is not reduced (Hsieh, Lin, Wang, Pauleen & Chen, 2020). There are a number of empirical studies showing that interventions such as social distancing (McGrail, Dai, McAndrews & Kalluri, 2020), hand washing (Boyce & Pittet, 2002; Ma et al., 2020), and mask wearing (Doung-Ngern et al., 2020; Karaivanov et al., 2020) are effective in reducing the total number of infections and reducing the serious patient,

hospitalization rate, and mortality rate. However, the proportion of people practicing preventive behavior is low, and little research has been done on the determinants of NPIs.

In terms of maternal health, women's empowerment is an important concept, referring to the ability of women who are strategically denied opportunities in life to make independent choices (Kabeer, 1999; Alkire, 2005; Malhotra & Schuler, 2002). Empowerment of women has been established as an important indicator of national growth since the emergence of neoliberal ideology in the 2000s (Sharma, 2008). Women's empowerment provides autonomy of behavior in situations controlled or restricted by the current status of women meaning that women's empowerment is a collective concept in which women recognize women's problems by themselves and create conditions that facilitate the solving of these problems (Narayan-Parker, 2002, 2005; Ibrahim & Alkire, 2007). In particular, East Asian women in the Confucian culture have experienced discrimination in various aspects such as education, politics, labor market, and use of health services in a male-centered social structure for a long time, but there have been few studies on maternal health and communication (Alesina & Giuliano, 2015; Santoso et al., 2019; Vu & Yamada, 2020).

Empowerment of women affects their health and that of their children and improves maternal health services (Mehra, 1997; Duflo, 2012; Kawaguchi, 2014). In addition, empowered mothers are healthy and are more likely to give birth to their children in a safe place and to immunize their children (Ahuru, 2019). These results suggest that

women's empowerment is a major determinant of maternal health. On the other hand, women with high empowerment actively use the media to collect health information (Sundar & Nass, 2001; Kim, 2010; Park & Sohn, 2001; Yoo & Chung, 2016). Adequate use of the media has a net function of increasing relevant health knowledge and inducing proper health practices or vaccination (Woo, 2007; Yoo, Park, & Na, 2010; Ho, Peh, & Soh, 2013; Lin & Lagoe, 2013; Rubin, Potts, & Michie, 2010). However, little is known about how women's empowerment and media use are associated with the acceptance of NPIs in terms of maternal health. Therefore, we investigated determinants affecting non-pharmaceutic interventions in terms of maternal health. The research questions (RQ) of this study are as follows:

RQ 1: Does women's empowerment affect maternal practices of NPI?

RQ 2: Is this relationship moderated by women's media use and their level of knowledge about emerging infectious diseases?

1. Methods

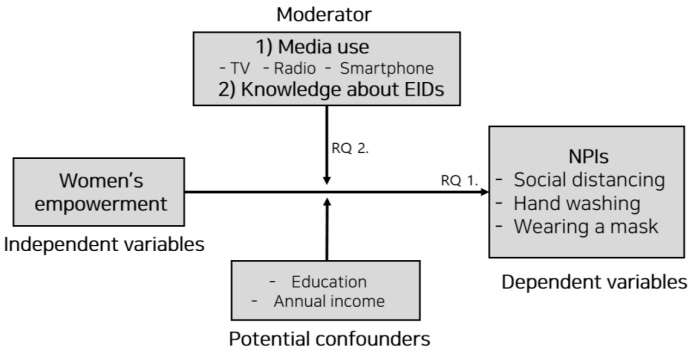
1) Sample

As part of a large-scale international comparison project supported by the National Research Foundation of Korea in 2016, this study compared the demographic health survey (DHS) data from eleven least-developed countries in Southeast Asia and data behaviors from three East Asian

countries (Korea, China, and Japan) in terms of maternal and child health. The dataset came from a survey of respondents drawn from a nationally representative online sample of women in East Asia who participated in the Hankook Research Master Sample Panel (Seoul) and the Lightspeed Global Market Insite, Inc. Sample Panel (Beijing and Tokyo). We conducted computer-assisted web interviews with married women in their 20s-40s holding South Korean, Chinese, or Japanese nationality. The final sample consisted of 1571 mothers who had underage children (574 Korean; 566 Chinese; 431 Japanese). Respondents received a nominal cash incentive (USD $2.00) to participate when they completed the surveys. We excluded respondents who did not answer survey questions on key analytical variables using a pairwise method.

