

Sociodemographic inequities in dental care utilisation among governmental welfare recipients in Japan: a retrospective cohort study

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Research

Keywords: poverty, oral health inequities, public assistance, free dental care access, Japan

Posted Date: November 13th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-104585/v1>

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Abstract

Background

Maintaining oral health is one of the global public health challenges. Income and out-of-pocket payments for dental care services are predictors of dental care utilisation. Although public assistance programmes guarantee income security for impoverished people, access barriers other than financial costs may cause unmet needs of dental care. We aimed to explore the potential sociodemographic factors determining dental care utilisation among recipients of public assistance in Japan using linkage data of public assistance database and medical assistance claim data administered by municipalities.

Methods

This was a retrospective cohort study involving a sample of public assistance recipients. We extracted the recipients' sociodemographic data (age, sex, household number, employment status, nationality, disability certificates, and long-term care status) in January 2016 and observed them until December 2016 to identify incidences of dental care utilisation as outcomes. We performed a multivariable Poisson regression analysis, with a robust standard error estimator to calculate the incidence ratio (IR) of dental care utilisation in each variable.

Results

We identified a total of 4,497 recipients at risk. Among them, 839 recipients used dental care services. The female recipients had a higher incidence of dental care utilisation when compared to the male ones (adjusted IR, 1.22; 95% confidence interval [CI], 1.08–1.38). Immigrant recipients had a higher incidence of dental care utilisation than the Japanese ones (IR, 1.53; 95% CI, 1.16–2.01). Recipients with psychological disabilities had higher incidences than those without disability certificates (IR, 1.30; 95% CI, 1.08–1.56).

Conclusions

Non-financial sociodemographic inequities in dental care utilisation stemming from sex, nationality, presence of psychological disability were found despite minimum income protection and equitable financial dental service access amongst public assistance recipients in Japan. Providing targeted preventive care and treatments for dental care among underserved populations is required to tackle oral health inequities.

Background

Oral diseases (such as dental caries and periodontal diseases) include a range of chronic clinical conditions that affect the teeth and mouth [1, 2]. Although preventable, oral diseases are highly prevalent throughout the life. Therefore, oral diseases are major global public health issues and have substantial negative effects on an individual's physical and mental health, further burdening the society [1–5].

As poverty is a strong determinant of oral health, governments in many countries have welfare programmes, which provide financial support to the poor, and the services include full or partial exemptions of dental care costs [6]. However, even though access to dental care services are ensured, previous studies have reported that other non-financial sociodemographic factors such as sex, marital status, race/ethnicity, nationality, education, job status, and social relationships are also associated with oral health [7–15]. In Japan, there is a governmental welfare programme called public assistance '*seikatsu-hogo*' that is eligible for households living below the poverty line without any assets. Households on public assistance receive monthly minimum income benefits and are fully exempted from paying for dental care [16]. However, given the potential effects of non-financial socioeconomic statuses on poor oral health, the financial welfare programme may not fully compensate for the socioeconomic risks associated with poor oral health.

Nonetheless, to the best of our knowledge, no study has investigated the potential factors determining dental care utilisation among the impoverished population supported by the Japanese governmental welfare programme. Therefore, the purpose of this study was to explore the sociodemographic determinants of dental care utilisation among public assistance recipients using the linkage data of the municipal public assistance database and the medical assistance claim data in Japan.

Methods

Study design and participants

This retrospective cohort study included all adults who received public assistance in two suburban municipalities, Osaka and Tokyo, in January 2016. In Japan, approximately 2% of the population receives public assistance [16]. Households availing public assistance receive monthly minimum income benefits and are fully exempted from paying for medical and dental care [16]. All the public assistance recipients were allowed to use the medical assistance programme (including payment for dental care) if they had medical-care vouchers (*iryō-ken*) from the welfare office. We excluded the data of participants who stopped receiving public assistance during the observational period, which occurred mainly due to participants' increased incomes or deaths (Fig. 1).

