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Master's Thesis of LEE Wonhee

Factors Associated with Unmet
Healthcare Needs during the
COVID-19 Pandemic in Korea
- Results from Korean Community Health
Survey 2020 -

코로나19로 인한 미충족 의료경험과 영향요인
분석: 2020 지역사회건강조사를 바탕으로

August 2022

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이 논문을 보건학석사 학위논문으로 제출함
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Abstract

Introduction: The unprecedented public health crisis, COVID-19 (Coronavirus disease 2019) was accompanied by social, economic repercussions and was demanding change of the existing Korean medical system. In the process of responding to COVID-19, Korea made a meaningful achievement called ‘K quarantine’, in which all efforts were prioritized to prevent infection. In the process, the public health system and local health system were partially suspended or reduced. Also, as the face-to-face interaction was restricted due to concerns about infection, the healthcare utilization rate also decreased significantly. There was no research on whether this decrease in medical use can be interpreted as an increase of unmet healthcare needs (UHNs). It was important to identify the associated factors of UHNs during the COVID-19 pandemic since UHNs can deteriorate the health problem of those who give up healthcare. Additionally, it could increase health inequity if UHNs were concentrated on the low-income population. The aims of this study were to check prevalence of UHNs and identify factors associated with UHNs during the pandemic of COVID-19 in Korea.

Methods: Data from the 2020 Community Health Survey was examined. Dependent variable was whether a respondent had experienced UHNs and independent variables were sociodemographic factors, health-related factors, and COVID-19 related factors. Multiple survey logistic regression analyses were performed after adjusting for all factors to identify factors associated with UHNs.

Results: UHNs decreased from 2019 to 2020 and 5.4% of South Koreans experienced

UHNs in 2020. The most frequent reason of UHNs was “Availability” (48.1%), followed by “Acceptability” (23.3%), “COVID-19 related- reasons” (16.1%), “Affordability” (8.7%) and “Accessibility” (3.9%) in 2020. Female, younger age, low education level, low-income level, living alone, living in rural and blue-collar workers and other job group who were unemployed including students, housewives, military army were more likely to experience UHNs. And poor rated health, no chronic disease, and depressive symptom (PHQ-9 with score of 10 and above) were associated factors for increased UHNs.

Among COVID-19 related factors, individuals without fear of death, individuals with fear of infection of family, individuals who evaluated neighbors and co-workers’ performance in dealing with COVID-19 as “bad” and who had no social supports from others during quarantine more likely to experience UHNs.

All sociodemographic and health-related factors that influenced UHNs due to non-COVID-19 related reasons were same as overall UHNs. Fear of death, fear of infection of family and social support are statistically significant factors to UHNs due to non-COVID-19 related reasons. Fear of infection is statistically significant factor to UHNs due to COVID-19. Fear of death and social support are not statistically significant.

Conclusions: Although South Korea has witnessed a steady decrease in UHNs, UHNs due to COVID-19 related reason occurred in 2020. This study identifies that the effects of fear of death and fear of infection on UHNs are different. Low socio-economic groups had higher frequency for “affordability”, “accessibility” for UHNs and it should be noted that the low socio-economic group was more vulnerable to the pandemic, leading to increased health inequity. This study suggests that a different approach and customized policy are required depending on type of fear and socioeconomic status.

Keyword: (within 6 words) unmet healthcare needs, COVID-19, Korean Community

Health Survey 2020, healthcare inequality, fear of infection

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Chapter 1. Introduction

1.1. COVID-19 and decrease of healthcare utilization

Since novel coronavirus disease (hereafter referred to as COVID-19) was first reported in Dec 2019 in Wuhan city, it has challenged the capacity of healthcare systems and the demand for medical care has changed. Some people may have forgone care for fear of contracting COVID-19 and long-term pandemic affected personal income and it could eventually affect patients' affordability for medical care. Many non-COVID-19 patients delayed or cancelled necessary healthcare(Emanuel et al., 2020) and healthcare utilization significantly dropped globally, e.g., by 38% in severe heart attack patients in nine major hospitals in the U.S.(Garcia et al., 2020), and 64% in pediatric emergency department (ED) visits in Germany(Dopfer et al., 2020). In Korea, the average annual number of outpatient visits was 47,105 before, and 40,786 during the COVID-19 pandemic, with a decrease of 13.4%. The number of outpatient visits in internal medicine decreased by 10.2% during the COVID-19 pandemic(Byun et al., 2022).

Preliminary studies have established that delays in diagnosis and treatment in the UK could lead to a 5% to 15% increase in the number of deaths from cancer up to 5 years after diagnosis (Maringe et al. 2020). Reduced or delayed healthcare utilization during the pandemic can have detrimental health consequences. For instance, patients may suffer from delayed routine care, diagnoses, and elective procedures, while halting clinical trials could have long-term negative effects on medical research(Richards et al., 2020; Tapper & Asrani, 2020).

1.2. Unmet healthcare needs (UHNs)

According to the 2000 World Health Report, published by the WHO (World Health Organization), a healthcare system is a means of improving health that ensures access to care based on needs, not on ability to pay (Organization, 2000). In order to examine this, it is important to consider “Unmet Healthcare Needs (hereafter referred to as UHNs),” which are indicators used globally to assess healthcare accessibility (Allin et al., 2010; Hwang et al., 2017). If UHNs continues for a long time, symptoms that can be alleviated through necessary medical services may worsen and negatively affect health.

UHNs can be defined in many ways. UHNs refer to the state in which necessary medical services are not received when subject medical services or medical professionals determine that medical services are necessary to the patients (Altman, 1974). These medical needs are divided into “perceived wants” and “evaluated needs” according to the judging subject. Perceived want refers to a want that the patient recognizes by himself/herself, and an evaluated need refers to a need judged by an expert. Allin classified UHNs into 5 categories. (Allin et al., 2010)

1. Unperceived unmet needs: an individual does not perceive that she needs health care.
2. Subjective, chosen unmet needs: An individual perceives herself as in need of some form of health intervention but chooses not to demand the health services available.
3. Subjective, not -chosen unmet needs due to inaccessibility: An individual

perceives herself as in need of some form of health intervention but does not receive health services because of access barriers beyond her control.

4. Subjective, clinician-validated unmet need: An individual perceives a need for health care, accesses health care but does not receive the treatment that a clinician would judge as appropriate.
5. Subjective unmet expectations: An individual perceives herself as in need of some form of health service, accesses care, but in her own perception does not receive the most suitable treatment.

There are several ways to evaluate UHNs. Just as there are several definitions: 1) the survey method, 2) measure the frequency and content of standard medical service use, 3) expert judgment as to whether patient have been without necessary treatment 4) a confirmation method through clinical verification by experts. When we use medical service data such as EMR (Electronic Medical Record) to evaluate UHNs, we can assess which medical uses have decreased and whether it could be classified to essential or non-essential medical care. Nevertheless, information is very limited, so it is impossible to check socio-demographic, health related lifestyle and perception on COVID-19. Additionally, only limited health care workers can access these data.

Therefore, mostly survey methods are used to measure UHNs in Korea. Korea National Health and Nutrition Examination Survey (KNHANES), Korea Health Panel Survey (KHPS) and Korea Community Health Survey (KCHS) contain these questions to ask UHNs in 2020.

Table 1. Question for UHNs in Korean surveys

Data	Question
KNHANES (2020)	Over the past year, have you been unable to go to the hospital when you want to? (Excluding dental care)
KHPS (2020)	Over the past year, have you ever needed to see a doctor or a medical examination, but did not get it? (Excluding dental care, dental examination)
KCHS (2020)	Over the past year, have you ever felt that you could not or did not access a medical service at the time when you needed it? (Excluding dentistry)

There are some limitations to use subjective method to measure UHNs. First, it is difficult to interpret results because UHNs include multiple meanings of unmet need(Kim et al., 2014). Second, individual perceptions on medical symptoms may differ and attitudes toward the importance of medical treatment may differ(Kim et al., 2014). Even with these limitations, survey provides access to realistic inequalities since it directly exposes the views of the respondents(Kim et al., 2014). Additionally, it has the advantage of being able to encompass not only the socioeconomic and demographic characteristics of the respondent, but also social characteristics such as the health care system(Hu et al., 2009).

Among KNHANES, KHPS and KCHS data, KCHS was the only questionnaire that additionally collected information related to COVID-19, including fear of COVID-19, quarantine status, and perception on administrative agency's response to deal with COVID-19 during 2020. Therefore, I used KCHS data for this study.

1.3 Objective of this study

1. To check prevalence of UHNs during the COVID-19 pandemic in 2020
2. To identify factors associated with overall UHNs
3. To identify factors associated with UHNs due to COVID-19 related reason and UHNs due to non- COVID-19 related reasons

Chapter 2. Study method

2.1 Data source

This study used raw data from the 2020 Korea Community Health Survey (KCHS) collected between Aug 16th to Oct 31st 2020, conducted by the Korea Disease Control and Prevention Agency. The KCHS is a cross-sectional survey, with participants from multistage, stratified area probability samples of civilian, non-institutionalized Korean households categorized according to geographic area, age, and sex. The survey is conducted annually and collects data through in-person (one-on-one) interviews. Since the population sample is extracted from national survey data, it is considered representative of the Korean population(Kang et al., 2015).

Ethics statement

The KCHS is open data where all personal information is fully anonymized before release. The Community Health Survey protocol was reviewed and approved by the institutional review board of the Korea Centers for Disease Control and Prevention. This study was covered under the review list pursuant to Article 2.2 of the Enforcement Rule of Bioethics and Safety Act in Korea, since the data were exempted from institutional review board review. This study was conducted in accordance with the ethical standards of the national research committee, the 1964 Helsinki Declaration, and its later amendments or comparable ethical standards(Kang et al., 2015).

