

Health-Seeking Patterns of Female North Korean Defectors in South Korea for Mental Health: Evidence from Nationwide Health Insurance Data

HyeSeung Wee, Jongmin Lee, and Seungho Jung

Utilizing data from South Korea's National Health Insurance Database, which covers the entire population, this study investigates the health-seeking patterns of North Korean defectors in South Korea, focusing on mental health issues. We find that female North Korean defectors utilize mental healthcare services significantly more than male defectors and more than their matched counterparts among either South Korean natives or other immigrants. Regarding the long-term effects of residing in South Korea, indicators of both the prevalence and seriousness of mental health issues do not appear to decrease over time, for up to fifteen years after migration. We recommend more active medical support and intervention by the government to alleviate the difficulty of adjustment among female North Korean defectors that arises from mental health issues.

Keywords female North Korean defectors, mental health, healthcare utilization, adjustment, National Health Insurance Database

Introduction

Refugees face heightened vulnerability when fleeing political strife or economic hardship in search of safety elsewhere. Despite the growing scale and stark realities of their plight each year, this issue fails to capture the attention of the global populace. Furthermore, as they depart from their places of settlement to venture into new territories, these individuals can find themselves outside the realm of legal protection. This poses challenges to collecting the fundamental data necessary to assess their health or economic struggles, thereby impeding the formulation of evidence-based policies and social discourse pertaining to refugees.

In the wake of prolonged economic decline since the 1980s and a severe

famine in the late 1990s, North Korean defectors represent a unique subset among the diverse immigrants who have journeyed through third-party countries, such as China, to arrive in South Korea. The majority of North Korean defectors are from the border region between China and North Korea. This is mainly because they initially stay in China after crossing the border, and then enter South Korea through a third country. Very few defectors come directly through the Demilitarized Zone.

During the migration process, North Korean defectors, especially women, endure hardships (such as separation from family) and face challenges (including inadequate medical support during pregnancy and childbirth). Moreover, many women shoulder the burden of child-rearing in circumstances where they lack familial or kinship assistance, exacerbating their vulnerability in terms of mental health. Sullivan et al. (2020) found that migrant and refugee women experience poorer health outcomes compared to women born in Australia. They also identified social determinants and predictors of mental illness and emphasized the importance of creating an environment conducive to data-driven discourse and policy development.

With this awareness, government agencies like the Hanawon¹ and organizations like the Korea Hana Foundation (2023) periodically conduct surveys. These surveys utilize questionnaires to investigate various aspects of North Korean defectors' health status, economic adaptation, and other factors upon their arrival in South Korea and beyond. Nevertheless, in-depth research regarding the health status of North Korean defectors and the analysis of long-term health changes are still underdeveloped and underexplored. Most studies are cross-sectional, making it challenging to ascertain whether mental or psychological problems improve or worsen over the long-term after resettlement. There is an urgent need for longitudinal studies to comprehensively understand mental health trajectories and clarify the contributing factors.

Therefore, this study aims to objectively examine how North Korean defectors' mental health in South Korean society has changed over time, utilizing data from the National Health Insurance Database. This study is structured as follows. The next section reviews existing research on the mental health and adaptation of immigrants and North Korean defectors. After that, this article describes the research methods used in this study, including the data utilized, followed by an examination of medical utilization patterns for North Korean defectors, South Korean residents, and immigrant samples. Finally, the discussion section highlights the contributions of the research and presents its policy implications.

Literature Review on the Health Status of Female North Korean Defectors

Mental health concerns feature prominently in discussions about the health of female North Korean defectors. Lee et al. (2022) revealed that, according to 2019 health insurance statistics, the prevalence among North Korean defectors of “mental and behavioral disorders” per 1,000 people was 144.6. This figure contrasts sharply with the 62.7 recorded among South Koreans. The discrepancy is even more pronounced among women, with 176.3 incidents per 1,000 female North Korean defectors compared to 85.4 among male defectors. Moreover, mental illness represents a significant economic burden. Using the disability-adjusted life year metric, Kim et al. (2021) identified depression as the leading condition affecting female North Korean defectors in terms of disease burden.

Research consistently shows that refugees experience higher rates of mental health disorders compared to the general population (Fazel et al. 2005; Porter and Haslam 2005). Pre-migration trauma and post-migration stress are significant risk factors for adverse mental health outcomes in refugees, including depression, post-traumatic stress disorder (PTSD), and anxiety disorders. In their systematic review, Bogic et al. (2015) report that depression is found in twenty-one studies, anxiety in twenty-four studies, and PTSD in twenty out of twenty-nine studies on mental disorders among refugees. Similarly, Fazel et al. (2005) find PTSD in seventeen and depression in fourteen out of twenty studies reviewed. An examination of 213 studies on the psychosocial health of North Korean refugees by Lim, Lee, and Yang (2017) reveals depression in fifty studies (35.7%), PTSD in twenty-five (17.9%), and anxiety in twenty-four (17.1%). This study also highlights depression and anxiety disorders as the main mental health issues among North Korean defectors. However, due to the limited number of PTSD diagnoses in National Health Insurance Service (NHIS) data, we use the broader category of reaction to severe stress and adjustment disorders (RSSAD) as proxies.²

North Korean defectors have endured various traumatic events while living in or escaping from North Korea. Female defectors, in particular, experience higher rates of trauma due to sexual violence in third countries. Kim and You (2011) found that 30.6% of their respondents had faced forced marriages or trafficking. Additionally, Kim et al. (2017) reported a 17.1% prevalence rate for experiences of sexual victimization in third countries, which include harassment, attempted rape, and rape. Prolonged stays in third countries seem to amplify mental health risks for North Korean defectors due to accumulated distress and trauma (Baek et al. 2007). Data from the 2016 North Korean defector survey by the Korea Development Institute (KDI) indicated that 36.4% had stayed in a third country for more than four years. This extended stay was more frequent

among women (40.1%) than men (22.4%). A significant portion of these women who found themselves in China faced damaged self-esteem, shame, and intense frustration, factors that predispose them to depression and anxiety (Kim and No 2003).

Upon resettlement, female North Korean defectors encounter numerous stresses adapting to South Korean society. Longitudinal studies on refugees' mental health indicate that mental health issues can persist or worsen post-resettlement (Mollica et al. 2001; Lie 2002). Studies of North Korean defectors provide mixed insights into the trajectory of mental health conditions such as PTSD and depression after resettlement. For example, Hong et al. (2006) note a significant reduction in PTSD diagnoses, from 27.2% at the start to 4.0% within three years. However, conditions like depression and anxiety seem to worsen post-resettlement, particularly in comparison to the initial stages of entry, such as during their stay at the Hanawon (Noh 2001; Kim and Shin 2010). A U-shaped curve of mental health distress, characterized by a decrease in the first two to three years and followed by an increase, is a common observation across studies. This suggests an initial period of optimism and engagement with South Korean society, followed by challenges like achieving economic independence that contribute to increased mental distress. This U-curve pattern is consistent with existing literature on migrant distress (Furnham and Bochner 1989). Among female North Korean migrants, there is a noted trend of increasing depressive symptoms with longer stays in South Korea (Kim 2012). Most research, however, is cross-sectional, highlighting a need for more longitudinal studies.

