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Undocumented immigrants suffering from inequality of vaccination access in Japan: measuring the institutional barriers and exploring the associated factors

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ABSTRACT

Objectives: Undocumented immigrants (UIs) have been reported to suffer from the unequal distribution of COVID-19 vaccination, but this inequality has never been quantified, and the associated factors have not been measured.

Study design and methods: We interviewed 190 municipal offices throughout Japan about the access to COVID-19 vaccination for UIs and control group foreigners. Using logistic regression, we investigated the association between assured access and municipal characteristics.

Results: Out of the respondent municipalities, 57.5% answered that UIs can apply for a COVID-19 vaccination voucher. Additionally, 31.5% said they had received an inquiry about vaccines from UI individuals. Furthermore, only 23.2% of the municipalities responded that they had issued vouchers for UIs at least once. The control groups were reported to have been given more access to vouchers. Logistic regression showed that the foreign resident ratio, tertiary industry, and university graduation ratio were positively associated with vaccination access.

Conclusions: This study revealed for the first time that UIs are disproportionately marginalized compared with other visitors, implying that “illegality” plays an important role in the context of vaccination eligibility. The street-level vaccination desks of local governments may refuse to supply vaccines. Vaccine equity will be more readily achievable when vaccination access to all populations including UIs is ensured. Such access will also improve overall public health by increasing the vaccination rate.

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Introduction

COVID-19 has disturbed our world. “Vaccines are one of our most important and cost-effective tools to prevent outbreaks, protect individuals, and therefore keep entire communities safe and healthy,”¹ said International Organization for Migration (IOM) Director General António Vitorino. Governments all over the world have acted to ensure that there have been sufficient vaccines for the populations of countries globally. To improve the vaccination rate, various policies have been implemented.² As of November 17, 2022, the percentage of people who get a second vaccination for COVID-19 is 62.7% in the world.^{3,4} People can get booster shots in some

countries. On the other hand, minorities usually suffer from a lower COVID-19 vaccination rate, even when booster doses are distributed.^{4,5} Studies have revealed that racial, ethnic, economic, and gender minorities suffer from limited access to COVID-19 vaccines.^{6–11}

Immigrants are one of these minorities. The IOM reports the unequal situation of COVID-19 vaccination surrounding immigrants.¹² The IOM, the United Nations High Commissioner for Refugees, and the World Health Organization have advocated ensuring access to COVID-19 vaccines for all people on the move.^{13,14} Although previous studies have revealed their hesitancy to be vaccinated,^{6,9,15} they have just discussed the barriers to vaccination during the COVID-19 pandemic.^{4,5,12,16–20}

Undocumented immigrants (UIs) are a minority within minorities. Because of their marginalized status, they tend to be found in an unstable status, and their needs are not sufficiently met by

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public services. Because UIs avoid being tracked by authorities, it is not easy to understand their situation.^{17–19,21} A survey in Japan reported that the vaccination rate among UIs from Vietnam was 21%, while that of overall Vietnamese respondents was 91%.²² Although the study implies vaccine inequality among UIs, the results should be examined because of the limitations in recruiting UIs (via TAIHEN, a Facebook group of Vietnamese living in Japan), target population (only Vietnamese), and self-selection bias (the vaccination rate is roughly 80% even among Japanese³). Except for the previously mentioned survey, to the best of our knowledge, no study quantitatively measures access to COVID-19 vaccination among UIs.

To fill this gap, our cross-sectional survey investigated vaccination opportunities for UIs in Japan by focusing on public administration, which may cause vaccine inequality. Previous research has focused on the psychological aspects of marginalized people.^{6,9,15} However, we have to bring academic attention to a more basic step; do UIs really have access to vaccines, even if they are not hesitant? As the IOM suggested, there are institutional barriers to vaccination.^{12,13} This study examined the implementation process of vaccination policy in each municipality.