2.2 Study design

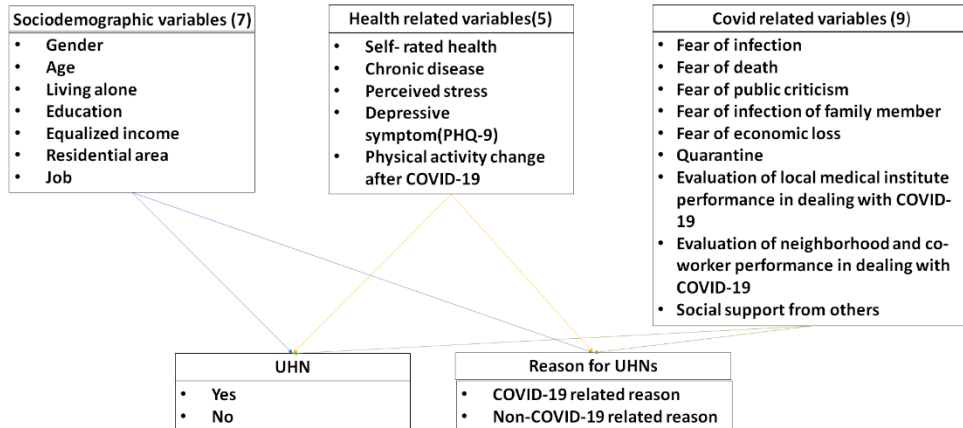


Figure1. Study design.

1) Study population

The final analysis used the data of 211,032 from a total of 229,269 individuals after excluding those who answered, “never needed”, “do not know”, and refused to answer to the question: “Over the past year, have you ever felt that you could not or did not access a medical service at the time when you needed it?”

2) Dependent variables

I set the dependent variable as whether a respondent had experienced UHNs. UHN was defined as wanting to receive treatment but unable and the presence of UHNs was measured by the question: “Over the past year, have you ever felt that you could not or did not access a medical service at the time when you needed it?” Respondents answered 1. Yes or 2. No or 3. Never needed. UHN rate in 2020 was 5.6% which decreased from 2019.

Table 2. Unmet healthcare need rate in 2019, 2020 (unweighted)

Question	Answer	2019 (Unweighted)		2020 (Unweighted)	
		Over the past year, have you ever felt that you could not or did not access a medical service at the time when you needed it?	1. Yes	12,956	6.1%
2. No	199,755		93.9%	199,244	94.4%
Total	212,713		100%	211,032	100%
3. Never needed	16,370		18,223		
7. Refusal to respond	3		2		
9. Do not know	13		12		
Total	229,099		229,269		

Those who answered to “yes” to the question were then asked to provide the reason: “What was the reason for which you did not receive the medical service you needed?” Respondents could select answer 1. Inconvenient time, 2. Symptoms not severe, 3. Financial burden, 4. Inconvenient transportation, 5. Long waits for medical care, 6. Difficulty making appointment, 7. Fear of treatment or examination, 8. Others. Those who answered to “8. Others” were then asked to provide the detailed reason as short answer questions. I reviewed all reasons for selecting 8. Others line by line and classified to COVID-19 related reasons and non- COVID-19 related reason. Additionally, the reasons for UHNs were then divided into six subcategories (“Availability” “Acceptability”, “Affordability”, “Accessibility”, “Non-COVID-19 related” and “COVID-19 related”). The most frequent reason of UHNs was “Availability (38.9%), followed by “Acceptability” (20.4%), “COVID-19 related reason” (18.1%),” “Accessibility” (9.2%), “Affordability (7.9%) and “non-COVID-19 related reason” (5.5%).

Table 3-1. Classification of UHNs by reasons in 2019 (unweighted)

Classification	Reasons	2019			
		n	%	n	%
Availability	1.Inconvenient time	5,808	44.8%	6,179	47.7%
	5.Long waits for medical care	273	2.1%		
	6.Difficulty making appointment	98	0.8%		
Acceptability	2.Symptoms not severe	2,674	20.6%	3,073	23.7%
	7.Fear of treatment or examination	399	3.1%		
Affordability	3.Financial burden	1,690	13.0%	1,690	13.0%
Accessibility	4.Inconvenient transportation	1,216	9.4%	1,216	9.4%
	8. Others (non-COVID-19 related reason)	798	6.2%	798	6.2%
	Total	12,956	100.0%	12,956	100.0%

Table 3-2. Classification of UHNs by reasons in 2020 (unweighted)

Classification	Reasons	2020			
		n	%	n	%
Availability	1.Inconvenient time	4,237	35.9%	4,582	38.9%
	5.Long waits for medical care	218	1.8%		
	6.Difficulty making appointment	127	1.1%		
Acceptability	2.Symptoms not severe	2,026	17.2%	2,409	20.4%
	7.Fear of treatment or examination	383	3.2%		
Affordability	3.Financial burden	928	7.9%	928	7.9%
Accessibility	4.Inconvenient transportation	1,084	9.2%	1,084	9.2%
	8. Others (non-COVID-19 related reason)	650	5.5%	650	5.5%
	8. Others (COVID-19 related reason)	2,135	18.1%	2,135	18.1%
	Total	11,788	100.0%	11,788	100.0%

3) Independent variables

(1) Sociodemographic variables

Sociodemographic variables included gender (female, male), age, education (no diploma, elementary school, middle school, high school, college or above) living alone (yes, no), resident area (rural, urban), 5 quartile income (Q1(the lowest) to Q5(the highest)) and job. Age was categorized into 10-year intervals. 5 quartile equivalized income was calculated by dividing the household's total income from all sources by its equivalent size, which was calculated using the modified OECD equivalence scale. Job classification was defined as 1. white collar (managers, professionals and office workers), 2. sales and service workers, 3. blue collar (agriculture, forestry and fishery worker & craft and related trades workers & plant, machine operators and assemblers & elementary workers), and 4. others who were unemployed like housewife, student and army.

(2) Health related variables

Health related variables included self-rated health (good, poor), no. of chronic disease (0,1,2), perceived stress (yes, no), depressed symptoms (PHQ-9) (yes, no) and change of physical activity after the COVID-19 pandemic.

Self-rated health was defined according to the answer to the question "What is your health status?" with responses of "very good", "good", "normal", or "poor", and "very poor". I re-categorized self-rated health as "good" or "poor" which including "normal". Chronic disease was classified according to no. of chronic disease among hypertension and diabetes which were diagnosed at 30 or more than 30 years old. To measure perceived stress, respondents responded to the following question: "How stressful do you feel in your daily life?" Their response options were "1. feel very much", "2. feel a

lot”, “3. feel a little bit”, “4. hardly feel it”. For the analysis, I re-categorized individuals who responded with “1. feel very much,” “2. feel a lot,” as people who usually felt stressed in their daily lives and while those who responded with “3. feel a little bit” and “4. hardly feel it” were classified as people who did not usually feel stressed. Depressed symptoms were measured using the Patient Health Questionnaire-9(PHQ-9). PHQ-9 is commonly used to screen for depression with 10 often recommended as the cut-off score.

(3) COVID-19 related variables

COVID-19 related variables included COVID-19 related fears, quarantine (yes, no), evaluation of local medical institute performance in dealing with COVID-19, evaluation of neighborhood and coworkers’ performance in dealing with COVID-19 and social support from others during self-quarantine.

COVID-19 related fears, which included fear of infection, dying from infection, public criticism, a family member getting infected, and economic loss. Each item was measured in response to the following statements :“I fear that I will get infected with COVID-19,” “I fear that I might die if I get infected,” “I fear that I may be criticized if I get infected,” “I fear that my family members vulnerable to poor health may get infected,” and “I fear that the pandemic may cause economic loss to me or my family.” Each item was considered separately and concurrently using different models. Their response options were “1. Always”, “2. Sometimes”, “3. Neutral”, “4. Rarely”, “5. Never”. I recategorized 1,2 as “yes” and 3,4,5 as “no”.

To evaluate local medical institute’s performance in dealing with COVID-19 and neighborhood and co-workers’ performance in dealing with COVID-19, respondents were asked the following question: “Do you think that local medical institute/ neighborhood and co-workers’ response to COVID-19 was appropriate? Their response

options were “1. Appropriate very much”, “2. Appropriate”, “3. Normal”, “4. Inappropriate” “5. Inappropriate very much”. To check social support from others, respondents were asked the following question: “If you stayed under quarantine since you were confirmed case of COVID-19 or classified as close contact, how many people except your family living with you, can you ask to help urgently?” Their response options were “1. 0(No one)”, “2. 1-2 people”, “3. 3-5 people”, “4. 6 and more than 6”.

2.3 Statistical analysis

The KCHS is based on a complex sample design: therefore, all data were analyzed through complex sample analysis, considering weights, stratification variables and cluster variables. A chi-square test of independence; χ^2 test of the complex sample analysis results was performed to identify general UHNs. Using χ^2 tests, categorical variables were presented as proportions (n, %). In addition, risk factors related to UHNs were analyzed using χ^2 tests. Multiple survey logistic regression analyses were performed after adjusting for all factors to identify factors associated with overall UHNs. The equations of the logistic regression analyses are below.

$$\log \left[\frac{\Pr(Y=1)}{\Pr(Y=0)} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Y=0: No UHN (reference)

Y=1: UHNs

X₁: Sociodemographic variables, X₂: Health related variables, X₃: COVID-19 related variables, ϵ : Error

Additionally, multinomial survey logistic regression was performed to identify factors associated with UHNs due to COVID-19 related reason and UHNs due to non-COVID-19 related reason.

$$\log \left[\frac{\text{Pr}(Y=1)}{\text{Pr}(Y=0)} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Y=0: No UHN (reference)

Y=1: UHNs due to COVID-19 related reasons

X₁: Sociodemographic variables, X₂: Health related variables, X₃: COVID-19 related variables, ϵ : Error

$$\log \left[\frac{\text{Pr}(Y=2)}{\text{Pr}(Y=0)} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Y=0: No UHN (reference)

Y=2: UHNs due to non-COVID-19 related reasons

X₁: Sociodemographic variables, X₂: Health related variables, X₃: non-COVID-19 related variables, ϵ : Error

All statistical analyses were performed using SAS version 9.4 (SAS Institute Inc, Cary, NC), and significance was set at $p < 0.05$.

Chapter 3. Study Result

3.1 Baseline characteristics by UHNs

Data from 211,032 individuals were used for analysis. Of the participants, 5.4% reported UHNs over the past year. The frequencies and percentage distributions of each categorical variables for UHNs, obtained by χ^2 . Females (6.1%), individuals living alone (6.8%) and living in rural (6.0%) more frequently experienced UHNs. 30s (6.7%), 40s (6.1%) more frequently experienced UHNs than 70s (3.9%) who less frequently experienced UHNs among other age groups. Individuals without diploma (6.2%) more frequently experienced UHNs compared with other educational levels. Individuals with lower income level most frequently experienced UHNs (Q1: 6.0%, Q2: 5.6%, Q3: 5.5%, Q4: 5.4%, Q5: 4.8%). When examining job cluster, sales and service workers (6.0%) more frequently experienced UHNs compared with other jobs groups.

