

Institute for Economic Studies, Keio University

Keio-IES Discussion Paper Series

**Uncovering the Barriers to Foreign Residents' Enrollment in
Japan's National Health Insurance: An Econometric Analysis
Using Pooled Cross-Sectional Data**

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2024 年 12 月 23 日

2024-026

<https://ies.keio.ac.jp/publications/24732/>

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23 December, 2024

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キーワード: Foreign residents; Public health insurance; Health coverage; Pooled cross-sectional data; Probit regression analysis

【要旨】

Due to liberalized immigration policies in recent years, the number of foreign residents in Japan has surged. However, the issue of some foreign residents lacking public health insurance persists. Given that the entities responsible for premium contributions to National Health Insurance (NHI) essentially make it a voluntary system, this study is the first to utilize nationwide microdata to investigate the factors preventing foreign residents from enrolling in NHI. This study offers several new insights. Specifically, in businesses where enrollment in Employees' Health Insurance is not mandatory, foreign residents working as regular full-time employees are significantly less likely to enroll in NHI. Additionally, individuals who are job-seeking or unemployed, those engaged in other forms of employment—including family workers and trainees—and those with no health concerns are all significantly less likely to enroll. In the analysis restricted to individuals other than regular full-time employees, the economic conditions of the prefecture of residence and whether the individual's country of nationality has implemented universal health insurance significantly affect enrollment. Furthermore, our analysis suggests that, while the large number of new positive cases following the prolonged spread of the pandemic played a role, the initial panic caused by the outbreak may have served as a significant incentive for foreign residents in Japan to enroll in NHI.

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謝辞: The data for this secondary analysis, "Survey on Foreign Residents, 2020," and "Survey on Foreign Residents, 2022," were provided by the Social Science Japan Data Archive, Center for Social Research and Data Archives, Institute of Social Science, The University of Tokyo. I would like to express my sincere gratitude to Professors Kouhei Komamura, Atsuhiko Yamada, and Yoko Ibuka of the Department of Economics, as well as to Yuzuki Hirazawa and Mao Hayashi of the Social Policy Group at Keio University, for their constructive suggestions. I am also deeply thankful to Professor Kei Shiho of Kwansei Gakuin University for his invaluable advice and comments at the 2024 Winter Conference of the Japan Association for Migration Policy Studies (JAMPS) held at Nanzan University in December 2024. Additionally, I extend my special gratitude to Professor Kouhei Komamura for serving as my referee for the Keio-IES Discussion Paper Series.

Uncovering the Barriers to Foreign Residents' Enrollment in Japan's National Health Insurance: An Econometric Analysis Using Pooled Cross-Sectional Data *

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Abstract

Due to liberalized immigration policies in recent years, the number of foreign residents in Japan has surged. However, the issue of some foreign residents lacking public health insurance persists. Given that the entities responsible for premium contributions to National Health Insurance (NHI) essentially make it a voluntary system, this study is the first to utilize nationwide microdata to investigate the factors preventing foreign residents from enrolling in NHI. This study offers several new insights. Specifically, in businesses where enrollment in Employees' Health Insurance is not mandatory, foreign residents working as regular full-time employees are significantly less likely to enroll in NHI. Additionally, individuals who are job-seeking or unemployed, those engaged in other forms of employment—including family workers and trainees—and those with no health concerns are all significantly less likely to enroll. In the analysis restricted to individuals other than regular full-time employees, the economic conditions of the prefecture of residence and whether the individual's country of nationality has implemented universal health insurance significantly affect enrollment. Furthermore, our analysis suggests that, while the large number of new positive cases following the prolonged spread of the pandemic played a role, the initial panic caused by the outbreak may have served as a significant incentive for foreign residents in Japan to enroll in NHI.

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Keywords: Foreign residents; Public health insurance; Health coverage; Pooled cross-sectional data; Probit regression analysis

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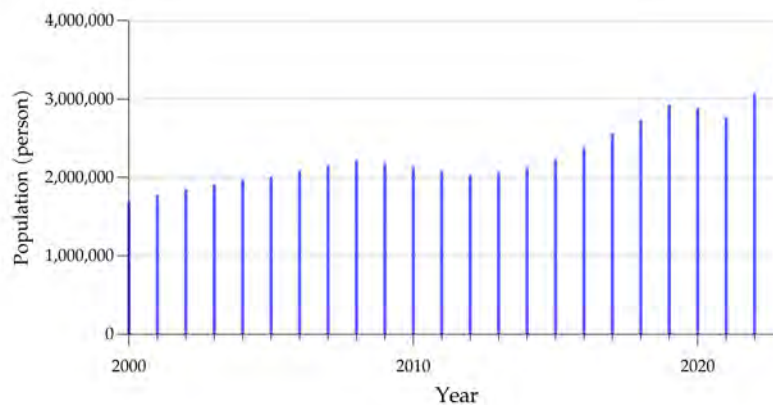
1 Introduction

“Many foreign residents in Japan continue to face barriers in access to health care, and health disparity remains a major challenge that needs to be addressed.”

— Yasukawa et al. (2019)

As Japan’s population structure becomes increasingly imbalanced and labor market demands persist, the country’s economic activities are ever more reliant on foreign labor (Oishi, 2023). Since the Great East Japan Earthquake in 2011, the population of foreign residents, including laborers, has been steadily rising. By December 2023, the number of foreign residents in Japan soared to a record high of 3.41 million (Figure 1). This surge has sparked a growing conversation about their social security, particularly regarding healthcare (Reshad and Maesato, 2008; Iguchi, 2016). Irrespective of nationality or ethnicity, every individual should be granted equal access to healthcare services. However, evidence suggests that foreign residents are less likely to seek regular medical assistance as their health risks escalate (Higuchi et al., 2021). Among the various factors that affect healthcare service utilization by foreigners in Japan, non-participation in public health insurance is often a significant barrier to accessing necessary healthcare services (Morita et al., 2021; Lu, 2024a).

Figure 1 Trends in the population of foreign residents in Japan



NOTE: Made by the author based on Statistics on Foreign National Residents.

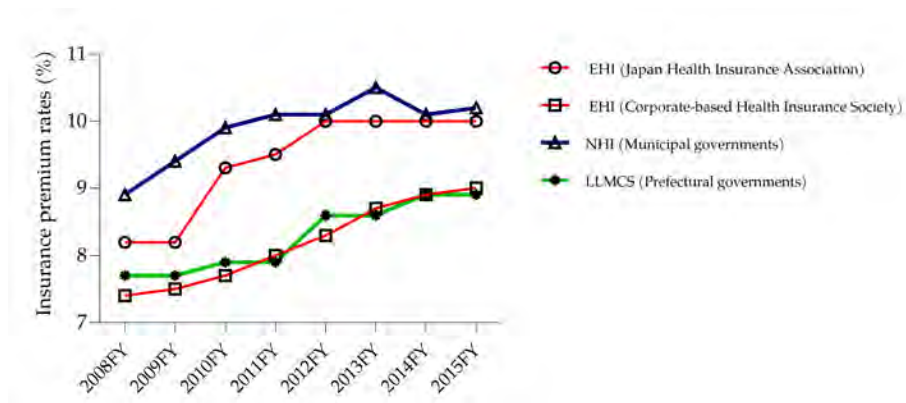
Japan's healthcare system is anchored by a nationally-led universal health insurance program. This program mandates all residents, irrespective of nationality, to enroll in public health insurance (Sakamoto et al., 2018). Japan's public health insurance is divided into three main schemes. The first, Employees' Health Insurance (EHI), primarily covers full-time workers under the age of 75. The second, National Health Insurance (NHI), is designed for all other residents under 75 who are not covered by EHI or any specialized health insurance scheme. The third, the Long Life Medical Care System (LLMCS), caters to individuals aged 75 and older. Regarding copayment ratios, insured individuals between the ages of 6 and 70 are required to pay 30%; children under 6, as well as elderly individuals aged 70 to 74 and those over 75 with certain income levels, contribute a copayment ratio of 20%; those over 75 years old generally pay a reduced ratio of 10% (OECD, 2024). Conversely, residents who opt out of the public health insurance system are subjected to a copayment ratio of 100%. This high out-of-pocket expense significantly deters these individuals from utilizing medical services, posing a substantial barrier to healthcare access.