Data sources

For the baseline data, we used the public assistance recipients' database from the welfare offices of municipalities. This database included information on age, sex, number of family members, household composition, nationality, working status, and income, including work income, pension, and disability

pension. These data were collected by the staff of the municipality welfare offices to determine the utilisation of public assistance and the amount of monthly minimum income protection; thus, we did not have any missing data. To obtain the outcome data, we used medical assistance claim data between January, 2016 and December, 2016, which included dental claim data. The data comprised the recipients' monthly medical and dental consultations, total consultation cost, total number of visits each month, and their diagnoses.

Each municipality linked the two databases using individual identification codes. The welfare offices of the two municipalities agreed to provide anonymised data to the authors via a system company that provided the management software of the public assistance database to the municipalities. This study protocol was approved by the Ethics Committee of the Graduate School of Medicine of the University of Tokyo (Approval No: 11503).

Measurements and variables

Outcome variables

From the medical assistance claim data, we identified the cumulative incidence of dental care utilisation, defined as receiving dental care services for the following oral diseases once or multiple times during the observational period: K00, disorders of tooth development and eruption; K01, embedded and impacted teeth; K02, dental caries; K03, other diseases of hard tissues of teeth; K04, diseases of pulp and periapical tissues; K05, gingivitis and periodontal diseases; and K06, other disorders of gingiva and edentulous alveolar ridge. These oral diseases were determined according to the International Classification of Disease, Tenth Edition (ICD-10) code [17]. These variables were considered as proxy measures of poor dental health conditions and accessibility to dental care services.

Explanatory variables

Based on the data availability as of January 2016, we extracted the following information as demographic factors: age (continuous), sex (female or male), household composition (living alone or not), employment status (working or not), and nationality (Japanese or others). We coded municipality as a dummy variable to adjust for unmeasured cultural and environmental characteristics of the two municipalities (A/B). We also considered psychological, intellectual, and physical disabilities as potential confounding factors by noting information on the qualifications for welfare benefits for disabled people, as municipality officials certify them with the diagnosis given by designated physicians. Since recipients of disability assistance can avail benefits of additional income and social care, we also considered the levels of long-term care needs based on the information in the public long-term care insurance system. In the system, there are seven nationally standardised levels of long-term care need (support requirement levels 1 and 2, and care need levels 1 to 5) [8]. People aged 65 years and above who are potentially under the need of long-term care and people aged 40 years and above with the designated diseases can apply for insurance benefits. Based on definition of the level, insurers (in most cases, municipality governments) assess and certify the insurance benefits. The benefits provided to the recipient are

determined based on the certified level. In this study, we classified the levels into 'support requirement' level and 'care need' level.

Statistical analysis

First, we described the characteristics of all of the study participants and recipients who received dental care during the observational period. Second, we performed a univariable Poisson regression analysis, and calculated the crude cumulative incidence ratio (IR) of dental care utilisation and 95% confidence interval (CI) of each explanatory variable. Third, we performed a multiple Poisson regression analysis to calculate the multivariable-adjusted IR of each explanatory variable (Analysis 1). To identify the incidence of dental care service utilisation amongst the population at risk, we performed an additional analysis, which excluded recipients who had received dental care in the first three months (Analysis 2). This allowed us to exclude recipients who used dental care services regularly for preventive and treatment measures because their dental care utilisation would have occurred frequently during these three months [18, 19]. Consequently, we could verify the actual incidence of dental care utilisation among the study participants. Furthermore, we performed two sensitivity analyses. To confine dental care utilisation only for treatment purposes, we limited our outcome variables to the incidence of dental caries using ICD-10 code of K02 (Analysis S1). Since dental care utilisation for preventive measures was also reported to occur over six months [18, 19], we performed an additional analysis which excluded recipients who had received dental care in the first six months (Analysis S2). The robust standard error estimator was adopted for all statistical analyses to calculate 95% CIs. All the analyses were performed using STATA SE Ver.16.2 (Stata Corp., College Station, TX, USA).

