Differences in Self-rated Health by Employment Contract and Household Structure among Japanese Employees: A Nationwide Cross-sectional Study

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Abstract: Differences in Self-rated Health by Employment Contract and Household Structure among Japanese Employees: A Nationwide Cross-sectional Study: Yuko Kachi, *et al.* **Department of Hygiene and Public Health, Nippon Medical School—Objectives:** The aim of this study was to examine whether the association between employment contract and self-rated health differs by household structure in a representative sample of employees in Japan. **Methods:** The participants were 81,441 male and 64,471 female employees aged 18−59 years who had participated in the 2010 Comprehensive Survey of Living Conditions. We assessed the interactive effect of employment contract (permanent or precarious) and household structure (couple only, couple with children, single parent, single person, or other multi-person) on fair/poor health, adjusting for covariates by using logistic regression. We then calculated the relative poverty rate by employment contract and household structure. **Results:** The interaction effect was significant for women ($p<0.001$) but not for men ($p=0.413$). A higher percentage of female precarious workers who lived in single-parent households (20.2%) reported fair/poor health compared with those in other types of households (10.4−13.2%), although the prevalence of fair/poor health did not differ substantially by household structure among female permanent workers. The relative poverty rates of female precarious workers who lived in single-parent households were higher compared with those of other female workers. **Conclusions:** Our results suggest that female precarious workers are not a homogeneous group and that those living in single-parent households suffer from poor health due to low income and insufficient coverage by insurance firms and family-based safety nets.
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The Japanese social security system has long depended on welfare contributed by firms or families rather than by the public sector[1]. Firms have secured the employment of families' main breadwinners and family incomes through lifetime employment and seniority-based wage systems[2]. In turn, families have provided social, emotional, and economic support to their household members and, thus, have functioned as a safety net[3].

However, employment and family patterns are changing; economic globalization, together with labor market deregulation, has increased the number of so-called precarious workers (i.e., part-time, fixed-term, temporary and dispatched employees) who are insufficiently covered by the firm-based safety net[4]. From 1984 to 2010, the proportion of precarious workers increased from 7.7 to 18.9% among male workers and from 29.0% to 53.8% among female workers[5]. The average household size has been decreasing from 3.4 in 1970 to 2.4 persons in 2010[6]. In addition, the increase in lifelong-unmarried and divorce rates has led to an increase in the number of single-person and single-parent households lacking a sufficient family safety net. Between 1970 and 2010, the proportion of single-person and single-parent households in the total number of Japanese households increased from 20.3 to 32.4% and from 5.7 to 8.7%, respectively[6].

Previous studies have examined the association between precarious employment and health but have yielded inconsistent findings. Some prospective studies in Western countries have indicated that precarious employment is associated with higher morbidity[7−10] and mortality[11, 12], whereas others found the reverse[13] or no significant association[14, 15]. Similar inconsisten-

cies have been observed in Japanese cross-sectional studies; some studies have indicated that precarious employment is associated with poor lifestyle habits and subjective health[16–18], whereas others have found the reverse to be true[19].

These inconsistencies may be, at least in part, due to the inhomogeneity of precarious workers, and the effect of precarious employment on health may depend on the underlying voluntary or involuntary bases for precarious work, employment instability and cultural or national backgrounds[12, 20, 21]. Regarding cultural or national backgrounds, Japan has been shifting from a male-breadwinner society to a dual-earner society[5]. However, both spouses do not necessarily earn the same income. In the Japanese tax system, a secondary earner's annual income of less than 1.03 million yen is tax-exempt, and the primary earner can also receive a tax deduction for a spouse. Thus, secondary earners have an incentive to earn less than 1.03 million yen per year and therefore tend to choose part-time work voluntarily[22]. In addition, couples with dependent children usually select to be a family with a father employed full-time and a mother employed part-time, owing to a combination of culturally fixed gender roles and gender-oriented segregation in the labor market[23, 24]. Therefore, employment choice and the effects of employment contracts on health may be affected by household structure.

The current study thus examined whether the association between employment contract and self-rated health (SRH) differed by household structure in a representative sample of employees in Japan. We hypothesized that precarious workers, whom neither firm- nor family-based safety nets provide sufficient cover to, would suffer from poor health.