According to Ministry of Health, Labour, and Welfare, Japan (2023), as of March 2022, approximately 121.14 million individuals in Japan were covered by public health insurance. Concurrently, the estimated total population was about 125.26 million (Statistics Bureau of Japan, 2022). These figures suggest an overall enrollment rate in Japan's public health insurance system of approximately 96.71%, indicating that around 3.29% of residents are uninsured. However, the proportion of uninsured among foreign residents is notably higher than the national average. A study by Suguimoto et al. (2012) in Nagahama City, Shiga Prefecture, revealed that about 19.8% of Latin American foreign residents were not enrolled in public health insurance. Similarly, Higuchi et al. (2021) analyzed data from the Medical Information Center in Aichi, which provided free medical consultations to local foreign residents from 2012 to 2016. Out of 608 valid samples, 101 individuals lacked insurance, equating to approximately 16.6%. Further support for these findings comes from several studies utilizing online surveys (Lu, 2024b). These findings highlight significant gaps in Japan's universal healthcare coverage, particularly affecting foreign residents, many of whom remain without health insurance coverage.

Research into the reasons behind the lack of insurance coverage among foreign res-

idents in Japan has predominantly focused on Latin American immigrants of Japanese descent, especially Brazilians. It is important to recognize that prior research has largely centered on this relatively small demographic of South American nationals in Japan. As Suguimoto et al. (2012) have indicated, these findings may not be generalizable. Moreover, there is a significant temporal gap between earlier studies and current times, during which Japan’s healthcare insurance system has undergone numerous reforms. Figure 2 illustrates the trends in insurance premium rates across different insurance schemes, revealing a marked upward trend in premium costs. Furthermore, healthcare insurance reforms have also included significant measures such as the implementation in April 2020 of a policy that restricts the residences of insured persons’ dependents to within Japan (Japan Pension Services, 2024).

Figure 2 Trends in insurance premium rates



NOTE: Made by the author based on data from Japan’s Cabinet Office (<https://www5.cao.go.jp/keizai-shimon/kaigi/special/reform/wg1/291108/shiryu1-4.pdf>). Japan Health Insurance Association and Corporate-based Health Insurance Society are the two main insurers for EHI.

Furthermore, major global events, like the Coronavirus Disease 2019 (COVID-19) pandemic, have significantly altered the public health landscape. The outbreak of COVID-19 in 2020 particularly affected the health status and medical care utilization of medically vulnerable groups, including immigrants, further complicating the challenges these populations face in accessing healthcare (Clark et al., 2020; Okonkwo et al., 2021).

Currently, health is widely regarded as a form of capital (Grossman, 1972). Individuals at a health disadvantage may lack the resources necessary to engage in the social and economic activities of society (Woodward and Kawachi, 2000). Moreover, significant health disparities within a population not only lead to internal negative impacts but also generate externalities. Uninsured immigrants in poor health may pose a risk to the health safety of local populations in the host country (Kluge et al., 2020). Given the high proportion of uninsured foreign residents in Japan and their difficulties accessing formal medical services due to health risks, this study believes it is necessary to use the latest data, especially data from during the COVID-19 pandemic, to reexamine the barriers to public health insurance enrollment among foreigners in Japan.

However, it should be noted that under public health insurance, EHI premiums are directly deducted from wages, making EHI a truly mandatory scheme¹. In contrast, NHI premiums must be paid by the insured themselves, thereby rendering enrollment in NHI effectively voluntary (Yuda, 2006). Therefore, when examining the barriers to public health insurance enrollment among foreign residents in Japan, it is more appropriate to focus on NHI.

Based on the discussion above, this study uses individual data from foreign residents in 2020 and 2022 to conduct an econometric analysis examining the barriers to enrollment in NHI among foreign residents in Japan. The following sections of the paper are organized as follows: Section 2 systematically reviews relevant prior research; Section 3 describes the data, variables, methodology, and hypotheses used; Section 4 presents the estimated results; Section 5 discusses the findings based on these results; and Section 6 provides policy recommendations based on the discussion.

¹As illustrated in Figure 2, in Japan, the primary insurers for EHI are categorized into Corporate-based Health Insurance Societies and the Japan Health Insurance Association (JHIA). The former are typically established by large enterprises capable of organizing their own EHI, whereas small and medium-sized enterprises must join the JHIA to provide health insurance for their employees (see Sakamoto et al. (2018) for details). Because employees in these companies are required to enroll in EHI, such companies are designated as “applicable places of business.” The size threshold for being classified as an applicable place of business was set at 501 or more employees prior to September 2016, adjusted to 101 or more employees in October 2020, and is scheduled to further decrease to 51 or more employees starting in October 2024. Companies with fewer employees than these thresholds are classified as “non-applicable places of business,” where employees are not mandated to join EHI but may choose to enroll through a vote.

2 Literature Review

Although there is currently no research specifically on the factors preventing foreign residents in Japan from enrolling in NHI, studies on the non-participation of Latin American foreign residents in public health insurance have provided important insights. Kojima (2006) conducted a preliminary analysis of survey data collected in 2004 from Japanese-Brazilian residents aged 18 and above in Iwata City, Shizuoka Prefecture. The survey garnered 497 valid responses. The analysis revealed that 71.7% of the respondents were not enrolled in either public or private health insurance. The reasons for not having insurance, in order of prevalence, were: “Costs too high” (31.6%), “Difficulty understanding the insurance system” (18.8%), “Employer refusal to enroll” (16.7%), and “Plans to return to home country soon” (8.5%). Suguimoto et al. (2012) analyzed stratified samples and semi-structured interviews conducted in 2010 with 282 Latin American residents in Nagahama City, Shiga Prefecture. They found that 56 uninsured respondents primarily declined to obtain insurance due to financial considerations². The study also conducted a logistic regression analysis to identify predictors of being uninsured. The results indicate that not having children, shorter educational attainment, insufficient understanding of the Japanese health insurance system, and the absence of chronic diseases are significant predictors of lacking insurance coverage. We can see that economic conditions and understanding of the Japanese healthcare insurance system are the main barriers to foreign residents’ participation in public health insurance, as reflected in these prior studies. On the other hand, Yuda (2006) found in an econometric analysis regarding factors affecting the duration of non-enrollment in NHI among Japanese that self-employed individuals had significantly longer non-enrollment periods compared to other employment forms, including the unemployed. Additionally, the study also discovered that as age increases, the duration of non-enrollment in NHI significantly decreases.

Internationally, extensive research has examined health insurance participation among various immigrant groups. Immigrants from different birthplaces or ethnic backgrounds

²Respondents cited financial considerations for not having insurance, including high health insurance costs, the substantial burden of paying penalties to restore insurance eligibility, and the need to remit money to relatives in their home countries.

often exhibit distinct patterns of insurance enrollment and health care utilization (Thamer et al., 1997; Carrasquillo et al., 2000; Sohn, 2017). In particular, Latino immigrant groups tend to have higher rates of being uninsured (Trevino et al., 1991). Moreover, even within Asian immigrant populations, there are notable coverage disparities among East Asian, South Asian, and Southeast Asian groups, and the factors contributing to a lack of health insurance vary across these subgroups (Tan et al., 2018). According to Tan et al. (2018)'s logistic regression results, gender significantly influences health insurance enrollment among East Asian immigrants, but not in other Asian groups. In addition, health-related factors, such as receiving regular medical check-ups or self-assessed health status, have a significant impact on health insurance enrollment across all these Asian subgroups.

However, because the immigrant population in many regions is relatively small, research on the factors affecting non-enrollment among local populations is generally more common. Similar to findings for foreign residents in Japan, income—whether individual or household—is widely recognized as a critical determinant of health insurance enrollment. Health insurance, as a “normal good,” is influenced by the affordability of its premiums (Dong et al., 2008). In some low-income countries, even after the implementation of public health insurance programs, large disparities persist between wealthier and poorer individuals or households (Jehu-Appiah et al., 2011). Additionally, in regions where the healthcare system is less developed, factors such as formal sector employment and the frequency of exposure to mass media play key roles in shaping public health insurance ownership (Kimani et al., 2014), reflecting the importance of employment conditions and awareness of available health services. Educational attainment has also been identified as a significant influence on public health insurance participation. For example, Adjei-Mantey and Yuji Horioka (2023) used microdata from Ghana to show that individuals with higher levels of education are more likely to enroll in public health insurance. The authors argue that these individuals have higher opportunity costs of time and health, motivating them to seek the financial protection and access to care that public health insurance provides.

