Author’s response to reviews

Title: Risk factors of functional disability among community-dwelling elderly people by household in Japan: a prospective cohort study

Authors:

Emiko Saito (saito@hs.tmu.ac.jp)
Shouzoh Ueki (sueki@hss.tbgu.ac.jp)
Nobufumi Yasuda (yasudan@kochi-u.ac.jp)
Sachiko Yamazaki (syamazaki@bgu.ac.jp)
Seiji Yasumura (yasumura@fm.ac.jp)

Version: 4 Date: 15 April 2014

Author’s response to reviews: see over
Responses to the comments of Reviewer #1

We wish to express our appreciation to the reviewer for these insightful comments, which have helped us significantly improve the paper.

1. To start with, based on the background, the significance and contribution of this study is not clearly written. The authors mentioned the relationship between diverse households among older adults and health status was still not clear without providing empirical or theoretical support. Why is this relationship unclear and why is this relationship important? In addition, the authors provided interesting information (e.g., factors related to functional disability) in the background section. However, the organization of the section needs major improvement. At the moment, it’s not coherent and it is sidetracking to the reviewer.

Response: We thank the reviewer for this pertinent comment. We have added five references to the first paragraph in the Background section. The causal relationship between diverse households among older adults and health status is not clear because few longitudinal studies have been conducted in this area. We believe it is important to clarify this causal relationship when assessing the care and support needs of vulnerable older adults and families in each household group. We have reorganized the paragraph structure in the Background. We have described research trends for older adult households in the first paragraph and studies concerning functional disability in the second.

Original version: page 5, lines 4–6

McCann et al. [3] reported living arrangements related to subsequent admission to a care home, but the relationship between diverse households of elderly and health status is still incompletely understood.

Revised version: page 5, lines 1–17

The risk factors related to the functional decline of elderly people in different households are still not fully clear.

Several cross-sectional studies have investigated household factors related to mortality, risk of disease, admission to nursing homes or hospitals, self-related health, depressive status, and poverty risk among elderly people [3-8]; however, there is a lack of longitudinal data relating to vulnerable households. In many developed countries, the household composition has shifted toward smaller size and more diverse range, and that particularly applies to Japan’s aging society. The development toward smaller household sizes and reduced family functions can potentially cause difficulties for elderly people with functional disability in a home-care setting. For example, the number of elderly people living alone and those living only with a spouse has
significantly increased, and several risks have been identified for this age-group [4, 9, 10]. Household composition is an important factor when assessing needs and providing health-care services for elderly people, and it includes the physical, mental, and social functional conditions of such people as well as their caregivers [5, 11]. However, few reports have examined the relationship between these diverse household factors related to the elderly and their functional disability.

2. In terms of measurements, the Tokyo Metropolitan Institute of Gerontology (TMIG) Index of Competence included three subscales such as instrumental activities of daily living, intellectual activity, and social roles. Activities of daily living (ADLs) as an important part of functional health were not captured by this index. What aspects of physical performance were measured by MFS? In addition, the authors need to report the validity and reliability of these scales.

Response: Most of the older adults in our study were living independently in their community. We believed the Motor Fitness Scale to be more appropriate than the items of basic activities of daily living (ADL). The Motor Fitness Scale (MFS) is a self-rated scale comprising 14 items in three subscales (morbidities, six items; strength, four items; and balance, four items) for measuring the physical performance of older adults. The total score is 14, with higher scores signifying better physical performance. The reliability of the scale was demonstrated using Cronbach’s coefficient alpha (TMIG 0.80, MFS 0.80). The MFS was significantly positively correlated with instrumental activities of daily living (IADL) and significantly negatively correlated with age.

Original version: page 9, lines 22–23

Measurements
The MFS is a self-rated measurement scale comprising 14 items measuring the physical performance of older adults [21].

Revised version: page 9, line 20 to page 10, line 1

The reliability and validity of the TMIG index of competence have been tested [18]. The MFS is a self-rated measurement scale that comprises 14 items in three subscales (morbidities, six items; strength, four items; and balance, four items) to assess the physical performance of older adults [19]. The total score is 14, with higher scores representing better physical performance. The reliability and validity of the MFS have been tested [19].

