Author’s response to reviews

Title: Temporary employment and tooth loss: a cross-sectional study from the J-SHINE study

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Author’s response to reviews:

Dear Professor Roger Keller Celeste,

We very much appreciate the time and effort that the three referees have given in reading our manuscript and providing such detailed and useful comments. We have considered all of the recommendations carefully. Please see our responses to each of the comments as outlined below. The necessary changes have also been made in the revised manuscript.

Carlo Eduardo Medina-Solís, DDS, MSD (Reviewer 1)

Comment 1.

Please provide additional information on inclusion and exclusion criteria.

Response.

Thank you for your useful comment.

We added the inclusion criteria and the exclusion criteria in the data sources and participants section of the methods section. The inclusion criteria were - being 25–50 years of age and regular or temporary employees at initial and current employment. The exclusion criteria were - having missing values among the independent or dependent variables and not having answered the survey questions by themselves.
Please see line 82 to 85, page 5.

"The inclusion criteria were being 25–50 years of age and being regular or temporary employees at initial (previous) and current employment. The exclusion criteria were having missing values among the independent or dependent variables and not having answered the survey questions by themselves."

Comment 2. The authors used an ordered logistic regression model, but I don't see the test "odds proportional assumption" in the bivariate and multivariate analyzes. Which is necessary when using this type of models. Please, provide the information in the corresponding section and in the corresponding table.

Response. We really appreciate your important comment.

We have confirmed that our models do not fit with ordered logistic analysis by testing "odds proportional assumption". Therefore, we conducted negative binomial regression to estimate prevalence rate ratios (PRRs) due to a right skewed distribution and overdispersion in the dependent variable. Negative binomial regression is often more appropriate in cases of overdispersion rather than Poisson regression. We also confirmed negative binomial regression fits much better with our data rather than Poisson regression (from the test alpha). In fact, negative binomial regression was often used in the previous studies using tooth loss as outcome [1,2].

Please see table 3.

"Table 3. Associations between change in employment status and tooth loss."

Lisa Jamieson, PhD (Reviewer 2)

Comment 1. I am not convinced this is a 'retrospective cohort' study. It looks like a cross-sectional study to me. Is the survey supposed to be representative? Given the efforts gone to for sampling, I would assume so. Then why weren't weights used?

Response.
Thank you for your useful comment. We agree with the comment. We rephrased "retrospective" to "cross-sectional".

Please see revised title and page 6, line 93.

"Temporary employment and tooth loss: a cross-sectional study from the J-SHINE study"

"This study was a cross-sectional study."

Our sample was representative in respect of age, and sex and educational attainment [3]. Thus, we did not put any weightings.

Comment 2.

To me, the logical causal pathway, and certainly one that the authors themselves describe in both Introduction and Discussion, is that temporary employment leads to tooth loss via a range of pathways. It would be helpful if the authors could provide a DAG (Directed Acyclic Graph) to demonstrate this. But it then means Tables 1 and 2 are inaccurate. Tooth loss, as the outcome variable, should be across the top, while employment (in its various categories) is placed down with the other explanatory variables.

Response.

We appreciate the reviewer's comment on this point. We created the DAG (figure 2). We hope it will help future readers to understand our hypothesis.

In addition, we have changed the layout of tables following your comment.

Please see table 1 and 2.

"Table 1. Characteristics and tooth loss in men (n = 1,394)."

"Table 2. Characteristics and tooth loss in women (n = 1,258)."

Comment 3.

Likewise in the Models, it should be tooth loss as the outcome variable. What was the rationale for using the cut-points of 1, 2, 3, 4 and 4+ for tooth loss, then to use as a categorical ordered variable? The functional limitation of 1-2 teeth lost is not likely to be substantial. Why not follow the literature of less than 21 teeth? Or use mean number of teeth lost?
Response.

Thank you very much for raising an important point. We have confirmed that our models do not fit with ordered logistic analysis by testing "odds proportional assumption". Therefore, we conducted negative binomial regression to estimate prevalence rate ratios (PRRs). We believe negative binomial regression fits well with the current dependent variable, because the dependent variable (tooth loss) is a count variable and has a right skewed distribution. In fact, the previous studies using tooth loss as an outcome used negative binomial regression [1,2].