A significant challenge in studying the mental health of North Korean defectors is their reluctance to seek medical care. National Cancer Center, Ministry of Unification's Hanawon, and Goyang City (2022) note that North Korean defectors often forego proper diagnoses and treatment at medical facilities, a consequence of the collapse of North Korea's healthcare system. They may self-diagnose or seek prescriptions for medications, a practice stemming from purchasing medication at markets. Particularly for mental health issues, there is a stigma, and patients with mental illnesses are often isolated in separate facilities, causing some to avoid seeking treatment for conditions like anxiety and insomnia. Therefore, even when NHIS data, an official source to measure healthcare utilization, is used, it is crucial to acknowledge that the true prevalence of mental health problems among North Korean defectors is likely underreported.

Methods

The National Health Insurance Service Database

In this section, we examine the health status of female North Korean defectors in South Korea and compare it to that of male defectors, South Korean natives,

and foreign immigrants. Specifically, we focus on mental health issues, including depression, anxiety, and reaction to RSSADs. In the existing literature, these conditions have been identified as major health concerns for female refugees. We exploit healthcare utilization data from the NHIS of South Korea, which is the national mandatory health insurance that covers the whole population in the country.³

The NHIS has granted researchers access to its database since 2015. This database covers the entirety of individual-level healthcare utilization records covered by the national health insurance system in South Korea, including disease codes, the number of outpatient visits, and days of hospitalization. It also includes biomarker measurements and health behavior surveys from nationwide regular health checkups. A customized research database is available after an anonymization process that removes personal information that could identify an individual. Each individual is assigned an arbitrary number so that a researcher can aggregate the records at the individual level and construct a panel dataset.

Sample Dataset

Our dataset encompasses almost the entire population of North Korean defectors in South Korea. We also sampled South Korean natives and foreign immigrants for comparison. Since the demographic composition of North Korean defectors is quite different from the other groups, we pulled South Korean natives and foreign immigrants with similar characteristics as North Korean defectors using propensity score matching methods. The matching is based on three main covariates (year of birth, gender, and city of residence) and under the criterion of the nearest score.

As a result of matching, 28,104 South Koreans and 27,225 foreigners were matched with 28,106 North Korean defectors. In Table 1, we find that the three groups in the sample have similar demographic compositions. Each group comprises of approximately 30% males and 70% females, with a slightly higher proportion of females among foreign immigrants (73%). The distribution of birth years is bell-shaped, centered on the 1970s. North Korean defectors can also be categorized by their year of immigration. Among the 28,106 defectors, 41.8% arrived in South Korea in 2010 and before, and 58.2% arrived in 2011 and after.⁴ There is no information regarding the year of immigration for foreign immigrants, as they are not obligated to enroll in the national health insurance program.

Furthermore, to control for the differences in nutritional endowment during the growth period and general health risks by group, we additionally include height and the Charlson Comorbidity Index (CCI) as matching covariates for the robustness check.⁵ We report the results in the Appendices section at the end.

The empirical analysis of this study is based on the person-year level observations from 2003-2022. We have 304,660 observations for North Korean defectors,

Table 1. Demographic Composition of North Korean Defectors, Natives, and Other Immigrants

	North Korean defectors	South Korean natives	Foreign immigrants
<i>Gender</i>			
Male	8,549 (30.4)	8,544 (30.4)	7,432 (27.3)
Female	19,557 (69.6)	19,560 (69.6)	19,793 (72.7)
<i>Year of birth</i>			
Pre-1950	1,154 (4.1)	1,144 (4.1)	896 (3.3)
1950s	1,360 (4.8)	1,359 (4.8)	1,414 (5.2)
1960s	4,982 (17.7)	4,986 (17.7)	5,235 (19.2)
1970s	6,789 (24.2)	6,789 (24.2)	6,933 (25.5)
1980s	6,243 (22.2)	6,245 (22.2)	6,615 (25.5)
1990s	4,389 (15.6)	4,388 (15.6)	3,837 (14.1)
Post-2000	3,189 (11.3)	3,193 (11.4)	2,295 (8.4)
<i>Residence</i>			
Seoul	6,712 (24.4)	6,824 (24.3)	6,558 (24.5)
Metropolitan city	4,357 (15.9)	4,491 (16.0)	4,373 (16.4)
Elsewhere	16,396 (59.7)	16,788 (59.7)	15,794 (59.1)
<i>Medical accessibility</i>			
General hospital	7,959 (29.0)	8,185 (29.1)	7,673 (28.7)
Hospital	17,191 (62.6)	17,537 (62.4)	16,808 (62.9)
Clinic	2,204 (8.0)	2,273 (8.1)	2,172 (8.1)
None	112 (0.4)	109 (0.4)	73 (0.4)
<i>Year of immigration</i>			
2000 or before	332 (1.2)		
2001-2005	1,658 (5.9)		
2006-2010	9,762 (34.7)		
2011-2015	9,882 (35.2)		
2016 or after	6,472 (23.0)		
<i>Total</i>	28,106 (100.0)	28,104 (100.0)	27,225 (100.0)

Note: The numbers in this table denote the counts of individuals within each demographic group and the figures in the parentheses indicate shares of the subgroups. We include the entire population of North Korean defectors and their corresponding matched individuals of South Korean natives and foreign immigrants. Residence categorization is based on the address at the time of matching, i.e., the first settlement city for North Korean defectors. We also group individuals based on their nearness to medical facilities. We define the first group as individuals living in cities that have at least one general hospital, the second group as residents of cities with at least one hospital located therein, but without any general hospital, and so on.

Source: Authors' compilation based on South Korea's National Health Insurance Database 2003-2022.

Table 2. General Health Status and Healthcare Utilization Patterns of North Korean Defectors, South Korean Natives, and Other Immigrants

	North Korean defectors		South Korean natives		Foreign immigrants	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	41.7	13.2	42.0	13.4	42.0	12.8
Years since migration	6.1	4.5				
<i>General health measurement</i>						
Height (cm)	157.0	7.5	162.7	8.4	160.4	8.4
Weight (kg)	57.7	9.4	62.6	12.3	61.3	12.2
BMI (cm/kg ²)	23.3	3.1	23.6	3.6	23.7	3.7
Blood pressure (mmHg)	115.2	13.8	119.4	14.6	118.9	14.7
Blood sugar (mg/dl)	94.8	18.4	96.9	21.6	96.0	20.3
Total cholesterol (mg/dl)	186.9	40.2	194.6	39.1	193.3	39.5
CCI	0.9	1.4	0.7	1.2	0.6	1.1
<i>Medical utilization</i>						
Outpatient visits	15.8	19.2	12.1	16.3	10.3	13.6
Inpatient days	3.2	18.8	1.7	15.7	1.1	10.3
Hospital visits	3.2	17.3	2.1	15.4	1.6	10.1
Clinic visits	12.0	16.5	9.2	13.8	7.6	11.3
<i>Medical expenditure (KRW 10000)</i>						
Total healthcare expenditure	114.9	333.2	77.6	301.8	66.0	255.5
Copayment	11.9	32.3	18.5	51.9	16.8	44.0
Insurance benefit	103.0	317.5	59.0	261.8	49.2	219.4
Copayment share (%)	17.0	15.2	31.3	10.1	32.4	10.3

Note: This table is based on the person-year level medical records throughout 2003-2022. The number of observations is 304,660 for North Korean defectors, 317,586 for South Korean natives, and 280,395 for foreign immigrants. The anthropometric measures and the biomarkers are calculated only for those who are older than twenty and have a national medical checkup.