2) Study Design

We designed a cross-sectional study to examine determinants affecting



〔Figure 1〕 A framework of this study

non-pharmaceutic interventions in terms of maternal health. In particular, we analyzed how women's empowerment and media use associated with the acceptance of NPIs (Figure 1).

3) Measures

(1) Dependent variables

Dependent variable is maternal acceptance of NPI (CDC, 2019). We asked respondents if they practiced disease prevention rules such as 'to refrain from going out during an epidemic outbreak', 'washing hands or using hand sanitizer', and 'wearing a mask' in their daily lives. The response items consisted of a five-point ordinal scale: The responses were grouped into five categories: (1) Never, (2) Rarely, (3) Sometimes, (4) Very often, and (5) Always. Respondents reporting "very often" or "always" for NPI acceptance were coded as 1 and were considered as the high-NPI group, while those reporting "never," "rarely" or "sometimes" acceptance were coded as 0 and were considered as the low-NPI group. Reclassification into binomial variables was performed based on the distribution of values and the results of regression diagnosis.

(2) Independent variables

Women's empowerment was measured based on previous studies to examine respondents' leading capacity in life (Jung, 2018). In this study, the following tools developed by DHS were used to measure this item:

‘I can freely make decisions that are important in my life’, ‘I have advantages as a woman’, ‘I confidently express my appearance as a woman’, ‘I make efforts to secure time to manage my health’, ‘I steadily do exercise that is suitable for me.’ The responses were grouped into five categories: (1) Strongly agree, (2) Disagree, (3) Undecided, (4) Agree, and (5) Strongly agree. These questions were put into the regression model after the factor analysis, and explained 62.02% of the total variance (Cronbach’s alpha=0.836).

(3) Moderator

Regarding media use, we measured how much respondents use TV, radio, and smartphones on average per day (Lin, Jung, McCloud, & Viswanath, 2014). We asked the question ‘How much do you use each of the media below the average per day’ and, ‘No use, less than 10 minutes, more than 10 minutes and less than 30 minutes, more than 30 minutes and less than 60 minutes, more than 1 hour and 2 hours’. Responses were received on an 8-point scale consisting of ‘less than 2 hours and less than 3 hours, 3 hours or more and less than 5 hours, and 5 hours or more’. For analysis, we classified the answers into ‘not used at all’, ‘less than 1 hour’, ‘more than 1 hour and less than 2 hours’, and ‘more than 2 hours’. Knowledge related to new infectious diseases measured respondents' EID awareness. We asked respondents, ‘Have you been continuously interested in the recent progress of the pandemic of the emerging infectious disease through news, etc.?’ and ‘Do you think that a pandemic of an emerging infectious disease is

highly probable to occur in the future in our country?' and received a response on the 5-points Likert scale. We summed the scores of the two items and used them as a continuous variable. These two questions were put into the regression model after the factor analysis, and explained 73.48% of the total variance (Cronbach's alpha=0.639).

(4) Potential confounders

It has been reported that child and maternal health are related to demographic characteristics (Arba, Darebo & Koyira, 2016). Accordingly, the age, socio-economic position (i.e., educational attainment and household income), and NPI behaviors of the mothers were considered as covariates in this study. Educational attainment levels were grouped into the following categories: high school/associate degree or less, bachelor's degree, and graduate school or higher. Annual household income levels were also grouped, as follows: below $16000, $16001-$33000, $33001-$49000, $49001-$66000, $66001 or more in US dollars.

(5) Statistical analyses

First, we described the general characteristics of the sample for each country in East Asia. Second, we conducted a cross-tabulation analysis to find out the associations between the respondents' social characteristics and whether or not to accept NPI. Third, we undertook a principal component analysis to extract the maternal empowerment factors. Fourth, we conducted a hierarchical multivariable regression analysis to examine the associations between the maternal empowerment, media use, EID

knowledge, and the acceptance of NPIs after adjustments for potential confounders. Finally, we analyzed the moderating effect of media use and knowledge related to emerging infectious diseases through the bootstrapping method. We performed all statistical analyses using SPSS v. 23.0.

(6) Ethics statement

Approval for the study was granted by the Policy Institutional Review Board of the Korea National Institute for Bioethics (P01-201611-21-009). All participants provided written informed consent to participate. During the investigation process, we collected no information that could distinguish individual participants.