Results

We obtained the data of 6,016 people on public assistance. After excluding recipients who stopped receiving public assistance during the observational period, 5,717 recipients were included in this study. We identified the population at risk (4,497 recipients) by excluding participants who visited dentists for oral care in the first three months (Fig. 1). Among them, 2,281 (50.7%) were women, 859 (19.0%) had jobs, 392 (8.7%) had psychological disabilities, and 124 (2.8%) were immigrants. Regarding the recipients' oral health, 839 (18.7%) utilised dental care during the observational period (Table 1). The univariable Poisson regression analysis showed that recipients who were young, women, immigrants, employed, and certified with psychological disabilities had higher incidences of dental care utilisation (Table S1).

In the multivariable Poisson regression analyses, the results of Analysis 1 showed that recipients who were young, women, immigrants, certified with psychological disabilities, certified with 'care-needs' level of long-term care, and those who lived alone had high incidences of dental care utilisation (Table 2). The results of Analysis 2 showed that recipients who were young (IR, 0.87 (by 10-year-age groups); 95% CI, 0.84–0.91), women (IR, 1.22; 95% CI, 1.08–1.38), immigrants (IR, 1.53; 95% CI, 1.16–2.01), and certified with psychological disabilities (IR, 1.30; 95% CI, 1.08–1.56) were associated with high incidences of dental care utilisation. Recipients, who lived alone, were employed, and who needed long-term care had a slightly high incidence of dental care utilisation (Table 2). Our sensitivity analysis (Analysis S1) showed

that recipients who were women and certified with psychological disabilities were associated with high incidences of dental caries (IR, 1.30; 95% CI, 1.14–1.49 and IR, 1.32; 95% CI, 1.09–1.59; respectively); however, there was no strong association between nationality and dental caries diagnosis (Additional File 2). Moreover, the results of Analysis S2 that excluded users from dental services in the first six months showed similar results as that of Analysis 2 (Additional File 3).

Discussion

Our study found that among public assistance recipients in Japan, the incidence of dental care utilisation was high among young people, women, immigrants, and those with psychological disability certificates. This was the first study that demonstrated sociodemographic inequities in dental care utilisation among adult public assistance recipients whose dental care utilisations and minimum incomes were financially ensured. The strength of this study was that by using existing standardised databases without missing data, we identified the inequities in dental care utilisation among public assistance recipients who are usually difficult to reach through standard social surveys.

Findings in context

Our results of high incidences of dental care utilisation among female recipients and those having psychological disabilities were consistent with results of other recent studies [20–23]. Women may have greater preference to maintain oral health and aesthetic appearance than men due to the societal norms [20–22], resulting in their higher use of dental care services than men. It is conceivable that we might have overestimated the usage of dental care service among female recipients because our outcome depended on recipients' dental care utilisations; in contrast, men might have not accessed dental services even though they needed treatment. Moreover, the reduced motivation of patients with psychological disabilities or severe mental health disorders for caring for their oral health may explain the association between psychological disability and poor oral health [24]. Reduced protective factors for oral diseases as side effects of medications (such as decreased saliva secretion) can also explain the association [25].

There may be several possible explanations for the results of higher incidence of dental care utilisation among immigrants than the Japanese recipients. First, free dental care associated with the public assistance programme might have inflated immigrants' dental care attendance, as payment for dental services may be needed in their own countries. Second, baseline disease levels may be higher among immigrants than among the Japanese [26]. Third, immigrant recipients of public assistance may use more dental care services for preventive measures than for treatment purposes. Our sensitivity analysis that showed the absence of a strong association between nationality and dental care utilisation for the treatment of dental caries underscored this hypothesis. The frequency of dental visits for symptoms of dental caries may be similar between Japanese and immigrant recipients. In this context, Japanese recipients might be underserved by dental care services for preventive measures. Finally, immigrant recipients have also been reported to use medical care services more frequently than Japanese recipients [27]. Immigrant recipients may experience social isolation, and this may lead to their increased demands

for support by healthcare professionals, including dental care providers. Further studies are required to examine the reasons for high incidences of dental visits among immigrants.

