Author's response to reviews

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

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Author's response to reviews: see over
Responses to the comments of additional Editorial comments

We are sincerely grateful for these additional editorial comments.

1. “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).”
Response: the authors should add an endnote for the details of the 14 items.

Response: We have corrected the sentence in question. We have also added details of the MFS as an endnote as suggested.

Revised version: page 10, lines 7–9:

The MFS is a self-rated measurement scale that comprises 14 items in three subscales (mobility, six items; strength, four items; and balance, four items) to assess the physical performance of older adults.

Revised version: page 18, line 12 to page 19, line 3:

Endnote
The MFS comprises three subscales: mobility (items 1–6); strength (7–10); and balance (11–14).
1. I can walk up to the second floor and down again.
2. I can walk up to the second floor without getting out of breath.
3. I can jump in the air with both feet clearly off the ground.
4. I can run for 20 paces.
5. I can pass another person who is walking ahead of me.
6. I can keep walking for over 30 minutes.
7. I can carry something weighing 10 pounds (e.g., a 1-gallon milk bottle).
8. I can lift something weighing 20 pounds (e.g., two 1-gallon milk bottles).
9. I can pick up a fallen bicycle.
10. I can open a screw-type bottle cap.
11. I can touch the floor with my fingertips without bending my knees.
12. I can put on socks, slacks, or a skirt while standing without any support.
13. I can stand up from a chair without using my hands.
14. I can stand on my toes without any support.
Responses to the comments of Editorial requests

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

1. In page 3, “A total of 1347 elderly people aged 70 years and over participated in a baseline geriatric health examination for this prospective cohort study. In the health examination, interview survey using a questionnaire was conducted in July 2004 and 2005.”
Comment: Is the questionnaire validated?

Response: This questionnaire consisted of items described in part of the Methods section (from page 9, line 12 to page 10, line 24). Our research team discussed the contents of the questionnaire, including measurements, which were for tested reliability and validity. Therefore, we believe that this questionnaire was validated.

2. In page 3, “Of the 1084 participants, 433 were male (39.9%), and the average age was 77.8 (SD 5.4). Functional disabilities occurred in 226 participants (20.9%) until March 2011.”
Comment: In the abstract, the authors should define functional disabilities.

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

Revised version: page 3, lines 14–18:

We defined the occurrence of functional disability as certification for long-term care needs of the subjects. 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.

3. In page 4, the paragraph “Families are also becoming more nuclear, Single-person household numbers have also increased: 4.87 million households (23.3%) as of 2012 [2].”
Comment: Please provide some figures in the last 2-3 decades and show the trends of different household composition changed over time.

Response: In light of this comment, we have revised that section as follows.
Revised version: page 4, lines 18–25:

The number of three-generation households with an elderly person aged 65 or older has decreased (3.35 million households, 16.2%, as of 2010; 4.14 million households, 26.5%, as of 2000; 4.27 million households, 39.5%, as of 1990), and the number of spouse-only households has increased (6.19 million households, 29.9%, as of 2010; 4.23 million households, 27.1%, as of 2000; 2.31 million households, 21.4%, as of 1990). Single-person household have also increased in number (5.02 million households, 24.2%, as of 2010; 3.08 million households, 19.7%, as of 2000; 1.61 million households, 14.9%, as of 1990) [1].

4. In pages 4-5, the paragraph “the number of spouse-only households has increased (6.33 million households, 30.3% as of 2012).” “the number of couple-only and single-person households is estimated to increase to approximately 5.70 and 7.17 million, respectively.”
Comment: Is the spouse-only and couple-only household the same? If so, the number of spouse-only households in 2012 was 6.33 million, then the authors said by 2030 it was estimated to be approximately 5.7 million, these numbers are decreasing, NOT increasing (pages 4-5).

Response: Thank you for pointing this out. We have corrected that section using the latest estimate made by the Household Projection for Japan: 2010–2035 in April 2014.