Table 4-1. Sociodemographic characteristics by UHN

Variables	Total (n=211,032)		UHN No		UHN Yes		P- value ^a
	n [†]	% [‡]	n [†]	% [‡]	n [†]	% [‡]	
Total	211,032	100.0	199,244	94.6	11,788	5.4	
Gender							<.0001
Female	116,994	51.3	109,530	93.9	7,464	6.1	
Male	94,038	48.7	89,714	95.4	4,324	4.6	
Age							<.0001
19-29	21,707	15.5	20,523	94.5	1,184	5.5	
30-39	22,307	15.5	20,745	93.3	1,562	6.7	
40-49	32,461	19.1	30,437	93.9	2,024	6.1	
50-59	41,157	20.3	38,786	94.7	2,371	5.3	
60-69	42,715	15.1	40,625	95.6	2,090	4.4	
≥70	50,685	14.5	48,128	96.1	2,557	3.9	
Living alone							<.0001
Yes	33,665	12.4	31,229	93.2	2,436	6.8	
No	177,354	87.6	168,002	94.8	9,352	5.2	
Education							<.0001
No diploma	20,104	4.4	18,637	93.8	1,467	6.2	
Elementary school	31,856	8.9	30,144	95.3	1,712	4.7	
Middle school	23,672	8.4	22,416	94.6	1,256	5.4	
High school	70,409	36.8	66,704	94.7	3,705	5.3	
College or above	64,726	41.4	61,091	94.6	3,635	5.4	
Equalized income^b							<.0001
Q1 (Lowest)	42,936	12.3	40,170	94.0	2,766	6.0	
Q2	42,823	17.2	40,439	94.4	2,384	5.6	
Q3	41,620	21.1	39,328	94.5	2,292	5.5	
Q4	37,017	21.3	35,052	94.6	1,965	5.4	
Q5 (Highest)	43,597	28.0	41,379	95.2	2,218	4.8	
Residential area							<.0001
Rural	93,242	19.2	87,428	94.0	5,814	6.0	
Urban	117,790	80.8	111,816	94.8	5,974	5.2	
Job							<.0001
White collar	38,807	25.5	36,570	94.5	2,237	5.5	
Sales and service workers	26,436	13.5	24,767	94.0	1,669	6.0	
Blue collar	60,659	22.0	57,123	94.3	3,536	5.7	
Others	84,926	39.0	80,590	95.2	4,336	4.8	

^a Rao-scott chi-square test was performed to determine the differences between groups with and without unmet healthcare needs

^b Equalized income divided by quartile

[†]Unweighted

[‡]Weighted

48.8% thought that self-rated health was poor. 16.7% had hypertension, 4.0% had diabetes and 5.7% had both diseases. 52.5% reported that physical activity was decreased after COVID-19 pandemic. Individuals who reported self-rated health as poor, individual without chronic disease, individual with perceived stress and individuals whose physical activity was decreased after COVID-19 more frequently experienced UHNs.

Table 4-2. Health-related characteristics by UHN

Variables	Total (n=211,032)		UHN No		UHN Yes		P- value ^a
	n [†]	% [‡]	n [†]	% [‡]	n [†]	% [‡]	
Total	211,032	100.0	199,244	94.6	11,788	5.4	
Self-rated health							<.0001
Poor	113,002	48.8	105,032	93.0	7,970	7.0	
Good	98,024	51.2	94,206	96.2	3,818	3.8	
Chronic disease							
No	138,902	73.5	130,645	94.2	8,257	5.8	<.0001
Hypertension	45,825	16.7	43,517	95.8	2,308	4.2	
Diabetes	10,005	4.0	9,549	95.7	456	4.3	
Both	16,256	5.7	15,494	96.1	762	3.9	
Perceived stress							<.0001
Yes	46,817	25.7	42,141	90.5	4,676	9.5	
No	164,154	74.3	157,050	96.1	7,104	3.9	
Depressive symptoms (PHQ-9)							<.0001
Yes	12,078	3.0	10,401	80.1	1,677	19.9	
No	198,907	97.0	188,802	95.1	10,105	4.9	
Physical activity change after COVID-19							<.0001
Increase	10,760	6.0	10,173	94.8	587	5.2	
Same as before	95,019	41.5	90,336	95.4	4,683	4.6	
Decrease	88,886	52.5	83,428	94.2	5,458	5.8	

^a Rao-scott chi-square test was performed to determine the differences between groups with and without unmet needs

[†]Unweighted

[‡]Weighted

69.4% feared COVID-19 infection, 39.8% feared dying from infection, 73.2% feared public criticism, 85.0% feared a family member getting infected, and 76.5% feared economic loss. Fear of infection of family member was the most frequent among five

fears. 0.6% experienced quarantine. 71.7% evaluated local medical institute performance in dealing with COVID-19 was good and 71.6% evaluated neighborhood and co-workers' performance in dealing with COVID-19 was good. 83.6% of respondents had social supports and could ask for help from others under the quarantine. Individuals who had fears of infection, public criticism, infection of family member and economic loss more frequently experienced UHNs compared with individuals without these fears. On the contrary, individual with fear of death less frequently experienced UHNs compared without fear of death. Individuals who evaluated local medical institute performance in dealing with COVID-19, neighborhood, and co-worker as "bad" more frequently experienced UHNs than those who evaluated as "good". Individuals without social supports more frequently experienced UHNs compared with individuals with social supports.

Table 4-3. COVID-19- related characteristics by UHN

Variables	Total (n=211,032)		UHN No		UHN Yes		P- value ^a
	n [†]	% [‡]	n [†]	% [‡]	n [†]	% [‡]	
Total	211,032	100.0	199,244	94.6	11,788	5.4	
Fear of infection							0.023
Yes	150,333	69.4	141,789	94.5	8,544	5.5	
No	60,637	30.6	57,399	94.9	3,238	5.1	
Fear of death							0.2712
Yes	97,128	39.8	91,788	94.7	5,340	5.3	
No	113,724	60.2	107,290	94.6	6,434	5.4	
Fear of public criticism							0.007
Yes	160,883	73.2	151,766	94.5	9,117	5.5	
No	49,897	26.8	47,246	94.9	2,651	5.1	
Fear of infection of family member							<.0001
Yes	169,453	85.0	159,728	94.5	9,725	5.5	
No	26,253	15.0	25,058	95.6	1,195	4.4	
Fear of economic loss							
Yes	166,932	76.5	157,336	94.4	9,596	5.6	<.0001
No	43,985	23.5	41,803	95.3	2,182	4.7	
Quarantine							0.1242
Yes	210,090	0.6	198,374	93.4	11,716	6.6	
No	942	99.4	870	94.6	72	5.4	
Local medical institute performance to COVID-19							<.0001
Bad	52,047	28.3	48,611	93.7	3,436	6.3	
Good	150,246	71.7	142,541	95.1	7,705	4.9	
Neighborhood and co-workers' performance to COVID-19							<.0001
Bad	54,569	28.4	50,787	93.2	3,782	6.8	
Good	153,914	71.6	146,108	95.2	7,806	4.8	
Social support from others							<.0001
0	38,106	16.4	35,449	93.4	2,657	6.6	
1-2	92,507	44.7	87,684	94.9	4,823	5.1	
3-5	59,017	28.9	55,958	94.9	3,059	5.1	
≥6	21,070	10.0	19,840	94.9	1,230	5.1	

^a Rao-scott chi-square test was performed to determine the differences between groups with and without unmet needs

[†]Unweighted

[‡]Weighted

To detect the severity of multicollinearity in the regression analysis, I checked the variance inflation factors (VIFs). VIFs were between 1.00 and 1.73 and it indicated absence of multicollinearity problem.

Table 5.VIF (Variance Inflation Factors) of all variables

Variables	VIF	Variables	VIF
Quarantine	1.002	Education	1.23893
Physical activity change	1.01401	Chronic disease	1.29214
Income	1.03172	Local medical institute performance in dealing with COVID-19	1.31194
Social support	1.04507	Neighborhood and co-worker performance in dealing with COVID-19	1.31875
Living alone	1.05579	Fear of economic loss	1.32617
Gender	1.05826	Fear of public criticism	1.38164
PHQ-9	1.06332	Fear of infection of family member	1.41118
Perceived stress	1.10665	Fear of death	1.45263
Residential area	1.11038	Fear of infection	1.5125
Self-rated health	1.15044	Age	1.72994
Job	1.21351		

3.2 Factors associated with UHNs

The result of multiple logistic regression on UHNs are summarized in table 6-1, table 6-2, and table 6-3. All sociodemographic variables (gender, age, living alone, education, income, residential area, job), all health-related variables (self-rated health, no. of chronic disease, perceived stress, depressive symptom (PHQ-9), physical activity change after COVID-19) showed a statistically significant association with UHNs. Among COVID-19 related variables, fear of death, fear of infection of family member, neighborhood, and co-worker performance in dealing with COVID-19 and social support from others showed a statistically significant association with UHNs.

Female (OR: 1.31, 95% CI: 1.23-1.39), living alone (OR: 1.23, 95% CI: 1.13-1.33) and rural dwellers (OR: 1.25, 95% CI: 1.17-1.34) had a higher odds ratio of experiencing UHNs compared with the opponent. Younger generation had a higher odds ratio of experiencing UHNs compared to 70s and more than 70s (20s: OR: 1.97, 95% CI: 1.70-2.27, 30s: OR: 2.13, 95% CI: 1.86-2.44, 40s: OR: 1.97, 95% CI: 1.72-2.25,

50s: OR: 1.80, 95% CI: 1.59-2.03, 60s: OR: 1.37, 95% CI: 1.23-1.53). Individual with no diploma (the lowest education level) had a higher odds ratio of experiencing UHNs compared to individual who graduated college or above (OR: 1.49, 95% CI: 1.28-1.74). The lower income group had higher odds ratio of experiencing UHNs compared to the highest income group(Q5) (Q1: OR: 1.42, 95% CI: 1.27-1.60, Q2: OR: 1.28, 95% CI: 1.16-1.41, Q3: OR: 1.13, 95% CI: 1.03-1.24, Q4: OR: 1.10, 95% CI: 1.00-1.21).