Practice and policy implications

Our study provided novel evidence that sociodemographic inequities in dental care utilisation were still prevalent among public assistance recipients in Japan, even though they were assured free dental care access and minimum income by the government welfare programme. Individual socioeconomic backgrounds may be involved in determining dental care utilisation. Since oral health strongly influences individual and societal burdens, identifying population segments that are at risk of underserved dental care and prioritising preventive and treatment activities for them may be effective [28, 29]. Dental care providers and policymakers should also consider designing dental care interventions using population-based approaches. Although the Japanese government will implement a mandated health management programme for public assistance recipients in 2021 [30], this programme does not include oral healthcare. Thus, the government also needs to provide an additional oral health management programme to public assistance recipients.

Limitations

Our study had several limitations. First, although we used longitudinal data, there was still the possibility of reverse causation. Some people may have developed severe oral diseases and other illnesses, which would have resulted in financial difficulties and the subsequent need for public assistance. Nonetheless, the results of the analyses that removed the incidence of dental care utilisation during the first three months minimised the risk of reverse causation. Second, our use of medical assistance claim data might have over- or under-estimated the incidence of dental care utilisation. The incidence was only evaluated for utilisation of dental care services; thus, recipients who experienced severe health conditions or social isolation might not have been able to access dental care services, which may have resulted in differential misclassification. Third, there were important factors that were not evaluated in this study such as the severity of diseases and what the dental treatments entailed, and this may have potentially biased our findings. For example, we could not differentiate between dental services used for preventive or treatment purposes from the data. Finally, since this study used data from only two municipalities in Japan, the generalisability of our findings to other populations may be limited.

Conclusion

Our study suggested that public assistance recipients who were young, female, immigrants, and had psychological disabilities were associated with high incidence of dental care utilisation. Sociodemographic inequities in the use of dental care services were found despite free access to dental services and minimum income protection amongst public assistance recipients in Japan. Providing targeted preventive and curative dental care for underserved populations is required. Further investigations using detailed information about broader sociodemographic factors, the severity of the oral health conditions, and dental treatments received are warranted.

Abbreviations

IR: incidence ratio; CI: confidence interval; ICD-10: International Classification of Disease, Tenth Edition

Declarations

Ethics approval and consent to participate

The welfare offices of the municipalities agreed to provide anonymised data to the authors via a system company, which had provided management software for the public assistance database to the municipality welfare offices. The study protocol was approved by the Ethics Committee of the Graduate School of Medicine, University of Tokyo (Approval No: 11503).

Consent for publication

Not applicable.

Availability of data and materials

The data used in this study were obtained from the participating municipalities in Japan; however, there are restrictions regarding the availability of these data, which were used under licence for the current study, and are not publicly available. The data are available from the authors upon reasonable request, with the permission of the municipalities.

Competing interests

Daisuke Nishioka, Keiko Ueno, Shiho Kino, and Jun Aida declare no competing interests associated with this manuscript. Naoki Kondo conducted collaborative research with Kitanihon Computer Service Co. Ltd. (KITACOM) that provided the data used in the present study. Naoki Kondo received a research fund and a scholarship donation from KITACOM.

Funding

This study was supported by the Japan Society for the Promotion of Science KAKENHI grants (17K19793, 18H04071, 20K20774) and Kitanihon Computer Service Co. Ltd. (KITACOM), who provided the data used. The research funding bodies had no discretion and involvement in our study protocol, analysis, interpretation of the results, or the submission of this manuscript.

Authors' contributions

DN, KU, SK, and NK conceptualised and designed the study. DN analysed the data and prepared the manuscript. KU, SK, and JA reviewed the manuscript. NK finalised the manuscript. All authors read and approved the final manuscript.

Acknowledgements

We would like to thank Editage [<http://www.editage.com>] for editing and reviewing this manuscript.