2. Results

1) Descriptive statistics of the sample

The socio-economic characteristics of the sample are shown in Table 1. As for the age of respondents, the ratio of '31-35 years old' was the highest at 35.9%, and in terms of education level, the ratio of 'bachelor's degree' was the highest at 78.2%. In the case of annual household income, the ratio of '$33001-$49000' was found to be the highest at 27.1%. In the case of TV, the average of 'more than 2 hours' per day was the most at 35.6%, and radio use was the most at

〈Table 1〉 General characteristics of the sample (n=1571)

Type			n	%
Socio-economic characteristics	Age	21-25	37	2.4
		26-30	443	28.2
		31-35	564	35.9
		36-40	527	33.5
	Education	High school or less	254	16.2
		Bachelor's degree	1228	78.2
		Graduate school or higher	89	5.7
	Annual income (KRW, won)	Below $16000	55	3.5
		$16001-$33000	371	23.6
		$33001-$49000	425	27.1
		$49001-$66000	310	19.7
		$66001 or more	410	26.1
Media use	TV	Not at all	46	2.9
		Less than 1 hour	504	32.1
		Less than 2 hours	462	29.4
		More than 2 hours	559	35.6
	Radio	Not at all	768	48.9
		Less than 1 hour	610	38.8
		Less than 2 hours	101	6.4
		More than 2 hours	92	5.9
	Smartphone	Not at all	37	2.4
		Less than 1 hour	542	34.5
		Less than 2 hours	456	29.0
		More than 2 hours	536	34.1
Acceptance of non-pharmaceutic interventions	Social distancing	Low group	722	46.0
		High group	849	54.0
	Hand washing	Low group	416	26.5
		High group	1155	73.5
	Wearing a mask	Low group	796	50.7
		High group	775	49.3
Total			1571	100.0

Note: Respondents reporting "very often" or "always" for NPI acceptance were coded as 1 and were considered as the high group, while those reporting "never," "rarely" or "sometimes" acceptance were coded as 0 and were considered as the low group.

48.9% ‘not at all’. In terms of smartphones, ‘less than 1 hour’ was the most at 34.5%. Regarding whether to accept the NPI, 54.0% of respondents practiced “social distancing”, 73.5% of “washing hands”, and 49.3% of “wearing a mask”.

2) Associations between the respondents′ social characteristics and the acceptance of NPI

Table 2 shows the results for the cross-tabulation analysis of the respondents' social characteristics and the acceptance of NPI. Regarding socio-demographic characteristics, the older respondents (χ^2=7.970, $p<0.05$) or the higher their educational level (χ^2=6.202, $p<0.05$), the more they wore masks than those who did not. Regarding media use, respondents who watch TV a lot were found to practice social distancing (χ^2=10.889, $p<0.05$) and wear masks well (χ^2=10.744, $p<0.05$). In addition, the more respondents used smartphones, the better they practiced social distancing (χ^2=18.074, $p<0.001$), hand washing (χ^2=28.646, $p<0.001$), and wearing a mask (χ^2=9.707, $p<0.05$).

3) Determinants of maternal acceptance of non-pharmaceutical interventions

Regarding RQ 1, table 3 presents the results of a hierarchical multivariable regression of effects of women’s empowerment on maternal acceptance of non-pharmaceutical interventions for each East Asian