Subjects and Methods

Data source

We used data from the Comprehensive Survey of Living Conditions (CSLC) for 2010[25]. Every three years since 1986, this nationally representative survey of households in Japan has collected detailed information on household demographics, health status, income and assets. Eligible respondents are all household members within census tracts, selected throughout Japan via a cluster sampling design. In this design, a constant number of clusters are randomly selected from prefectures and designated cities with a population of more than 500,000. The clusters are census tracts, consisting of 50 households on average, and all households in the sample clusters are asked to participate in the survey[26]. The CSLC 2010 was carried out on household demographics and health status across 5,510 census tracts that included 289,363 households, from which it randomly selected and further surveyed

35,971 households on income and assets. Trained personnel collected data through a combination of interviews and self-administered questionnaires. The response rates for the household demographics and health status survey and for the income and assets survey were 79 and 76%, respectively. We restricted our analyses to employed workers aged 18–59 years who had complete information on the variables of interest. The resulting sample comprised 145,912 respondents (81,441 men and 64,471 women). We also used data from the CSLC 2007 to evaluate the robustness of the results obtained from the 2010 data[27]. The sample for the 2007 data comprised 169,069 respondents (91,880 men and 77,189 women). According to the Japan's Ethical Guidelines for Epidemiological Research[28], this study was exempt from the need for ethical approval because it was a retrospective analysis of national surveillance data that were free of personally identifiable information. However, we obtained permission to use individual data from the CSLC 2007 and 2010 for purposes other than those initially intended by the Ministry of Health, Labour and Welfare of Japan.

Variables

The outcome variable was SRH, which was assessed by the answer to a single question ("What is your current health status?") selected from five possible response options ("excellent", "very good", "good", "fair" or "poor"). Following previous studies based on data from the CSLC[29], we classified these responses into the following two categories: "fair/poor" or "excellent/very good/good". Previous studies have shown SRH to be a validated indicator of overall health and to be an independent predictor of overall mortality[30]. The predictors were employment contract and household structure. Employment contract was assessed by the answer to a single question about employment contract selected from six possible response options ("full-time permanent", "part-time", "arbeit [short time and term]", "dispatched", "contract" and "others"). We classified these responses into the following two categories: permanent ("full-time permanent") and precarious ("part-time", "arbeit", "dispatched", "contract" or "others"). Household structure was classified into one of the following five categories: couple only, couple with children, single parent, single person or other multi-person. "Couple only" is a household with only one legally or common-law married couple. "Couple with children" is a household with one legally or common-law married couple with dependent children aged <20 years. "Single parent" is a household with a single parent and dependent children aged <20 years. "Single person" is a household where a person lives alone.

"Other multi-person" is a household that is neither a couple nor a single-parent household; this group would include couples with other adults and single parents with only nondependent children. Covariates included (1) age (20–29, 30–39, 40–49, 50–59 years), (2) marital status (married, never married, widowed, divorced) and (3) working hours per week (<40 h, 40–49 h, ≥50 h).

For the subset of participants for whom income data were available, the relative poverty rate was calculated by employment contract and household structure in order to deepen the discussion about why precarious workers in a specific household structure suffer from poorer health. Relative poverty rate was defined as the proportion of respondents whose equivalent disposable income was less than 50% of the median of all men or women, following the definition of the Organisation for Economic Co-operation and Development (OECD)[31]. Equivalent disposable income was calculated by summing the annual after-tax income of all household members and then dividing this sum by the square root of the household size.

Statistical analysis

We performed all analyses separately by gender, given the different trends among the key variables. When we examined the interaction between predictors and age groups (aged 20–39 and 40–59 years) prior to modeling, no interactions were found. Therefore, we present only the results for all age groups combined. First, we calculated the percentages of respondents who reported having fair/poor health according to predictors and covariates. Second, we calculated the percentages of respondents who reported having fair/poor health by employment contract and household structure. Third, we conducted a logistic regression to assess the interactive effect of employment contract and household structure on fair/poor health[32]. The logistic regression model included SRH as a dependent variable and employment contract, household structure, the interaction term (employment contract × household structure), age, and working hours per week as independent variables. The main and interactive effects were displayed graphically by plotting the mean predicted values of fair/poor health for each employment contract and household structure group using the effects package in R[33, 34] because of the difficulty of interpreting the logistic model with the interaction term from their estimated coefficients. The significance of the interaction term was tested by using a likelihood ratio test. Marital status was not included as a covariate in the models because of its high correlation with household structure. Fourth, we conducted the same analyses with the 2007 data to test the stability of the associations obtained with the

2010 data. Finally, we calculated the relative poverty rate by employment contract and household structure based on the definition described above. In line with previous studies based on data from the CSLC[29, 35], we did not adjust the sample weights because the CSLC is not strictly based on probabilistic sampling and the sample weights the government offers are only useful for expanding the estimated totals of the number of households or household members from a sample to the subnational level[26]. All analyses were conducted using R version 2.12.2[36]. All statistical tests were two-sided, and *p*<0.05 was considered significant.