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Tables

Table 1. Characteristics of the study participants and the recipients on dental care services.					
		Analysis 1		Analysis 2	
		Total participants	Participants on dental care	Population at risk	Participants on dental care
Character		(N=5717)	(n=2059)	(N=4497)	(n=839)
	Category	N (%)	n, % for N	N (%)	n, % for N
Age	Mean (SD)	62.6 (15.9)	60.2 (15.8)	63.0 (15.9)	59.2 (15.6)
Sex					
	Male	2790 (48.8)	950, 34.1%	2216 (49.3)	376, 17.0%
	Female	2927 (51.2)	1109, 37.9%	2281 (50.7)	463, 20.3%
Living alone					
	Yes	3762 (65.8)	1353, 36.0%	2943 (65.4)	534, 18.1%
	No	1955 (34.2)	706, 36.1%	1554 (34.6)	305, 19.6%
Working status					
	Yes	1088 (19.0)	433, 39.8%	856 (19.0)	201, 23.5%
	No	4629 (81.0)	1626, 35.1%	3641 (81.0)	638, 17.5%
Nationality					
	Japanese	5558 (97.2)	1986, 35.7%	4373 (97.2)	801, 18.3%
	Other	159 (2.8)	73, 45.9%	124 (2.8)	38, 30.6%
Long-term care status					
	None	4896 (85.6)	1762, 36.0%	3870 (86.1)	736, 19.0%
	Support required	202 (3.5)	62, 30.7%	163 (3.6)	23, 14.1%
	Care needs	619 (10.8)	235, 38.0%	464 (10.3)	80, 17.2%
Disabilities certificate					
	None	4645 (81.2)	1605, 34.6%	3709	669, 18.0%

				(82.5)	
	Psychological disability	536 (9.4)	246, 45.9%	392 (8.7)	102, 26.0%
	Intellectual disability	83 (1.5)	33, 39.8%	59 (1.3)	9, 15.3%
	Physical disability	453 (7.9)	175, 38.6%	337 (7.5)	59, 17.5%
Municipality					
	A	4213 (73.7)	1537, 36.5%	3310 (73.6)	634, 19.2%
	B	1504 (26.3)	522, 34.7%	1187 (26.4)	205, 17.3%

Analysis 1 includes all eligible participants, and Analysis 2 includes population at risk after excluding cases at the first three months. SD: Standard Deviation.

Table.2 Adjusted incidence ratios for the incidence of dental care utilization among public assistance recipients			
		Analysis 1	Analysis 2
		IR, (95% CI)	IR, (95% CI)
Age	by 10 year	0.90 (0.88- 0.93)	0.87 (0.84- 0.91)
Sex			
	Male	Ref	Ref
	Female	1.14 (1.06- 1.22)	1.22 (1.08- 1.38)
Working status			
	No	Ref	Ref
	Yes	1.03 (0.94- 1.13)	1.15 (0.99- 1.34)
Living alone			
	No	Ref	Ref
	Yes	1.08 (1.00- 1.16)	1.06 (0.93- 1.21)
Nationality			
	Japanese	Ref	Ref
	Other	1.25 (1.05- 1.49)	1.53 (1.16- 2.01)
Long-term care status			
	None	Ref	Ref
	Support required	0.99 (0.80- 1.23)	0.94 (0.64- 1.40)
	Care needs	1.26 (1.12- 1.41)	1.20 (0.95- 1.50)
Disabilities certificate			
	None	Ref	Ref
	Psychological disability	1.22 (1.10- 1.36)	1.30 (1.08- 1.56)
	Intellectual disability	0.98 (0.75- 1.29)	0.65 (0.36- 1.19)
	Physical disability	1.11 (0.98- 1.26)	1.02 (0.80- 1.31)
Municipality			
	A	Ref	Ref
	B	0.94 (0.87- 1.02)	0.91 (0.79- 1.06)

Analysis 1 includes all eligible participants, and Analysis 2 includes population at risk after excluding

Additional Files

Additional file 1. docx

Table.S1 Crude incidence ratios (IR) and 95% confidence intervals (CI) for the incidence of dental care utilization among public assistance recipients.

Additional file 2. docx

Table.S2 Adjusted incidence ratios (IR) and 95% confidence intervals (CI) for the incidence of dental caries diagnosis among public assistance recipients (Analysis S1)

Additional file 3. docx

Table.S3 Adjusted incidence ratios (IR) and 95% confidence intervals (CI) for incidence of the dental care utilization excluding cases at the first six months.