Table 6-1. Sociodemographic factors associated with UHN (weighted)

Variables	Unadjusted		Adjusted ^a	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Gender				
Female	1.35(1.29-1.42)	<.0001	1.31(1.23-1.39)	<.0001
Age				
19-29	1.45(1.32-1.59)	<.0001	1.97(1.70-2.27)	<.0001
30-39	1.80(1.65-1.96)	<.0001	2.13(1.86-2.44)	<.0001
40-49	1.61(1.48-1.75)	<.0001	1.97(1.72-2.25)	<.0001
50-59	1.41(1.30-1.52)	<.0001	1.80(1.59-2.03)	<.0001
60-69	1.13(1.04-1.23)	0.004	1.37(1.23-1.53)	<.0001
≥70	Ref.		Ref.	
Living alone				
Yes	1.33 (1.25-1.42)	<.0001	1.23(1.13-1.33)	<.0001
Education				
No diploma	1.16(1.06-1.26)	0.001	1.49(1.28-1.74)	<.0001
Elementary school	0.86(0.79-0.93)	0.000	1.10(0.96-1.25)	0.16
Middle school	0.99(0.91-1.08)	0.818	1.16(1.03-1.31)	0.01
High school	0.98(0.92-1.04)	0.422	0.97(0.90-1.04)	0.38
College or above	Ref.		Ref.	
Equalized income				
Q1 (Lowest)	1.27(1.17-1.38)	<.0001	1.42(1.27-1.60)	<.0001
Q2	1.17(1.07-1.26)	0.000	1.28(1.16-1.41)	<.0001
Q3	1.15(1.06-1.24)	0.001	1.13(1.03-1.24)	0.008
Q4	1.13(1.04-1.23)	0.004	1.10(1.00-1.21)	0.045
Q5 (Highest)	Ref.		Ref.	
Residential area				
Rural	1.15(1.09-1.22)	<.0001	1.25(1.17-1.34)	<.0001
Job				
White collar	Ref.		Ref.	
Sales and service workers	1.09(1.00-1.18)	0.039	1.07(0.97-1.18)	0.2
Blue collar	1.04(0.97-1.12)	0.245	1.15(1.05-1.26)	0.0028
Others	0.87(0.81-0.93)	<.0001	0.84(0.77-0.92)	<.0001

^a Binary logistic regression analysis was adjusted including all variables

Individuals who evaluated self- rate health as “poor” had a higher odds ratio of experiencing UHNs compared to individual who evaluated as “good” (OR: 1.72, 95% CI: 1.62-1.84). The number of chronic diseases had a significant effect on UHNs, when compared with the absence; the probability for unmet medical care decreased with an increase in the number of chronic diseases (One chronic disease: OR: 0.72, 95% CI:

0.66-0.78, two chronic diseases: OR: 0.62, 95% CI: 0.53-0.71). Perceived stress and depressive symptom (PHQ-9) were associated with UHNs (OR: 1.91, 95% CI: 1.80-2.04, OR: 2.82, 95% CI: 2.53-3.15). Individual whose physical activity was same as before COVID-19 had a lower odds ratio of experiencing UHNs compared to individual whose physical activity was decreased (OR: 0.88, 95% CI: 0.83- 0.94).

Table 6-2. Health related factors associated with UHN (weighted)

Variables	Unadjusted		Adjusted ^a	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Self- rated health				
Poor	1.91(1.81-2.01)	<.0001	1.72(1.62-1.84)	<.0001
Chronic disease				
0	Ref.		Ref.	
1	0.72(0.67-0.77)	<.0001	0.72(0.66-0.78)	<.0001
2	0.66(0.59-0.74)	<.0001	0.62(0.53-0.71)	<.0001
Perceived stress				
Yes	2.58(2.45-2.71)	<.0001	1.91(1.80-2.04)	<.0001
Depressive symptoms (PHQ-9)				
Yes	4.81(4.41-5.24)	<.0001	2.82(2.53-3.15)	<.0001
Physical activity change after COVID-19				
Decrease	Ref.		Ref.	
Same as before	0.78(0.74-0.83)	<.0001	0.88(0.83-0.94)	<.0001
Increase	0.88(0.79-0.98)	0.022	1.01(0.90-1.15)	0.8

^a Binary logistic regression analysis was adjusted including all variables

Fear of death and infection of family member showed opposite result. The probability for UHNs decreased with fear of death (OR:0.87, 95% CI: 0.81-0.93) but the probability for UHNs increased with fear of infection of family member (OR:1.22, 95% CI: 1.10-1.34). Respondents who evaluated neighborhood and co-workers' performance in dealing with COVID-19 as "bad" more likely to experience UHNs compared with those who evaluated as "good" (OR:1.22, 95% CI: 1.14-1.32). Individuals who had social support had a lower odds ratio compared with absence (1-2: OR: 0.84, 95% CI: 0.77-0.92), 3-5: OR: 0.85, 95% CI: 0.76-0.95, ≥6: OR: 0.85, 95% CI: 0.76-0.95).

Table 6-3. COVID-19 related factors associated with UHN (weighted)

Variables	Unadjusted		Adjusted ^a	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Fear of infection				
Yes	1.07(1.01-1.13)	0.023	1.00(0.92-1.07)	0.9039
Fear of death				
Yes	0.97(0.92-1.02)	0.273	0.87(0.81-0.93)	<.0001
Fear of public criticism				
Yes	1.09(1.02-1.15)	0.007	1.06(0.98-1.15)	0.1365
Fear of infection of family member				
Yes	1.27(1.18-1.38)	<.0001	1.22(1.10-1.34)	0.0001
Fear of economic loss				
Yes	1.20(1.12-1.27)	<.0001	1.02(0.94-1.11)	0.6787
Quarantine				
Yes	1.26(0.94-1.68)	0.125	0.76(0.55-1.05)	0.0913
Local medical institute performance to COVID-19				
Bad	1.17(1.11-1.24)	<.0001	1.04(0.96-1.12)	0.3365
Neighborhood and coworkers' performance to COVID-19				
Bad	1.47(1.40-1.55)	<.0001	1.22(1.14-1.32)	<.0001
Social support from others				
0	Ref.		Ref.	
1-2	0.76(0.71-0.82)	<.0001	0.84(0.77-0.92)	<.0001
3-5	0.76(0.69-0.84)	<.0001	0.85(0.76-0.95)	<.0001
≥6	0.76(0.69-0.84)	<.0001	0.85(0.76-0.95)	0.0058

^a Binary logistic regression analysis was adjusted including all variables

3.3 Socio-demographic & health-related factors by UHN reasons

Sociodemographic characteristics by UHN reasons are summarized in table 7-1. Nearly two times as many females (20.1%) as male (10.4%) experienced UHNs due to COVID-19. The most frequent reason for UHNs in individuals who were under 70s was “availability” whereas 70s and over 70s selected “accessibility” as the most frequent reason. More than twenty times as many 70s and over 70s (24.2%) as many 20s(1.3%), 30s(1.4%), 40s(1.0%), 50s(12.0%) experienced UHNs due to “accessibility”. Frequency of “COVID-19 related reason”, “affordability” and “accessibility” tend to increase with age. More than two times as many individuals

living alone (17.5%) as many individuals living together (7.1%) experienced UHNs due to “affordability”. More than three times as many individuals living alone (9.2%) as many individuals living together (2.9%) experienced UHNs due to “accessibility”. The lower education level, the higher frequency for “affordability” and “accessibility”. More than five times as many individuals without diploma (20.2%) as many individuals who graduated college or above (3.8%) experienced UHNs due to “affordability”. More than twenty-five times as many individuals without diploma (28.6%) as many individuals who graduated college or above (1.2%) experienced UHNs due to “accessibility”. The lower income level, the higher frequency for “affordability” and “accessibility”. More than ten times as many Q1(the lowest group) (25.2%) as many Q5(the highest) (2.4%) experienced UHNs due to “affordability”. More than fourteen times as many Q1(the lowest) (14.4%) as many Q5(the highest) (1.0%) experienced UHNs due to “accessibility”. Regarding residential area, about five times as many individuals living in rural (10.4%) as many individuals living in urban (2.1%) experienced UHNs due to “accessibility”. White collar, sales and service workers and blue collars selected “availability” as the most frequent reason for UHNs whereas others selected “acceptability” as the most frequent reason for UHNs. The others group had higher frequency for “COVID-19 related reason”, “affordability” and “accessibility” compared to other job groups.

These finding suggest that the low socio-economic groups had higher frequency for “affordability” and “accessibility”.

Table 7-1. Sociodemographic characteristics by UHN reasons (weighted)

Variables	Availability (%)	Acceptability (%)	Covid-related (%)	Affordability (%)	Accessibility (%)	P-value
Total	48.1	23.3	16.1	8.7	3.9	
Gender						<.0001
Female	42.4	23.6	20.1	8.6	5.2	
Male	55.8	22.8	10.4	8.8	2.1	
Age						<.0001
19-29	55.6	24.1	11.2	7.7	1.3	
30-39	60.8	20.8	13.2	3.9	1.4	
40-49	54.5	22.9	14.8	6.8	1.0	
50-59	48.4	25.2	14.7	9.7	2.0	
60-69	33.2	24.0	26.3	12.7	3.8	
≥70	12.9	22.8	22.7	17.4	24.2	
Living alone						<.0001
Yes	39.6	19.4	14.3	17.5	9.2	
No	49.6	24.0	16.4	7.1	2.9	
Education						<.0001
No diploma	11.1	21.1	18.9	20.2	28.6	
Elementary school	25.8	20.4	24.5	17.9	11.5	
Middle school	36.4	23.8	19.7	14.4	5.7	
High school	48.5	25.2	14.9	9.6	1.8	
College or above	58.3	22.4	14.4	3.8	1.2	
Equalized income^a						<.0001
Q1 (Lowest)	21.2	20.7	18.5	25.2	14.4	
Q2	39.0	22.1	19.5	14.2	5.2	
Q3	52.3	24.1	15.5	5.9	2.3	
Q4	56.3	24.5	14.3	3.4	1.4	
Q5 (Highest)	58.4	24.2	13.9	2.4	1.0	
Residential area						<.0001
Rural	41.5	22.6	18.8	6.7	10.4	
Urban	49.8	23.5	15.3	9.0	2.1	
Job						<.0001
White collar	63.7	20.3	12.6	2.6	0.8	
Sales and service workers	56.6	22.5	12.3	7.5	1.1	
Blue collar	56.1	21.2	12.3	7.7	2.7	
Others	26.0	27.6	23.2	14.8	8.4	

^a Equalized income divided by quartile

More than twice as many individuals who evaluated self-rated health as “poor” (11.0%) as many those evaluated as “good” (4.7%) experienced UHNs due to “affordability”. About three times of individuals who evaluated self-rated health as “poor” (5.3%) as many those evaluated as “good” (1.3%) experienced UHNs due to “accessibility”. Regarding chronic disease, more than twice as many individuals with both chronic

diseases (16.7%) as many those without chronic disease (7.4%) experienced UHNs due to “affordability”. More than five times as many individuals with both chronic diseases (15.9%) as individuals without chronic disease (2.3%) experienced UHNs due to “accessibility”. More than three times as many individuals with depressive symptom (22.1%) as individuals without depressive symptom (7.0%) experienced UHNs due to “affordability”. These results imply that underprivileged communities and the poor health had more chance to experience UHNs due to “affordability” and “accessibility”.