Results

Participant characteristics

Descriptive data showed that more women reported having fair/poor health than men (11.4% vs. 9.3%). The older subjects, the separated or divorced, those with the longest working hours (≥50 h), those living in single-parent households, and those with precarious employment were more likely to report fair/poor health, among both men and women. In addition, the relative poverty rate was higher among women (22.0%) than among men (20.7%; Table 1). Table 2 shows the distribution of household structure by employment contract and the percentage of fair/poor health. Female precarious workers living in single-parent households were particularly more likely to report fair/poor health (19.7%) compared with those in other types of households (11.0–13.2%).

Differences in self-rated health by employment contract and household structure

We examined whether the prevalence of fair/poor health differed by employment contract and household structure. Figure 1 presents the main and interaction effects of employment contract and household structure by gender (please also see Table 3). The interaction effect was significant for women (*p*<0.001), but not for men (*p*=0.413). A higher percentage of female precarious workers living in single-parent households (20.2%) reported fair/poor health compared with those in other types of households (10.4–13.2%), although the prevalence of fair/poor health did not differ substantially by household structure among female permanent workers. We repeated the same logistic regression analyses with the 2007 data (see Appendix in J-STAGE). These analyses confirmed the robustness of the above results, as the interaction effect was again significant among women (*p*<0.001) but not among men (*p*=0.180). A higher percentage (18.7%) of female precarious workers living in single-parent households reported fair/poor health compared with those in other types of households (10.6–14.0%).

Table 1. Participant characteristics by gender, CLSC 2010

Variables	Men N (%)	Men % Fair/poor health	Women N (%)	Women % Fair/poor health
Total N	81,441 (100.0)	9.3	64,471 (100.0)	11.4
Age, years				
20–29	15,269 (18.8)	6.5	12,522 (19.4)	8.9
30–39	23,358 (28.7)	8.0	16,853 (26.1)	10.6
40–49	22,139 (27.2)	10.0	18,115 (28.1)	12.0
50–59	20,675 (25.4)	12.0	16,981 (26.3)	13.5
Marital status				
Married	53,811 (66.1)	9.7	38,713 (60.1)	11.6
Never married	24,855 (30.5)	7.9	19,134 (29.7)	9.5
Widowed	354 (0.4)	15.0	1,164 (1.8)	13.6
Divorced	2,421 (3.0)	12.3	5,460 (8.5)	16.1
Working hours, hours per week				
<40	27,382 (33.6)	9.7	44,651 (69.3)	11.2
40–49	31,645 (38.9)	8.0	15,079 (23.4)	10.9
50+	22,414 (27.5)	10.5	4,741 (7.4)	15.0
Household structure				
Couple only	8,616 (10.6)	10.6	7,681 (11.9)	11.4
Couple with children	26,326 (32.3)	8.9	17,000 (26.4)	11.5
Single parent	232 (0.3)	16.0	2,412 (3.7)	17.5
Single person	8,729 (10.7)	10.5	5,376 (8.3)	12.4
Other multi-person	37,538 (46.1)	8.9	32,002 (49.6)	10.7
Employment contract				
Permanent	71,200 (87.4)	9.1	30,142 (46.8)	11.0
Precarious	10,241 (12.6)	10.2	34,329 (53.3)	11.7
Subset N[a]	8,078 (100.0)		6,699 (100.0)	
Household income[b], JPY10,000				
median (IQR)	263.0 (156.0 to 384.0)		248.1 (138.5 to 382.9)	
Relative poverty rate[c], N (%)	1,669 (20.7)		1,474 (22.0)	

CLSC=Comprehensive Survey of Living Conditions; IQR=interquartile range. [a] The subset of participants for whom income data were available. [b] Annual equivalent disposable household income. [c] Poverty thresholds were defined as 50% of the median equivalent disposable household income for all men or women.