Furthermore, we investigated the characteristics of municipalities by hypothesizing three factors associated with a municipality's vaccine administration: *Understanding*, *Municipality Finance*, and *Presence*. We focused on the municipality characteristics because this analysis aims to understand more about how the environmental factors surrounding UIs externally determine their vaccination access. Although IOM has been discussing the seven kinds of national-level barriers to migrant inclusion in COVID-19 vaccination deployment,^{1,12,13} which is in line with academic discussions,^{2,4,5,14} the situation varies from country to country so that it is too delicate to statistically examine the impacts of these barriers by directly comparing between countries. On the other hand, this domestic municipal-level study provides a unique opportunity to quantitatively investigate the factors (i.e. discrimination and finance) because we can better control the rest five factors (i.e. regulations, technologies, information, logistics and the overall supply of doses).¹ *Understanding* among residents may mitigate hostility against UIs; income, the opportunity for intergroup contact, and education level might influence the majority's attitudes toward immigrants.²³ *Municipality Finance* could influence the attitude toward socially vulnerable people because the costs of supporting them are significant.²⁴ In addition, we hypothesized *Presence*, measured by the proportion of foreign residents in a municipality, might also be an important factor in line with the World Health Organization report.¹⁴ The more UIs in the jurisdiction, the stronger incentive the local governments have to increase the vaccination rate.

Background

The immigration situation varies from country to country. As UI can be defined as “foreign-born people who do not possess a valid visa or other immigration documentation,”²⁵ UIs consist mainly of illegal trespassers and overstayers. Because island geographics in Japan facilitate rigid border control to contain illegal trespassers, we can safely assume that the number of overstayers should be a surrogate measure of the overall number of UIs. The mechanisms by which a foreign worker who entered Japan legally becomes an “illegal” immigrant have been discussed elsewhere.²⁶ Besides UIs, there are other short-term residents who are having difficulty returning to their home country and have stayed in Japan for 3 months or longer (hereafter referred to as “remnants”) and those who are granted provisional release (hereafter referred to as “released”). The remnants are overstayers who have been granted

the right to stay in Japan temporarily due to COVID-19 travel restrictions. The released were originally UIs who were once captured but provisionally released through deportation. Although remnants and released are lookalikes, they are not classified as UIs (Supplementary Table 1).

Although the Japanese government has tried to some extent to eliminate the difficulties immigrants face in accessing vaccination, there are issues left unresolved. According to the Ministry of Health, Labour, and Welfare (MHLW) announcement, minorities, including UIs, are eligible for COVID-19 vaccination. However, the main hurdle for UIs to communicate with civil servants is that they have a legal duty to report UIs. Then, MHLW also notified that the local municipalities and civil servants can choose not to report them when considering the importance of public interest (i.e. the increase in local vaccination rate). Nevertheless, the MHLW has not established a definite standard and has virtually depended on the municipality's decisions as to the reporting. In addition, as a general concern, the municipalities provide services only if they can confirm the client's residence in their jurisdiction, although it is difficult for UIs to verify it.

In Japan, the supply of vaccines is strictly controlled by authorities through the Vaccination Record System (VRS).^{27,28} The shots are managed by the lot numbers, and people need a voucher issued only by their municipality to get vaccinated. The voucher number is tied to the vaccine lot number, so authorities can trace the stocks comprehensively and easily. Under this circumstance, the vaccines are never used for people who do not have their vouchers. The municipalities automatically provide vouchers for registered residents using VRS. Those who are not registered can also receive their voucher only if they apply.²⁹ For example, people who are unhoused and temporary foreigners need to complete the procedure to have access. This structure means the foreign nationals this study would like to survey have had contact with the administrative office if they got vaccinated.

Method

To measure UIs' access to vaccination, we focused on the supply side of the vaccination policy. Given the number of overstayer surrogates among UIs, we selected target municipalities using statistics calculated by the Immigration Services Agency of Japan.³⁰ We collected the total number of overstayers and the breakdown by their major status of residence (Supplementary Fig. 1 and Supplementary Table 2). Previous research has revealed that the vaccination rate among foreign nationals from Vietnam differs by their status of residence.²² We also used municipality data that indicate the number and breakdown of registered foreigners in each jurisdiction.³¹ Hypothesizing that the distribution of overstayers corresponds to that of registered foreigners in 2020,³² we distributed the overstayer number to each municipality by following the number of registered foreigners weighed by the breakdown of residential status. Then we acquired an estimation of the number of overstayers in each municipality following the equation below.

$$rate_i^s = Registered_i^s / OverallRegistered^s$$

$$Overstayer_i = \sum_{s \in S} rate_i^s \cdot OverallOverstayer^s$$

S is a set of statuses of residence, and i indicates the individual municipality. *OverallRegistered^s* indicates the overall population of the registered foreigners of residence status s in Japan. *Registered^s_i* indicates the population of the registered foreigners of residence status s in municipality i. *OverallOverstayer^s* indicates the overall

population of overstayers of residence status *s* in Japan. *Overstayer_i* indicates the estimated population of overstayers in municipality *i*.