Figures

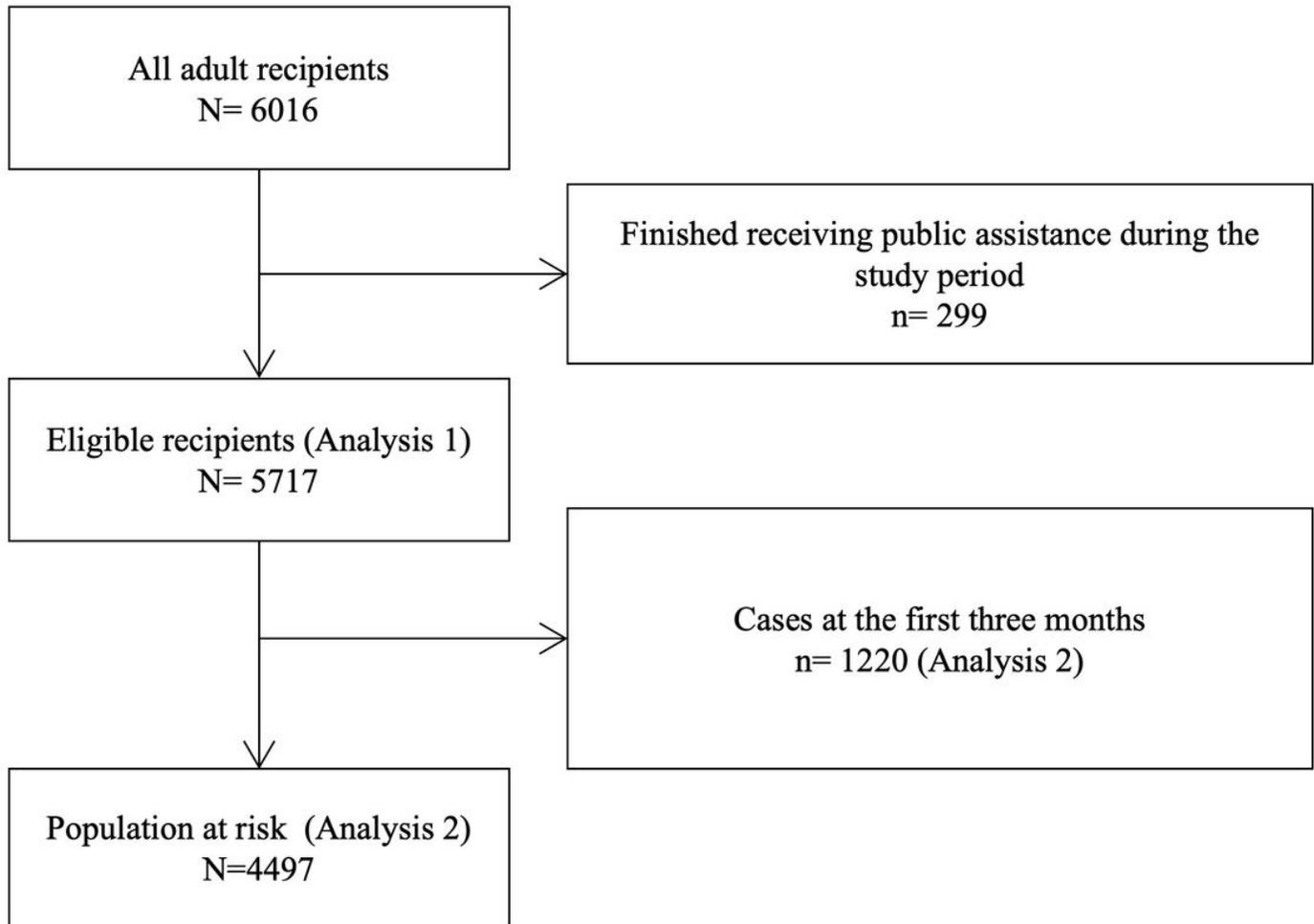


Figure 1

Flow-chart of study participants

Supplementary Files

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