Revised version: page 5, lines 5–7:

This trend is expected to continue, and the number of spouse-only and single-person households is estimated to increase to approximately 6.33 and 7.30 million, respectively.

5. In page 5, the sentence “Despite of becoming poor resources of family, the number of elderly people who has functional disability is increasing.”
Comment: This sentence is too vague. Please provide in-text citations and evidence.

Response: We have revised that sentence and also provided a reference as follows.

Revised version: page 5, lines 9–11:

Despite the decline in family resources and functions, the number of elderly people with functional disability is on the rise (2.88 million as of 2001; 4.91 million as of 2010) [1].
6. In page 5, “Functional disability in community-dwelling elderly is a frequent cause of admission to a hospital or nursing home and the use of long-term care services.”
Comment: Please provide an in-text citation for this sentence.

Response: We have now added in-text citations to the sentence in question. They appear as follows.

Revised version: page 21, lines 11–16:


7. In page 6, the sentence “However, few reports are available on actual condition of vulnerable households in elderly people.”
Comment: What does it mean of the vulnerable households? Living alone? And for those males living alone? Please clarify this sentence.

Response: We have clarified that point as follows.

Revised version: page 6, lines 17–19:

However, few reports have dealt with the actual conditions for elderly people living only with their spouse or living alone.

8. In page 6, the sentence “The household composition of elderly people are becoming more diverse, and it is predicted that elderly people living an independent life may have potential health and life problems and will not have enough private resources or the ability to cope with the changes caused by these problems.”
Comment: Please rewrite the above sentence as it is not consistent with what the authors have stated in page 5 a sentence about the proportion of proportion of couple-only and single-person households will increase by 2030 (see page 5, It is predicted that the proportion of couple-only and single-person households will account
for approximately 70% of all households with an elderly person aged 65 or older). They also quoted “Koyano et al. [7] reported that elderly community residents are independent with respect to approximately 75% of their abilities. Specifically, approximately 70% of elderly people living alone were reported to be independent [8].” If all these previous results are relevant, the household composition of elderly people should be more couple-only and single-person oriented in the coming future. And as quoted, among those living alone elders 70% was reported to be independent (in what sense? In terms of ADL and IADL? Or Economic ability? How does it define ?independent??). If so, will they be more healthy and able to take care of themselves as 2/3 of them are living alone? Or vice versa?

Response: In light of these comments, we have made the following revisions. We deleted the sentences quoted by the reviewer in a previous revised version (“Koyano et al. [7] reported that elderly community residents are independent with respect to approximately 75% of their abilities. Specifically, approximately 70% of elderly people living alone were reported to be independent [8].”) The elderly people in the Koyano et al. study may have had a high level of functional capacity in their daily lives because they were able to answer the self-reported questionnaires. That may have amounted to selection bias.

We clarified this issue with the following change in the revised version: page 6, lines 8–10:

Despite the rise in the number of elderly people requiring care, it is becoming more difficult for family members to provide care for elderly relatives. The composition of households with elderly people is characterized by ever-smaller size.

9. Thus, it is of prime importance that the authors should show the changes of the health status and abilities (i.e. physical, cognitive, ADL and IADL) of those living alone elders. If those variables are deteriorating, then they could say those elders “may have potential health and life problems and will not have enough private resources or the ability to cope with the changes caused by these problems”, as they conjectured.

Response: We have deleted and revised that section, as noted in response no. 8.

10. In page 6, the sentence “To enable elderly people living in smaller households to continue living a healthy life in their community, it is important to predict risk factors by the household.”
Comment: This sentence presumes those living alone elders are currently living healthily in their community. Thus, the authors want to predict their risk factors by the household to ensure that they can continue living in a healthy life, but the logic of the sentence is not correct, please rewrite the whole sentence.

Response: We have revised that sentence as follows.

Revised version: page 6, lines 20–22:

Because the number of elderly people needing care and that of smaller households with such individuals are predicted to increase, it is important to determine the risk factors for households over the next decade.

11. In page 7, “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.”
Comment: How the samples were selected? Why only in Fukushima Prefecture? Need to tell more about sampling method.

