

# Single-parenthood and health conditions among children receiving public assistance in Japan: a cross-sectional study

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## Research

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# Abstract

**Background:** Single-parenthood is recognised as a risk factor for chronic childhood health conditions due to lower family income, resulting in food insecurity and an increased psychological burden. Governmental social assistance may address the risk by ensuring minimum-income protection and financial healthcare access. However, no study has investigated the association between single-parenthood and health statuses among children in families receiving social assistance benefits. This study aimed to examine the association between single-parent households and children's health among public assistance recipients in Japan by—for the first time ever—using linkage data of two municipal public assistance databases and medical assistance claim data.

**Methods:** We performed a cross-sectional study. Public assistance for households below poverty line ensures their income security and medical care. We extracted individual factors of children aged 15 years or younger in January 2016 and observed until December 2016. We identified one-year prevalence of childhood diseases by using International Classification of Disease, Tenth Edition (ICD-10) codes.

**Results:** Among the 573 participants, 383 (66.8%) lived in single-parent households. A multivariable Poisson regression showed that single-parenthood is associated with a higher prevalence of asthma (prevalence ratio [PR] = 1.62; 95% confidence interval [CI], 1.16-2.26), allergic rhinitis (PR = 1.41; 95% CI, 1.07-1.86), dermatitis and eczema (PR = 1.81; 95% CI, 1.21-2.70), and dental diseases (PR = 1.79; 95% CI, 1.33-2.42), as compared to other households. No association was found between single-parenthood and acute children's diseases such as respiratory infections, injuries, and intestinal infections.

**Conclusions:** Living in single-parent households is a risk factor for children's chronic diseases, despite them receiving public assistance benefits. These results may be explained by the increased psychosocial stress, suggesting that the present public assistance system in Japan should provide additional social support. Ameliorating health conditions of children among single-parent households on public assistance can be achieved by closer monitoring of the community. Further investigations are necessary using more detailed information such as environmental factors, the severity of children's health conditions, the contents of any received treatments, and broader socioeconomic factors.

## Background

Ensuring the healthy development of children is an important societal concern [1]. Early social and environmental experiences, as well as certain genetic predispositions, all affect children's health statuses, with these also influencing the development of adaptive behaviours, learning capacities, prospective physical and mental health statuses, and future human resources or economic productivity [2-5]. Despite a strong commitment to the health and development of all children, there are still concerns about poor childhood health outcomes due to issues within the social determinants of health. In recent studies, single-parenthood is recognised as a risk factor for the development of chronic health conditions among children [6-13]. Children in single-parent households are seen as a socially vulnerable population, as their families tend to have a lower overall income, resulting in food insecurity and other physical conditions that impose a heightened risk for maladaptive health outcomes. Furthermore, these children tend to experience a stronger psychological burden, as they lack instrumental and emotional social support.

Although the association between single-parenthood and children's chronic health conditions have been explained using the factors of financial difficulties or psychosocial stress, previous studies have not identified this mechanism in sufficient detail. Thus, an effective approach aimed at maintaining children's positive health statuses in single-parent households remains unclear [14, 15]. To address this deficit, this study aimed to examine the association between single-parenthood and children's chronic health conditions among families receiving governmental public assistance who were ensured a monthly basic income and are fully exempted from the co-payments for their medical care utilisation. Hence, the objective of this study was to examine the association between children's health statuses and their household compositions among those living on public assistance by using aggregated public assistance and medical assistance claim data, as administered by Japanese municipalities.

## Methods

### Data sources

This cross-sectional study included children aged 15 years or younger who were living on public assistance in January 2016 from two suburban municipalities in Japan. Public assistance is a governmental welfare programme applied to households who live below the poverty line without any assets. In Japan, approximately 2% of people are receiving public assistance. Households on public assistance are financed by governmental subsidies, whereby they are supported by receiving a monthly basic income and are fully exempted from the co-payments on their medical care utilisation [16].

We used public assistance databases as administered by the welfare offices of the chosen municipalities in January 2016. These databases include information on peoples' age, sex, number of family members, household composition, nationality, working status, and income that includes working income, pension, and disability pension. These data were collected by staff members working at the welfare office in each municipality. This information was required to determine the total applications for public assistance and the amounts of each family's monthly basic income, resulting in no missing data. Further, we used the medical assistance claim data, from January to December 2016, that includes the month of the children's medical consultations, the total cost of their medical claims, the total numbers of visits in each month, and their diagnoses.