Following your suggestion, we also conducted linear regression analysis using the mean number of tooth loss, and we obtained similar results (please see table 3).

"Table 3. Associations between change in employment status and tooth loss."

Comment 4.

What is the clinical validity of self-reported tooth loss in Japan?

Response.

Thank you very much for raising an important point. Strictly speaking, “self-reported tooth loss” is NOT validated -- “self-reported number of teeth” is validated [4]. We have added this limitation (line 265 to 268, page 15).

"Although, several studies have shown that the validity and reliability of self-reported oral health status is acceptable [30], self-rated number of teeth lost is not validated. However, previous studies have used self-reported number of teeth lost [31,32]."

Comment 5.

In the Introduction and Discussion, toothbrushing is mentioned as being linked with tooth loss. Why was this not included as an explanatory variable?

Response.

Thank you very much for raising an important point. We agree that toothbrushing should be included in our analysis. However, the J-shine does NOT include information on tooth brushing. We discussed this limitation of oral health behavior variables in possible pathways section.

Please see page 14, line 240 to 247.
"Third, poor health behavior also might explain the association between employment status and oral health. Work Stress was associated with poor health behaviors such as less frequent toothbrushing and heavier smoking [11]. In addition, low social economic status such as low income could lead to poor oral health behaviors [26]. Indeed, the association between temporary employment and tooth loss was explained by smoking status (models 5 and 6). However, we could not obtain oral health behavior variables such as toothbrushing. It might also well explain the association between temporary employment and tooth loss."

Comment 6.

Please provide some context of dental service provision in Japan. Is it largely funded out-of-pocket, or do Government-based dental public health clinics serve those who are socially marginalised? What is the role of insurance, and does temporary employment impact on this?

Response.

Thank you very much for raising an important point. We agree that more information on health service in Japan should be included in the revised text. We have now added a paragraph about Japanese dental services. Japan has universal healthcare coverage (UHC) and patients pay only 10–30% of the total cost of treatment [5]. Also, the total cost itself is relatively low because the cost is controlled by the government. In addition, the UHC covers the most basic dental treatments, such as treatments for caries and for periodontal disease [5]. With the UHC, almost any people in Japan did not hesitate to visit medical and dental service so far. However, under long lasting economic depression, some people in temporary employment, a new emerging type of unstable employment, were NOT able to afford to use health care service appropriately due to the following two reasons; 1) even 10-30% of the total cost could be a barrier for them to use dental care because they are employed on a low wage, 2) they may be reluctant to take a time off work to visit medical or dental services because they are concerned that they might be fired if they take frequent sickness absence [6].

Please see line 248 to 263, page 14.

"Finally, limited access to health care might explain the association between employment status and oral health. Japan has universal healthcare coverage (UHC) and patients pay only 10–30% of the total cost of treatment [28]. Also, the total cost itself is relatively low because the cost is controlled by the government. In addition, the UHC covers the most basic dental treatments, such as treatments for caries and for periodontal disease [28]. With the UHC, almost any people in Japan did not hesitate in visiting medical and dental services. However, under long lasting economic depression, some people in temporary employment, a new emerging type of unstable employment, were not able to afford to use health care service appropriately due to the following two reasons [29]; 1) even 10-30% of the total cost could be a barrier for them to use dental care
because they are employed on a low wage, 2) they may be reluctant to take a time off work to visit dental services because they are concerned that they might be fired if they take frequent sickness absence. Indeed, the association between temporary employment and tooth loss was explained by the frequency of visiting a dental clinic for preventive care and the hesitation to use medical and dental care analyzed in our study (models 3 and 4)."

Comment 7.

Why was household economic status at age 5 years used? How can this be relevant to a population that now has a mean age of 37 years. And why were the cut-points of 'rich', 'fair' or 'poor' used; what do they actually mean? Did the participants themselves provide this, or did the investigators define.

Response.

Thank you very much for raising an important point. We used this variable through life course perspective. This question is just a subjective one (based on participants’ responses. No clear objective definitions). Therefore, we clarified that this variable is "self-reported".

Please see line 131 to 132, page 8.

"self-rated household economic status in early life at 5 years old (rich, fair, or poor)"

Comment 8.