Table 7-2. Health related variables by UHN reasons (weighted)

Variables	Availability (%)	Acceptability (%)	Covid-related (%)	Affordability (%)	Accessibility (%)	P-value
Total	48.1	23.3	16.1	8.7	3.9	
Self- rated health						<.0001
Poor	45.9	21.0	16.8	11.0	5.3	
Good	51.8	27.1	14.8	4.7	1.5	
Chronic disease						
No	51.1	23.9	15.2	7.4	2.3	<.0001
Hypertension	36.6	22.6	19.4	12.4	9.0	
Diabetes	40.3	16.6	19.9	15.9	7.3	
Both	30.0	18.4	19.1	16.7	15.9	
Perceived stress						<.0001
Yes	55.2	17.4	13.4	10.7	3.4	
No	42.1	28.3	18.3	7.0	4.2	
Depressive symptoms (PHQ-9)						<.0001
Yes	41.0	15.6	13.8	22.1	7.6	
No	49.0	24.3	16.3	7.0	3.3	
Physical activity change after COVID-19						<.0001
Increase	43.9	24.3	21.7	8.0	2.2	
Same as before	46.8	25.4	14.0	8.4	5.3	
Decrease	49.1	22.5	17.4	8.5	2.5	

3.4 Factors associated with UHNs due to COVID-19 related reasons, non-COVID-19 related reasons

The factors associated with UHNs due to COVID-19 related reason and non- COVID-19 related reason are shown in table 8-1,8-2 and 8-3. All sociodemographic variables

(gender, age, living alone, education, income, residential area, job) showed a statistically significant association with UHNs due to non- COVID-19 related reason whereas living alone, education and job were not statistically significant with UHNs due to COVID-19 related reason. The odds ratio of female to male for UHNs due to COVID-19 related reason was higher than UHNs due to non-COVID-19 related reason. As age decreased, the odds ratio for UHNs due to non- COVID-19 related reason showed a tendency to increase whereas the odds ratio for UHNs due to COVID-19 were consistent among different age groups.

Table 8-1. Sociodemographic factors associated with UHNs due to COVID-related, non-COVID-19 related reasons (weighted)

Variables	COVID-19 related reason/ No UHN		Non-COVID-19 related reason/ No UHN	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Gender				
Female	2.09 (1.78-2.47)	<.0001	1.21 (1.14-1.3)	<.0001
Age				
19-29	1.14 (0.82-1.57)	0.439	2.19 (1.87-2.56)	<.0001
30-39	1.30 (0.94-1.79)	0.111	2.34 (2.01-2.73)	<.0001
40-49	1.50 (1.11-2.03)	0.008	2.09 (1.81-2.43)	<.0001
50-59	1.39 (1.08-1.79)	0.010	1.90 (1.66-2.18)	<.0001
60-69	1.59 (1.29-1.96)	<.0001	1.31 (1.15-1.48)	<.0001
≥70	Ref.		Ref.	
Living alone				
Yes	1.10 (0.90-1.33)	0.355	1.25 (1.14-1.36)	<.0001
Education				
No diploma	1.08 (0.78-1.49)	0.652	1.59 (1.35-1.88)	<.0001
Elementary school	1.07 (0.80-1.41)	0.664	1.08 (0.94-1.25)	0.28
Middle school	1.07 (0.81-1.41)	0.659	1.18 (1.03-1.35)	0.01
High school	0.93 (0.78-1.11)	0.425	0.97 (0.90-1.05)	0.48
College or above	Ref.		Ref.	
Equalized income				
Q1 (Lowest)	1.44 (1.11-1.88)	0.007	1.44 (1.27-1.63)	<.0001
Q2	1.51 (1.21-1.88)	0.000	1.24 (1.11-1.38)	0.0
Q3	1.20 (0.95-1.5)	0.122	1.12 (1.02-1.24)	0.019
Q4	1.15 (0.92-1.44)	0.212	1.09 (0.99-1.20)	0.089
Q5 (Highest)	Ref.		Ref.	
Residential area				
Rural	1.54 (1.35-1.76)	<.0001	1.20 (1.11-1.29)	<.0001
Job				
White collar	Ref.		Ref.	
Sales and service workers	0.99 (0.77-1.27)	0.952	1.08 (0.98-1.20)	0.1
Blue collar	1.11 (0.87-1.42)	0.414	1.17 (1.06-1.29)	0.002
Others	1.17 (0.94-1.46)	0.153	0.78 (0.71-0.86)	<.0001

All health-related variables (self-rated health, no. of chronic disease, perceived stress, depressive symptoms, physical activity change after COVID-19) were associated with both UHNs due to COVID-19 related reason and due to non- COVID-19 related reason.

Table8-2. Health related factors associated with UHNs due to COVID-related, non-COVID-19 related reasons(weighted)

Variables	COVID-19 related reason/ No UHN		Non- COVID-19 related reason/ No UHN	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Self-rated health				
Poor	1.77 (1.52-2.056)	<.0001	1.71 (1.60-1.84)	<.0001
Chronic disease				
0	Ref.		Ref.	
1	0.73 (0.62-0.87)	0.000	0.71 (0.65-0.78)	<.0001
2	0.63 (0.47-0.85)	0.002	0.61 (0.52-0.72)	<.0001
Perceived stress				
Yes	1.52 (1.31-1.77)	<.0001	1.99 (1.86-2.13)	<.0001
Depressive symptoms (PHQ-9)				
Yes	2.40 (1.85-3.10)	<.0001	2.90 (2.58-3.26)	<.0001
Physical activity change after COVID-19				
Decrease	Ref.		Ref.	
Same as before	0.72 (0.62-0.83)	<.0001	0.92 (0.86-0.99)	0.010
Increase	1.24 (0.94-1.64)	0.122	0.96 (0.84-1.10)	0.599

Among COVID-19 related variables, fear of death, fear of infection of family member, neighborhood, and co-workers' performance in dealing with COVID-19 and social support showed a statistically significant association with UHNs due to non- COVID-19 related reason. Meanwhile, fear of infection, fear of infection of family member and neighborhood and co-worker performance in dealing with COVID-19 showed a statistically significant association with UHNs due to COVID-19 related reason.

Table 8-3. COVID-19 related factors associated with UHNs due to COVID-related, non-COVID-19 related reasons (weighted)

Variables	COVID-19 related reason/ No UHN		Non -COVID-19 related reason/ No UHN	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Fear of infection				
Yes	1.33 (1.09-1.62)	0.005	0.95 (0.88-1.03)	0.2396
Fear of death				
Yes	1.06 (0.90-1.26)	0.499	0.83 (0.77-0.9)	<.0001
Fear of public criticism				
Yes	0.98 (0.80-1.19)	0.820	1.08 (0.99-1.17)	0.0836
Fear of infection of family member				
Yes	1.43 (1.09-1.87)	0.009	1.18 (1.06-1.32)	0.0024
Fear of economic loss				
Yes	0.85 (0.69-1.04)	0.105	1.05 (0.96-1.15)	0.2673
Quarantine				
Yes	0.86 (0.32-2.34)	0.767	0.74 (0.53-1.04)	0.0873
Local medical institute performance to COVID-19				
Bad	1.17 (0.99-1.4)	0.070	1.01 (0.93-1.2)	0.7657
Neighborhood and co-workers' performance to COVID-19				
Bad	1.22 (1.02-1.45)	0.031	1.22 (1.13-1.33)	<.0001
Social support from others				
0	Ref.		Ref.	
1-2	0.85 (0.71-1.02)	0.087	0.78 (0.71-0.86)	<.0001
3-5	0.93 (0.76-1.13)	0.454	0.82 (0.74-0.90)	<.0001
≥6	0.92 (0.70-1.2)	0.519	0.84 (0.74-0.95)	0.0045

Chapter 4. Discussion

4.1 Discussion

This study analyzed the determinants of UHNs during the COVID-19 pandemic in South Korea using KCHS data of 2020. Among 211, 032 recipients, 5.4% experienced UHNs. Annual percentage change (APC) of UHNs was -8.0% which was tracked from 2008-2019(Jang et al., 2021), and UHN rate decreased from 2019 to 2020 even during healthcare utilization significantly dropped during the COVID-19 pandemic. COVID-19 may have affected the decrease in UHNs in several ways and there are 5 probable factors for the decrease in UHNs.

The first factor was that increased remote work allowed workers to have more flexible working times and to save commute time, leading to decrease of UHNs. This study showed that 2.7% (5,808/212,713) experienced UHNs due to lack of time in 2019 and 2.0% (4,237/211,032) in 2020. As social distancing was strengthened to prevent the spread of COVID-19, the number of remote workers increased 12-fold from 95,000 in 2019 (0.3% of the total employed) to 1.14 million (4.2%) in 2021(<https://www.bok.or.kr/portal/bbs/P0002353/view.do?nttId=10068609&menuNo=200433>, Bank of Korea issue note No.2022-4). This could have allowed the people to make it to the hospitals within the operating hours.

The second probable factor for decrease in UHN was the increased use of telemedicine. To respond to COVID-19, the Korean government temporarily allowed telephone consultations and remote prescriptions to prevent COVID-19 infection

beginning February 24, 2020(Kim et al., 2022). As of January 2022, the cumulative number of remote diagnoses reached about 3.52 million, a nearly 150-fold increase in two years since the temporary telemedicine was allowed (<https://www.kiri.or.kr/report/downloadFile.do?docId=167839>). Kim et al. (2022) analyzed the outpatient electronic medical records of one tertiary medical institution from March 4 to September 4, 2020, in which about 1% of patients used telemedicine(Kim et al., 2022). People with concerns of COVID-19 infection could receive treatment through telemedicine, and it was also useful for patients living in distant locations and has the advantages of reducing the time and indirect cost such as transportation fee. This study found that percentage of respondents who experienced UHNs due to “accessibility” was 0.57% (1,216/212,713) in 2019 and has decreased to 0.51% (1,084/211,032) in 2020. These findings suggest that telemedicine could decrease UHNs due to accessibility.