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

### Measurement and variables

#### *Childhood diseases*

We identified a one-year prevalence of childhood diseases using the medical assistance claim data. For the included diseases, we chose 1) acute upper respiratory infections; 2) acute lower respiratory infections; 3) injuries, including fractures; 4) intestinal infectious diseases; 5) conjunctivitis; 6) asthma; 7) allergic rhinitis; 8) dermatitis and eczema, including atopic dermatitis; and 9) diseases of the oral cavities, salivary glands, and jaws, such as

tooth decay or dental caries. We identified these nine diagnoses as common medical conditions occurring among children in Japan [17], as well as among the study participants, as shown by our preliminary research. We regarded the diseases from 1) to 5) as acute health conditions and those from 6) to 9) as chronic health conditions. Each diagnosed health condition listed above was identified using their International Classification of Disease, Tenth Edition (ICD-10) codes which were: 1) J00-06, 2) J10-18, 3) S00-S99 and T00-T14, 4) A00-09, 5) H10, 6) J45-46, 7) J30, 8) L20-L30, and 9) K00-K06 [18].

### *Household composition*

We extracted information on the participants' household compositions from the database. If the children lived with a single parent, and not with their grandparents or other caregivers, their household composition status was labelled as a single-parent household.

### *Covariates*

Based on the available evidence, for demographic factors, we used age (continuous), sex (girl/boy), presence of siblings (yes or no), and nationality (Japanese or not), as of January 2016. For participants' socioeconomic characteristics, we used the working statuses of their family members (working or not). We used this variable as a covariate because the family members' working statuses may influence the amount of time that they have available to care for their children. We coded the municipality in which the participants lived as a dummy variable in order to adjust for the unmeasured cultural and environmental characteristics of the two municipalities (A/B).

### *Statistical analysis*

First, we described the participating families and their children's characteristics, who were consulted with during the study period. Second, we performed a univariate Poisson regression analysis and calculated the crude prevalence ratio (PR) and its 95% confidence interval (CI) for each explanatory variable for each of the chosen diseases. Third, we performed a multiple Poisson regression analysis to calculate the multivariable-adjusted PR of each disease. The robust standard error estimator was adopted in order to calculate the 95% CI. Analyses were performed using the STATA SE Ver.16.2 programme for all of the statistical analyses (Stata Corp., College Station, TX, USA).

## **Results**

We obtained data of 573 children from families on public assistance. Among them, 290 (50.6%) were boys, 383 (66.8%) lived in single-parent households, and 478 (83.4%) had undergone a medical consultation. During the study period, 146 (25.4%) were diagnosed with asthma, 185 (32.2%) were diagnosed with allergic rhinitis, 108 (18.8%) were diagnosed with dermatitis and eczema, and 181 (31.6%) were diagnosed with one of the dental diseases (Table 1) (see Additional file 1).

The multivariable Poisson regression analysis revealed that children living in single-parent households had an increased prevalence of asthma (PR = 1.62; 95% CI, 1.16-2.26), allergic rhinitis (PR = 1.41; 95% CI, 1.07-1.86), dermatitis and eczema (PR = 1.81; 95% CI, 1.21-2.70), and dental diseases (PR = 1.79; 95% CI, 1.33-2.42), when compared with those not living in single-parent households (Table 2). However, there was little association between children's household compositions and acute health conditions (see Additional file 2, and 3).