Source: Authors' calculation based on South Korea's National Health Insurance Database 2003-2022.

317,586 observations for native South Koreans, and 280,395 observations for foreign immigrants. Table 2 summarizes the descriptive statistics for health measurements and healthcare utilization patterns of North Korean defectors and comparison groups, from a general perspective. North Korean defectors are

found to be, on average, 5.7 cm shorter than a South Korean native, indicating the malnutrition in their homeland. They have lower health risks in terms of biomarker measurements, such as blood pressure, blood sugar, and cholesterol, while they have a slightly higher comorbidity burden, as measured by the CCI. North Korean defectors also tend to utilize healthcare services more frequently than other groups, with 15.8 outpatient visits, 3.2 inpatient days, and KRW 1.15 million of medical expenditure per year. Their share of copayment among total expenditures is, on average, 17.0%, which is significantly lower than that of South Korean natives (31.3%) and foreign immigrants (32.4%) due to the extensive financial support for medical expenses up to five years after entering South Korea as Type 1 Medicaid recipients.

Empirical Framework

Our empirical analysis aims to characterize the healthcare utilization patterns of North Korean defectors, focusing on mental health conditions, and to explore gender differences. Each condition of interest is specified using the Korean Standard Classification of Disease.⁶ We analyze the patterns of healthcare utilization for the following three categories of mental conditions: depression (F32, F33, F34.1, F41.2),⁷ anxiety (F41), and reaction to severe stress and adjustment disorders (F43).

We used three indicators to represent the prevalence and severity of a specific disease. The *healthcare utilization rate* is defined as the percentage of people who have received medical treatments, either outpatient or inpatient, for a condition of interest in a specific year. The *number of outpatient visits* is defined as the annual visits per person to clinics or hospitals for a condition of interest. *Medical expenditure* is defined as the annual amount of healthcare spending per person for a condition of interest, including both copayment and benefits from the National Health Insurance.⁸

In medical records, there can be multiple diagnoses for a single visit, making it difficult to determine how much spending is attributed to each condition. Given that this situation may result in an overestimation of the medical expenditure, we only include cases where the condition of interest is the principal diagnosis when calculating them. In contrast, we also count sub-diagnosis cases when calculating the medical utilization rate and the number of visits. We also adjusted the expenditure variables to real terms using the Consumer Price Index, with the base year being 2020.

To examine the mental health status of North Korean defectors and to explore any gender gaps, we first compare the healthcare indicators of six demographic groups categorized by origin and gender: male North Korean defectors (NK male), female defectors (NK female), male natives (SK male), female natives (SK female), male immigrants (IMG male), and female immigrants (IMG female).

We then delve into the dynamic evolution of healthcare utilization among North Korean defectors post-entry into South Korea. We compute the healthcare utilization rate, the average number of visits, and the average amount of healthcare expenditure associated with the conditions of interest, all categorized by the number of years the defectors have spent in South Korea. This approach can provide insights into how acculturation and adaptation might influence healthcare-seeking patterns.

The relationship between healthcare utilization patterns and the number of years since migration can be biased due to confounding factors. For example, changes in frequency of utilization by years since migration might reflect the natural aging process. It is also likely that utilization for mental health condition is influenced by other diseases comorbid with mental issues or medical accessibility inherent in the region of residence. For this reason, we adjust the utilization indicators controlling for age, CCI, city of residence, and type of policyholder (whether a Medicaid recipient or not). We also control for year fixed effects considering the overall time trends of healthcare utilization for mental conditions. Detailed methods for the adjustment are presented in the Appendices section at the end.

Results

Comparison of Mental Healthcare Utilization by Gender and Immigrant Status

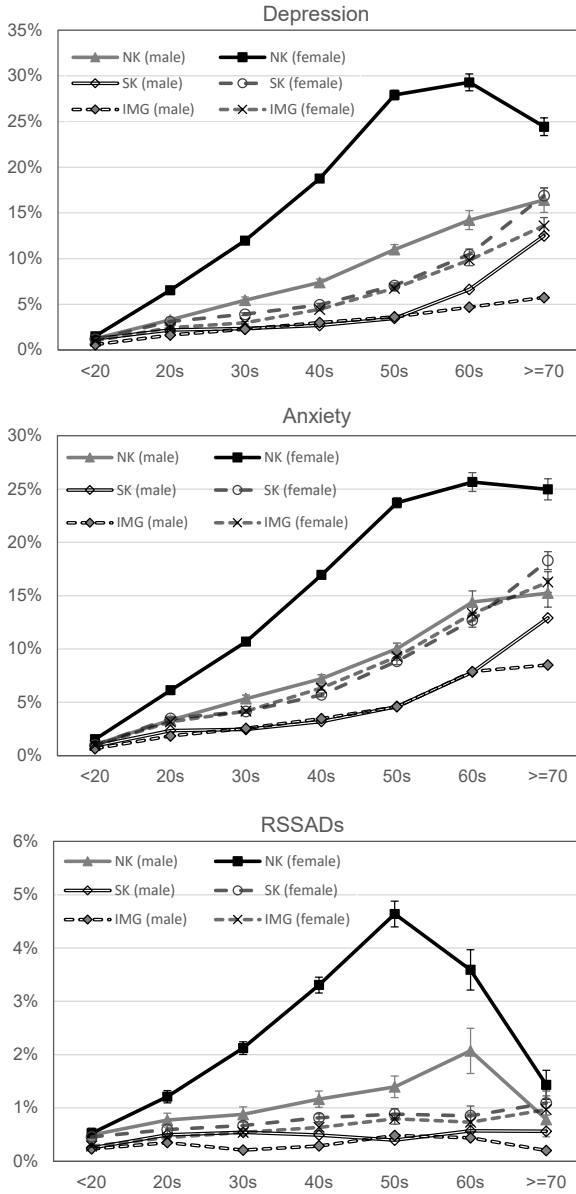
Figure 1 shows the healthcare utilization rate for the six demographic groups, associated with depression, anxiety, and RSSAD. Rates are compared between the demographic groups within the same age bracket.