We conducted structured interviews with a single free-response question via phone calls to municipality offices. The interviews were conducted by two interviewers in November 2021. We selected municipalities in descending order of coverage that are estimated to cover at least 50% of all overstayers, instead of random sampling. We prioritized municipalities with the most coverage because this survey questionnaire is not suitable for municipalities having no UIs in their jurisdiction. We asked three yes/no questions.

- Q1 “Is it possible for UIs to apply for the vaccination voucher in your municipality?” (Declared eligibility);
- Q2 “Has your municipality ever received an inquiry or question about COVID-19 vaccines from a UI individual before?” (Consultation); and
- Q3 “Has your municipality ever issued a voucher for UIs before?” (Ensured access).

As the control groups, we put the same questions to remnants and released. As none of the UIs, remnants, or released were registered in the municipality vaccination list, they needed to apply for the voucher at the public office desk. We also collected qualitative information by asking for a free description of vaccination implementation.

Furthermore, we investigated the association between access and municipality characteristics. Using logistic regression, we calculated the adjusted odds ratio that a municipality has issued a voucher for UIs. The outcome variable is a binominal dummy of the answer to Q3 for UIs (i.e. answering yes is equal to 1, and otherwise 0.). The exploratory variables are the municipality-level variables that surrogate *Presence*, *Understanding*, and *Municipality Finance* (Table 1). These variables were changed into dummy variables referred to as tertiles (i.e. low, medium, and high). As we focused on the municipality’s characteristics, we controlled for medical and public office capacity, including population. The logistic regression is calculated by the following equation:

$$\log \frac{p}{1-p} = \alpha + \beta \text{Exploratory} + \gamma \text{Control} + \epsilon$$

where *p* equals the possibility that the outcome variable takes 1, and ϵ is an error term. The parameters of interest are β s. Standard errors are clustered by prefecture. We checked multicollinearity by calculating variance inflation factors and regressed for the crude odds ratio and its confidence intervals to examine the robustness of the model.

Table 1
List of exploratory and control variables.

Exploratory variables	
<i>Presence</i>	Foreign residents ratio
<i>Understanding</i>	Average income
	Rate of employees in tertiary industries
	University graduate ratio
<i>Municipality Finance</i>	Municipality financial index
Control variables	
<i>Medical Capacity</i>	Number of hospitals
	Number of doctors
<i>Public Office Capacity</i>	Population
	Number of officers in local health center
	Number of healthcare professionals in government office

Results

We included 190 municipalities in the study out of 1792 municipalities in Japan. These 190 municipalities are estimated to accommodate between 106.97 and 942.33 overstayers (Fig. 1). The proportion of the number of estimated overstayers in each municipality is shown in Supplementary Fig. 2. During our survey in November 2021, we received 181 complete responses (95.3%) from the 190 municipalities.

One hundred and four municipalities (57.5%) answered that UIs can apply for a vaccination voucher in their municipality. Forty municipalities (22.1%) answered that they do not provide vaccination for UIs (Fig. 2). Forty-two municipalities (23.2%) said they have issued a voucher for UIs at least once. This means that out of the 104 municipalities that said UIs can apply for a vaccination voucher, only 40.4% actually did provide vouchers. Fifty-seven municipalities (31.5%) stated they had received an inquiry or question about COVID-19 vaccines from a UI before. Fifteen municipalities may have turned down UI individuals despite inquiries from UIs (Supplementary Table 3).

Regarding the control groups, 170 municipalities answered that the remnants could apply for a vaccination voucher, 158 said they had received inquiries by remnants, and 156 said they had ever issued a voucher for remnants (Fig. 2). One hundred and forty-four municipalities said that those who had been released could apply for the vaccination voucher, 116 answered they had received inquiries by released individuals, and 109 answered that they have issued a voucher for them at least once.

Qualitative answers included the number of vouchers issued to UIs, procedures to screen eligible UIs, and reasons or episodes to limit the vaccination of UIs (Table 2). Supplementary Table 4 lists all answers of free descriptions of vaccination implementation.