The first part of the Discussion repeats much of what was in the Introduction. Please delete, and provide more details of WHY the findings might have been what they are.

Response.

Thank you for your important comment. We agree with your opinion. We have deleted the first part of the discussion section and we have added more details of the possible pathway discussion.
Comment 1.

The manuscript would benefit if the authors could explain the criteria for selecting and entering the covariates in the models.

Response.

We thank the reviewer for this comment. We agree that we should clarify the criteria for selecting and entering the covariates in the models. We explained why we included these variables in covariate section.

Please see covariate section (page 8, line 125 to 142).

"We regarded the following factors as potential confounders, and included them in the multivariable adjusted models: age (categorized as 25–30, 30–35, 35–40, 40–45, or 45–50 years old) and sex (man or woman). Health status variables that may be related to employment status and tooth loss were included: history of diabetes (none or present) and body mass index (kg/m^2) (≥25.0, 18.5–25.0, or <18.5). In addition, social determinants variables that could affect oral health were also included: years of education (<9, 10–12, or >12 years), self-rated household economic status in early life at 5 years old (rich, fair, or poor), marital status (married or single), and number of family members in the household (living alone, 2, 3, or ≥4).

We supposed potential pathways: income, psychological stress and disorder, access to health care, and health behavior. Annual household income (0–300, 300–750, or >750 million Japanese yen) were included. We used feel fear of job loss (yes or no) and psychological distress (K6 score [19]; none (0–4) or present (≥5)) as a psychological stress and disorder variable. To assess the access to health care, we included visiting a dental clinic for preventative care (yes or no) and hesitation to use medical and dental care (yes, no, or never felt a need to use). We included smoking status (current smoker, former smoker, or never smoker) as a health behavior variable. We created dummy variables for missing values for each covariate."

Comment 2.

The study was defined as a retrospective cohort study but it seems a cross-sectional study nested in a cohort.

Response.

We really appreciate your important comment. We agree with your comment.

We rephrased "retrospective" to "cross-sectional".
"Temporary employment and tooth loss: a cross-sectional study from the J-SHINE study"

"This study was a cross-sectional study."

Comment 3.
Line 142- The last term should be revised as the authors are probably referring to model 1.
Response.
Thank you very much for pointing it out. We have revised it.

Please see page 9, line 149 to 151.
"In model 2, years of education, self-rated household economic status in early life at 5 years old, marital status, and number of family members in the household, history of diabetes, and body mass index were added into model 1."

Comment 4.
Line 155- The sentence "More than half of the participants were men (n = 1,422, 52.8%)" should be revised. Table 1 reports n=1,394.
Response.
We really appreciate your careful reading.
We have corrected "n = 1,422" to "n = 1,394".

Please see page 10, line 166 to 167.
"More than half of the participants were men (n = 1,394, 52.6%)."

Comment 5.
Line 156- The response rate was very low. Although the obtained sample has been fairly comparable with the vital statistics of the target population in terms of age and sex distribution, others characteristics of the analyzed sample may not support the use of the term 'prevalence'.
Response.
Thank you very much for raising an important point. We agree with your comment. We have changed "prevalence" to "percentage".

Please see page 10, line 167 to 168.

"The percentage of the experience of temporary employment was 14.5% (n = 202) in men and 61.3% (n = 771) in women."

Comment 6.

Tables 1 and 2 should be revised as sum of values in determined columns do not result in 100.0%. In Table 2, "Having the experience of temporary employment" corresponds to 771 instead of 202.

Response.

Thank you very much for raising an important point. We have revised the table 1 and table 2.

"Table 1. Characteristics and tooth loss in men (n = 1,394)."

"Table 2. Characteristics and tooth loss in women (n = 1,258)."

Comment 7.

Line 159 and 163- I am afraid that the sentences may not be supported in the results. The authors should test whether the observed differences are statistically significant. Several variables did not show association with the outcome and should not be included in the model if the objective is to evaluate potential association routes. Additionally, the authors should explain why visiting a dental clinic for preventive care and hesitation to use medical and dental care were included in the model simultaneously.

Response.

Thank you for your important comment.

Following your suggestion, we conducted chi-squared test for cross-tabulation. Following these results, we revised this paragraph.