It is found that female defectors are considerably more likely to receive healthcare treatment due to mental issues compared to natives, foreign immigrants, and male defectors. The upper panel shows that the healthcare utilization rates of female defectors for depressive symptoms far surpass those of the other five groups within the same age brackets. Notably, among individuals in their fifties and sixties, over 25% of female defectors receive medical care for depression at least once a year. This rate is approximately double that of male defectors and triple that of female natives within the same age group.

Similarly, as shown in the middle panel of Figure 1, anxiety disorders are notably prevalent among female defectors in their fifties and sixties. The rate is higher by at least 10% than that of the other demographic groups in the same age brackets. Note that the results only account for those who receive healthcare treatment, which suggests that the actual prevalence rate could be much higher.

For the RSSAD data shown in the lower panel of Figure 1, the healthcare utilization rates are also highest among female defectors. These rates, however, range only between 1% and 5%, which are substantially lower than the rates for

Figure 1. Healthcare Utilization Rates by Gender, Immigrant Status, and Age Groups

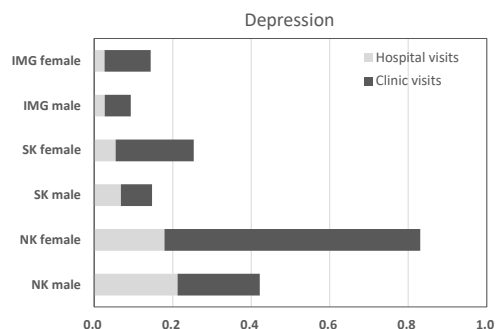


Note: The sample is constructed using propensity score matching. We match each North Korean defector with a South Korean native and a foreign immigrant using gender, year of birth, and city of residence as covariates. The y-axis is the healthcare utilization rate, which denotes the percentage of people who have received medical treatment (either outpatient or inpatient) for the condition of interest in a specific year. Bars in the figures denote the 95% confidence intervals.

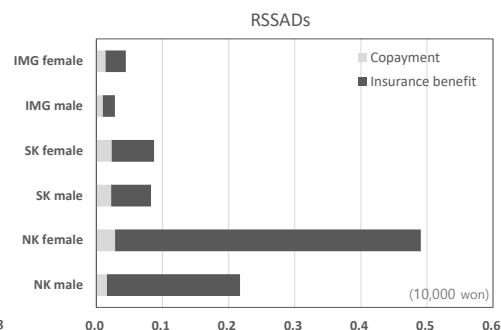
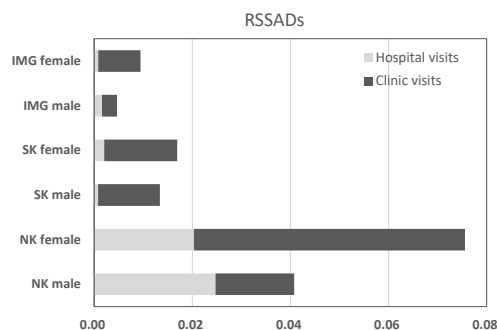
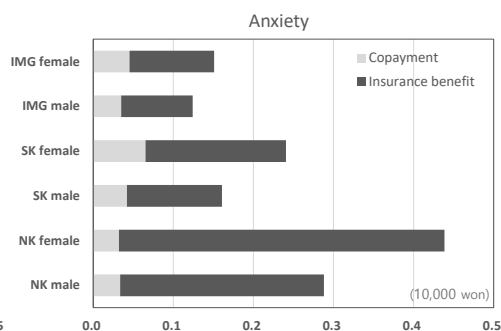
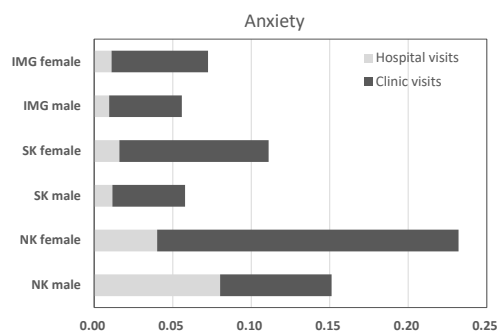
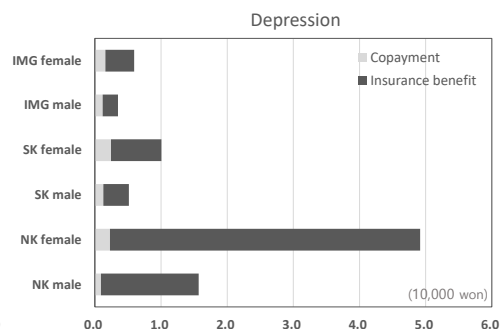
Source: Authors' calculation based on South Korea's National Health Insurance Database 2003-2022.

Figure 2. Healthcare Utilization Intensity by Gender and Immigration Status

Panel A. Annual Outpatient Visits per Person



Panel B. Annual Expenditure per Person



Note (Panel A): The sample is constructed using propensity score matching. We match each North Korean defector with a South Korean native and a foreign immigrant using gender, year of birth, and city of residence as covariates. The x-axis represents the number of outpatient visits per person. The bright gray bar and the dark gray bar denote number of annual outpatient visits at hospitals and at clinics, respectively.

Note (Panel B): The sample is constructed using propensity score matching. We match each North Korean defector with a South Korean native and a foreign immigrant using gender, year of birth, and city of residence as covariates. The x-axis represents the amount of expenditure per person, measured in units of KRW 10000. The bright gray bar and the dark gray bar denote annual copayment expenditures and insurance benefits, respectively. Expenditures for both inpatient and outpatient treatments are counted.

Source: Authors' calculation based on South Korea's National Health Insurance Database 2003-2022.

depression and anxiety disorders. It is worth noting that since RSSAD often arises from an acute stress reaction, there may be limitations in capturing the trauma of the escape and journey experienced by North Korean defectors, considering the time lag.

In Figure 2, we compare annual outpatient visits and expenditure per person for the six demographic groups associated with the mental conditions of interest. It is found that female defectors' healthcare utilization intensity due to mental issues is also high. They visit healthcare services more frequently and incur higher expenses compared to natives, foreign immigrants, and male defectors. Interestingly, when the number of outpatient visits was divided into hospitals and clinics, female defectors visit clinics significantly more than male defectors, while male defectors visit hospitals more than female defectors. However, this does not necessarily mean that male defectors, on average, experience greater severity of mental health problems, and further analysis is needed to understand the causes of these gender differences in visit patterns.

Dynamics over Time Spent in South Korea

In Figure 3, we plot the healthcare utilization rate, number of outpatient visits, and expenditure of North Korean defectors for mental conditions by the years since migration to gauge whether mental health problems alleviate as a result of adaptation over time spent in South Korea.