Fig. 3 and Supplementary Table 5 show the results of the logistic regression. *Presence* was an important factor. Foreign resident ratio was associated with ensured access (adjusted odds ratio [AOR]: 1.63, 95% confidence interval [CI]: 0.78–3.40 in medium; AOR: 3.02, 95% CI: 1.19–8.13 in high). Out of the *Understanding* variables, the opportunity of intergroup contact and education were promotional factors, whereas the association with income was not determined substantially. The rate of employees in tertiary industries was positively associated with access (AOR: 2.99, 95% CI: 0.99–9.48 in Medium; AOR: 3.50, 95% CI: 0.76–16.17 in High). The university graduation ratio was also a promotional factor (AOR: 2.66, 95% CI: 1.20–5.91 in Medium; AOR: 1.77, 95% CI: 0.70–4.50 in High). The odds ratio of average income was negatively estimated, but its confidence interval was too broad to conclude any association (AOR: 0.81, 95% CI: 0.22–2.98 in Medium; AOR: 0.57, 95% CI: 0.13–2.46 in High). The financial power index was non-linearly associated with access (AOR: 0.39, 95% CI: 0.11–1.37 in Medium; AOR: 2.73, 95% CI: 0.80–9.38 in High). Multicollinearity was weak, and the trend of crude odds ratios basically paralleled those of adjusted odds ratios (Supplementary Tables 6 and 7).

Discussion

The results reveal the inequality in the administration of COVID vaccines to UIs in Japan. Only 23.2% of the subject municipalities have ever issued a voucher for UIs, which implies extremely limited access. Given the hesitancy to vaccinate UIs^{6,9,10,16,18} and other barriers,^{4,5,12,16–20} they suffer from a lower vaccination rate. There are roughly 80,000 overstayers alone,³⁰ so there would be even more UIs in total. Because the COVID-19 vaccination has an externality to prevent infections and to promote community health,^{18,21,33} this is an emergent problem that should be dealt with as soon as possible.

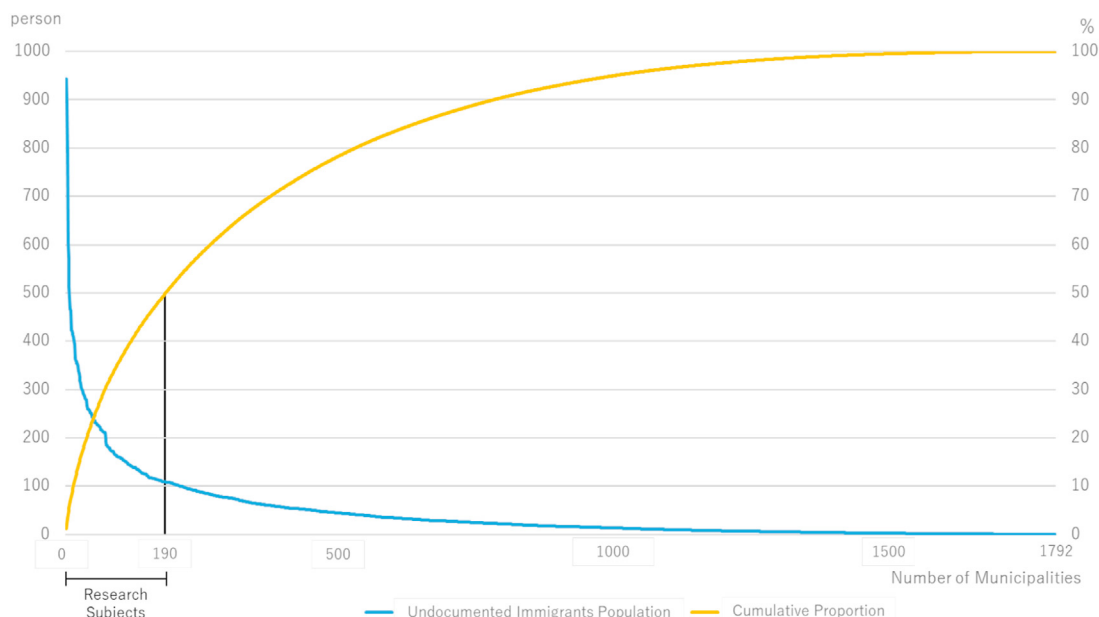


Fig. 1. Estimated distribution of the number of overstayers among municipalities. *Note:* All 1792 municipalities are aligned in descending order. The proportion of the number of estimated overstayers is shown in [Supplementary Fig. 2](#).