Please see page 10, line 169 to 173.

"Tables 1 and 2 show the characteristics and dependent variables among men and women. Men who experienced temporary employment were not significantly associated with tooth loss. On
the contrary, compared with women who were continuous regular employees, women who experienced temporary employment were significantly associated with tooth loss."

We reconsidered and changed our models to re-build new models. We believe that the pathway analysis could have been improved. In addition, we revised discussion of possible pathways.

Please see table 3 and page 13, line 223 to 263.

"Table 3. Associations between change in employment status and tooth loss."

"Several potential pathways can exist between temporary employment and oral health. First, economic factors may link employment status and oral health. In general, temporary employees have incomes lower than those of regular employees, and low income is among the key risk factors for oral disease [25]. Low income is associated with severe caries and periodontal disease, and poor people are less likely to use medical services [26]. Indeed, the association between temporary employment and tooth loss was explained by the analysis of income in the present study (models 2 and 3).

Second, psychological stress and disorder may explain the association between temporary employment and tooth loss. Because they can be easily dismissed, temporary employees tend to feel more job insecurity and work-related stress which lead psychological disorder [7,13,27]. Stress from fear of job loss and psychological disorder could influence health behaviors such as less frequent toothbrushing and heavier smoking [11]. In addition, stress may decrease salivary flow, which increases the occurrence and progression of periodontal disease [12]. Temporary employees could lose their teeth for any of these reasons. Indeed, the association between temporary employment and tooth loss was explained by the fear of job loss and psychological disorder in the present analysis (models 4 and 5).

Third, poor health behavior also might explain the association between employment status and oral health. Work Stress was associated with poor health behaviors such as less frequent toothbrushing and heavier smoking [11]. In addition, low social economic status such as low income could lead to poor oral health behaviors [26]. Indeed, the association between temporary employment and tooth loss was explained by smoking status (models 5 and 6). However, we could not obtain oral health behavior variables such as toothbrushing. It might also well explain the association between temporary employment and tooth loss.

Finally, limited access to health care might explain the association between employment status and oral health. Japan has universal healthcare coverage (UHC) and patients pay only 10–30% of the total cost of treatment [28]. Also, the total cost itself is relatively low because the cost is controlled by the government. In addition, the UHC covers the most basic dental treatments, such as treatments for caries and for periodontal disease [28]. With the UHC, almost any people
In Japan did not hesitate in visiting medical and dental services. However, under long lasting economic depression, some people in temporary employment, a new emerging type of unstable employment, were not able to afford to use health care service appropriately due to the following two reasons [29]; 1) even 10–30% of the total cost could be a barrier for them to use dental care because they are employed on a low wage, 2) they may be reluctant to take a time off work to visit dental services because they are concerned that they might be fired if they take frequent sickness absence. Indeed, the association between temporary employment and tooth loss was explained by the frequency of visiting a dental clinic for preventive care and the hesitation to use medical and dental care analyzed in our study (models 3 and 4)."

In order to certify the access to health care pathway, we used both variables ("visiting a dental clinic for preventive care" and "hesitation to use medical and dental care") in the same model. We added this explanation in covariate section and discussion section.

Please see page 14, line 248 to 263.

"Finally, limited access to health care might explain the association between employment status and oral health. Japan has universal healthcare coverage (UHC) and patients pay only 10–30% of the total cost of treatment [28]. Also, the total cost itself is relatively low because the cost is controlled by the government. In addition, the UHC covers the most basic dental treatments, such as treatments for caries and for periodontal disease [28]. With the UHC, almost any people in Japan did not hesitate in visiting medical and dental services. However, under long lasting economic depression, some people in temporary employment, a new emerging type of unstable employment, were not able to afford to use health care service appropriately due to the following two reasons [29]; 1) even 10-30% of the total cost could be a barrier for them to use dental care because they are employed on a low wage, 2) they may be reluctant to take a time off work to visit dental services because they are concerned that they might be fired if they take frequent sickness absence. Indeed, the association between temporary employment and tooth loss was explained by the frequency of visiting a dental clinic for preventive care and the hesitation to use medical and dental care analyzed in our study (models 3 and 4)."

References