3. Regarding analyses, the authors need to present the outcome variable and other risk factors clearly. It seems that the authors used functional health and other factors related to functional health to predict onset of functional disability. Please check the correlations among all variables to rule out multicollinearity
issue. Most of the factors could also be treated as time-varying covariates. The authors mentioned the effects of age and gender. How the other factors were treated remains unknown. Another limitation needs to be discussed is whether the causal relationship between risk factors and functional disability could be established using this type of research design and analytic tools.

Response: We have made revisions to present the outcome variable and other risk factors in the Methods section. In the Results section, Table 3 shows results of bivariate analysis adjusted for covariates of age and sex. So we believed we did not need to rule out the multicolinearity issue. To simplify Table 3, we have changed the title and added horizontal lines for greater clarity.

We agree with your comment about the necessity for most of the factors to be treated as time-varying covariates. However, because we proceeded from the statistical hypothesis that physical, mental, and social factors at the baseline could be predictive of future functional disability in elderly people living independently in a community, we did not treat these factors as time-varying covariates. The consideration of time-varying covariates is thus a limitation of this study. We have added a note that there is a possibility of underestimation with regard to interpreting the variables that were not statistically significant. We have made the following addition regarding limitations.

Original version: page 14, line 20 to page 15, line 2

One limitation of this study is that, because the four household groups had a different number of events, the study may have failed to identify factors for groups that have a small number of events. In addition, we did not perform an analysis based on the levels of disability. Among the participants occurred functional disability, 42.4% were assigned a low level, and 57.6% were assigned higher levels. The percentage of participants with higher levels was higher in our study than in other study [5]. One possible reason for this difference is that the participants in our study were all 70 or older.

Revised version: page 15, line 18 to page 16, line 6

Some limitations of this study are as follows. First, because the four household groups had different numbers of the onset of functional disability, this study may have failed to identify factors for groups that had a small number of events. Second, we did not perform an analysis based on levels of disability. Among the participants with newly occurring functional disability, 42.4% were categorized as low level and 57.6% as higher levels. In this study, the percentage of participants with higher-level functional disability was higher than that found in precedence reports. One possible reason for
this difference is that the participants in our study were all 70 years or older, not 65 or older. Third, because we proceeded from the statistical hypothesis that physical, mental, and social factors at the baseline would be predictive of future functional disability in elderly people living independently in a community, we did not collect data on all episodes, and so we did not analyze them for time-varying covariates. So there could have been an underestimation regarding the onset of functional disability.

4. The discussion needs to be strengthened on the contribution and significance of the study. What was new and different from existing literature? How could this study contribute to the knowledge building process?

Response: We have made the following addition to the text.

Original version: none

Revised version: page 13, lines 1–14

This study found that the children-only household group demonstrated a higher risk for functional disability than the three-generation household group, and the factors associated with functional disability differed depending on household composition. In this regard, the risk in children-only households has not been reported. Life-course analysis has shown that critical periods exist, for example those related to family life events or family life course, with respect to health disparities [26]. Among families in East Asian countries, including Japan, the number of households with elderly parents and unmarried children has increased. Though elderly people living alone face many social problems, such as obtaining nursing care, isolation, and low income, few studies have investigated this issue. The present study examined the vulnerability of such households. The poor family functions of the children-only households were probably caused by vulnerability during the family life course.

Revised version: page 16, lines 14–18

Despite these limitations, this is the first study in Japan to provide new information about the risk factors of functional disability according to household composition. It was found that there was vulnerability both among elderly people living alone and among those living in a household only with their children.
Responses to the comments of Reviewer #2

We wish to express our appreciation to the reviewer for these insightful comments, which have helped us significantly improve the paper.

1. Abbreviations should be spelt out in abstract.

Response: We checked with the journal guidelines on this point, and it states that the use of abbreviations should be minimized in the abstract. Accordingly, we have avoided all use of abbreviations in the abstract. We have spelled out all abbreviations upon first appearance in the body text.