The results also suggest uneven vaccination access even among the remnants, released, and UIs. Previous studies have testified to the overall disadvantages in having vaccinations among racial minorities, foreigners, and immigrants.^{6–11} This study, however, reveals for the first time that UIs are disproportionately marginalized, whereas the results also show that the control groups suffered from limited access to vaccines. This may reflect the “illegality” derived from the duty to report.³⁴ Japanese public officers are obliged to report UIs, not remnants or those released by law.³⁵ Although the MHLW notification admits the exemption of the duty in vaccination policy, a certain number of municipalities claimed their duty to report as the rationale for their refusal ([Supplementary Table 4](#)).

What has led to this inequality even among minorities? This study focused on the supply side, that is, bureaucracy. In this study, only 42 of the 104 municipalities (40.4%) that answered they could issue vouchers actually did provide them. In addition, 15 municipalities did not provide vouchers, whereas they received an inquiry from a UI in this regard. Public policy theorizes this situation as “street-level bureaucracy,” which can put minorities in a fragile position.³⁶ The frontline public officers, such as the vaccine voucher application desk, face a dilemma, especially when they engage in welfare cases. Under information asymmetry concerning the regulations, the officers can use their discretion to judge a client’s eligibility. Thus, they can be less positive in dealing with casework

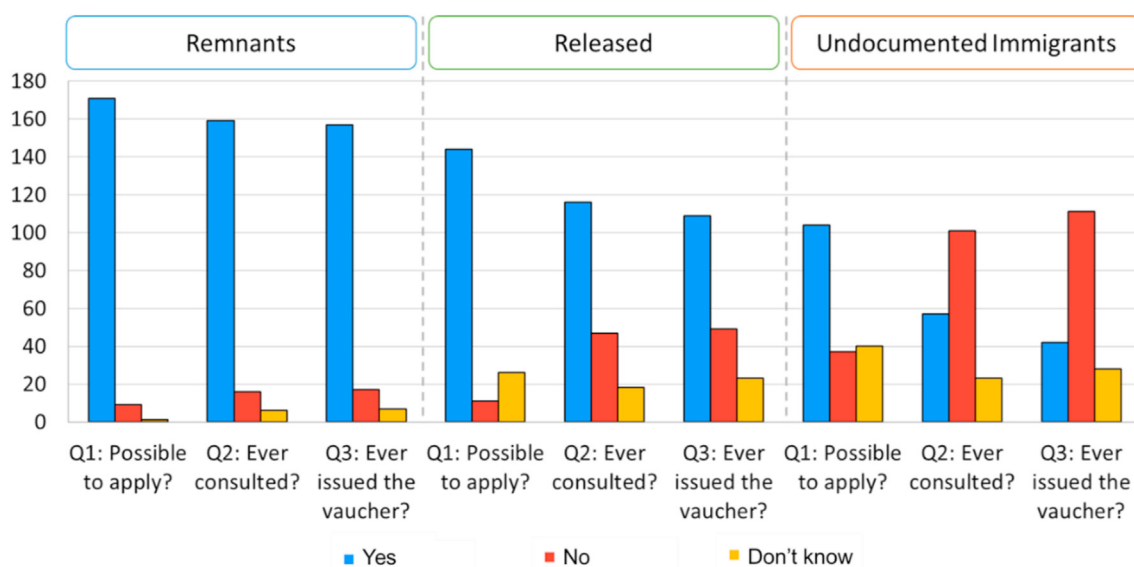


Fig. 2. Municipality-reported access to vaccination of each group. *Note:* The bars indicate the number of municipalities that answer “Yes,” “No,” and “Don’t know,” respectively. Questions for each group are Q1 “Is it possible for UIs to apply for the COVID-19 vaccination voucher in your municipality?” (Declared eligibility); Q2 “Has your municipality ever received an inquiry or question about COVID-19 vaccines from a UI individual before?” (Consultation); Q3 “Has your municipality ever issued a COVID-19 vaccination voucher for UIs before?” (Ensured access). Answering “Don’t know” means respondents do not understand the practice.

Table 2
Qualitative results of free descriptions of vaccination implementation.