**Table 1. Characteristics of overall, children who have consultation, and children with diagnosed chronic diseases.**

|                                  |             | Total participants | Having medical consultation | Asthma     | Allergic rhinitis | Dermatitis | Dental diseases |
|----------------------------------|-------------|--------------------|-----------------------------|------------|-------------------|------------|-----------------|
| Character                        |             | (N=573)            | (n=478)                     | (n=146)    | (n=185)           | (n=108)    | (n=181)         |
|                                  | Category    | N (%)              | n, % for N                  | n, % for N | n, % for N        | n, % for N | n, % for N      |
| Age                              | Mean (SD)   | 9.7 (4.3)          | 9.4 (4.2)                   | 8.3 (4.2)  | 9.5 (4.0)         | 7.8 (4.7)  | 9.5 (3.7)       |
| Sex                              |             |                    |                             |            |                   |            |                 |
|                                  | Girl        | 283 (49.4)         | 225, 79.5%                  | 67, 23.7%  | 82, 29.0%         | 47, 16.6%  | 93, 32.9%       |
|                                  | Boy         | 290 (50.6)         | 253, 87.2%                  | 79, 27.2%  | 103, 35.5%        | 61, 21.0%  | 88, 30.3%       |
| Having siblings                  |             |                    |                             |            |                   |            |                 |
|                                  | No          | 207 (36.1)         | 179, 86.5%                  | 56, 27.1%  | 72, 34.8%         | 43, 20.8%  | 72, 34.8%       |
|                                  | Yes         | 366 (63.9)         | 299, 81.7%                  | 90, 24.6%  | 113, 30.9%        | 65, 17.8%  | 109, 29.8%      |
| Single-parenthood                |             |                    |                             |            |                   |            |                 |
|                                  | No          | 190 (33.2)         | 154, 81.1%                  | 35, 18.4%  | 48, 25.3%         | 25, 13.2%  | 40, 21.1%       |
|                                  | Yes         | 383 (66.8)         | 324, 84.6%                  | 111, 29.0% | 137, 35.8%        | 83, 21.7%  | 141, 36.8%      |
| Working status of family members |             |                    |                             |            |                   |            |                 |
|                                  | Not working | 268 (46.8)         | 225, 84.0%                  | 81, 30.2%  | 95, 35.4%         | 57, 21.3%  | 90, 33.6%       |
|                                  | Working     | 305 (53.2)         | 253, 83.0%                  | 65, 21.3%  | 90, 29.5%         | 51, 16.7%  | 91, 29.8%       |
| Nationality                      |             |                    |                             |            |                   |            |                 |
|                                  | Japanese    | 534 (93.2)         | 449, 84.1%                  | 140, 26.2% | 175, 32.8%        | 102, 19.1% | 162, 30.3%      |
|                                  | Others      | 39 (6.8)           | 29, 74.4%                   | 6, 15.4%   | 10, 25.6%         | 6, 15.4%   | 19, 48.7%       |
| Municipality                     |             |                    |                             |            |                   |            |                 |
|                                  | A           | 404 (70.5)         | 327, 80.9%                  | 91, 22.5%  | 112, 27.7%        | 79, 19.6%  | 121, 30.0%      |
|                                  | B           | 169 (29.5)         | 151, 89.3%                  | 34, 20.1%  | 73, 43.2%         | 29, 17.2%  | 60, 35.5%       |

Table.2 Adjusted prevalence ratios (PR) and 95% confidence intervals (CI) for chronic diseases.

|                                  |             | Asthma           | Allergic rhinitis | Dermatitis       | Dental diseases  |
|----------------------------------|-------------|------------------|-------------------|------------------|------------------|
|                                  |             | PR (95% CI)      | PR (95% CI)       | PR (95% CI)      | PR (95% CI)      |
| Age                              | by 1 year   | 0.93 (0.91-0.96) | 1.00 (0.97-1.03)  | 0.89 (0.86-0.93) | 0.99 (0.97-1.02) |
| Sex                              |             |                  |                   |                  |                  |
|                                  | Girl        | Ref              | Ref               | Ref              | Ref              |
|                                  | Boy         | 1.15 (0.87-1.52) | 1.17 (0.92-1.48)  | 1.29 (0.93-1.78) | 0.90 (0.71-1.15) |
| Have siblings                    |             |                  |                   |                  |                  |
|                                  | No          | Ref              | Ref               | Ref              | Ref              |
|                                  | Yes         | 0.83 (0.62-1.12) | 0.89 (0.69-1.15)  | 0.72 (0.51-1.02) | 0.88 (0.68-1.13) |
| Single-parenthood                |             |                  |                   |                  |                  |
|                                  | No          | Ref              | Ref               | Ref              | Ref              |
|                                  | Yes         | 1.62 (1.16-2.26) | 1.41 (1.07-1.86)  | 1.81 (1.21-2.70) | 1.79 (1.33-2.42) |
| Working status of family members |             |                  |                   |                  |                  |
|                                  | Not working | Ref              | Ref               | Ref              | Ref              |
|                                  | Working     | 0.83 (0.62-1.11) | 0.89 (0.69-1.14)  | 0.98 (0.69-1.40) | 0.91 (0.71-1.17) |
| Nationality                      |             |                  |                   |                  |                  |
|                                  | Japanese    | Ref              | Ref               | Ref              | Ref              |
|                                  | Others      | 0.69 (0.31-1.50) | 0.91 (0.52-1.60)  | 0.91 (0.43-1.91) | 1.81 (1.27-2.57) |
| Municipality                     |             |                  |                   |                  |                  |
|                                  | A           | Ref              | Ref               | Ref              | Ref              |
|                                  | B           | 0.94 (0.69-1.27) | 1.53 (1.21-1.93)  | 0.82 (0.57-1.17) | 1.26 (0.98-1.63) |

## Discussion

Among the participating children living with families on governmental public assistance in Japan, the prevalence of chronic diseases, such as allergic rhinitis, dermatitis and eczema, and dental diseases, was higher among those living in single-parent households when compared with non-single-parent households. However, there was little association found between children's acute health conditions and living within a single-parent household. This was the first study to identify children's health statuses among those on public assistance in Japan. Further, an important strength of this study is that, through using existing national standardised databases of people receiving public assistance without any missing data, we could examine the association between children's morbidities and the household compositions of socially vulnerable people that are usually considered difficult to reach in a standard social survey.