2. Abstract, results: "Risk factors of functional disability are different according to households." should be dropped. Also in this section, "In the spouse-only group,.... were significantly associated with functional disability" is awkward and should be rephrased. In other words, this section should be entirely rewritten.

Response: We have corrected that section as follows.

Original version: page 3, line 23 to page 4, line 6

Risk factors of functional disability are different according to households. In the spouse-only group, following variables were associated with functional disability: history of stroke (hazard ratio (HR) =4.57; 95% confidence interval (CI), 1.26-16.61), IADL (HR=0.52; 95% CI, 0.38-0.71), IA (HR=0.52; 95% CI, 0.36-0.75), SR (HR=0.56; 95% CI, 0.37-0.85), MFS (HR=0.78; 95% CI, 0.69-0.88), falls experienced during the past year (HR=4.70; 95% CI, 1.71-12.91), DVS (HR=5.30; 95% CI, 1.34-20.94), frequency of going outdoors (HR=3.95; 95% CI, 1.27-12.29) and depressive status (HR=4.59; 95% CI, 1.68-12.57) and in the living alone group, following variables were associated with functional disability: heart disease (HR=5.67; 95% CI, 1.06-30.14) and depressive status (HR=5.19; 95% CI, 1.33-20.31) were significantly associated with functional disability.

Revised version: page 3, lines 24–25

The risk factors for functional disability varied according to household group.

3. Abstract, conclusions: The first sentence should be rephrased.

Response: We have corrected that sentence as follows.

Original version: page 4, lines 8–9
It has become increasingly the social need to support for elderly people in vulnerable families.

Revised version: page 4, lines 1–2

In Japan, the number of vulnerable households with elderly people in need of care has increased steadily over the years.

4. Background: very first sentence should be rephrased.

Response: We have revised that sentence as follows.

Original version: page 4, line 15

Household composition changes on small size and diverse range, especially aged in Japan.

Revised version: page 4, lines 10–11

Households in Japan, including those with elderly people, have become increasingly characterized by diminishing size and reduced care functions.

5. Background: There is only one sentence about the association between living arrangements (household structure) with admission to institutional care. There are a plenty of studies in the literature on elderly living arrangements and subsequent functional disability in both developed and developing countries. The authors need to review them.

Response: We have now made significant revisions to the Background section. In light of the above comment, we have revised the second paragraph in that section, adding three references related to developed and three to developing countries.

Original version: page 5, lines 5–7

McCann et al. [3] reported living arrangements related to subsequent admission to a care home, but the relationship between diverse households of elderly and health status is still incompletely understood.

Revised version: page 5, lines 1–17
The risk factors related to the functional decline of elderly people in different households are still not fully clear. Several cross-sectional studies have investigated household factors related to mortality, risk of disease, admission to nursing homes or hospitals, self-related health, depressive status, and poverty risk among elderly people [3-8]; however, there is a lack of longitudinal data relating to vulnerable households. In many developed countries, the household composition has shifted toward smaller size and more diverse range, and that particularly applies to Japan’s aging society. The development toward smaller household sizes and reduced family functions can potentially cause difficulties for elderly people with functional disability in a home-care setting. For example, the number of elderly people living alone and those living only with a spouse has significantly increased, and several risks have been identified for this age-group [4, 9, 10]. Household composition is an important factor when assessing needs and providing health-care services for elderly people, and it includes the physical, mental, and social functional conditions of such people as well as their caregivers [5, 11]. However, few reports have examined the relationship between these diverse household factors related to the elderly and their functional disability.

6. Background: The second paragraph is less relevant to the topic. I would suggest shortening it and adding more literature on living arrangements and functioning disability. Of course, in that case, the authors need to write some new sentences to make smooth transitions to the third paragraph.

Response: We have revised that paragraph in the Background as follows.