3 Data, Variables, Methodology and Hypothesis

3.1 Data

This study will analyze data from two such surveys, which were publicly released through the Social Science Japan Data Archive (SSJDA)³, a unit within the Center for Social Research and Data Archives at the Institute of Social Science, University of Tokyo. These surveys include the Survey on Foreign Residents, 2020 (SFR 2020) and the Survey on Foreign Residents, 2022 (SFR 2022), released in October 2021 and April 2024, respectively. Both surveys are rare examples of publicly available microdata focusing on foreign residents in Japan and cover comprehensive areas such as health, insurance, employment, and lifestyle.

The SFR 2020, conducted in March 2020 by the private survey firm SURVEY RESEARCH CENTER CO., LTD, and the follow-up SFR 2022, conducted in February 2022, are online surveys targeting foreign residents in Japan. Both utilized the same questionnaire and a database of registered foreign residents in Japan. In 2020, the database included approximately 15,000 participants from 105 countries, growing to about 20,000 by 2022. These surveys are repeated cross-sectional surveys that employ quota sampling methods. The samples were allocated based on the number of foreign residents by nationality, as published by Japan's Ministry of Justice at the end of 2019 and 2021, respectively. The SFR 2020 and SFR 2022 ultimately collected 1,037 and 999 valid responses, respectively (Table 1).

Despite differences in survey periods, these surveys remain among the few publicly available comprehensive studies targeting foreign residents in Japan. Spanning nationwide, they provide a foundation to explore potential regional differences and offer opportunities to study common characteristics among uninsured foreign residents in Japan.

³The SSJDA promotes empirical research in the social sciences and has been disseminating archival data since April 1998.

Table 1 Basic information of surveys

Basic information	SFR 2020	SFR 2022
Sampling method	Quota sampling	Quota sampling
Data collection mode	Web survey	Web survey
Survey subject	Approximately 15,000 foreign registered panelists residing in Japan, aged 20 and above.	Approximately 20,000 foreign registered panelists residing in Japan, aged 20 and above.
Sample size	1,037	999
Survey conductor	SURVEY RESEARCH CENTER CO., LTD	SURVEY RESEARCH CENTER CO., LTD
Survey implementation time	From March to April 2020	February 2022
Geographic scope of the survey	Nationwide in Japan	Nationwide in Japan
Main components of the survey	The survey mainly pertains to the respondents' sociodemographic characteristics, employment, residence, health insurance, and children's education situations.	The survey mainly pertains to the respondents' sociodemographic characteristics, employment, residence, health insurance, and children's education situations.

3.2 Variables

3.2.1 Dependent Variable

This study aims to explore the factors that influence foreign residents' participation in NHI. Accordingly, the dependent variable selected concerns whether survey respondents are enrolled in NHI. Questions regarding health insurance enrollment status were included in both the SFR 2020 and SFR 2022. The specific question asked in these surveys is as follows:

Question: Please tell us about your health insurance enrollment status in Japan (single choice).

1. *National Health Insurance*
2. *Health insurance at the workplace⁴*
3. *Travel accident Insurance*
4. *Other Insurances*
5. *Enrolled in health insurance but don't know the type*
6. *Not enrolled*
7. *I don't know*

Option 1 corresponds to the NHI, while Option 2 pertains to EHI; both are types of public health insurance in Japan. Options 3 and 4 are clearly not part of Japan's public health insurance plans, and along with Option 6, they are categorized as not being enrolled in any of Japan's public health insurance. Participants selecting Option 5 are unsure of the type of health insurance they have enrolled in.

Table 2 presents the distribution of responses from survey participants regarding their health insurance enrollment status in Japan. Participants who selected Option 1 and Option 2, clearly indicating their enrollment in Japan's public health insurance programs, account for 84.37% and 90.59% of the total survey respondents, respectively. Participants

⁴Regarding Option 2, "Health insurance at the workplace," the terminology was specifically chosen to be easily understandable for the survey participants—foreign residents. This option can also be interpreted as EHI.

who selected Options 3, 4, and 6, clearly indicating that they have not enrolled in a public health insurance plan, accounted for 4.24% and 5.20% of respondents in the SFR 2020 and SFR 2022, respectively. However, for participants who selected Option 5, it remains unclear which type of health insurance program they enrolled in.

For participants who selected Option 5, we seek to infer the type of health insurance in which they are enrolled based on their employment status. Table 3 presents the distribution of employment status among these individuals. Considering employment categories, full-time employees, dispatched workers/contract workers, and trainees are generally more inclined to enroll in EHI. In contrast, those in other employment statuses, being less likely to join EHI, tend to opt for NHI instead.

Table 2 Distribution of responses to health insurance enrollment

Options	SFR 2020		SFR 2022	
	N	Ratio (%)	N	Ratio (%)
1. National Health Insurance	436	42.04	457	45.75
2. Health insurance at the workplace	439	42.33	448	44.84
3. Travel accident Insurance	7	0.68	3	0.30
4. Other Insurances	13	1.25	17	1.70
5. Enrolled in health insurance but don't know the type	111	10.70	33	3.30
6. Not enrolled	24	2.31	32	3.20
7. I don't know	7	0.68	9	0.90
Total	1037	100.00	999	100.00

Table 3 Distribution of Employment Statuses

Employment status	N	Ratio (%)
Family worker*	1	0.69
Full-time employee	53	36.81
Job-seeking*	5	3.47
Dispatched worker/contract worker	22	15.28
Unemployed*	3	2.08
Trainee	4	2.78
Part-time worker*	53	36.81
Self-employed worker*	3	2.08
Total	144	100.00

Since this study aims to explore the factors leading to non-enrollment in NHI, it is necessary first to exclude samples that explicitly indicate enrollment in EHI or are highly likely to join EHI. Specifically, we exclude all samples from Option 2, and samples from Option 5 where the employment status is full-time employee, dispatched worker/contract worker, or trainee. Additionally, we also exclude samples from Option 7 from the analysis to narrow the scope of our sample size.

The dependent variable of this study is defined in binary form: individuals enrolled in NHI are coded as 1, and those not enrolled as 0.

$$Y = \begin{cases} 1 & \text{if the individual is covered by NHI} \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

3.2.2 Explanatory Variables

The selection of independent variables was guided by prior research and the survey questionnaire content, initially including age, gender, and employment status.

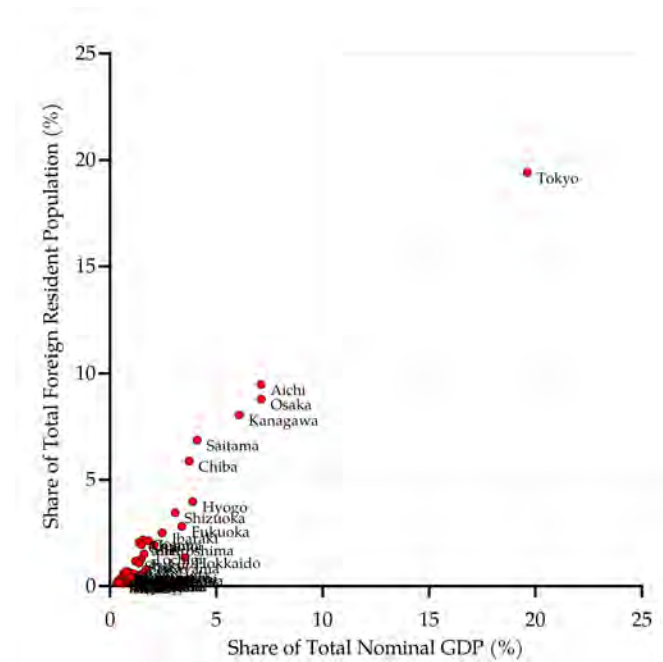
Previous research has highlighted income restrictions, which we term here as liquidity constraints. Although personal income strongly correlates with enrollment in public health insurance, Suzuki and Zhou (2001) note that personal income largely depends on employment status. To avoid collinearity, We are considering not including the monthly income in the analysis. In addition, while earlier studies often treat residency status as a symbolic variable representing foreign resident identity, our findings indicate that residency status substantially determines employment status and thus influences income. For instance, foreign residents holding student or dependent visas face restrictions on their work activities, preventing them from securing regular employment; instead, they rely on part-time or other informal work arrangements, and their working hours are strictly limited. Consequently, rather than considering residency status independently, we treat it in parallel with employment status as a factor influencing the labor income of foreign residents in Japan.