Third, it was possible that healthcare which was recognized as necessary service before COVID-19 was no longer recognized as necessary service after COVID-19. Park defined UHN as unmet needs experienced throughout the process of recognizing the need of medical care to getting the final treatment. When I applied to Park’s definition of unmet healthcare needs, UHN could decrease as the needs were not perceived or were refused to be perceived. Before COVID-19, people sought for diagnosis and treatment when visiting a hospital, but with COVID-19, they need to risk infection when visiting a hospital. Therefore, people might consider trade-off between “COVID-19 infection risk” and “benefits of visiting a hospital” when they decide healthcare necessity. For example, even those who thought routine health checkups were necessary, if they think that the damage from COVID-19 infection is greater than the benefit of health checkups, they may no longer regard the health checkups as

necessary. A person who thought it was necessary to visit a hospital for common cold may have realized that the visit to the hospital is not necessary even with same symptoms due to concerns about infection, since COVID-19 has respiratory symptom. COVID-19 could have influenced the perception of necessity of medical care despite same physical condition due to changed attitude towards health & medical care, and social & cultural impact.

Fourth, it was possible that there was a lot of unessential medical use before the COVID-19 pandemic, and the needs for unessential healthcare has decreased due to concerns on COVID-19 infection. The number of visits to medical institutions per person per year has steadily increased from about 8 days in 1990 to about 21 days in 2019 but has decreased since 2020 to about 19 days in 2021. When the visit was separated into inpatient and outpatient, 3 days were hospitalization and 16 days were outpatient visits per year in 2021. OECD measures the frequency of medical use based on physician consultation, such as outpatient visits. According to OECD's measurement, Koreans used 17.2 medical services, which was more than double the OECD average of 6.6 per year in 2019 (<https://www.index.go.kr/unify/idx-info.do?idxCd=4240&clasCd=7>). This could be positively evaluated reflecting that Korea has relatively high accessibility of healthcare compared with other countries. On the other hand, there are concerns of excessive medical access resulting from the Korean payment system such as FFS, fee-for-service. Therefore, to improve the sustainability of the health insurance system, it is necessary to suppress unnecessary medical use and to strengthen coverage in essential areas.

Then, how could the essential medical practices be distinguished from the unnecessary practices? The World Health Organization (WHO) was actively introducing the concept of essential health technology or essential medicine based on

evidence and effectiveness the criterion but the specific definition of ‘essential medical care’ is yet to be defined as there is no internationally accepted definition(Lee, 2019). Therefore, the concept of ‘essential’ may vary according to the circumstances, conditions, and backgrounds of the country concerned. In Korea, essential healthcare generally refers to medical services that, if not treated, greatly affect the patient's life or quality of life. Contrary to this concept, non-essential healthcare is optional treatment that does not correspond to life or serious illness. In this study, due to data limitations, it was not possible to determine whether decreased medical services were essential or non-essential healthcare. Therefore, further study is warranted to check whether the decreased medical use was UHN or not. However, considering that there is still no clear standard criteria for essential and non-essential healthcare, and that even non-essential healthcare can affect quality of life, work activities, and infringe human rights such as the right to be healthy, non-essential medical healthcare should not be interpreted as unnecessary. If most of reduced medical use were essential healthcare after COVID-19, the rebound effect may appear in the future. According to HIRA data, the number of new cancer treatment patients increased at an average annual rate of 4% from 2016 to 2019 but decreased by 3.0% compared to the previous year in 2020. Therefore, it will be meaningful to check whether other diseases have also rebound effect through further studies.

Lastly, it was possible that the UHNs has decreased due to the strengthening of health insurance coverage and the effects of various policies, regardless of the COVID-19. Since 2007, UHNs and UHNs due to affordability has been decreasing(Jang et al., 2021). Since 2017, the national health insurance has been expanded to support medically disadvantaged group who do not receive medical benefits at the national level and various policies were implemented to enhance health

equity. Data provided by the Centers for Disease Control and Prevention reported that rate of UHNs (median) continued to decrease to 6.0% in 2019, 5.5% in 2020, and 5.0% in 2021.

However, these suggested reasons could not be clearly identified through this study, so future studies are warranted. To react to the prolonged COVID-19, it is necessary to understand the causes of UHNs and changed medical use in detail from various angles. Despite the decrease of UHNs, COVID-19 related reason appeared in 2020 as a new factor for UHNs. This finding suggests that associated factors for UHNs due to COVID-19 related reason should be considered to resolve UHNs along with the existing factors.

No. of responder who selected “availability” decreased from 2019 to 2020. This is understandable since most local and general hospitals operated normally during the COVID-19 pandemic in South Korea, leaving no significant effect on the availability of healthcare system.

In this study, female, younger person, living alone, a lower level of education, a lower level of income and living in rural were sociodemographic factors which increased the likelihood of UHNs, consistent with previous studies (JH., 2013; Lee et al., 2016). The decrease of medical use of women was larger than of the men and it may be related to the psychological factors that women generally react more sensitively on health issues (Oh et al., 2021). This might also be related to women having higher possibility of UHN than men during COVID-19. Park reported that UHNs involves a complicated mechanism where personal factors, including individuals’ resources and recognition, and social factors, including social norm and culture, interact with the healthcare system. Norms at work and at home can act as a sense of responsibility and cause various kinds of UHNs. The impacts of COVID-19

survey on parents with children in South Korea revealed that mothers were much more likely to bear the increased burden of childcare than fathers, which in turn had direct and negative impacts on their well-being. Social norms about childcare may have contributed to the persistent unequal distribution of childcare and gender inequality.(Peng & Jun, 2022). Wolfe et al., reported that the toll of the pandemic for working parents has fallen heavily on women than men in America. A survey found that women were almost twice as likely as men to report bearing primary responsibility for overseeing children's remote schooling and general care. Data from this survey indicated that working mothers with children cut back their work hours to provide care four to five times as much compared with working fathers (Wolfe et al., 2021). The fact that COVID-19 has had greater impact on women among working parents imply that social norms and responsibilities can increase UHNs of women during the COVID-19 to a greater extent than men. Therefore, cultural, and social efforts are needed to reduce the gender inequity in childcare, and it is necessary to expand emergency care support to relieve the burden of childcare. In addition, it is crucial to recognize all members of society as the caregivers instead of having the perception childcare is mainly the responsibility of women.

This study results showed that with increasing age, the rate of UHNs tends to decrease, which was consistent with previous study(Kim et al., 2021). The higher rate of UHNs among young people may be related to time constraints due to working hours if they are not able to use medical care when necessary due to their busy schedules or economic activities(Chen & Hou, 2002; JH., 2013). This interpretation could also be reflected on this study in which the most frequent reason for UHNs for 20s, 30s and 40s was "availability".

This study showed that UHNs was higher in lower income quintile than higher

income quintile, consistent with previous studies (JH., 2013; Kim et al., 2018; Lee et al., 2016). Oh et al., 2021 reported that lower socioeconomic status was associated with a higher risk of contracting COVID-19 (Oh et al., 2021) and Belot et al., 2020 reported that lower income groups have been more affected economically, higher income groups have experienced more changes in their social life and spending during COVID-19 pandemic (Belot et al., 2020). This may increase the vulnerability in lower income group and eventually leading to increased UHNs. To reduce the burden of medical expenses for low-income families during the pandemic, Korean government has made efforts by lowering out of pocket expenses for low-income households from January 2021. However, the patient has to pay the hospital fee out of the pocket first and then get reimbursed. Therefore, for people whose income sharply decreased due to COVID-19 and for whom government support was not enough, this supporting expense is insufficient to provide a practical solution. For these people, it is necessary to expand the cost of health expenses.

In this study, blue collar groups with more physical activity experienced more UHNs (blue collar: OR 1.15) compared to the white-collar group. This study showed that blue collar and service workers were more likely to experience UHNs due to “affordability” and less likely to have UHNs due to “availability” compared to white collar workers. These study results are consistent with prior studies but the fact that specialized professions income is generally higher must also be considered. New technology has made remote work more practical than ever and lots of white-collar office workers have been able to safely work from home whereas blue collar workers whose jobs mostly can’t be done remotely had no choice but to be exposed to the risk of infection to continue earning a living during and after COVID-19 pandemic. 35% of jobs in South Korea can be done as remote work, and the occupations whose work can’t

be done at home are closely related to the group who earn low wages and are economically vulnerable. (Choi, 2020). Blue collar workers more likely to experience a layoff than white-collar workers (65.6% vs. 40.1%, respectively). (Wolfe et al., 2021). These working environment and job insecurity also lead to blue collar and service workers having higher possibility of unpaid leave or unemployment due to the strengthening of social distancing, which could eventually deprive their affordability and availability during pandemic. Increased employment insecurity and relatively fewer paid sick leave have widened the income gap among workers and deepened inequality across society, which in turn can increase the gap in the incidence of UHNs among workers. Therefore, the government should devise a system to increase the employment stability of the underprivileged.

Among health-related factors, poor evaluated health status, perceived stress, and depressive symptom (PHQ-9) were key determinants of UHNs, and these results were consistent with previous studies(Jung & Ha, 2021; Kim, 2016; Park et al., 2017; Starkes et al., 2005).

This study showed that as no. of chronic disease increased, UHN decrease, which differed from previous studies. Previous studies showed that chronic diseases increased the likelihood of UHNs(Kim et al., 2021) whereas some studies showed no statistically significant difference during COVID-19 (Hung et al., 2022; Lee & You, 2021). Shin et al., reported that the medical use of chronic disease patients was 96.7% in 2019 and 97.0% in 2020 even total medical service use was 59.1% in the first half of 2020, a decrease of 9.8 % points from a year ago (the first half of 2019)(Shin et al., 2021). COVID-19 had little impact on medical use for chronic disease patients in Korea, which differed from other countries. Many other countries implemented lockdown or movement restrictions, which resulted in complete or partial suspension in the medical

service areas such as hypertension, diabetes, related complications, cancer treatment, and cardiovascular disease(COVID). Unlike other countries, there was no recommendation to postpone or cancel hospital visits led by health authorities while social distancing was in act and telemedicine was quickly implemented in Korea to make treatment available for chronic diseases like high blood pressure and diabetes. These environments could lead to the result that people with chronic disease experienced less UHNs compared to the people without.