Original version: page 5, lines 12–20

The factors related to care needs among elderly people include old age, being treated for a disease, requiring a large number of medicines, a history of falling in the past year, low functional capacity, poor self-rated health, depression, low frequency of going outdoors [4]. Fujiwara et al. [5] reported that old age and impaired walking ability were factors that contributed to a lower need for long-term care, whereas old age and inability to perform the instrumental activities of daily living (IADL) contributed to a high level of long-term care need. Yoshii et al. [6] reported that social support is also a factor related to disability in elderly people.

Revised version: page 5, line 23 to page 6, line 1

The household composition for elderly people has become more diverse; it has been predicted that elderly people living independently have potential health and life problems and will lack the private resources or ability to cope with the changes caused by such problems.
7. Method Section, Subjects and settings: In the first sentence, please specify the baseline year(s). It is better to note them here instead of noting them in the next paragraph.

Response: We have modified that section in the Methods as follows.

Original version: page 7, lines 5–18

Participants for a baseline survey were selected from 1523 elderly people 70-years-old or older residing in a local region in Fukushima Prefecture, Japan. Of these, 176 were excluded from the baseline survey as they had a functional disability and were hospitalized, leaving 1347 participants. The population of the local region was 8441 and had an older population ratio of 22% in 2004. In July 2004 and 2005, we conducted the baseline survey during geriatric health examinations held at community health centers using a self-rated questionnaire [14]. Because all of the community-dwelling elderly aged 70 years and older was intended, we divided the community into two areas and conducted each survey in 2004 (n=892) and 2005 (n=455). When elderly people did not undergo this geriatric health examination at community health centers, we visited their home for health examinations and interviews. The health examinations and home visits were conducted by public health nurses, nutritionists, home caregivers, and graduate students who were briefed in advance.

Revised version: page 6, line 19 to page 7, line 6

In July 2004 and 2005, we conducted a baseline survey during geriatric health examinations held at community health centers by means of a self-rated questionnaire[14]. We aimed to survey all the community-dwelling elderly people aged 70 years and older; we divided the community into two areas and conducted each survey in 2004 (n=892) and 2005 (n=455). For the elderly people who did not undergo this geriatric health examination at the community health centers, we visited their homes and carried out health examinations and interviews. The health examinations and home visits were conducted by public health nurses, nutritionists, home caregivers, and graduate students—all of whom were briefed in advance. The participants for the baseline survey were selected from 1523 elderly people aged 70 years or older residing in a region within Fukushima Prefecture, Japan. Of these, 176 were excluded from the baseline survey owing to functional disability and hospitalization, which left 1347 participants.
8. Method Section, Subjects and settings: In the last sentence, what is the age range of the older population here refers to? (It seems that it does not refer to 70 years old or order.)

Response: We have now deleted the sentence in question.

Original version: page 7, lines 8–9

The population of the local region was 8441 and had an older population ratio of 22% in 2004.

9. I am not sure whether all episodes of functional disability were collected in the survey. If no, there would be an underestimation about onsets of functional disability. If yes, then some or perhaps many participants should have multiple episodes of onset. I just wonder how the authors adjust the intrapersonal correlation between episodes for the same person (if there were multiple episodes). As far as I know, SPSS does not have such a command to adjust intrapersonal correlations in survival analysis. The authors have to find some alternative software to perform their analyses.

Response: We could not collect data pertaining to all episodes related to the onset of functional disability. Following preliminary research, we selected the main episodes. This was because we did not assume there would be a difference in such episodes at the baseline according to the type of household. However, following your comment, we have now added some remarks about underestimation in the study limitations. We have reanalyzed the data using SAS 9.3.