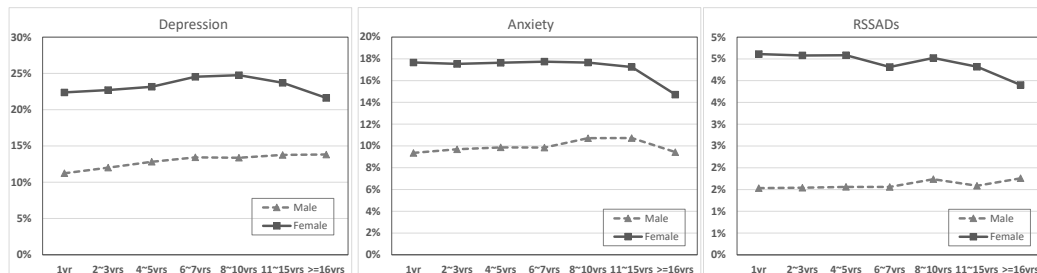
In Panel A of Figure 3, the healthcare utilization rates for female defectors due to depression, anxiety, and RSSAD do not appear to decline significantly until fifteen years after entering South Korea. Similarly, in Panel B, the number of annual hospital visits per capita for depression increases gradually over time spent in South Korea, while there is little change for RSSAD and anxiety disorders. Panel C also shows an overall increase in the number of annual clinic visits per capita for depression and anxiety disorders over time since arrival in South Korea. Meanwhile, in Panel D, annual per capita healthcare expenditure decreases only for RSSADs, but not for the other two mental illnesses.

The trends in healthcare utilization for the mental health conditions over time since arrival are not notably different between male and female defectors, while the levels of healthcare utilization indicators are much higher among females than among males, except for the number of hospital visits.

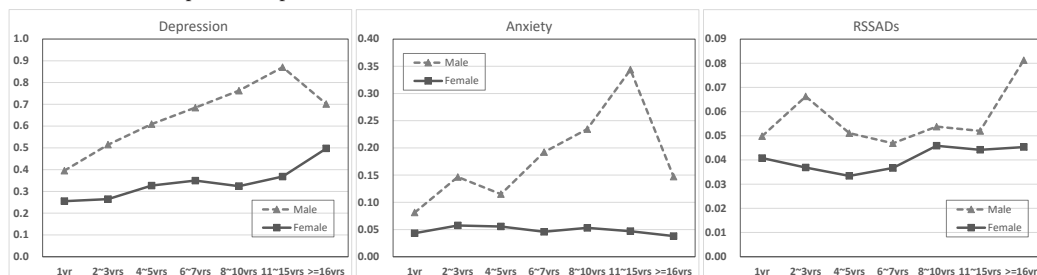
The results imply that acute stress reactions caused by harsh experiences during the process of defection can be alleviated over time after entering the country, but challenges in the process of adapting to South Korea make it difficult to improve overall mental health.

Figure 3. North Korean Defector Healthcare Utilization Patterns for Mental Diseases, by Years Spent in South Korea

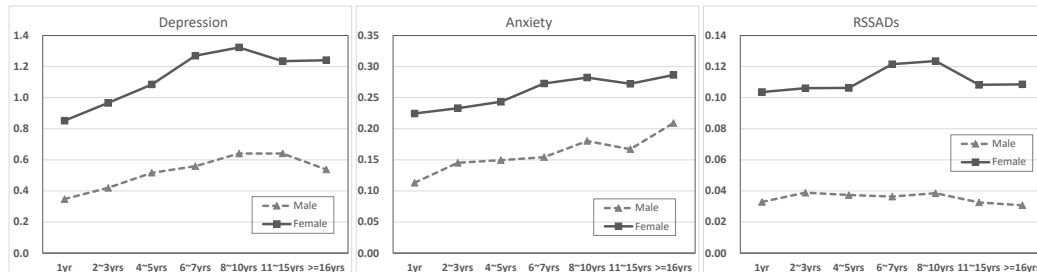
Panel A. Healthcare Utilization Rate



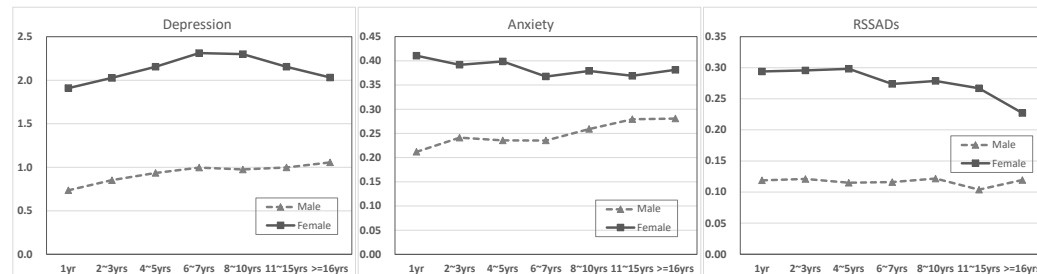
Panel B. Annual Hospital Visits per Person



Panel C. Annual Clinic Visits per Person



Panel D. Annual Expenditure (log) per Person



Note: Medical records for the entire population of North Korean defectors are analyzed. The x-axis represents the years spent in South Korea. The y-axis denotes the percentage of people having received medical treatment in Panel A, the number of annual outpatient visits in Panels B and C, and the log of annual expenditures in Panel D, respectively. We adjusted the medical utilization indicators, assuming that every individual is forty years old, a Medicaid beneficiary, rated 1 on the Charlson Comorbidity Index, and a resident of Seoul and that the indicators were observed in 2015.

Source: Authors' calculation based on South Korea's National Health Insurance Database 2003-2022.

Discussion

We find that female North Korean defectors have a higher rate of healthcare utilization than male North Korean defectors, particularly in terms of mental health. When examining mental health indicators such as depression, anxiety, and RSSAD, both male and female North Korean defectors showed higher healthcare utilization rates compared to either the general South Korean population or foreign immigrants. The healthcare utilization rate was particularly higher among those in their fifties and sixties. Female North Korean defectors exhibited a similar pattern to male North Korean defectors, but at a higher proportion.

This study contributes to existing research on the health and settlement of North Korean defectors in several ways. First, while previous studies primarily focused on the initial health status of North Korean defectors affected by their residence in North Korea and experiences in third countries, this study goes a step further by examining their healthcare utilization patterns in South Korean society. Second, the study utilizes administrative data managed by the National Health Insurance Service to analyze the entire population of North Korean defectors, South Korean nationals, and foreigners in South Korea. By using propensity score matching based on variables such as year of entry, gender, and city of residence, the study constructed a comparison group and analyzed healthcare utilization patterns, particularly in mental health. Third, the study meticulously controlled for health characteristics such as height and the CCI using health examination results of the subjects. Fourth, considering that health status, including mental health, is an important factor in shaping human capital, analyzing the healthcare utilization patterns of North Korean defectors serves as a basis for developing policies that will support their successful settlement in the future.

The study, however, did not analyze the reasons behind the differences in mental health or the mechanisms of their persistence. A lack of information about their experiences in North Korea and in third countries and their family compositions in South Korean society hindered this analysis. Future research should consider combining data through surveys to address this gap.