With respect to the remittance behavior noted in prior studies, we treat sending money abroad as a liquidity constraint factor, positing that it heightens liquidity pressures among foreign residents in Japan. Similarly, we consider place of residence as a liquidity constraint factor. In economically advanced prefectures, foreign residents tend to earn higher labor income, thus enjoying greater liquidity. In contrast, in less economically developed prefectures, foreign residents face more pronounced liquidity constraints. Figure 3 illustrates the relationship between the distribution of foreign residents and the economic conditions of each prefecture in 2020. Drawing on these observations, we classify Tokyo, Aichi, Osaka, Kanagawa, Saitama, and Chiba as “Economically developed prefectures with a high concentration of foreign residents,” while categorizing all remaining prefectures as “Economically underdeveloped prefectures with a low concentration of foreign residents.”

In response to factors repeatedly cited in previous studies as contributing to foreign residents’ limited understanding of Japan’s health insurance system, we employ four

proxy variables to identify potential underlying causes: duration of residence in Japan, Japanese language learning experience, engagements with Japanese neighbors, and frequent exposure to Japanese media. Self-assessed health status is represented by a proxy variable reflecting unease about one's own health. Additionally, we control for family composition through the inclusion of cohabitation status.

Figure 3 Foreign Resident Distribution and Prefectural Economies



NOTE: Made by the author using data from the Statistics on Foreign National Residents (December 2020) and the 2020 Prefectural Economic Accounts.

In examining the cultural differences associated with immigrants' countries of origin, previous work by Sasaki (2008) demonstrates that parental awareness of public pension contributions significantly influences the next generation's likelihood of enrolling in public pension plans. Drawing on this insight, we consider whether the implementation of universal health insurance in a foreign resident's home country might also shape their decision to enroll in Japan's NHI system. To indirectly assess this potential ef-

fect, we create a dummy variable—birth region implements universal health insurance. Specifically, this variable is used to determine whether the sample’s country of nationality is considered to have implemented universal health insurance. The criteria for this determination are detailed in Table 4.

Table 4 Classification

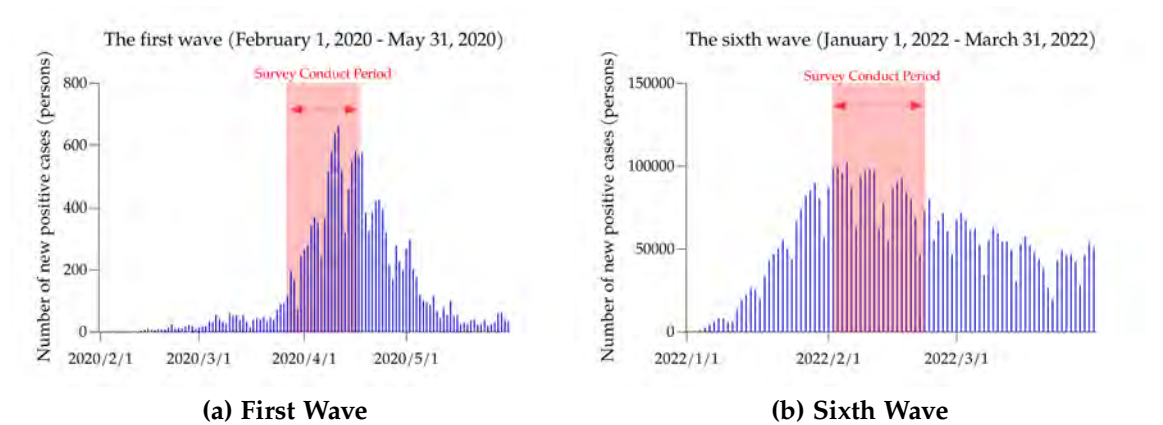
Region implements universal health insurance	Descriptions
Yes	Korea, Brazil, Taiwan, Thailand, The United Kingdom (U.K.)
No	China PR, Vietnam, Indonesia, The Philippines, Nepal, The United States (U.S.), India, Peru, Myanmar

NOTE: By 1989, South Korea had already established universal health insurance (Kwon, 2009). Similarly, Brazil’s Unified Health System (Sistema Único de Saúde, SUS) constitutionally guarantees free healthcare for all citizens (Paim et al., 2011), while Taiwan’s National Health Insurance, introduced in 1995, provides comprehensive coverage for its entire population (Cheng, 2015). Thailand followed suit in 2002 with the introduction of the “30-Baht Scheme” (later known as the Universal Coverage Scheme), effectively ensuring universal access to healthcare (see Tangcharoensathien et al. (2018)). On the other hand, despite substantial advancements, China has not yet fully achieved universal health coverage due to persistent urbanrural disparities and significant out-of-pocket expenses, which hinder equitable access and financial protection for all citizens (Yip et al., 2019). Similarly, despite the significant expansion of the Jaminan Kesehatan Nasional (JKN) since its implementation in 2014, Indonesia had not fully achieved universal health coverage by 2020, partly due to its relatively late start (Agustina et al., 2019). Moreover, countries such as Vietnam, the Philippines, Nepal, the United States, India, Peru, and Myanmar still face considerable gaps in both the breadth and depth of coverage. Although steps are being taken to expand health insurance in these settings, substantial work remains to ensure truly universal and equitable coverage (Reddy et al., 2011; Han et al., 2018).

Finally, and most critically, as shown in Table 2, the number of samples not enrolled in national health insurance is relatively limited in both SFR 2020 and SFR 2022. To obtain more robust estimates, we have decided to pool the samples from these repeated cross-sectional surveys, thereby creating pooled cross-sectional data. It is worth noting that the timing of these two surveys coincides with the first and sixth waves of COVID-19 infections in Japan, with significant differences in the number of new infections observed

during these periods (see Figure 4). We believe this may have differently impacted the behavior of foreign residents in joining national health insurance, particularly during the sixth wave of infections in SFR 2022. The sharp increase in new infections during this period may have caused panic among foreign residents, thereby encouraging those not enrolled in national health insurance to enroll. Therefore, we include a dummy variable for the survey year in our model to examine the impact of the surge in COVID-19 infections on the behavior of foreign residents in joining national health insurance. The list of explanatory variables can be found in Table 5.

Figure 4 Trend in the number of new positive cases during the first and sixth waves



NOTE: Made by the author using data released by Ministry of Health, Labour, and Welfare, Japan (<https://www.mhlw.go.jp/stf/covid-19/open-data.html>).

Table 5 Code Sheet for Explanatory Variables

No.	Variable	Codes/Values	Name
1	Age	1 = 30 to 39 years old 2 = 20 to 29 years old 3 = 40 to 49 years old 4 = 50 years old and above	AG
2	Gender	0 = Female 1 = Male	GND
3-1-A	Employment status	1 = Regular employee (full-time) 2 = Other forms of employment ^a 3 = Seeking employment or not in employment 4 = Temporary worker or contract worker 5 = Part-time worker 6 = Self-employed	EPYS
3-1-B	Residence status	0 = Residence statuses without work activity restrictions 1 = Residence statuses with work activity restrictions	RDS
3-2	Remittances to overseas	0 = No 1 = Yes	ROFM
3-3	Residential area	0 = Economically underdeveloped prefectures with a low concentration of foreign residents 1 = Economically developed prefectures with a high concentration of foreign residents	RDA
4-1	Duration of residence in Japan	1 = Less than 3 years 2 = 4 to 9 years 3 = 10 years or more	DRJP
4-2	Japanese language learning experience	1 = Otherwise 2 = Proficient with a strong Japanese foundation	JPLN
4-3	Engagements with Japanese neighbors	0 = No 1 = Yes	EGJN
4-4	Frequent exposure to Japanese media	0 = No 1 = Yes	FEJM
5	Unease about one's own health	0 = No 1 = Yes	UHT
6	Cohabitation status	1 = Cohabiting 2 = Living alone	CHS
7	Birth region implements universal health insurance	0 = No 1 = Yes	BTH
8	Survey year	1 = The year 2020 2 = The year 2022	SYR

^a Due to the very limited sample size for Family workers and Trainees, we categorize these two types of employment as other forms of employment.