〈Table 2〉 Results of cross-tabulation analysis

Type			Social-distancing		Handwashing		Wearing a mask	
			Low group	High group	Low group	High group	Low group	High group
Socio-economic characteristics	Age	21 - 25	17(2.4%)	20(2.4%)	9(2.2%)	28(2.4%)	17(2.1%)	20(2.6%)
		26 - 30	208(28.8%)	235(27.7%)	107(25.7%)	336(29.1%)	201(25.3%)	242(31.2%)
		31 - 35	258(35.7%)	306(36%)	138(33.2%)	426(36.9%)	294(36.9%)	270(34.8%)
		36 - 40	239(33.1%)	288(33.9%)	162(38.9%)	365(31.6%)	284(35.7%)	243(31.4%)
		Total	722(100.0%)	849(100.0%)	416(100.0%)	1155(100.0%)	796(100.0%)	775(100.0%)
			χ^2 = .265		χ^2 = 7.405		χ^2 = 7.970*	
	Education	High school or less	127(17.6%)	127(15%)	87(20.9%)	167(14.5%)	145(18.2%)	109(14.1%)
		Bachelor's degree	555(76.9%)	673(79.3%)	307(73.8%)	921(79.7%)	602(75.6%)	626(80.8%)
		Graduate school or higher	40(5.5%)	49(5.8%)	22(5.3%)	67(5.8%)	49(6.2%)	40(5.2%)
		Total	722(100.0%)	849(100.0%)	416(100.0%)	1155(100.0%)	796(100.0%)	775(100.0%)
			χ^2 = 1.995		χ^2 = 9.404		χ^2 = 6.202*	
	Annual income (KRW, won)	Below $16000	22(3.0%)	33(3.9%)	12(2.9%)	43(3.7%)	22(2.8%)	33(4.3%)
		$16001-$33000	171(23.7%)	200(23.6%)	81(19.5%)	290(25.1%)	193(24.2%)	178(23.0%)
		$33001-$49000	197(27.3%)	228(26.9%)	110(26.4%)	315(27.3%)	236(29.6%)	189(24.4%)
		$49001-$66000	140(19.7%)	170(20.0%)	79(19.0%)	231(20.0%)	149(18.7%)	161(20.8%)
		$66001 or more	192(26.6%)	218(25.7%)	134(32.2%)	276(23.9%)	196(24.6%)	214(27.6%)
		Total	722(100.0%)	849(100.0%)	416(100.0%)	1155(100.0%)	795(100.0%)	775(100.0%)
			χ^2 = 1.020		χ^2 = 13.069*		χ^2 = 8.890	
Media use	TV	Not at all	26(3.6%)	20(2.4%)	19(4.6%)	27(2.3%)	29(3.6%)	17(2.2%)
		Less than 1 hour	253(35.0%)	251(29.6%)	139(33.4%)	365(31.6%)	278(34.9%)	226(29.2%)
		Less than 2 hours	188(26.0%)	274(32.3%)	112(26.9%)	350(30.3%)	228(28.6%)	234(30.2%)
		More than 2 hours	255(35.3%)	304(35.8%)	146(35.1%)	413(35.8%)	261(32.8%)	298(38.5%)
		Total	722(100.0%)	849(100.0%)	416(100.0%)	1155(100.0%)	796(100.0%)	775(100.0%)
			χ^2 = 10.889*		χ^2 = 6.731		χ^2 = 10.744*	
	Radio	Not at all	389(53.9%)	379(44.6%)	229(55%)	539(46.7%)	412(51.8%)	356(45.9%)
		Less than 1 hour	260(36.0%)	350(41.2%)	139(33.4%)	471(40.8%)	296(37.2%)	314(40.5%)
		Less than 2 hours	37(5.1%)	64(7.5%)	22(5.3%)	79(6.8%)	43(5.4%)	58(7.5%)
		More than 2 hours	36(5.0%)	56(6.6%)	26(6.3%)	66(5.7%)	45(5.7%)	47(6.1%)
		Total	722(100.0%)	849(100.0%)	416(100.0%)	1155(100.0%)	796(100.0%)	775(100.0%)
			χ^2 = 14.805**		χ^2 = 9.963*		χ^2 = 6.606	
	Smartphone	Not at all	23(3.2%)	14(1.6%)	16(3.8%)	21(1.8%)	18(2.3%)	19(2.5%)
		Less than 1 hour	281(38.9%)	261(30.7%)	181(43.5%)	361(31.3%)	300(37.7%)	242(31.2%)
		Less than 2 hours	199(27.6%)	257(30.3%)	103(24.8%)	353(30.6%)	232(29.1%)	224(28.9%)
		More than 2 hours	219(30.3%)	317(37.3%)	116(27.9%)	420(36.4%)	246(30.9%)	290(37.4%)
		Total	722(100.0%)	849(100.0%)	416(100.0%)	1155(100.0%)	796(100.0%)	775(100.0%)
			χ^2 = 18.074***		χ^2 = 28.646***		χ^2 = 9.707*	
Total			1571 (100.0%)		1571 (100.0%)		1571 (100.0%)	

*: p< .05, **: p< .01, ***: p< .001

country. In Seoul, mothers with high EIDs knowledge are 1.623 times more likely to practice social distancing (95% CI: 1.338-1.970), 1.747 times more likely to practice hand washing (95% CI: 1.376-2.216), and 1.436 times more likely to wear masks (95% CI: 1.181-1.746). In addition, mothers with high empowerment are 1.608 times more likely to practice hand washing (95% CI: 1.234-2.097) and 1.247 times more likely to wear masks (95% CI: 1.009-1.542) after adjusting potential confounders.