Our findings were consistent with those of recent literature [10, 13, 19, 20]. Moncrief et al. reported a possible association of living in single-parent households and the development of childhood asthma in the United States, [13] with this phenomenon being driven by underlying low household income among single-parent homes. Our study, thus, provides new evidence supporting the notion that single-parenthood remains a risk for children's health statuses even among families whose minimum basic income and healthcare access are financially ensured by the government.

### Interpretation

There are two possible explanations for the higher prevalence of these chronic diseases occurring among children in single-parent households compared to those in other household types. First, in single-parent households on public assistance, parents might experience psychosocial stress from either the responsibilities of parenting or social isolation. Several studies have reported that parental psychosocial stress increases the risk of their children developing asthma and allergic diseases [21-25]. An association between single-parenthood and increased parental psychosocial stress has also been reported [26-29]. Mullins et al. identified an association between being a single parent and peoples' parenting capacities, suggesting that children living in single-parent households may not receive enough care, resulting in their increased morbidity of chronic health conditions [26]. Second, people operating as single parents may notice their children's diseases more often than those in other types of households. Children's disease symptoms in single-parent homes may be given greater attention due to the increased level of affection or overprotection received from their single parent. Children in single-parent households would also use more social resources, such as after school care, due to their parent's work conditions, [30] which may also result in an increased detection likelihood of any disease symptoms.

Those results showing little association between acute symptoms and household types support the first proposed mechanism: because a family's medical consulting behaviours is consistent between the different household types if their children develop more notable acute symptoms.

### Implications

Our results suggest important policy implications that ameliorating health conditions of children among single-parent households on public assistance can be achieved by closer monitoring in the community. For example, strengthening community governance within welfare offices, healthcare institutes, and nurseries or schools would be able to provide a more effective vulnerable population approach, which is aimed at supporting the healthy development of children living in single-parent households among families receiving public assistance services.

### Limitations

There are several limitations to this study. First, because we analysed a cross-sectional data, there is a possibility of a reverse causation. For instance, if children had severe chronic diseases, especially in single-parent households, their parents might not be able to work as they have to care for their children, resulting in financial difficulties and, subsequently, receiving public assistance. Second, the variables used in our analysis were limited; important unmeasured factors include other social background variables, such as social relationships, environmental factors (e.g., the smoking habits of family members), and medical history (e.g., genetic factors, disease severity, or degree of medical treatment). Third, this study's generalizability is limited because it only covered two municipalities that may not represent all those throughout Japan.

## Conclusions

Children in single-parent households experience a higher prevalence of chronic health conditions, such as asthma, allergic rhinitis, dermatitis, and dental diseases among those specifically living with families on governmental public assistance; while little association was found between this living condition and children's acute health conditions. These results may be explained by the increased psychosocial stress of this family type, suggesting that the present public assistance system in Japan needs to provide additional social support through sufficiently integrating care for socially vulnerable populations, like families living in single-parent households. Further investigations, using more detailed longitudinal information such as the environmental factors, the severity of the children's health conditions, or the content of any received treatment, as well as broader socioeconomic factors, is still required.

## Abbreviations

PR

prevalence ratio; CI:confidence interval

## 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 that 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 thus not publicly available. The data are however available from the authors upon reasonable request and with the permission of the municipalities.



### *Competing interests*

Daisuke Nishioka, Junko Saito, and Keiko Ueno declare no competing interests associated with this manuscript. Naoki Kondo conducted collaborative research with Kitanihon Computer Service Co. Ltd. (KITACOM), which provided the data used in the present paper. Naoki Kondo received a research fund and scholarship donation from KITACOM. KITACOM had no discretion and involvement in our study protocol, analysis, interpretation of the results, or submission of this manuscript.

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### *Authors' contributions*

Daisuke Nishioka conceptualised and designed the study, analysed the data, prepared the initial manuscript, and reviewed and revised the manuscript. Junko Saito and Keiko Ueno conceptualised and designed the study, and reviewed and revised the manuscript. Naoki Kondo conceptualised and designed the study, coordinated and supervised data collection, and finalised the manuscript. All authors read and approved the final manuscript.

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