Table 2. Proportions of fair/poor health by gender, employment contract and household structure

Household structure	Men (N=81,441) Permanent N	Men Permanent % Fair/poor health	Men Precarious N	Men Precarious % Fair/poor health	Women (N=64,471) Permanent N	Women Permanent % Fair/poor health	Women Precarious N	Women Precarious % Fair/poor health
Couple only	7,887	10.4	729	12.5	3,322	11.9	4,359	11.0
Couple with children	25,137	8.8	1,189	12.1	5,838	11.9	11,162	11.3
Single parent	207	15.9	25	16.0	1,065	14.7	1,347	19.7
Single person	6,995	10.2	1,734	11.7	3,417	12.0	1,959	13.2
Other multi-person	30,974	8.8	6,564	9.1	16,500	10.1	15,502	11.4
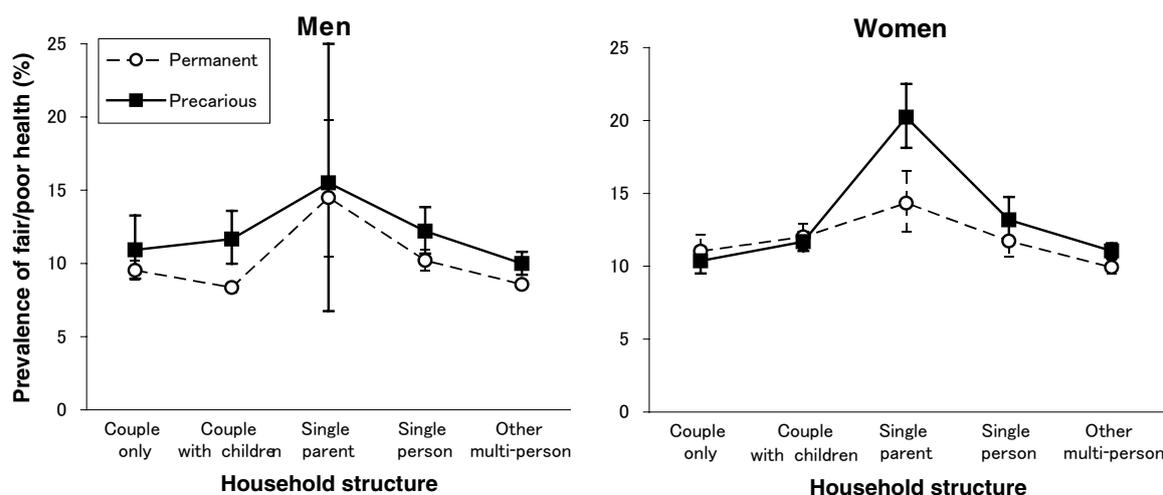
Fig. 1. The prevalence of fair/poor health by employment contract and household structure among all men and women; CLSC 2010.

CLSC=Comprehensive Survey of Living Conditions. Men, N=81,441; women, N=64,471. Error bars represent the 95% confidence intervals. The prevalence of fair/poor health was estimated using a logistic regression model that included self-rated health as a dependent variable and employment contract, household structure, the interaction term (employment contract × household structure), age and working hours per week as independent variables.

Table 3. Association of employment contract and household structure with fair/poor health by gender[a], CLSC 2010: results of logistic regression analyses

Variables	Men (N=81,441)					Women (N=64,471)				
	β	(SE)	*p*-value	OR	(95% CI)	β	(SE)	*p*-value	OR	(95% CI)
Employment contract										
(ref.=permanent)										
Precarious	0.15	(0.12)	0.198	1.17	(0.92 to 1.47)	−0.07	(0.07)	0.342	0.93	(0.81 to 1.08)
Household structure										
(ref.=couple only)										
Couple with children	−0.14	(0.04)	0.001	0.87	(0.80 to 0.94)	0.10	(0.07)	0.160	1.10	(0.96 to 1.26)
Single parent	0.48	(0.19)	0.014	1.61	(1.10 to 2.36)	0.30	(0.10)	0.004	1.35	(1.11 to 1.65)
Single person	0.08	(0.05)	0.157	1.08	(0.97 to 1.20)	0.07	(0.08)	0.369	1.07	(0.92 to 1.24)
Other multi-person	−0.12	(0.04)	0.006	0.89	(0.82 to 0.97)	−0.12	(0.06)	0.050	0.89	(0.78 to 1.00)
Interaction terms										
(ref.=permanent × couple only)										
Precarious × couple with children	0.21	(0.15)	0.147	1.24	(0.92 to 1.67)	0.04	(0.09)	0.669	1.04	(0.87 to 1.23)
Precarious × single parent	−0.12	(0.59)	0.843	0.89	(0.28 to 2.84)	0.49	(0.13)	<0.001	1.63	(1.25 to 2.11)
Precarious × single person	0.04	(0.15)	0.762	1.05	(0.79 to 1.39)	0.22	(0.10)	0.049	1.23	(1.01 to 1.53)
Precarious × other multi-person	0.02	(0.13)	0.897	1.02	(0.79 to 1.31)	0.19	(0.08)	0.020	1.21	(1.03 to 1.42)