Category	Answer examples
Number of vouchers issued for UIs	<ul style="list-style-type: none"> • Out of 128 issued, 3–40% are for UI individuals. • Three issuances for UIs. • Five issuances for the remnants. • Two issuances for the released. • 126 issuances for overall irregular cases (not limited to foreigners).
Procedure for screening eligible UIs	<ul style="list-style-type: none"> • Check the certificate of residence. • Check proof of address documents (e.g. housing contract, receipts for public utility bills, certificates of public assistance). • Confirm UI's address based on self-report. • Check passport only.
Reason or episodes for limiting vaccination for UIs	<ul style="list-style-type: none"> • To obey the MHLW policy. • Duty to report. • UIs possibly from various municipalities came to the office all at once (dozens of people), declaring that they reside in their community leader's house in the jurisdiction.

MHLW, Ministry of Health, Labour, and Welfare; UIs, Undocumented immigrants.

because they can allocate their efforts to other routine work instead of helping their clients. In the interviews, we often noticed the variation in the strictness of eligibility checks. Applicants for vouchers need to certify their residence in the municipality in general, but the UIs usually do not have any documents to demonstrate their place of residence. Some municipalities grant their residence by self-report, whereas others require the contract documents of rental housing or a certificate of residence, which is impossible for UIs to obtain (Table 2).

Beyond the office, overall municipality characteristics can also determine an officer's attitude. The voice of the UIs is a promotional

factor. The exploratory analysis suggests that the *Presence* of foreign people may help ensure access for UIs. *Understanding* from residents might be associated with ensured access; education may decrease xenophobia, and urbanization (tertiary industry) might increase attachment. We could not determine the association between the average income of residents with these data. *Municipality Finance* was non-linearly associated; low and high groups tend to have vaccine access rather than the middle class. A wealthy municipality might be able to afford vaccines for UIs. A poor municipality may need to provide vaccines as UIs might be a crucial labor force in the local economy.