3.3 Methodology

3.3.1 Model

We conducted the analysis using a probit model. The function for enroll in the NHI is as follows:

$$\begin{aligned}
 y^* &= \mathbf{X}\boldsymbol{\alpha} + \epsilon_i \\
 &= \alpha_0 + \sum_{m=1}^M \alpha_{(AG)m} AG_{mi} + \alpha_{(GND)} GND_i + \left\{ \begin{array}{l} \underbrace{\sum_{j=1}^J \alpha_{(EPYS)j} EPYS_{ji}}_{\text{Diversification of employment types}} \quad (\text{Model A}) \\ \underbrace{\alpha_{(RDS)} RDS_i}_{\text{Work activity restrictions}} \quad (\text{Model B}) \end{array} \right. \\
 &\quad + \underbrace{\alpha_{(ROFM)} ROFM_i + \alpha_{(RDA)} RDA_i}_{\text{Other factors related to liquidity constraints}} \\
 &\quad + \underbrace{\sum_{n=1}^N \alpha_{(DRJP)n} DRJP_{ni} + \alpha_{(JPLN)} JPLN_i + \alpha_{(EGJN)} EGJN_i + \alpha_{(FEJM)} FEJM_i}_{\text{Understanding of Japan's healthcare insurance system}} \\
 &\quad + \underbrace{\alpha_{(UHT)} UHT_i}_{\text{Health status}} + \underbrace{\alpha_{(CHS)} CHS_i}_{\text{Family composition}} \\
 &\quad + \underbrace{\alpha_{(BTH)} BTH_i}_{\text{Awareness of public health insurance enrollment}} + \alpha_{(SYR)} SYR_i + \epsilon_i \\
 \text{where } \epsilon_i &\sim N(0,1) \tag{2}
 \end{aligned}$$

$$y = \begin{cases} 1 & \text{if } y^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

Here, \mathbf{X} represents the row vector comprising p observed variables for a single individual, while $\boldsymbol{\gamma}$ is a $p \times 1$ column vector of coefficients. ϵ_i is the error term, following a normal distribution with mean 0 and standard deviation 1. y^* is a continuous latent

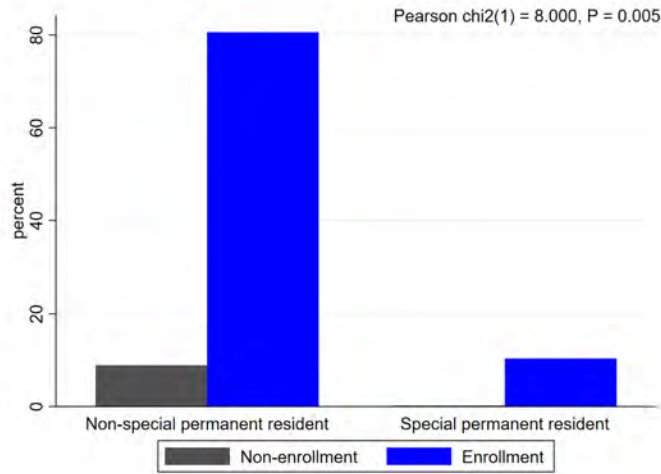
variable determined by the input variables X and the coefficients γ , which are estimated using the maximum likelihood estimation (MLE). The dependent variable y is set to 1 when $y^* > 0$ and to 0 when $y^* \leq 0$. To evaluate the consistency between the predicted y and the actual observed Y , the Area under the Receiver Operating Characteristic (ROC) curve (AUC) will be utilized to assess the model's discriminative accuracy.

3.3.2 Data preprocessing

Before conducting regression analysis, we need to preprocess the data to exclude samples irrelevant to the study. Based on previous discussions, we will exclude samples that explicitly indicate enrollment in EHI, are very likely to join EHI, or have answered "I don't know." Additionally, samples answering "Have lived in Japan since birth" to the question about duration of residence in Japan, as well as those answering "Special permanent resident" to the residence status question, will also be considered for exclusion. This is because these two types of samples are considered to have lived in Japan since birth or shortly thereafter, and compared to other foreign residents in Japan, they have a certain understanding of the Japanese healthcare insurance system.

However, to test the appropriateness of excluding samples with the "Special permanent resident" status and those born in Japan, we further conducted a χ^2 Homogeneity Test. Figure 5 shows the differences in NHI enrollment between special permanent residents and samples with other types of residence statuses. Clearly, compared to samples with other types of residence statuses, the proportion of special permanent residents not enrolled in NHI is significantly lower, consistent with our expectations. As for the χ^2 Homogeneity Test between samples born in Japan and those not born in Japan regarding NHI enrollment, since there was only one sample born in Japan who had enrolled in NHI in this step, we do not display the results of the χ^2 Homogeneity Test here.

Figure 5 Differences in NHI Enrollment Across Groups



NOTE: The test was conducted after excluding three types of samples: those that explicitly indicate they have joined EHI, those very likely to join EHI, and those who answered “I don’t know” to questions about their health insurance status.

Table 6 displays the descriptive statistics of the analyzed samples. It can be seen that employment status ($P < 0.001$), overseas remittances ($P < 0.001$), interaction with Japanese neighbors ($P = 0.036$), and unease about one’s own health ($P = 0.012$) are significantly correlated with enrollment in National Health Insurance at the 5% significance level. Additionally, the survey year ($P = 0.091$) shows significant correlation with the dependent variable at the 10% significance level. To achieve more robust estimation results, as shown in Table 6, the category with the largest sample size among each categorical variable will be set as the reference group.

Table 6 Descriptive statistics

Variable	Total		Non-enrollment		Enrollment		P-value
	N	Percent	N	Percent	N	Percent	
Age							0.599
20 to 29 years old (Ref.)	508	53.99	46	49.46	462	54.48	
30 to 39 years old	320	34.01	32	34.41	288	33.96	
40 to 49 years old	89	9.46	12	12.90	77	9.08	
50 years old and above	24	2.55	3	3.23	21	2.48	
Gender							0.799
Male (Ref.)	484	51.43	49	52.69	435	51.30	
Female	457	48.57	44	47.31	413	48.70	
Employment status							<0.001
Regular employee (full-time)	288	30.61	31	33.33	257	30.31	
Temporary worker/contract worker	110	11.69	9	9.68	101	11.91	
Part-time worker (Ref.)	404	42.93	25	26.88	379	44.69	
Self-employed	33	3.51	3	3.23	30	3.54	
Other forms of employment	16	1.70	5	5.38	11	1.30	
Job-seeking or unemployment	90	9.56	20	21.51	70	8.25	
Residence status							0.348
Residence statuses without work activity restrictions	503	53.45	54	58.06	449	52.95	
(Ref.)							
Residence statuses with work activity restrictions	438	46.55	39	41.94	399	47.05	
Remittances to overseas							<0.001
Yes	285	30.29	11	11.83	274	32.31	
No (Ref.)	656	69.71	82	88.17	574	67.69	
Residential area							0.552
Economically developed prefectures with a high concentration of foreign residents (Ref.)	770	81.83	74	79.57	696	82.08	
Economically underdeveloped prefectures with a low concentration of foreign residents	171	18.17	19	20.43	152	17.92	
Duration of residence in Japan							0.866
Less than 3 years	375	39.85	35	37.63	340	40.09	
4 to 9 years (Ref.)	466	49.52	47	50.54	419	49.41	
10 years or more	100	10.63	11	11.83	89	10.50	
Japanese language learning experience							0.289
Proficient with a strong Japanese foundation	53	5.63	3	3.23	50	5.90	
Otherwise (Ref.)	888	94.37	90	96.77	798	94.10	
Engagements with Japanese neighbors							0.036
Yes	368	39.11	27	29.03	341	40.21	
No (Ref.)	573	60.89	66	70.97	507	59.79	
Frequent exposure to Japanese media							0.897
Yes (Ref.)	522	55.47	51	54.84	471	55.54	
No	419	44.53	42	45.16	377	44.46	
Unease about one's own health							0.012
Yes (Ref.)	540	57.39	42	45.16	498	58.73	
No	401	42.61	51	54.84	350	41.27	
Cohabitation status							0.526
Cohabiting (Ref.)	535	56.85	50	53.76	485	57.19	
Living alone	406	43.15	43	46.24	363	42.81	
Birth region implements universal health insurance							0.781
Yes	244	25.93	23	24.73	221	26.06	
No (Ref.)	697	74.07	70	75.27	627	73.94	
Survey year							0.091
The year 2020 (Ref.)	523	55.58	44	47.31	479	56.49	
The year 2022	418	44.42	49	52.69	369	43.51	

3.4 Hypothesis

Based on the aforementioned discussion and insights from previous research, we propose the following hypotheses regarding the impact of various variables on enrollment in NHI, to better explain the estimation results (table 7).