In Beijing, mothers who watch TV a lot were 1.524 times more likely to practice social distancing (95% CI: 1.180-1.969) and 1.544 times more likely to wear masks (95% CI: 1.183-2.015). In addition, mothers with high EIDs knowledge are 1.480 times more likely to wear masks (95% CI: 1.173-1.867). Besides, mothers with high empowerment are 1.340 times more likely to practice social distancing (95% CI: 1.040-1.727), 2.462 times more likely to practice handwashing (95% CI: 1.813-3.343), and 1.360 times more likely to wear masks (95% CI: 1.054-1.756) after adjusting potential confounders.

In Tokyo, mothers with high EIDs knowledge are 1.320 times more likely to practice social distancing (95% CI: 1.059-1.644), 1.316 times more likely to practice hand washing (95% CI: 1.067-1.623), and 1.442 times more likely to wear masks (95% CI: 1.164-1.787). In addition, mothers with high empowerment are 1.549 times more likely to practice social distancing (95% CI: 1.214-1.976), 1.406 times more likely to practice handwashing (95% CI: 1.113-1.776), and 1.318 times more likely to wear masks (95% CI: 1.046-1.660).

〈Table 3〉 Results of logistic regression analysis on the determinants of maternal acceptance of non-pharmaceutical interventions

Nationality	Variables		Social distancing		Hand washing		Wearing a mask		-2LL (Nagelkerke R^2)
			OR	95% CI	OR	95% CI	OR	95% CI	
Seoul	Socio-economic characteristics	Education	1.006	.689-1.470	1.206	.748-1.944	1.568*	1.057-2.326	634.414 (.091)
		Annual income	.871	.735-1.032	.949	.764-1.179	.809*	.683-.957	
	Media use	TV	.959	.776-1.186	1.019	.779-1.333	1.216	.982-1.507	
		Radio	.917	.756-1.113	.830	.656-1.051	1.092	.899-1.326	
		Smartphone	1.145	.922-1.422	1.007	.765-1.325	1.104	.888-1.372	
	Knowledge about EIDs		1.623***	1.338-1.970	1.747***	1.376-2.216	1.436***	1.181-1.746	
	Women's empowerment		1.202	.975-1.480	1.608***	1.234-2.097	1.247*	1.009-1.542	
Beijing	Socio-economic characteristics	Education	.757	.411-1.395	1.814	.886-3.713	1.952*	1.029-3.704	647.796 (.138)
		Annual income	1.450***	1.233-1.705	.858	.707-1.043	1.058	.899-1.244	
	Media use	TV	1.524**	1.180-1.969	1.186	.867-1.621	1.544**	1.183-2.015	
		Radio	.931	.703-1.231	.854	.609-1.199	.968	.724-1.295	
		Smartphone	1.032	.814-1.309	1.181	.890-1.568	1.129	.886-1.437	
	Knowledge about EIDs		1.119	.896-1.399	1.207	.921-1.583	1.480**	1.173-1.867	
	Women's empowerment		1.340*	1.040-1.727	2.462***	1.813-3.343	1.360*	1.054-1.756	
Tokyo	Socio-economic characteristics	Education	.901	.612-1.325	.869	.599-1.261	.729	.500-1.061	560.199 (.072)
		Annual income	.862	.706-1.051	.921	.759-1.117	1.032	.851-1.251	
	Media use	TV	.964	.763-1.218	1.061	.848-1.327	1.182	.944-1.480	
		Radio	1.057	.774-1.445	.749	.550-1.022	1.012	.743-1.378	
		Smartphone	.910	.715-1.157	1.099	.872-1.385	.872	.692-1.099	
	Knowledge about EIDs		1.320*	1.059-1.644	1.316*	1.067-1.623	1.442**	1.164-1.787	
	Women's empowerment		1.549***	1.214-1.976	1.406**	1.113-1.776	1.318*	1.046-1.660	