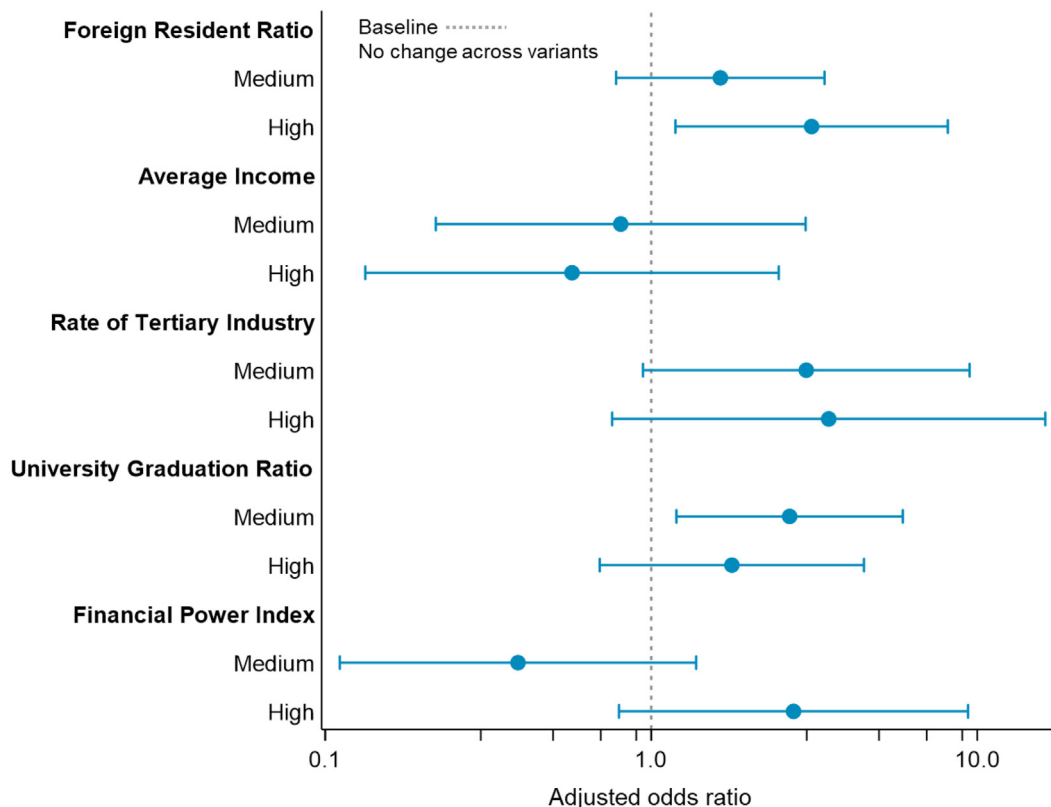


Fig. 3. Factors associated with ensured access to vaccination among UIs by regression analysis. *Note:* The plot shows the adjusted odds ratio and its 95% confidence interval of logistic regression. The details of the results are shown in Supplementary Table 5. The x-axis is converted into logarithm values. Foreign residents ratio, rate of employees in tertiary industries, and university graduate ratio are positively associated with ensured access, whereas municipality financial index was non-linearly associated. The odds ratio of average income was negative, but its confidence interval was too broad to conclude any association.

We found some good practices through this survey. First, UIs avoid being traced, so they are reluctant to provide their information. One of the subject municipalities issues vouchers with blank numbers for UIs to bypass the VRS. Similarly, there was a successful case in vaccination campaigns that intentionally did not aim to identify the recipients' status in the past.^{37,38} Second, in Oarai city, the municipality office strived to generate bottom-up cooperation with ethnic communities to prevail over the vaccination.³⁹ They got an agreement not to use the information for any purpose other than vaccination. The office learned a lesson from the fact that a cluster infection occurred – including among UIs – in the early period of COVID-19 in the jurisdiction. Third, the central government, through the Foreign Residents Support Center in the Immigration Services Agency of Japan, sent letters to remnants telling them they could have access to a vaccine if they brought the letter to the municipality desk.⁴⁰ This may have contributed to the relatively higher rate of access among remnants than UIs.

Besides the individual endeavors of frontline public officers, a strong top-down approach, in which the central government mandates local governments to indiscriminately provide welfare, is necessary to overcome this inequality because it is known that the municipalities can be exclusive when following their rationality. The local welfare policy is considered to have its “city limits.”²⁴ If one city adopts a welfare policy that is above average in its contents than its counterparts, those in need will concentrate in that city, which puts a load on finance or operation in the city. Thus, it is reasonable for cities to minimize their welfare program. According to a qualitative answer, one municipality, which initially had generously accepted applications by UIs, strictly checked their residence after dozens of UIs, who resided outside the municipality, rushed to the desk and claimed they lived in a friend's house in the municipality. As seen in the regression, only municipalities with high financial power disproportionately tend to ensure access. Given this theory, the central government had better adopt the top-down approach. For example, it would be ideal to strengthen the exceptional guideline stipulated by the MHLW to declare the legality of allocating vaccines for UIs and to disseminate it to all municipalities to raise awareness in general. It would drive municipalities to achieve vaccine equity by resolving confusion about illegality stemmed the duty to report, which is frequently observed in the open-ended question (Supplementary Table 2).

This study has some limitations. First, the number of UIs in each municipality was not precisely estimated. Because the real distribution is unknown, we believe it is acceptable to use the number of overstayers as a surrogate variable for UIs and to weigh the estimated distribution using foreign residents' data. Second, we have to be careful about generalizing for the overall country due to selection bias. To conduct the survey efficiently, we selected municipalities that contained the top 50% of estimated UIs. Because of the weighting in the estimation of UIs, these municipalities tend to have more foreign residents. We chose not to use random sampling because some municipalities possibly do not have any UIs, so they are not suitable subjects for this survey. Third, due to the limited samples, the power of logistic regression was not ample. Further research is necessary to identify causal factors.

Conclusion

This study revealed the vaccination inequality among UIs in Japan and that they suffer from limited access to vaccination. Vaccine equity will be more readily achievable when vaccination access to all populations including UIs is ensured. Because there are roughly 80,000 overstayers alone²⁹ and there would be even more UIs, ensuring vaccine access will improve overall public health by increasing the vaccination rate. Although we found various good

practices to supply vaccines for UIs, it is necessary to tackle this problem with a stronger commitment from the central government to achieve vaccine equity. It is reasonable to strengthen the exceptional guideline stipulated by the MHLW to declare the legality of allocating vaccines for UIs and to disseminate it to all municipalities to raise awareness in general.

Author statements

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Ethical approval

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Competing interests

None declared.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.puhe.2023.01.019>.

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