Original version: page 14, line 20 to page 15, line 2

One limitation of this study is that, because the four household groups had a different number of events, the study may have failed to identify factors for groups that have a small number of events. In addition, we did not perform an analysis based on the levels of disability. Among the participants occurred functional disability, 42.4% were assigned a low level, and 57.6% were assigned higher levels. The percentage of participants with higher levels was higher in our study than in other study [5].
Some limitations of this study are as follows. First, because the four household groups had different numbers of the onset of functional disability, this study may have failed to identify factors for groups that had a small number of events. Second, we did not perform an analysis based on levels of disability. Among the participants with newly occurring functional disability, 42.4% were categorized as low level and 57.6% as higher levels. In this study, the percentage of participants with higher-level functional disability was higher than that found in precedence reports. One possible reason for this difference is that the participants in our study were all 70 years or older, not 65 or older. Third, because we proceeded from the statistical hypothesis that physical, mental, and social factors at the baseline would be predictive of future functional disability in elderly people living independently in a community, we did not collect data on all episodes of the onset of functional disability, and so we did not analyze them for time-varying covariates. So there could have been an underestimation regarding the onset of functional disability.

10. Cox regression analysis is commonly used in event history analysis. However, there is a strong assumption for all variables in Cox regression. That is, the relative hazards (of onset of disability) of all categories of a variable in the model are assumed to change proportionally. I just wonder whether the authors have tested its proportionality assumption of each variable used in Cox regression. If there is a violation, the authors may need to apply parametric hazard regression. In my knowledge, there is no parametric hazard regression in SPSS. The authors may need to consider using other statistical packages. A more relatively detailed description about analytical strategy should be presented.

Response: We thank the reviewer for this pertinent comment. We have made an addition about the proportional assumption of all variables. We have also conducted a reanalysis using SAS 9.3.
functional disability groups. An alpha level of 0.05 was employed for all statistical tests. We used SAS version 9.3 for Windows (SAS Japan Inc., Tokyo) for analysis.

11. Results: The second paragraph should note the covariates as did in Table 2.

Response: We have added a sentence about the covariates in that paragraph.

Original version: page 11, lines 15–17

Table 2 contains the rate of functional disability for each of the household groups and the relative risk for each group compared with the three-generation household group.

Revised version: page 12, lines 1–3

Table 2 presents the rate of functional disability for each of the household groups and the hazard risk for each group compared with the three-generation household group adjusted for age and sex as covariates.

12. It is unclear to me what new contributions of this study will add to the existing literature comparing to previous studies (4) and (6). To be a new research paper, it must have sufficient new contributions to the previous studies. The authors need to provide some descriptions about the difference between the present study and the earlier two if they are based on the same data survey. If these two studies used different data sources, it would be good for the authors. However, in that case, the authors need to explicitly state it clearly when they compare the current study with these two.

Response: Those two studies did not analyze the risk factors related to functional disability according to household composition. The new contribution made by our study is demonstrating how the risk factors differed according to household type. We have clarified this by making the following addition.

Original version: none

Revised version: page 16, lines 14–18

Despite these limitations, this is the first study in Japan to provide new information about the risk factors of functional disability according to household composition. It was found that there was vulnerability both among elderly people living alone and among those living in a household only with their children.
13. Throughout the manuscript, the authors have not clearly defined the measurement of functional disability, although there are descriptions on Pages 9-10. It is unclear to me which it is a single indicator or a set of indicators. According to Table 2, it should be a single variable, whereas there is no any clue for Table 3. In any case, the authors need to clarify them and explicitly define them.

Response: This functional disability was measured using a single indicator, which was certification of long-term care needs. To clarify this, we have made the following addition to the Methods section.

Original version: none

Revised version: page 8, lines 19–25

For functional disability, we collected data at the onset of certification for LTC from recipients eligible for LTCI [17]. The certification process started with a home visit for an initial assessment to evaluate nursing care needs using a questionnaire on current physical and mental status. The results were assigned a care-needs level, and the Nursing Care Needs Certification Board determined whether the initial assessment was appropriate. The observation period ended on 31 March 2011. We regarded the certification occurrence to be when a participant first applied for LTC services.

14. Table 3, what does the symbol "-" mean?

Response: That was a dagger symbol relating to notes to the table. Since that was not clear, we have now deleted the daggers from that table.

15. English is poorly written. The paper needs editing thoroughly.

Response: We have now had the manuscript professionally edited.