CLSC=Comprehensive Survey of Living Conditions; SE=standard error; OR=odds ratio; CI=confidence interval. The *p*-value for the likelihood ratio test of the interaction term was 0.413 for men and <0.001 for women. The pseudo-R^2 was 0.16 for men and 0.19 for women. [a] Adjusted for age and working hours per week.
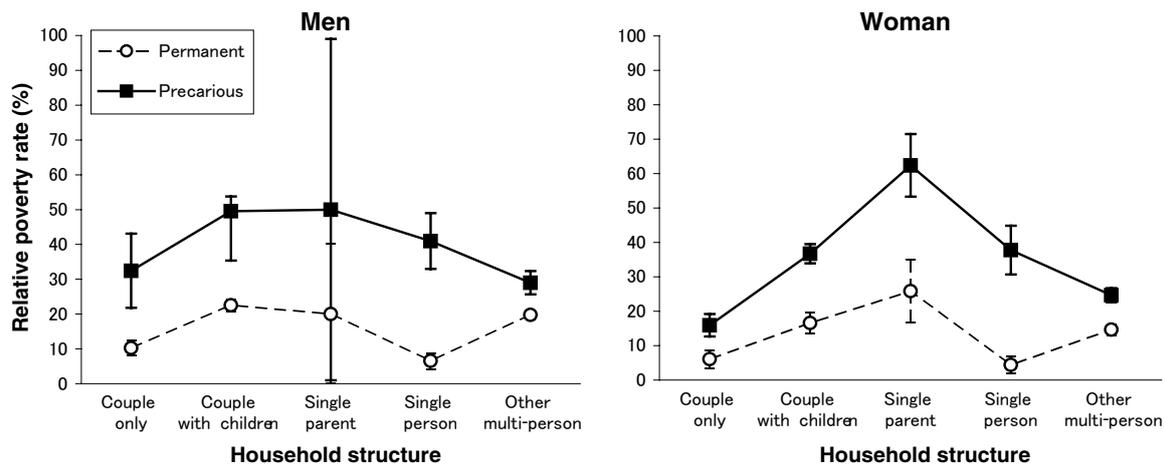
Poverty rate by employment contract and household structure

We calculated the relative poverty rate by employment contract and household structure (Fig. 2). Similar patterns were observed for both sexes. In general, the relative poverty rates of precarious workers were higher compared with those of permanent workers. Specifically, we observed high relative poverty rates among precarious workers living in households including couples with children (men 49.6%, women 36.7%), single parents (men 50.0%, women 62.4%) and single persons (men 41.0%, women 37.8%).

Discussion

We found that, for women, the association between

Fig. 2. Relative poverty rates by employment contract and household structure among the subset of all men and women; CLSC 2010.

CLSC=Comprehensive Survey of Living Conditions. Men, N=8,078; women, N=6,699. Error bars represent the 95% confidence intervals. Poverty thresholds were defined as 50% of the median equivalent disposable household income for all men or women.

employment contract and SRH differed by household structure. Specifically, female precarious workers living in single-parent households tended to suffer from fair/poor health; this finding partly supports our hypothesis. Previous cross-sectional and prospective studies have yielded inconsistent findings about the association between precarious employment and SRH[37]. This inconsistency may be partly due to the difference in household structure. In addition, our results suggest gender differences in this field, which is consistent with some previous studies in Western countries[13]. Furthermore, the relative poverty rates of female precarious workers living in single-parent households were higher compared with those of other female workers, suggesting that low-income status may relate to their poorer health. The stability of these results obtained by analyzing the CSLC 2010 data was also confirmed with the 2007 data.