As for policy implications, it is important to consider that while policy support for North Korean defectors initially focuses on various aspects, including healthcare, ongoing support for their mental health needs is crucial, as their healthcare utilization in the mental health domain persists over time. Additionally, it is essential to recognize the possibility of underreporting in mental health care utilization due to the stigma associated with seeking mental health treatment, which could lead to an inaccurate representation of actual healthcare utilization. Therefore, sustained support for the mental health of North Korean defectors and strategies to address potential underreporting should be

prioritized in policy considerations.

Acknowledgments

The authors thank Young-Ja Park, Kate Mandeville, Sohee Lee, Sungchul Park, and participants at the 2024 Korean Association of Health Economics and Policy Conference for providing useful comments to earlier versions of this article. This study used data from the National Health Insurance Services Database (NHIS-2022-1-666) and was financially supported by the Bank of Korea. The study procedure meets the criteria for Institutional Review Board exemption for human subject research at Incheon National University's Institutional Review (project number 7007971-202204-002).

Notes

1. The Settlement Support Center for North Korean Refugees, known as the Hanawon, operates under the auspices of South Korea's Ministry of Unification. Its primary role is to assist with the initial resettlement of North Korean refugees into South Korean society. North Korean defectors, upon their arrival in South Korea, are mandated to stay at the Hanawon where they participate in a three-month resettlement training program. The Hanawon also provides an array of medical services, including basic health checkups, to meet the healthcare needs of the defectors.
2. RSSAD encompasses conditions such as acute stress reaction and adjustment disorders, in addition to PTSD.
3. North Korean defectors are categorized as medical aid recipients upon entering South Korea according to the North Korean Refugees Protection and Settlement Support Act.
4. In this paper, North Korean defectors' immigration year is defined as the first year of registration in the National Health Insurance system. This may differ from the official entry data provided by the Ministry of Unification due to administrative time lags.
5. The Charlson Comorbidity Index (CCI) is a tool used to quantify the burden of comorbidities in patients, aiding in predictions of mortality risk and guiding clinical decision-making.
6. The Korean Standard Classification of Diseases is a system used in Korea to categorize medical records and cause of death statistics based on the similarity of their nature. It is designed for the classification of diseases and other health issues that are recorded in all forms of health and demographic records.
7. Our categorization of depression covers depressive episodes (F32), major depressive disorders (F33), dysthymia (F34.1), and mixed anxiety and depressive disorders.
8. Unless otherwise stated, our healthcare expenditure variables indicate the sum of copayments and insurance benefits. This is because we focus on medical utilization as a proxy for the prevalence or severity of the conditions of interest, rather than analyzing the financial burden on individuals due to these conditions.

Appendices

Detailed Adjustment Methods for Healthcare Utilization Indicators

Before being used in the analysis of dynamic patterns in sub-section *Dynamics over Time Spent in South Korea*, the healthcare utilization indicators for the mental health conditions are adjusted through the following process. First, we regress each utilization indicator on the age (including square and cubed term), CCI, residence city dummies, year dummies, and Medicaid beneficiary dummy:

$$Y_{it} = \alpha + \beta_1 Age_{it} + \beta_2 Age_{it}^2 + \beta_3 Age_{it}^3 + \gamma CCI_{it} + \tau D_{it} + \delta_c + \theta_t + \varepsilon_{it} \quad (1)$$

Here, Y_{it} denotes the utilization indicator of interest, CCI is the Charlson comorbidity index, and D_{it} is a dummy variable indicating a person i is a Medicaid recipient in year t . δ_c and θ_t represent city fixed effects and year fixed effects, respectively.

Second, we predict the level of the dependent variable for each observation:

$$\hat{Y}_{it} = \hat{\alpha} + \hat{\beta}_1 Age_{it} + \hat{\beta}_2 Age_{it}^2 + \hat{\beta}_3 Age_{it}^3 + \hat{\gamma} CCI_{it} + \hat{\tau} D_{it} + \hat{\delta}_c + \hat{\theta}_t. \quad (2)$$

Third, we set a benchmark vector of covariates with age = 40, CCI = 1, $D_{it} = 1$, residing in Seoul, and year = 2015. Then we calculate the benchmark prediction of the dependent variable, \tilde{Y} :

$$\tilde{Y} = \hat{\alpha} + \hat{\beta}_1 A\tilde{g}e + \hat{\beta}_2 A\tilde{g}e^2 + \hat{\beta}_3 A\tilde{g}e^3 + \hat{\gamma} C\tilde{C}I + \hat{\tau} \tilde{D} + \hat{\delta}_{c=Seoul} + \hat{\theta}_{t=2015}. \quad (3)$$

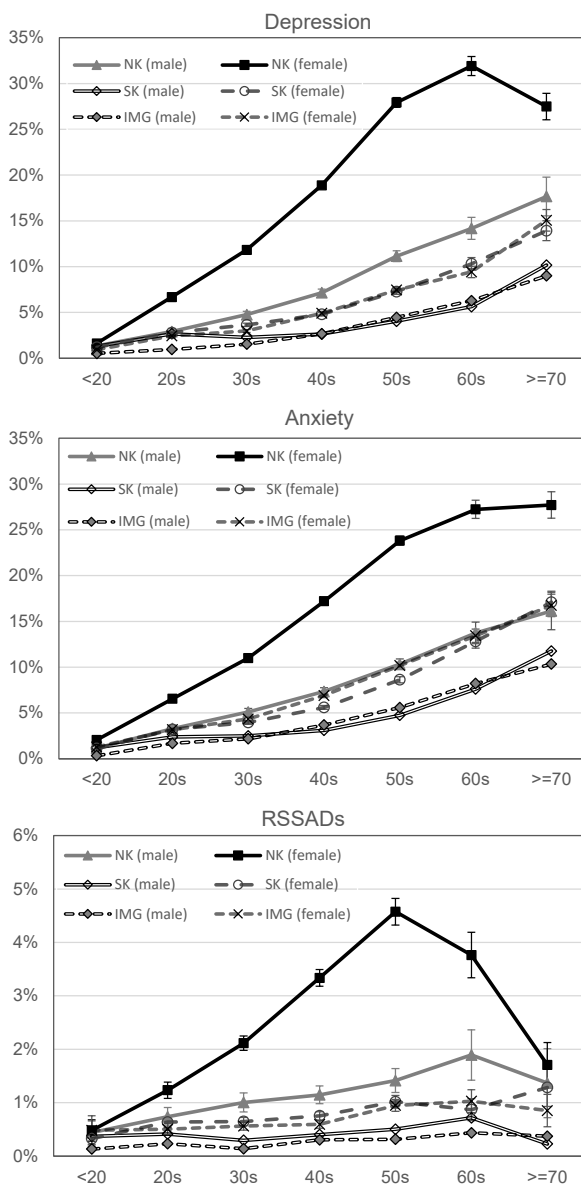
Finally, we can construct the adjusted value $Y_{adj,it}$ by subtracting the difference between the predicted value and the benchmark level from Y_{it} . This is equivalent to the residuals from the regression (1) plus the benchmark value of dependent variable. Since \tilde{Y} is a constant, the variation in $Y_{adj,it}$ comes entirely from the variation in e_{it} :

$$Y_{adj,it} = Y_{it} - (\hat{Y}_{it} - \tilde{Y}) = (Y_{it} - \hat{Y}_{it}) + \tilde{Y} = e_{it} + \tilde{Y}. \quad (4)$$

Robustness Check with Alternative Sample Dataset

We checked the robustness of the results presented in sub-section *Comparison of Mental Healthcare Utilization by Gender and Immigrant Status* with an alternative sample dataset. Specifically, we included height and the Charlson Comorbidity Index (CCI) as covariates for the propensity score matching. The sample size becomes smaller because height data are only available for those who get a national medical checkup. We found the patterns shown in Figure 1.1 and Figure 2.1 to be in-line with the baseline results.