Response: Our participants were all residents aged 70 years and older in this local region. This research was conducted using the long-term relationship and collaboration between the local public health authority and our research team. We provide details of the sampling in the Methods, page 7, lines 6–11:

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. We aimed to survey all the community-dwelling elderly individuals aged 70 years and older; we divided the community into two areas and conducted each survey in 2004 and 2005.

12. In page 7, “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].”
Comment: How many community health centers did participate? If the sampling method has been reported elsewhere, the authors should mention in the current manuscript.

Response: We have now clarified that point. There was just one community health center.
Revised version: page 7, lines 4–6:

In July 2004 and July 2005, we conducted a baseline survey during geriatric health examinations held at a community health center by means of a self-rated questionnaire [18].

13. In page 7, “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.”
Comment: The two sentences are not clear. The method is quite confusing.

Response: We have revised that section as follows.

Revised version: page 7, lines 4–17:

In July 2004 and July 2005, we conducted a baseline survey during geriatric health examinations held at a community health center by means of a self-rated questionnaire [18]. 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. We aimed to survey all the community-dwelling elderly individuals aged 70 years and older; we divided the community into two areas and conducted each survey in 2004 and 2005. For the elderly people who did not undergo this geriatric health examination at the community health center, 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 physicians, who were briefed in advance. They had experience in health examinations and home visits for elderly people.

14. In page 7, “The health examinations and home visits were conducted by public health nurses, nutritionists, home caregivers, and graduate students who were briefed in advance.”
Comment: Was there any prior training given to them before the survey? Please elaborate!
Response: The graduate students were physicians. All those individuals had experience in conducting health examinations and making home visits for elderly people or they carried out them as part of their regular duties. We have clarified that point as follows.

Revised version: page 7, lines 14–17:

The health examinations and home visits were conducted by public health nurses, nutritionists, home caregivers, and physicians, who were briefed in advance. They had experience in health examinations and home visits for elderly people.

15. In page 7, “The participants were then under observation until 31 March 2011 during which time occurrences of functional disabilities were recorded by health care professionals.”
Comment: What does it mean by observation? During the observation period, what did the investigators do to the participants and how many home visits did they offer?

Response: We were referring to the observation period for the cohort study. We have clarified that point as follows.

Revised version: page 7, lines 18–20:

New occurrences of functional disabilities were recorded by the health-care professionals up to 31 March 2011. In the observation period, the participants were monitored in terms of the onset of functional disability by means of the LTCl database.

16. In page 9, “the Tokyo Metropolitan Institute of Gerontology index of competence (TMIG) [7, 17], the Motor Fitness Scale (MFS) Japanese version, history of falling in the past year [18], the Dietary Variety Score (DVS)”
Comment: It is suggested to write a footnote to explain some details for the MFS although the authors quoted the reference.

Response: We have explained those details in the form of an endnote as follows.

Revised version: page 18, line 12 to page 19, line 3:

Endnote
The MFS comprises three subscales: mobility (items 1–6); strength (7–10); and balance (11–14).
1. I can walk up to the second floor and down again.
2. I can walk up to the second floor without getting out of breath.
3. I can jump in the air with both feet clearly off the ground.
4. I can run for 20 paces.
5. I can pass another person who is walking ahead of me.
6. I can keep walking for over 30 minutes.
7. I can carry something weighing 10 pounds (e.g., a 1-gallon milk bottle).
8. I can lift something weighing 20 pounds (e.g., two 1-gallon milk bottles).
9. I can pick up a fallen bicycle.
10. I can open a screw-type bottle cap.
11. I can touch the floor with my fingertips without bending my knees.
12. I can put on socks, slacks, or a skirt while standing without any support.
13. I can stand up from a chair without using my hands.
14. I can stand on my toes without any support.