Table 7 Hypothesis

No.	Hypothesis
1	<i>Compared to younger age groups, older individuals exhibit a significantly higher likelihood of enrolling in the NHI program.</i>
2	<i>Females are more likely to join the NHI compared to their male counterparts.</i>
3	<i>Individuals employed in full-time positions have a higher probability of enrolling in the NHI than those in part-time or other forms of employment, as well as those who are unemployed or job-seeking.</i>
4	<i>Individuals holding residence statuses with work activity restrictions demonstrate a lower probability of joining the NHI compared to those without work activity restrictions.</i>
5	<i>Those who engage in overseas remittances are less likely to enroll in the NHI compared to individuals who do not engage in such financial activities.</i>
6	<i>Residents of less economically developed prefectures are less likely to join the NHI than those living in more economically developed prefectures.</i>
7	<i>Long-term residents in Japan have a higher probability of enrolling in the NHI compared to those with shorter periods of residence.</i>
8	<i>Individuals with a stronger foundation in the Japanese language are more likely to join the NHI compared to those with limited Japanese language experience.</i>
9	<i>People who interact with their Japanese neighbors are more likely to enroll in the NHI than those who do not engage with their neighbors.</i>
10	<i>Frequent exposure to Japanese media is associated with a higher likelihood of enrolling in the NHI, whereas those who are not regularly exposed to Japanese media exhibit lower enrollment probabilities.</i>
11	<i>Individuals who do not have concerns about their own health are less likely to enroll in the NHI compared to those who do experience health-related anxieties.</i>
12	<i>Those living alone are less likely to join the NHI compared to individuals who cohabit with others.</i>
13	<i>Individuals originating from countries without universal health insurance systems are less likely to enroll in Japan's NHI compared to those coming from countries with established universal health coverage.</i>
14	<i>Participants surveyed in 2022 show a higher probability of enrolling in the NHI compared to those surveyed in 2020.</i>

4 Results and Diagnostics

Table 8 presents the Probit regression results for Model A. The results indicate that, relative to part-time workers, individuals who are engaged in other forms of employment or are job-seeking/unemployed have significantly lower probabilities of enrolling in the NHI, with reductions of 25.1% and 11.6%, respectively. Contrary to expectations, full-time employees are also 7.4% less likely to join the NHI compared to part-time workers. Furthermore, individuals who remit funds overseas are 7.9% more likely to enroll in the NHI than those who do not engage in overseas remittances. Additionally, participants who engage with their Japanese neighbors exhibit a 3.6% higher likelihood of enrolling in the NHI compared to those who do not engage with their Japanese neighbors. In terms of health attitudes, individuals without health concerns are 4% less likely to enroll in the NHI compared to those who are uneasy about their own health.

Table 9 presents the Probit regression results of Model B. The impact of residence statuses with work activity restrictions on the likelihood of joining the NHI was contrary to our expectations. Specifically, compared to groups without work activity restrictions, those with such restrictions showed a 5% significant increase in the likelihood of joining the NHI. Additionally, remittances to overseas, engagements with Japanese neighbors, and unease about one's own health also significantly influenced the likelihood of enrolling in NHI, with these variables' effects on the dependent variable consistent with the results of Model A. Regarding the impact of the survey year, in Model A, its coefficients or marginal effects were not significant; however, in Model B, the results indicated that compared to the 2020 samples, the 2022 survey samples had a significant 3.1% decrease in the likelihood of enrolling in NHI, which also contradicted our expectations. This might indicate that, with the prolonged spread of the COVID-19 pandemic, although there was a short-term surge in new confirmed cases, the incentive for foreign residents in Japan to join NHI was not as strong as the initial panic-driven motivation during the early stages of the pandemic.

Combining the results from Models A and B, we are puzzled by the estimated outcomes for full-time regular employees and those with residence statuses that restrict

work activities. It is generally believed that full-time regular employees and those without work activity restrictions have relatively higher income levels, and thus are less likely to forego joining NHI due to financial constraints. However, the research findings contradict this expectation, showing that these groups have a significantly lower likelihood of joining NHI. This finding seems to suggest that the significantly lower likelihood of these groups enrolling in NHI may be driven by non-economic factors.

To verify our hypotheses, we tested the relationships between monthly income ranges and employment status, as well as between monthly income ranges and residence statuses among uninsured individuals, with the results shown in Table 10. Consistent with our hypotheses, among uninsured individuals, full-time regular employees and those with residence statuses without work activity restrictions have significantly better monthly income conditions compared to other groups. To better observe the impact of residence status, we conducted additional Probit regression analysis using Model B, based on the actual residence statuses held by survey participants. The marginal effects of residence status on enrollment in NHI are shown in Figure 6, according to the regression results. It is evident that holding residence statuses of Engineer, Specialist in Humanities/International Services has a significant negative marginal effect on enrolling in NHI, at a 1% level of significance.

Table 8 Probit Regression Results for Model A

Variable	Coef.	$\Delta x / \Delta y$
30 to 39 years old	-0.060 [0.148]	-0.009 [0.021]
40 to 49 years old	-0.251 [0.227]	-0.041 [0.041]
50 years old and above	-0.100 [0.388]	-0.015 [0.060]
Female	0.083 [0.119]	0.012 [0.017]
Regular employee (full-time)	-0.519*** [0.161]	-0.074*** [0.024]
Temporary worker or contract worker	-0.277 [0.222]	-0.033 [0.029]
Self-employed	-0.182 [0.333]	-0.020 [0.041]
Other forms of employment	-1.166*** [0.357]	-0.251* [0.118]
Job-seeking or unemployment	-0.709*** [0.179]	-0.116*** [0.037]
Remittances to overseas (Yes)	0.634*** [0.162]	0.079*** [0.017]
Residential area (Economically underdeveloped prefectures with a low concentration of foreign residents)	-0.145 [0.152]	-0.023 [0.025]
Less than 3 years	0.007 [0.142]	0.001 [0.021]
10 years or more	0.145 [0.216]	0.020 [0.027]
Japanese language learning experience (Proficient with a strong Japanese foundation)	0.304 [0.310]	0.037 [0.030]
Engagements with Japanese neighbors (Yes)	0.252† [0.135]	0.036† [0.018]
Frequent exposure to Japanese media (No)	0.154 [0.125]	0.022 [0.018]
Unease about one's own health (No)	-0.264* [0.116]	-0.040* [0.018]
Cohabitation status (Living alone)	-0.048 [0.126]	-0.007 [0.019]
Birth region implements universal health insurance (Yes)	0.047 [0.132]	0.007 [0.019]
Survey year (The year 2022)	-0.164 [0.121]	0.007 [0.019]
Const.	1.534*** [0.208]	
Obs.	941	
Prob > chi2	0.000	
Pseudo R2	0.097	
McFadden R2	0.097	
AIC	589.863	
Area under ROC curve	0.717	

NOTE: [] contains robust standard deviations. () contains delta-method standard errors. †p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

Table 9 Probit Regression Results for Model B

Variable	Coef.	$\Delta x / \Delta y$
30 to 39 years old	-0.043 [0.141]	-0.006 [0.021]
40 to 49 years old	-0.186 [0.225]	-0.031 [0.040]
50 years old and above	-0.133 [0.394]	-0.021 [0.068]
Female	0.066 [0.117]	0.010 [0.018]
Residence statuses with work activity restrictions	0.329* [0.139]	0.050* [0.021]
Remittances to overseas (Yes)	0.624*** [0.157]	0.082*** [0.017]
Residential area (Economically underdeveloped prefectures with a low concentration of foreign residents)	-0.095 [0.148]	-0.015 [0.025]
Less than 3 years	0.022 [0.144]	0.003 [0.022]
10 years or more	0.147 [0.214]	0.021 [0.029]
Japanese language learning experience (Proficient with a strong Japanese foundation)	0.371 [0.301]	0.045 [0.028]
Engagements with Japanese neighbors (Yes)	0.247† [0.130]	0.037† [0.019]
Frequent exposure to Japanese media (No)	0.164 [0.123]	0.025 [0.018]
Unease about one's own health (No)	-0.270* [0.113]	-0.043* [0.018]
Cohabitation status (Living alone)	-0.107 [0.122]	-0.017 [0.019]
Birth region implements universal health insurance (Yes)	0.076 [0.132]	0.011 [0.019]
Survey year (The year 2022)	-0.196† [0.118]	-0.031† [0.019]
Const.	1.072*** [0.206]	
Obs.	941	
Prob > chi2	0.001	
Pseudo R2	0.064	
McFadden R2	0.064	
AIC	602.186	
Area under ROC curve	0.704	