There are several implications that have emerged from this study. All fears of COVID-19, local medical institute performance in dealing with COVID-19 and neighborhood and co-workers' performance in dealing with COVID-19 were significantly associated with UHNs in the univariate analyses. Nonetheless, most of these associations were statistically non-significant in the multivariate analysis (Table 6). The associations between such variables and UHNs were hence mediated by other factors.

The result of this study regarding the relationship between fear of infection and UHNs was consistent with previous studies during SARS, H1N1(Lau et al., 2010; Lau et al., 2005). Individual with fear of infection of family member are more vulnerable and more likely to have UHNs as compared to their counterparts and this result was consistent with previous study(Lau et al., 2010). However, fear of death had negative correlation with UHNs. Individuals with fear of death less likely to have UHNs as compared to their counterparts. According to a systematic review and meta-analysis(Özgülç et al., 2021), factors associated with death anxiety were determined as death of a family member from COVID-19, religiosity and cultural norms, perceived level of stress, attitude towards COVID-19, subjective proximity to death, coping strategies, history of COVID-19 contact, mental illness, alcohol consumption,

loneliness, perceived risk and strategies for coping with stress. This result suggests that a different approach is needed depending on type fear to decrease UHNs.

The positive evaluation of neighborhood and co-workers' performance in dealing with COVID-19 and social support significantly associated with lower UHNs. Yang et al. reported that social support, family trust, and a sense of belonging to the local community affect fear of COVID-19 and the more people perceived that they received support from others, the more they trusted community members to cope well with pandemic (Yang & Kim, 2020). Since COVID-19 is an infectious disease, neighbors' respond to COVID-19 could affect the possibility of COVID-19 infection, which can have a great impact on changes in individual activities including hospital visiting. To reduce the UHNs due to fear of infection, an individual psychological approach is important, but it is also important to prepare the response guidelines to COVID-19 in an easy-to-understand manner and communicate it well to the people so that members of the community and society can follow the government's response guidelines well.

4.2 Limitations

There are some limitations to this study.

First, residential area was only classified into rural or urban even though residential area could be influencing factor for UHNs considering that number of confirmed cases varied on each district. Lee et al (Lee & You, 2021) reported that living in Daegu or Gyeongbuk regions, where the no. of confirmed peaked during study duration, was one of the strongest influencing factor for UHNs.

Second, 2020 Korea Community Health Survey (KCHS) was conducted between Aug 16th to Oct 31st, 2020, when the number of confirmed cases exploded after the assembly of national liberation day, and it may have influenced responders' perception on UHNs.

Third, UHN period included 4 months (Aug 2019 to Dec 2019) before COVID-19, so the impact of COVID-19 on UHN may have been underestimated.

Fourth, I only analyzed the determinants of UHNs in 2020 so it was hard to identify the long-term impact of COVID-19 on UHN change in depth.

Fifth, it was hard to clearly identify long term changes of UHNs during the pandemic because this was a cross sectional baseline study. Sixth, there were some possibilities of selection bias considering that those with fears of infection, contact may have been excluded from the investigation since the survey was conducted in person.

Lastly, essential, nonessential UHNs cannot be separated due to data limitation. This should be further investigated to identify whether UHNs rate decreased due to nonessential or essential care during the pandemic. Additionally, further studies are warranted to track the long-term change of UHNs during pandemic.

Despite these limitations, this study is significant because it provides up-to-date analysis concerning UHNs during the unprecedented infectious disease, COVID-19 pandemic in South Korea. This is the first study to identify UHNs by classification of the detailed causes of UHNs. Also, this study identified factors associated with UHNs due to COVID-19 related and non-COVID-19 -related reasons. It is important to identify association factors for UHNs during pandemic since another pandemic can occur in the future.

4.3 Conclusions

Although South Korea has witnessed a steady decrease in UHNs, UHNs due to COVID-19 related reason occurred. The results of this study showed that female was more vulnerable. Individuals without fear of death, individuals with fear of infection of family member and individuals who had social support from others were more likely to experience more UHNs. Low socio-economic groups had higher frequency of “affordability”, “accessibility” for UHNs and it should be noted that the low socio-economic group was more vulnerable to the pandemic, leading to increased health inequity. This study will offer guidance for public health policy to establish customized healthcare utilization policies and health promotion during pandemic.

Bibliography

- Allin, S., Grignon, M., & Le Grand, J. (2010). Subjective unmet need and utilization of health care services in Canada: what are the equity implications? *Soc Sci Med*, 70(3), 465-472. <https://doi.org/10.1016/j.socscimed.2009.10.027>
- Altman, I. (1974). Aspects of Medical Care Administration: Specifying Requirements for Health Care. *Health Services Research*, 9(1), 86-87. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1071786/>
- Belot, M., Choi, S., Jamison, J. C., Papageorge, N. W., Tripodi, E., & Van den Broek-Altensburg, E. (2020). Unequal consequences of Covid 19 across age and income: representative evidence from six countries.
- Byun, H., Kang, D., Go, S. I., Kim, H. I., Hahm, J. R., & Kim, R. B. (2022). The impact of the COVID-19 pandemic on outpatients of internal medicine and pediatrics: A descriptive study. *Medicine (Baltimore)*, 101(8), e28884. <https://doi.org/10.1097/MD.00000000000028884>
- Chen, J., & Hou, F. (2002). Unmet needs for health care. *Health Rep*, 13(2), 23-34.
- Choi, S. (2020). Characteristics and Distribution of Teleworkable Jobs Based on Physical Working Conditions. *Journal of the Economic Geographical Society of Korea*, 23(3), 276-291.
- COVID, W. Significantly Impacts Health Services for Noncommunicable Diseases. *World Health Organisation (2020)*. Available online at: <https://www.who.int/news-room/detail/01-06-2020-covid-19-significantly-impactshealth-services-for-noncommunicable-diseases> (accessed November 11, 2020).
- Dopfer, C., Wetzke, M., Zychlinsky Scharff, A., Mueller, F., Dressler, F., Baumann, U., Sasse, M., Hansen, G., Jablonka, A., & Happle, C. (2020). COVID-19 related reduction in pediatric emergency healthcare utilization – a concerning trend.

- BMC Pediatrics*, 20(1), 427. <https://doi.org/10.1186/s12887-020-02303-6>
- Emanuel, E. J., Persad, G., Upshur, R., Thome, B., Parker, M., Glickman, A., Zhang, C., Boyle, C., Smith, M., & Phillips, J. P. (2020). Fair Allocation of Scarce Medical Resources in the Time of Covid-19. *N Engl J Med*, 382(21), 2049-2055. <https://doi.org/10.1056/NEJMs2005114>
- Garcia, S., Albaghdadi, M. S., Meraj, P. M., Schmidt, C., Garberich, R., Jaffer, F. A., Dixon, S., Rade, J. J., Tannenbaum, M., Chambers, J., Huang, P. P., & Henry, T. D. (2020). Reduction in ST-Segment Elevation Cardiac Catheterization Laboratory Activations in the United States During COVID-19 Pandemic. *J Am Coll Cardiol*, 75(22), 2871-2872. <https://doi.org/10.1016/j.jacc.2020.04.011>
- Hu, S., Kim, M., Lee, S., & Kim, S. (2009). Policy options to tackle unmet health needs. *The Korea Institute for Health and Social Affairs*.
- Hung, K. K., Walline, J. H., Chan, E. Y. Y., Huang, Z., Lo, E. S. K., Yeoh, E. K., & Graham, C. A. (2022). Health service utilization in Hong Kong during the COVID-19 pandemic—a cross-sectional public survey. *International Journal of Health Policy and Management*, 11(4), 508-513.
- Hwang, J., Guilcher, S. J. T., McIsaac, K. E., Matheson, F. I., Glazier, R., & O'Campo, P. (2017). An examination of perceived health care availability and unmet health care need in the City of Toronto, Ontario, Canada. *Can J Public Health*, 108(1), e7-e13. <https://doi.org/10.17269/cjph.108.5715>
- Jang, B. N., Joo, J. H., Kim, H. J., Park, E.-C., & Jang, S. I. (2021). Unmet healthcare Needs Status and Trend of Korea in 2019. *Health Policy and Management*, 31(2), 225-231.
- JH., L. (2013). Analysis of unmet medical need status based on the Korean health panel.

Health and Social Science. *Health and social science*, 34, 237-256.

Jung, B., & Ha, I.-H. (2021). Determining the reasons for unmet healthcare needs in South Korea: a secondary data analysis. *Health and quality of life outcomes*, 19(1), 1-17.

Kang, Y. W., Ko, Y. S., Kim, Y. J., Sung, K. M., Kim, H. J., Choi, H. Y., Sung, C., & Jeong, E. (2015). Korea Community Health Survey Data Profiles. *Osong Public Health Res Perspect*, 6(3), 211-217.
<https://doi.org/10.1016/j.phrp.2015.05.003>

Kim, H. S., Kim, B., Lee, S. G., Jang, S.-Y., & Kim, T. H. (2022). COVID-19 Case Surge and Telemedicine Utilization in a Tertiary Hospital in Korea. *Telemedicine and e-Health*, 28(5), 666-674.

Kim, J. (2016). The impact of health care coverage on changes in self-rated health: comparison between the near poor and the upper middle class. *Health Policy and Management*, 26(4), 390-398.

Kim, J., You, M., & Shon, C. (2021). Impact of the COVID-19 pandemic on unmet healthcare needs in Seoul, South Korea: A cross-sectional study. *BMJ open*, 11(8), e045845.

Kim, M., Ki, M., Kim, M., Kim, Y., Yoon, T., Jang, S., & Choi, J. (2014). Developing health inequalities report and monitoring the status of health inequalities in Korea. *Sejong: Korea Institute for Health and Social Affairs*, 2014-2003.

Kim, Y.-S., Lee, J., Moon, Y., Kim, K. J., Lee, K., Choi, J., & Han, S.-H. (2018). Unmet healthcare needs of elderly people in Korea. *BMC geriatrics*, 18(1), 1-9.