17. In page 10, “Among 1290 participants, we analyzed 1084 people who were able to classified four types of household composition in three-generation household, living together with only their children, living with only their spouse and living alone. Of 1291 elderly people, 206 participants were classifications of other household composition.”
   Comment: Two figures are different: 1290 and 1291. Which one is correct? Typo? What does it mean of other household composition?? Like what? As the total number of other household composition (n=206) is only second to 3-generation household? (n=798), the authors should look over this category also.

Response: We have revised the section in question as indicated below. Other household compositions related to various other family members, such as grandchildren, brothers and sisters and their relatives. We analyzed data that fell only into the four defined types and excluded other household compositions, as indicated below.

Revised version: page 11, lines 5–10:

Among the 1290 participants, we analyzed 1084 people who we were able to classify into four types of household composition: living in a three-generation household; living only with their children; living only with their spouse; and living alone. Of the 1290 elderly people, 206 participants were classified as having a household composition that was not one of the above four types.

18. In page 10, “A participant was defined as onset of functional disability if their support
or care needs were newly certified in LTCI during the observation period. To clarify the relationships, excluding the effects of age at the time of the health examinations and sex, we performed a Cox regression analysis with an onset of functional disability as the endpoint, age and sex as covariates, and the 136 people who died before applying for LTCI and the 12 people who relocated during the observation period as the censored cases.

Comment: It is suggested the authors should write briefly in the abstract that they follow and observe the participants from the baseline surveys in July 2004 and 2005 (from July 2004 to 2005? Which month ended in 2005?), then using the application date of LTCI as an onset of functional disability to identify the risk factors of functional disability by household in Fukushima Perfect until March 2011. The readers wouldn’t know what they did until we read through till the end of the statistical analysis in page 10.

Response: We have clarified that section in the abstract as follows.

Revised version: page 3, lines 9–14:

In the health examination, we conducted an interview survey using a questionnaire in July 2004 and July 2005. Questionnaire items covered the following: age, sex, household, medical history, instrumental activities of daily living, intellectual activity, social role, Motor Fitness Scale, falls experienced during the past year, Dietary Variety Score, frequency of going outdoors, cognitive impairment, and depressive status.

19. In pages 10 and 11, “Of the 1084 participants, 433 were male (39.9%), and the average age (SD) was 77.8 (5.4). A total of 226 participants (20.9%) were newly occurrence of functional disability.”

Comment: How about among 1084 (corresponding merely to those 4 types of household composition), any of them already have the LTCI (using as a benchmark of considering functional disability) at the baseline survey, as the authors only provide the newly occurrence of functional disability?

Response: All the 1084 participants were living independently and were not applicable to certification for long-term care need in a local community at baseline.

20. In page 11, “The 1084 participants were classified into four groups according to their household compositions: three generation households (798 participants, 73.6%), living with children-only households (101 participants, 9.3%), spouse-only households (131 participants, 12.1%), and living alone households (54 participants, 5.0%)”
Comment: Can the authors show the newly occurred functional disabled participants (n=226) by 5 types of the household compositions? Table 2 only shows the number of newly occurred functional disability by 4 types. Excluded ?others??
In page 11, frequency of going outdoors, how do they define ?going outdoors??
In Table 1, page 21, what kind of instrument was used to measure the cognitive function? Please explain.

Response: We analyzed 1084 people that we were able to classify into the four types of household composition (page 11, lines 5–10).

We have revised that point in the Methods as follows.

Revised version: page 10, lines 16–22:

The degree of housebound status was measured by frequency of going outdoors: more than once a week; one to three times a month; and seldom. Cognitive function was evaluated in terms of whether or not the participant had difficulty functioning in daily life through cognitive dysfunction. This was likewise assessed in terms of three self-reported stages: no cognitive dysfunction or no inconvenience in daily life; slight inconvenience in daily life; and serious inconvenience in daily life.

21. In page 12, “The percentage of newly occurrence of functional disability among elderly people 70-years or older in our study was 20.9%. Among prior studies in which participants were aged 65 or older, the reported occurrence rates were 4.5% in 24 months [5], 8.0% in 40 months [6] and 0.306 per 10,000 in 36 months [4].”
Comment: Apart from the age bias, the authors should address the geographic variations because they only used the data from Fukushima prefecture. Other studies may cover other prefecture and regions. And the definition of functional disability may differ from what they used the benchmark of the application date of LTCI in their study.