Figure 1.1. Healthcare Utilization Rates by Gender, Immigrant Status, and Age Groups: Controlling for Height and Potential Health Risk

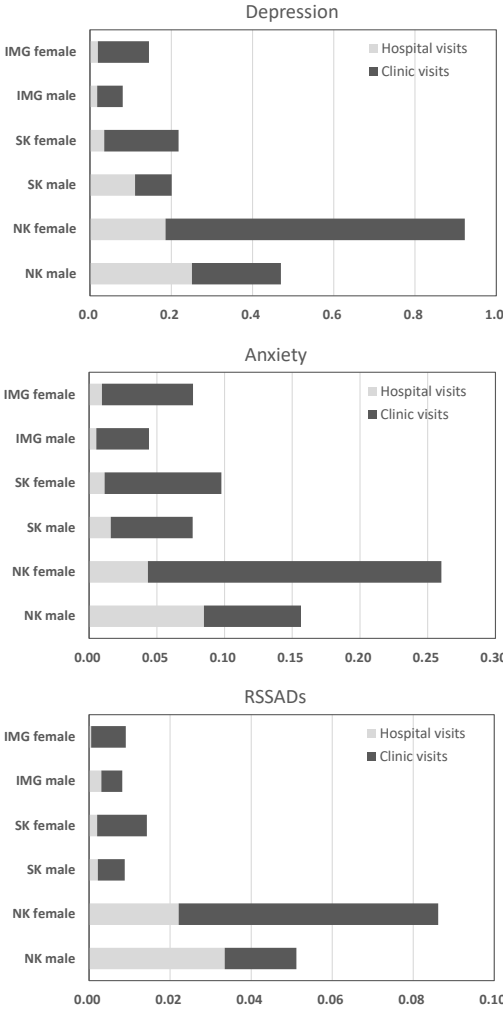


Note: The sample is constructed using propensity score matching. We match each North Korean defector with a South Korean native and a foreign immigrant using gender, year of birth, city of residence, height, and CCI as covariates. The y-axis is the healthcare utilization rate, which denotes the percentage of people who have received medical treatment (either outpatient or inpatient) for the condition of interest in a specific year. The bars in the figures denote the 95% confidence intervals.

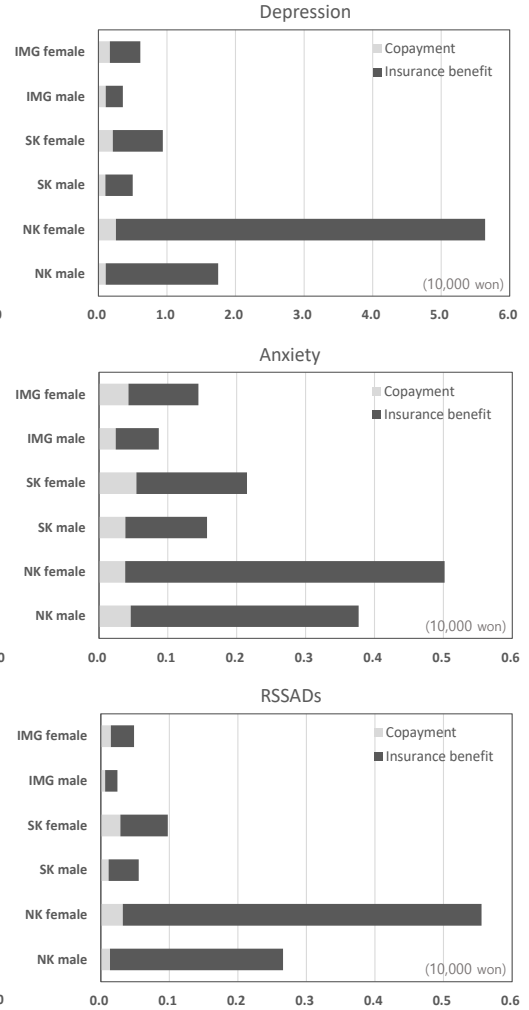
Source: Authors' calculation based South Korea's the National Health Insurance Database 2003-2022.

Figure 2.1. Healthcare Utilization Intensity by Gender and Immigrant Status: Controlling for Height and Potential Health Risk

Panel A. Annual Outpatient Visits per Person



Panel B. Annual Expenditure per Person



Note (Panel A): The sample is constructed using propensity score matching. We match each North Korean defector with a South Korean native and a foreign immigrant using gender, year of birth, city of residence, height, and CCI as covariates. The x-axis shows the number of outpatient visits per person. The bright gray bar and the dark gray bar denote the number of annual outpatient visits in hospitals and in clinics, respectively.

Note (Panel B): The sample is constructed using propensity score matching. We match each North Korean defector with a South Korean native and a foreign immigrant using gender, year of birth, city of residence, height, and CCI as covariates. The x-axis shows the amount of expenditure per person, measured in units of KRW 10000. The bright gray bar and the dark gray bar denote the annual copayment expenditure and the insurance benefits, respectively. Expenditures for both inpatient and outpatient treatments are counted.

Source: Authors' calculation based on the National Health Insurance Database 2003-2022.