Our results therefore suggest that female workers who are excluded from the safety nets provided by firm- and family-based safety nets—that is, precarious workers living in single-parent households—suffer from poorer SRH. This suggests that economic aspects play an important role in SRH. In Japan, there exists a gap between permanent and precarious workers in terms of income and social security benefits. Because the majority of precarious workers are women, the gender income gap also comes into play here; the female-to-male income ratio for full-time workers was 69.3% in 2011[24]. For these reasons, the income level of households headed by female precarious workers tends to be low. Nevertheless, in Japan, public income support for single mothers is limited. Even though around 70% of single mothers receive a

childcare allowance, 58% of working single parents in 2000 lived in relative poverty—a figure well above the OECD average of 21%[22]. Other aspects, such as social and emotional aspects, may also contribute to SRH. For example, single parents tend to lack social and emotional support in addition to having the burden of child rearing[38]. The importance of other aspects was further supported by our results, which showed that, despite lower income levels, female precarious workers living as couples with children or in single-person households did not suffer from poorer health than their permanent counterparts (see Figs. 1 and 2). These aspects may very well influence SRH among female precarious workers who live in single-parent households.

Because the interaction effect of employment contract and household structure with SRH was not statistically significant in men, we could not conclude whether this interaction existed in men, given the potential lack of statistical power stemming from having so few male precarious workers who were also living in single-parent households within the sample. Although the proportion of single-father households in the total number of Japanese households is very low (1.3% in 2010), it has been increasing[6]. The proportion of male precarious workers with low income levels has also been increasing, as noted previously[39]. Furthermore, as our results in Table 1 show, male workers living in single-parent households suffer more from poor health than other men do. These results suggest that the number of male precarious workers and single fathers who suffer from poor health may increase in the future.

Our results also suggest that precarious workers

do not constitute a homogeneous group. This finding is consistent with those of earlier studies[12, 20, 40]. For example, a cross-sectional study in Spain found that the negative impact of temporary employment on well-being depended on the employee's contract preference and employability level, and that this effect was restricted to workers who have low-level skills and less preference for temporary work[40]. In addition, a prospective study in Finland found that temporary employees who either found the insecurity inherent in precarious work to be unsatisfactory or who worked in temporary work involuntarily had a higher risk of mortality than permanent employees[12]. In the current study, we could not examine the effect of these factors (i.e., contract preference, employability level and the degree of satisfaction with the uncertainty related to precarious work situations) because they were not measured by the CSLC. However, these factors may mediate the association elucidated by this study's results, considering a report by the Ministry of Health, Labour and Welfare in 2010 showing that married Japanese women in their 20s and 30s voluntarily tended to select precarious work, while single women did so involuntarily[24].

Our study has some key strengths; it examined a nationally representative sample and deepened our understanding of the effect of employment contract and household structure on health among employed workers. We also recognize, however, that this study has several limitations. First, our findings based on a Japanese sample should be generalized with caution to other countries, given the differences in cultural or national backgrounds, including the definitions of "precarious worker" and differences in household structure, gender roles, labor policies, and social security policies. Second, we could not examine the association between various types of precarious employment (i.e., part-time and dispatched workers) and SRH, given the insufficient number of male precarious workers within the sample. Third, selection bias caused by nonresponse or missing values could have influenced our results, although the response rates were relatively high in this field (76–79%). Fourth, we did not deal with the effect of clusters (i.e., census tracts and households), as we followed the methods of previous studies based on data from the CSLC to maintain comparability[29, 35]. Because we analyzed data by sex and restricted the age range of participants, the cluster effect of households may be limited. Finally, given the cross-sectional nature of the study, we could not exclude the possibility of reverse causality—that is, that lower SRH led to precarious employment status. However, a previous study reported that gaining permanent employment predicted better health outcomes for precarious workers[10].

In summary, this large representative study suggests that female precarious workers in Japan do not constitute a homogeneous group and that those living in single-parent households are vulnerable to low income and poor health. Given the potential future increase in the number of female-headed households insufficiently covered by both firm- and family-based safety nets[41], there is an urgent need to improve the working conditions of precarious employees and reconsider the coverage of public safety nets.

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