OR: odds ratio; CI: confidence interval
*p<0.05, **p<0.01, ***p<0.001

4) Moderating effect of media use and knowledge about EIDs

Regarding RQ 2, we performed bootstrapping through the SPSS Process Macro to confirm the moderating effect of media use and knowledge related to emerging infectious diseases between women's empowerment and NPI practices. The results are shown in Table 4

〈Table 4〉 Moderating effect of media use and knowledge about EIDs by bootstrapping

		Pathway	Effect	Boot SE	95% CI	
					LLCI	ULCI
Social distancing	Direct effect	Women's empowerment → Social distancing	.2782	.0548	.1708	.3856
	Indirect effect	Women's empowerment → Media use → Social distancing	.0206	.0095	.0038	.0409
		Women's empowerment → Knowledge about EIDs → Social distancing	.0272	.0122	.0045	.0526
		Women's empowerment → Media use → Knowledge about EIDs → Social distancing	.0130	.0032	.0075	.0200
Hand washing	Direct effect	Women's empowerment → Hand washing	.4869	.0636	.3623	.6115
	Indirect effect	Women's empowerment → Media use → Hand washing	.0131	.0108	-.0066	.0359
		Women's empowerment → Knowledge about EIDs → Hand washing	.0289	.0128	.0043	.0551
		Women's empowerment → Media use → Knowledge about EIDs → Hand washing	.0138	.0035	.0079	.0213
Wearing a mask	Direct effect	Women's empowerment → Wearing a mask	.3681	.0548	.2608	.4754
	Indirect effect	Women's empowerment → Media use → Wearing a mask	.0208	.0092	.0044	.0405
		Women's empowerment → Knowledge about EIDs → Wearing a mask	.0103	.0058	.0013	.0237
		Women's empowerment → Media use → Knowledge about EIDs → Wearing a mask	.0049	.0019	.0016	.0092

Boot LLCI : Lower limit 95% CI of the Bootstrapping indirect effect
Boot ULCI : Upper limit 95% CI of the Bootstrapping indirect effect

below. When women's empowerment and parameters such as media use and knowledge related to new infectious diseases were simultaneously input, the practice of social distancing, hand washing, and mask wearing did not all count as 0. This means that the moderating effects of media use and knowledge related to emerging infectious diseases are each statistically significant. At the same time, the moderating effect from women's empowerment to media use and knowledge related to emerging infectious diseases to NPI was also significant. Thus, we found that women's empowerment has a direct effect on maternal NPI practice, and also has an indirect effect through media use and knowledge related to emerging infectious diseases.

3. Discussion

In the research on health promotion, numerous studies have investigated the importance of maternity in family health care (Kawaguchi, 2014; Sohn, Lin & Jung, 2018; Sohn & Jung, 2020). However, few have systematically identified the characteristics of maternity in particular and which areas have health promotion or disease prevention effects. In addition, little is known about whether the role of maternity is important when demographic characteristics or social contexts are controlled. During the Covid-19 pandemic, we have experienced how important NPIs are in suppressing the spread of infectious diseases. However, akin to the issue of quitting smoking or abstaining from

alcohol, not everyone adheres to health practices such as NPIs. Therefore, the role of maternity is very important at the family level (Jung, 2018). Mothers are the most important reference group for children and significant others. Thus, children see and learn from their mother's actions, and her husband also becomes in tune with them. There are various empirical studies in this regard (Vikram & Vanneman, 2020). Examples include tooth brushing by the mother as a preventive factor and smoking by the mother as a risk factor (Sun, Zhang & Zhou, 2017; Mund, Louwen, Klingelhoefer & Gerber, 2013).

This study identified the determinants of the maternal acceptance of NPIs under the premise that maternity can play a special role in increasing the acceptance rate of NPIs in the era of new infectious diseases. We examined various factors that reflect maternal characteristics under the analytical framework results showing that media use increases knowledge about infectious diseases and eventually leads to NPI acceptance. As a result, we found that women's empowerment is a significant and consistent determinant that increases the likelihood of practicing hand washing, wearing a mask, and social distancing. This result is gained after controlling for respondents' socioeconomic characteristics. Even with knowledge of new infectious diseases, the possibility of accepting NPIs was very high. Hence, high maternal empowerment leads to the seeking of relevant knowledge and, as a result, the likelihood of accepting NPIs.