Lau, J. T., Griffiths, S., Choi, K. C., & Tsui, H. Y. (2010). Avoidance behaviors and negative psychological responses in the general population in the initial stage of the H1N1 pandemic in Hong Kong. *BMC infectious diseases*, 10(1), 1-13.

- Lau, J. T., Yang, X., Pang, E., Tsui, H., Wong, E., & Wing, Y. K. (2005). SARS-related perceptions in Hong Kong. *Emerging infectious diseases*, *11*(3), 417.
- Lee, M., & You, M. (2021). Avoidance of healthcare utilization in South Korea during the coronavirus disease 2019 (COVID-19) pandemic. *International Journal of Environmental Research and Public Health*, *18*(8), 4363.
- Lee, S. E., Yeon, M., Kim, C.-W., & Yoon, T.-H. (2016). The Association Among Individual and Contextual Factors and Unmet Healthcare Needs in South Korea: A Multilevel Study Using National Data. *J Prev Med Public Health*, *49*(5), 308-322. <https://doi.org/10.3961/jpmph.16.035>
- Lee, S. M. (2019). Essential health care. *Journal of the Korean Medical Association*, *62*(4), 231-237.
- Oh, T. K., Choi, J.-W., & Song, I. (2021). Socioeconomic disparity and the risk of contracting COVID-19 in South Korea: an NHIS-COVID-19 database cohort study. *BMC Public Health*, *21*(1), 1-12.
- Organization, W. H. (2000). *The world health report 2000: health systems: improving performance*. World Health Organization.
- Özgülç, S., Kaplan Serin, E., & Tanriverdi, D. (2021). Death Anxiety Associated With Coronavirus (COVID-19) Disease: A Systematic Review and Meta-Analysis. *OMEGA-Journal of Death and Dying*, 00302228211050503.
- Park, E. H., Park, E.-C., Oh, D. H., & Cho, E. (2017). The effect of stress and depression on unmet medical needs. *Korean Journal of Clinical Pharmacy*, *27*(1), 44-54.
- Peng, I., & Jun, J. (2022). Impacts of COVID-19 on parents with small children in South Korea: survey findings and policy implications. *International Journal of Care and Caring*, *6*(1-2), 13-32.
- Richards, M., Anderson, M., Carter, P., Ebert, B. L., & Mossialos, E. (2020). The impact

of the COVID-19 pandemic on cancer care. *Nat Cancer*, 1(6), 565-567.

<https://doi.org/10.1038/s43018-020-0074-y>

Shin, J., Moon, S.-J., & Jung, S.-H. (2021). Covid-19 and health care utilization.

Research in Brief(75), 1-7.

Starkes, J. M., Poulin, C. C., & Kisely, S. R. (2005). Unmet need for the treatment of

depression in Atlantic Canada. *The Canadian Journal of Psychiatry*, 50(10),

580-590.

Tapper, E. B., & Asrani, S. K. (2020). The COVID-19 pandemic will have a long-lasting

impact on the quality of cirrhosis care. *J Hepatol*, 73(2), 441-445.

<https://doi.org/10.1016/j.jhep.2020.04.005>

Wolfe, R., Harknett, K., & Schneider, D. (2021). Inequalities at work and the toll of

COVID-19. *Health Affairs Health Policy Brief*, 4.

Yang, M.-R., & Kim, H.-S. (2020). The effect of social support on anxiety in pandemics

(COVID-19): the mediated effect of social trust. *Journal of the Korea*

Convergence Society, 11(11), 309-319.

Website

<https://www.bok.or.kr/portal/bbs/P0002353/view.do?nttId=10068609&menuNo=2004>

[33](#)

<https://www.kiri.or.kr/report/downloadFile.do?docId=167839>

<https://www.index.go.kr/unify/idx-info.do?idxCd=4240&clasCd=7>

초 록

코로나19라는 유례없는 공중보건 위기상황은 사회적, 경제적 파장과 함께 보건의료체계에도 변화를 요구하는 계기가 되었다. 우리나라의 코로나19 대응은 ICT기술을 바탕으로 빠르고 정확한 진단, 포괄적인 경로 추적, 적절한 치료로 완성된 ‘K 방역’이라는 의미 있는 성과를 창출하였으나, 감염 예방과 방역에 대한 가용자원 집중으로 인해 만성질환관리와 건강증진을 견인하는 공공의료체계에 서비스 공백이나 축소가 발생하기도 했다. 거리두기 방역정책으로 대면 활동이 제한되면서 의료이용도 크게 감소하였는데 이러한 의료 이용 감소가 실제 의료적 필요가 있었음에도 불구하고 치료를 받지 못한 미충족 의료인지 팬데믹 이전의 불필요한 의료이용이 감소한 것인지를 확인하는 것은 의미 있는 연구가 될 것이다. 미충족 의료는 적절한 치료를 받지 못한 사람들의 건강을 악화시킬 수 있으며, 가난한 사람들에게 집중된다면 건강불평등을 증가시킬 수 있다. 이러한 건강위험을 예방하고 관리하기 위해 미충족 의료에 영향을 미치는 요인을 규명하는 것이 필요하다.

본 연구에는 팬데믹 시기에 발생한 미충족 의료 현황을 살펴보고, 미충족 의료의 이유를 세분화하여 팬데믹이 미충족 의료 발생에 미치는 영향을 확인하고자 하였다. 본 연구에 이용한 자료는 2020년 지역사회건강조사 결과 얻어진 전국 성인 약 23만명의 응답자료이다. 조사수행기간은 2020년 8월 16일부터 10월 31일까지이며, 전국 시군 구 단위 255개 보건소의 관할 지역에서 주택유형과 인구구성을 고려한 복합표본 추출을 통해 선정한 가구를 대상으로 만 19세이상 성인 가구원을 모두 조사하였다. 전체 응답자 229,269명 중 미충족 의료경험을 묻는 질문에 응답하지 않은 18,237명을 제외한 211,032명(여자 116,994명 55.4%)의 자료를 분석하였다.

독립변수로는 인구사회학적 특성, 건강행태, 만성질환 진단경험과 코로나

감염여부, 코로나에 대한 인식 등을 포함하였으며 종속변수로는 미충족 의료 경험을 사용하였다.

전체 응답자의 5.4%가 미충족 의료를 경험했다고 응답하여, 이는 2019년보다 감소한 수치이나, 미충족 의료 이유를 세분화하여 살펴보면 시간적 가용성 (Availability, 48.1%), 수용성(Acceptability, 23.3%), 코로나 관련 요인 (COVID-19 related, 16.1%), 지불능력(Affordability, 8.7%), 물리적 접근성 (Accessibility, 3.9%)순으로 미충족 의료를 경험했다고 응답하여 코로나로 인한 이유가 세번째로 많음을 확인하였다.

인구 사회학적 변수, 건강 관련변수와 코로나 관련변수를 모두 보정하여 미충족 의료의 영향요인을 분석한 결과 여성, 젊은 연령, 낮은 교육수준, 낮은 소득수준, 1인 가구, 시골 거주, 육체노동자(Blue collar) 및 기타(학생, 주부, 군인 등)에서, 주관적 건강상태가 나쁘고, 자가 만성질환이 없는 경우, 우울증세가 있는 경우(PHQ-9 10점이상)에서 미충족 의료경험이 증가하였다. 코로나 감염으로 인한 죽음에 대해 두려움이 있는 군이 두려움이 없는 군에 비해 통계적으로 유의하게 미충족 의료경험이 감소하였으나, 가족(건강취약자)의 감염에 대한 두려움이 있는 군은 두려움이 없는 군에 비해 미충족 의료경험이 더 높았다. 이웃과 직장동료의 코로나 대응능력이 적절하지 않다고 판단한 군, 자가 격리동안 도움을 요청할 수 있는 주변인이 없는 군에서 미충족 의료경험이 증가하였다.

미충족 의료를 경험하게 된 이유를 코로나로 인한 이유와 그 외의 이유로 나누어 미충족 의료 영향요인을 확인하였을 때, 코로나 이외의 이유로 미충족 의료를 경험한 군의 인구사회학적변수와 건강 관련 변수는 모든 미충족 의료 관련요인과 동일하였으나, 코로나 관련 요인 중 통계적 유의차가 있는 요인은 죽음에 대한 두려움, 가족(건강취약자)의 감염에 대한 두려움, 이웃과 직장동료의 코로나 대응능력 및 격리 시 도움을 요청할 수 있는 주변인의

유무였다.

코로나로 인한 이유로 미충족 의료를 경험한 군의 영향 요인의 경우 모든 건강 관련 변수는 미충족 의료 관련요인과 동일하였으나, 인구사회학적 특성 중 1인 가구여부와 교육수준의 통계적 유의차는 없었다. 또한 죽음에 대한 두려움과 격리 시 도움을 요청할 수 있는 주변인의 유무도 통계적 유의차는 없었으며 감염에 대한 두려움이 있는 군에서 미충족 의료경험이 감소하는 결과를 보여 코로나 이외의 이유로 인한 미충족 의료 영향 요인과는 다른 양상을 보였다.

본 연구를 통하여 감염에 대한 두려움과 죽음에 대한 두려움이 미충족 의료에 미치는 영향이 서로 다름을 확인할 수 있었고, 코로나로 인한 이유와 코로나 이외의 이유로 인한 미충족 의료의 영향 요인은 상이하여 미충족 의료 발생된 이유에 따라 다른 접근 및 정책이 필요하다는 것을 확인할 수 있었다.

코로나 팬데믹 기간 동안 여성, 낮은 교육수준, 낮은 소득수준 및 1인 가구 등 취약계층은 일반국민에 비해 미충족 의료를 더 많이 경험하였으며, 사회적 취약계층이 코로나로 인한 경제적 타격이 크고 우울감과 질병에 대한 우려가 더 크기 때문에 취약계층에 더욱 세분화된 접근이 필요하겠다.

본 연구는 2020년도에 수집한 데이터를 바탕으로 분석한 결과로 장기간 지속되는 감염병 위기시대에 의료이용 행태 변화를 확인하기 위해서는 보다 장기적 연구가 추가적으로 필요하겠다. 또한 코로나 팬데믹 기간 동안의 미충족 의료 발생이 방역정책에 따른 이유에서 불필요한 검사와 치료가 줄어든 영향 때문인지 실제 의료적 필요가 있었음에도 불구하고 치료를 받지 못한 미충족 의료인지 여부를 확인할 필요가 있겠다.

주요어: 미충족 의료, COVID-19, 2020 지역사회건강조사, 의료불평등, 감염의 두려움