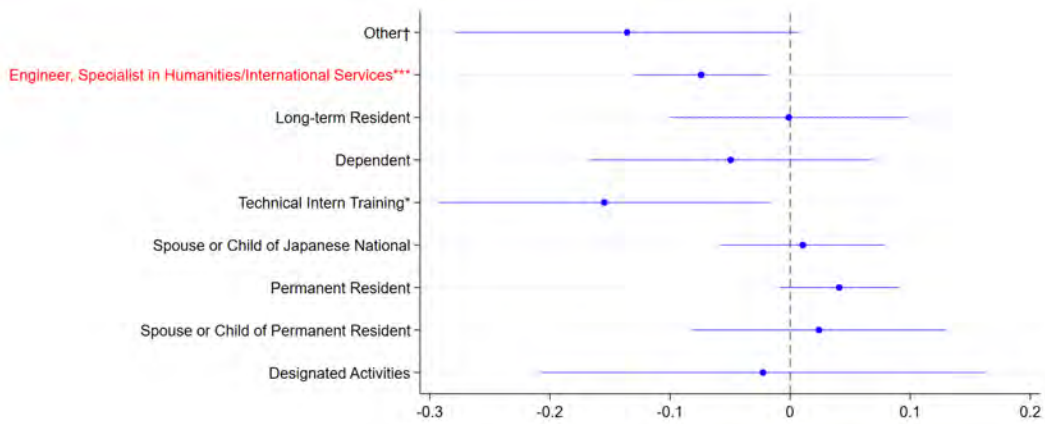
NOTE: [] contains robust standard deviations. () contains delta-method standard errors. †p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

Table 10 Income Range Distribution among Uninsured Individuals

Variable	Range 1		Range 2		Range 3		Range 4		Range 5		
	N	Percent	N	Percent	N	Percent	N	Percent	N	Percent	
Employment status***											
Regular employee (full-time)	1	2.44	10	40.00	12	75.00	3	75.00	5	71.43	
Temporary worker/contract worker	2	4.88	5	20.00	2	12.50	0	0.00	0	0.00	
Part-time worker	16	39.02	9	36.00	0	0.00	0	0.00	0	0.00	
Self-employed	0	0.00	1	4.00	1	6.25	0	0.00	1	14.29	
Other forms of employment	2	4.88	0	0.00	1	6.25	1	25.00	1	14.29	
Job-seeking or unemployment	20	48.78	0	0.00	0	0.00	0	0.00	0	0.00	
Residence status***											
Without work activity restrictions	11	26.83	16	64.00	16	100.00	4	100.00	7	100.00	
With work activity restrictions	30	73.17	9	36.00	0	0.00	0	0.00	0	0.00	

NOTE: †p<0.10, * p<0.05, ** p<0.01, *** p<0.001. Monthly income ranges are divided into five levels: Income Range 1 is 0-99,999 yen, Income Range 2 is 100,000-199,999 yen, Income Range 3 is 200,000-299,999 yen, Income Range 4 is 300,000-399,999 yen, and Income Range 5 is 400,000 yen and above.

Figure 6 Marginal effects on NHI enrollment by residence status



NOTE: † $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. The reference group is the residence status of Student. The choice of student residence status as the reference group was made because the sample size for students is larger than that for other residence statuses, allowing for more stable estimation results.

Given that we know regular full-time employment has a significant negative impact on joining NHI, to explore other factors beyond employment and work restrictions affecting enrollment, we conducted another Probit regression analysis on the remaining samples, with results presented in Table 11. In the estimation results, we found that for samples other than regular full-time employees, the coefficient and marginal effects of the residential area variable, which reflects regional economic conditions, were significant. Specifically, compared to prefectures with developed economies and relatively concentrated foreign populations, those with less developed economies and fewer foreign residents had a 7.3% significantly lower likelihood of enrolling in NHI. Additionally, we discovered that the variable “Birth region implements universal health insurance,” which reflects awareness of public health insurance enrollment, was significant for samples other than regular full-time employees. Individuals from regions where universal health insurance is implemented were 4.5% more likely to enroll in NHI compared to those from regions where it is not fully implemented. Besides, the direction of the effects of remittances overseas, unease about personal health, and the survey year on enrollment in NHI is consistent with previous regression analysis results.

Table 11 Probit Regression Results Excluding Regular Full-Time Employees

Variable	Coef.	$\Delta x / \Delta y$
30 to 39 years old	0.226 [0.208]	0.026 [0.022]
40 to 49 years old	-0.274 [0.314]	-0.045 [0.058]
50 years old and above	-0.678 [0.490]	-0.142 [0.137]
Female	-0.066 [0.145]	-0.009 [0.019]
0–99,999 yen	-0.225 [0.239]	-0.025 [0.023]
100,000–199,999 yen	-0.402 [0.270]	-0.052 [0.033]
Remittances to overseas (Yes)	0.784*** [0.231]	0.076*** [0.016]
Residential area (Economically underdeveloped prefectures with a low concentration of foreign residents)	-0.447*** [0.169]	-0.073* [0.035]
Less than 3 years	0.095 [0.166]	0.013 [0.023]
10 years or more	0.268 [0.352]	0.032 [0.036]
Japanese language learning experience (Proficient with a strong Japanese foundation)	0.270 [0.349]	0.029 [0.031]
Engagements with Japanese neighbors (Yes)	0.053 [0.163]	0.007 [0.021]
Frequent exposure to Japanese media (No)	0.105 [0.157]	0.014 [0.020]
Unease about one’s own health (No)	-0.405*** [0.145]	-0.055*** [0.019]
Cohabitation status (Living alone)	-0.172 [0.153]	-0.023 [0.020]
Birth region implements universal health insurance (Yes)	0.402* [0.176]	0.045* [0.018]
Survey year (The year 2022)	-0.386* [0.152]	-0.052** [0.020]
Const.	1.820*** [0.363]	
Obs.	653	
Prob > chi2	0.000	
Pseudo R2	0.116	
McFadden R2	0.116	
AIC	398.308	
Area under ROC curve	0.761	

NOTE: [] contains robust standard deviations. () contains delta-method standard errors. †p<0.10, * p<0.05, ** p<0.01, *** p<0.001. Regarding the monthly income ranges, given the very limited number of samples with incomes of 300,000 yen and above after excluding full-time regular employees, we combined these with samples earning between 200,000 and 299,999 yen to form a new income range starting from 200,000 yen, and designated this range as the reference group.

5 Discussion

Based on the results from Section 4, we summarize and discuss the conclusions in this section. Our study highlights that employment status is a significant factor influencing the enrollment of foreign residents in NHI system. Specifically, non-regular employment, job-seeking, or unemployment—circumstances often associated with liquidity constraints—reduce the likelihood of enrollment. However, even among regular full-time employees, who are relatively less affected by liquidity constraints, the probability of enrolling in NHI remains significantly lower. Given that we excluded individuals enrolled in EHI from our analysis, the remaining regular full-time employees are likely working in businesses where EHI enrollment is not mandated. The reasons why foreign residents working as full-time regular employees in such businesses are more likely to be non-participants in NHI are complex. We propose a possible explanation: as illustrated in Figure 2, the premium rates for NHI are relatively higher compared to EHI and are borne entirely by the insured individual, unlike EHI, where costs are shared between employer and employee. Moreover, foreign residents employed as full-time regular workers tend to have higher salaries, which makes them less likely to qualify for reductions in NHI premiums, unlike lower-income groups⁵. These factors may result in a disproportionate increase in the public health insurance cost burden for foreign residents working in businesses where EHI is not mandatory, particularly as their salaries rise. Under these circumstances, this group is more likely to opt out of NHI due to the escalating public health insurance costs. Besides economic considerations, the complexity of the enrollment procedures for NHI, given their foreign status, might also be one of the factors making it more likely for this group to become non-participants. However, this study does not provide evidence to support this view.