In terms of media use, we found that TV, radio, and smart phone had a partial influence on NPI practices. This means that, in the case of

a new infectious disease outbreak, the public health authorities of each country provided information on the status of infectious disease outbreaks, the effects of NPIs, and methods of implementation through news, which had a positive effect on respondents' NPI practices. In addition, media use and knowledge related to emerging infectious diseases were found to moderate the relationship between women's competency and NPI practice. It can be said that media use and knowledge related to emerging infectious diseases reinforce the positive influence of women's empowerment on NPI practices. This result is consistent with previous studies that media use and health-related knowledge influence disease prevention behavior (Jung, Lin, & Viswanath, 2013). Therefore, we found that strengthening women's overall empowerment, including decision-making ability, had an important effect on health promotion of mothers and children, and media use and knowledge level of emerging infectious diseases moderate these effects (Koski, Stephenson & Koenig, 2011).

This study has several limitations. First, the causal relationship for cross-sectional research must be confirmed through longitudinal studies in the future. Second, although the three East Asian countries are geographically close and share Confucian culture, each country has a different cultural background, so we must be careful when generalizing the results. Third, we used data collected immoderately after the MERS outbreak in East Asia for the analysis. Thus, people's perceptions and attitudes toward NPIs may have changed over the course of Covid-19. Fourth, the acceptance of NPIs is affected not only by individual

characteristics but also by social institutional factors. During the Covid-19 pandemic, given that the government enforced social distancing and fined people for not wearing masks, it is necessary to apply a multilevel model in future studies. Fifth, the media factors used in this study are limited in understanding the quality level of health information contained in the media, so follow-up studies need be conducted in consideration of the information environment to which people who use media are exposed.

This study revealed that empowerment is a consistently more important determinant than media use in deciding whether or not to accept NPIs by mothers. Unlike self-efficacy, women's empowerment is based on resource control and on her decision-making authority. Therefore, in order to increase maternal acceptance of NPIs, media campaigns alone are not enough, and women's empowerment need to be enhanced just as media literacy is reinforced. In addition, it is necessary to determine whether the importance of women's empowerment in East Asian countries is related to Confucianism.

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Effects of Women's Empowerment and Media Use on
the Maternal Acceptance of Non-Pharmaceutical Interventions

임파워먼트와 매체 이용이 모성의 비약물적 중재 수용에 미치는 영향

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비약물적 중재(NPI; 마스크 착용, 손 씻기, 사회적 거리두기 등)는 신종감염병 전파를 지연시키고 백신보급까지 시간을 벌어주는 방법이다. 본 연구는 모성보건의 측면에서 NPI에 영향을 미치는 결정요인을 분석하였다. 자료는 미성년 자녀를 둔 20~40세 한, 중, 일 기혼여성이 컴퓨터 웹 설문조사로 응답한 결과이다(n=1,571). 잠재적 교란요인을 보정한 다중 로지스틱 회귀분석과 부트스트래핑을 이용한 매개효과 분석결과, 서울은 모성 역량이 높으면 손 씻기를 1.608배(p<.001), 마스크 착용을 1.247배(p<.05) 더 잘 실천하고, 베이징은 사회적 거리두기를 1.340배(p<.05), 손 씻기를 2.462배(p<.001), 마스크 착용을 1.360배(p<.05) 더 잘 실천하였다. 도쿄는 모성 역량이 높으면 사회적 거리두기를 1.549배(p<.001), 손 씻기를 1.406배(p<.01), 마스크 착용을 1.318배(p<.05) 더 잘 실천하였다. 미디어 이용의 매개효과는 부분적으로 확인되었는데 베이징은 모성의 TV 시청이 많을수록 사회적 거리두기를 1.524배(p<.01), 마스크 착용을 1.544배(p<.01) 더 잘 실천하였다. 본 연구는 모성 역량이 NPI 수용도를 높이는 가장 강력하고 일관된 요인이며 이들의 연관성이 미디어 이용을 통해 더 강화될 수 있음을 시사한다. 따라서 향후 새로운 감염병에 대처하기 위해 모성보건의 관점에서 여성 역량을 증진하는 보건교육과 미디어 리터러시 캠페인이 필요하다.

주제어 : 신종감염병, 비약물적 중재, 여성 역량