References

- Baek, Hye Jeong, Eun Bae Khil, In Jin Yoon, and Young Ran Lee. 2007. "Namhan nae bukanital cheongsoneondeurui simnijeogeunge yeonghyangeul michineun jeogeungjunbidoe gwanhan yeongu" [A Study on Psychological Adaptation of North Korean Adolescent Refugees in South Korea]. *Hanguk Cheongsoneon Yeongu* [Studies on Korean Youth] 18 (2): 183-211.
- Bogic, Marija, Anthony Njoku, and Stefan Priebe. 2015. "Long-Term Mental Health of War Refugees: A Systematic Literature Review." *BMC International Health and Human Rights* 15: 29. doi: 10.1186/s12914-015-0064-9.
- Fazel Mina, Jeremy Wheeler, and John Danesh. 2005. "Prevalence of Serious Mental Disorder in 7,000 Refugees Resettled in Western Countries: A Systematic Review." *The Lancet* 365 (9467): 1309-14. doi: 10.1016/S0140-6736(05)61027-6.
- Furnham, Adrian, and Stephen Bochner. 1989. *Culture Shock: Psychological Reactions to Unfamiliar Environments*. Cambridge: Great Britain at the University.
- Hong, Chang Hyun, Jong Ja Yoo, Young A Cho, Jinsup Eom, Hyun Ji Ku, Seung Won Seo, Eun Mi Ahn, Sung Kil Min, and Woo Taek Jeon. 2006. "Bukan italjuminui oesanghu seuteureseujangae daehan 3nyeon chujeogyongu" [A 3-Year Follow-Up Study of Posttraumatic Stress Disorder among North Korean Defectors]. *Singyeongjeongsinuihak* [Journal of Korean Neuropsychiatric Association] 45 (1): 49-56.
- Kim, Byung-Chang, and Shi-Eun You. 2011. *Bukanitaljumin paeneol yeongu: gyeongje-jeongsinbogeon-sinchegeongang* [North Korean Defectors Panel Study: Economic Adaptation, Mental Health, Physical Health]. Seoul: North Korean Refugees Foundation.
- Kim, Hee Kyung. 2012. "Talbuk yeoseonggwa namhan yeoseongui uulgam, yangyuk joechaekgam mit yangyuk seuteureseuga yangyuk haengdonge michineun yeonghyangnyeogui chai" [Comparison of the Influence of Depressed Mood, Parenting Guilt, and Parenting Stress on Parenting Behaviors in North Korean Women Refugees and South Korean Women]. *Hanguksimnihakoeji: Yeoseong* [The Korean Journal of Woman Psychology] 17 (4): 535-58.
- Kim, Hee Kyung, and Hyunyun Shin. 2010. "Jiyeoksahoe jeongchak jeonhu bukanitaljuminui seong mit yeollyeongbyeol simni jeungsang" [Psychological Symptoms Before and After the Settlement in the South Korean Society of North Korean Refugees According to Gender and Age]. *Hanguksimnihakoeji: Ilban* [Korean Journal of Psychology: General] 29 (4): 707-24.
- Kim, Jae Yop, Hee Jin Kim, Kwonho Choi, and Boyoung Nam. 2017. "Mental Health Conditions among North Korean Female Refugee Victims of Sexual Violence." *International Migration* 55 (2): 68-79.
- Kim, Keun A., Yoon Sun Jung, Chae Bong Kim, Ki Beom Kim, and Seok Jun Yoon. 2021. "Trend of Disease Burden of North Korean Defectors in South Korea Using Disability-adjusted Life Years from 2010 to 2018." *Journal of Korean Medical Science* 36 (32): 1-17. doi: 10.3346/jkms.2021.36.e211.
- Kim, Taehyun, and Chi-young Noh. 2003. "Bukanitaryeoseongdeurui sam iyagi2: saengjonjeollyageul jungsimeuro han jungguksaenghwalcheheom" [North Korean

- Female Defectors' Voices II: The Lived Experiences Focused on Survival Strategies in China]. *Daehangajeonghakoeji* [Journal of the Korean Home Economics Association] 41 (12): 229-43.
- Korea Hana Foundation. 2023. "2022 Settlement Survey of North Korean Refugees in South Korea." <https://www.koreahana.or.kr/home/kor/promotionData/information/researchData/index.do?ptSignature=QnrvtOekxiPklgsn74dfsYRAqgXaIX2EzU5d7cx8ePM%3D&menuPos=135> (accessed September 27, 2023).
- Lee, Jeong-myeon, Joohyang Lee, Moon-jeong Choi, Yunkyun Ahn, Ki-bong Kim, and Min-jeong Jeon. 2022. *Bukanitaljuminui geongsangtaewa uiryoyong bunseok* [Analyzing the Health Status and Healthcare Utilization of North Korean Defectors]. Wonju: Health Insurance Research Institute.
- Lie, Birgit. 2002. "A 3-year Follow-Up Study of Psychosocial Functioning and General Symptoms in Settled Refugees." *Acta Psychiatrica Scandinavica* 106 (6): 415-25. doi: 10.1034/j.1600-0447.2002.01436.x.
- Lim, Hyun-Ju, Guna Lee, and Sook-Ja Yang. 2017. "Bukanitaljuminui geongang gwallyeon yeongu donghyang" [The Trends in Research on the Health of North Korea Refugees]. *Jiyeoksahoeganhohakoeji* [Journal of the Korean Academy of Community Health Nursing] 28 (2): 144-55.
- Mollica, R. F., N. Sarajlic, N. Chernoff, J. Lavelle, I. V. Sarajlic, and M. P. Massagli. 2001. "Longitudinal Study of Psychiatric Symptoms, Disability, Mortality, and Emigration among Bosnian Refugees." *JAMA* 286 (5): 546-54.
- National Cancer Center, Ministry of Unification's Hanawon, and Goyang City. 2022. *Jillysireseo mannan bukanitaljumin* [North Korean Refugees Meeting in the Clinic]. Goyang: National Cancer Center.
- Porter, Matthew, and Nick Haslam. 2005. "Predisplacement and Postdisplacement Factors Associated with Mental Health of Refugees and Internally Displaced Persons: A Meta-analysis." *JAMA* 294 (5): 602-12.
- Roh, Dae Kyun. 2001. "Talbukjau i gaeincha yoini jeogeung mit jeongsinggeongange michineun yeonghyang" [The Influences of Individual Differences on Adjustment and Mental Health in North Korean Refugees]. Ph.D diss., Chung-Ang University.
- Sullivan, Claire, Cathy Vaughan, and Judith Wright. 2020. *Migrant and Refugee Women's Mental Health in Australia: A Literature Review*. Melbourne: School of Population and Global Health, University of Melbourne.

HyeSeung Wee (first author) works at the NHIS (National Health Insurance Service) Global Cooperation and Development Department developing collaborative projects with countries interested in Korea's health insurance system. Her interests address health disparities, extending to differences in labor productivity and income inequality, with a focus on the health status of vulnerable populations. Email: hswhee@nhis.or.kr

Jongmin Lee (corresponding author), PhD in economics (Seoul National University), is an economist on the North Korean Economy team at Bank of Korea (BOK) Economic Research Institute. Before joining BOK, Lee was a senior fellow at the Institute for Peace and Unification Studies, Seoul National University. His research interests comprise the North Korean economy and economics of inter-Korean relations, including North Korean foreign trade, resettlement of North Korean defectors in South Korea, and consequences of geopolitical tensions. Email: ljm1208@bok.or.kr

Seungho Jung is Associate Professor at the School of Northeast Asian Studies at Incheon National University, South Korea. His research interests encompass the North Korean economy and unification-related issues, including the North Korea-China economic relationship, potential economic integration of the two Koreas, public perception of unification, and resettlement of North Korean refugees. Jung's publications include *China's Trade and Investment with North Korea: Firm Survey in Dandong* (Seoul National University Press, 2015) and "Measuring North Korean Marketization: An Index Approach" (*Asian Perspectives* 46: 2, 2022). Email: shjung@inu.ac.kr

Submitted: September 30, 2023; Revised: February 18, 2024; Accepted: March 08, 2024