Regarding the job-seeking or unemployed groups, Table 10 clearly shows that their non-enrollment in NHI is likely due to liquidity constraints. This result is also consistent with previous research (Dong et al., 2008; Kimani et al., 2014). Since health and health insurance are considered normal goods, foreign residents in Japan may need to

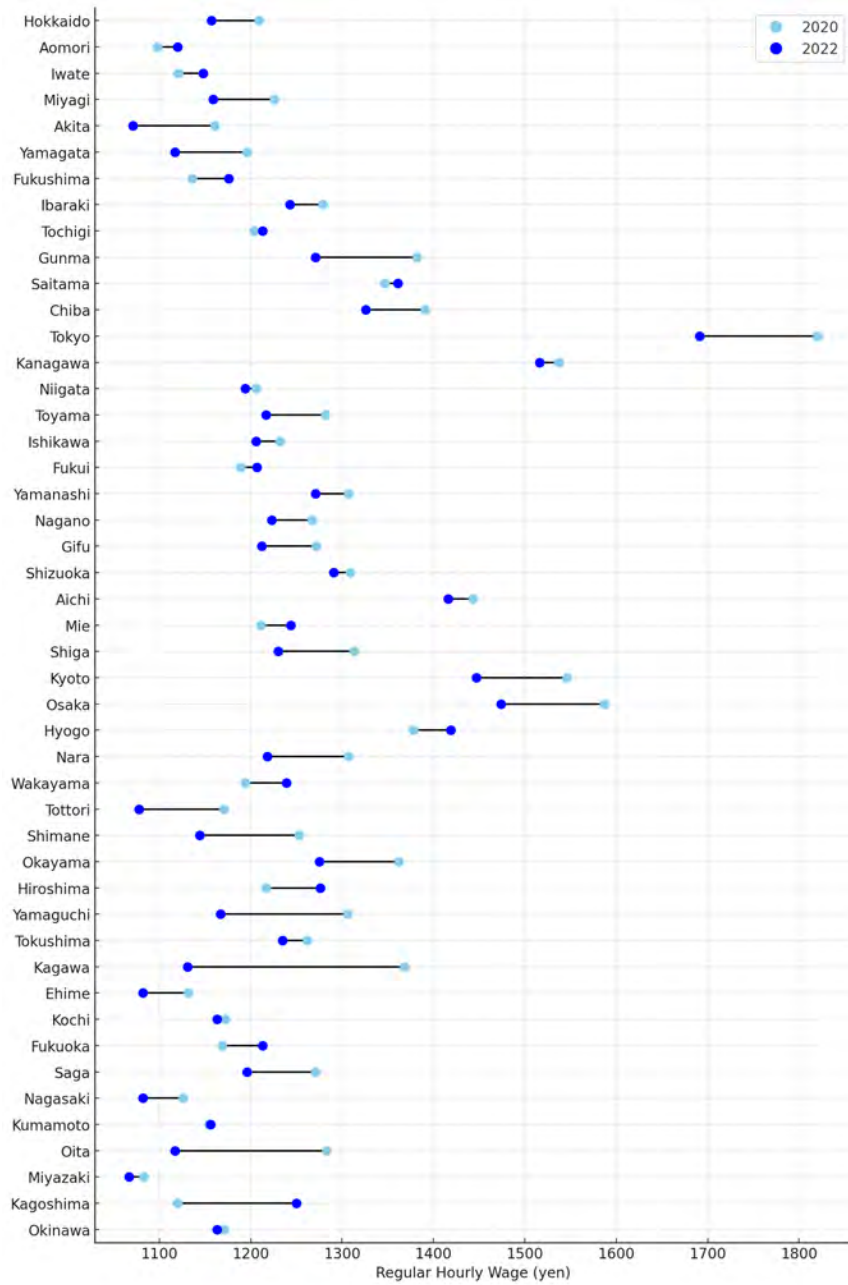
⁵For detailed information on the National Health Insurance premium reduction policy, please see Ministry of Health, Labour, and Welfare, Japan (2022)

make trade-offs between health insurance and other goods when faced with liquidity constraints. Under liquidity constraints, foreign residents in Japan may face trade-offs that compel them to forego health insurance, as it provides less immediate utility compared to other consumer goods. Consequently, they allocate their limited income to purchases that satisfy their immediate needs. Regarding other forms of employment, Table 10 indicates that non-enrollment in NHI under these employment conditions does not seem to be associated with liquidity constraints, and the specific reasons require further investigation.

About the impact of health status on insurance enrollment, our results show that foreign residents who have no unease about their own health are more likely to lack NHI coverage. In the insurance market, insured individuals typically have a clear understanding of their health status, and those in better health may perceive the expected utility or marginal utility of enrollment as lower, thus possibly refusing to join or opting out of insurance (Handel, 2013). Although Japan's NHI is nominally mandatory, it effectively operates as a voluntary enrollment system. Consequently, some foreign residents may choose to opt out of joining after weighing the trade-offs between their health risks and the costs of insurance, resulting in delayed payment of NHI premiums and ultimately not enrolling in the program.

Considering the impact of residence, for foreign nationals working in Japan under non-full-time regular employment, regional economics also seem to be an important factor influencing their enrollment in NHI. For example, regarding the wages of short-term workers, Figure 7 shows the regular hourly wages of short-term workers in each prefecture for the years 2020 and 2022. It can be clearly seen that in prefectures classified as economically developed with a high concentration of foreign residents, including Tokyo, Osaka, Chiba, Saitama, Kanagawa, and Aichi, the average hourly wage is higher, whereas in most other prefectures it is relatively lower. Foreign nationals working in non-regular employment formats in areas with lower average hourly wages for short-term workers may face greater liquidity constraints. Of course, this explanation is based on the assumption of regional wage differences and does not rule out the impact of improved regulations or measures related to NHI payments specifically for foreign residents in areas with high concentrations of such populations.

Figure 7 Regular Hourly Wages of Short-Term Workers by Prefecture



NOTE: Made by the author using data from the Basic Survey on Wage Structure (<https://www.e-stat.go.jp/dbview?sid=0003439178>).

In the sample excluding regular full-time employees, this study also found that public health insurance awareness significantly influences foreign residents enrollment in NHI in Japan. Specifically, foreign residents in Japan from countries that have not fully implemented universal health insurance in their country of origin are more likely not to enroll in NHI. Combined with the results of Model A, we further suggest that public health insurance awareness does not exhibit a significant impact among the regular full-time employee group, possibly due to the exacerbation of disproportionate insurance cost burdens.

Regarding the impact of the survey period, our findings show that, compared to the survey period in 2020 when COVID-19 first caused a surge in positive cases in Japan, the likelihood of foreign residents enrolling in NHI during the survey period in 2022, when infections surged significantly again, was notably lower. This finding contradicts our hypothesis. Some evidence suggests that during the early stages of the COVID-19 pandemic, people were more likely to experience tension and anxiety, but over time, as protective measures and related knowledge became widespread, their anxiety gradually subsided (Wang et al., 2020). This indirectly supports the robustness of our estimation results. The panic during the initial stage of the COVID-19 pandemic was more likely to serve as a motivating factor for foreign residents in Japan to enroll in NHI.

About the impact of remittance behavior, the results contradict our hypothesis. Based on previous studies, we typically assumed that foreign residents sending remittances overseas might be more likely to face liquidity constraints, leading to non-enrollment in NHI. However, the results indicate that foreign residents who send remittances overseas are significantly less likely to be non-enrolled in NHI. This study suggests that during the COVID-19 pandemic, sacrificing one's own health to send remittances overseas was not a common behavior. During the pandemic, foreign residents in Japan were more likely to prioritize ensuring their own health (i.e., enrolling in NHI) before deciding whether to send remittances overseas.

Discussion of some limitations of this study. Firstly, for survey participants who selected "Enrolled in health insurance but don't know the type" in the question about health insurance enrollment in Japan, this study inferred their possible type of health insurance based on their employment status. However, this method may lack sufficient

rigor, and we cannot rule out the possibility that some individuals in this group may be enrolled in types of insurance other than public health insurance. Secondly, the data used in this study come from a private survey agency and were collected using a non-probability sampling method via an online sample database. It must be noted that this sampling method may result in a lack of representativeness of the sample. Thirdly, previous studies have suggested that educational attainment significantly influences enrollment in public health insurance. However, because the survey we employed did not collect data on participants' educational attainment, it was not possible to include this variable as a control in our analysis.

6 Policy implications

Based on the discussion, this study suggests that further strengthening premium reduction measures for low-income foreign residents in Japan characterized by job-seeking or unemployment, expanding the scope of businesses mandatorily covered by EHI, and conducting targeted campaigns or incentives to promote NHI enrollment among foreign residents from non-universal health coverage countries could be effective strategies to reduce the non-enrollment rate in NHI among foreign residents in Japan.

7 Conclusion

This study draws on microdata from foreign residents in Japan to investigate the factors associated with non-enrollment in the NHI system. The findings suggest that holding a regular full-time position, being job-seeking or unemployed, working in non-standard forms of employment, and having no concerns about one's health status are key contributors to non-enrollment. Furthermore, after excluding regular full-time employees from the sample, the results indicate that regional economic conditions, awareness of public health insurance, and the spread of COVID-19 also significantly influence the likelihood of non-enrollment among foreign residents in Japan.

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