Response: The comment relating to the section on page 12 was a point that we addressed in our previous revised version. We have revised the relevant section on page 14 as indicated below. The studies cited were based on the application date of LTCI.

Revised version: page 14, line 24 to page 15, line 5:

In the present study, the proportion of newly occurring functional disability among elderly people aged 70 years or over was 20.9%. In previous studies involving participants aged 65 or older, the reported occurrence rates were 4.5% for 24 months [9], 8.0% for 40
months [29], and 8.6% for 36 months [30]. A possible reason for the higher incidence in the present study is that our participants were older. Because most local regions of Japan have a high population-aging rate, there is the possibility that the occurrence of functional disability is likewise high.

22. In page 12, “In the children-only household group, history of hypertension was associated with functional disability.”
Comment: Table 3 shows the history of hypertension is NOT statistically significant (p value = 0.059) associated with functional disability in the children-only household group. It is suggested the authors to discuss why it is not significant rather saying it was positively associated with functional disability.

Response: We have deleted the sentence in question on page 13, lines 17–18.

23. In page 13, “However, no items belonging to cognitive function demonstrated a significant association with functional disability for any of the household groups.”
Comment: Please discuss the above finding.

Response: We have revised that section as follows.

Revised version: page 14, lines 16–18:

We used a self-reported questionnaire for the item of cognitive function. The subjective preference of respondents may have affected this result.

24. In page 13, “A study comparing three household groups (living alone, spouse-only, and living with a child) found that, for elderly people living alone, participating in social activities and having close contact with neighbors or friends were related to quality of life [29]. Our study did not find significant associations for intellectual activity or social role in living alone household group. However, those factors were associated with functional disability in three generation and spouse-only household groups.”
Comment: Caution should be made as the independent variables to define social activity used in the other studies may differ from the ones (i.e. intellectual activity or social role) that the authors are using now.

Response: We have revised those sentences as follows.
Revised version: page 15, lines 21–23:

It is possible that the definitions of social activity used in previous studies differ from those employed in the present one. This is a significant factor when interpreting the results of this study.

25. In page 14, “The rate of functional disability was greatest in children-only households, and progressively decreased in living alone households, three-generation households, and spouse-only households.”

Comment: Based on the results, it is hardly to understand why the rate of functional disability was greatest among children-only households as all used independent variables were not statistically significant with functional disability (please refer to Table 3). Thus, using the application date of LTCI as a benchmark of the onset of functional disability may generate a bias because presumably those elders living with children may have some resources and support by children to apply for LTCI. Or put it another way, those living alone and with old-old spouse may not easily obtain information and assistance to apply for LTCI which may affect the rate of functional disability for them. On the other hand, we don’t know why the rates of functional disability decreased among living alone households, three-generation households, and spouse-only households as so many risk factors (nine variables) are found to be statistically significant with functional disability among three-generation households, and spouse-only households. Would it be possible that those elders refused or declined to apply for LTCI? Or would it be any regulation and terms that restricted them from applying? The authors should discuss this issue in great detail.

Response: We do not think it is likely that any households would have refused to apply for LTCI. There are no regulations or conditions that would prevent them from applying. The differences in the occurrence of functional disability by household types are clarified in this study. Advancing age itself might be a strong risk factor than other risk factors observed in other group. So, we suppose no significant risk factors could not be detected in children-only households.

Revised version: page 14, lines 18–23:

Though the rate of functional disability was greatest among children-only households, all used independent variables were not statistically significant with functional disability. One reason why is that advancing age itself might be a strong risk factor than other risk factors observed in other group. So, we suppose no significant risk factors could not be detected in children-only households.
26. In page 14, “Kandler et al. [13] reported a higher death rate among ? to delay institutionalization among elderly people [30]. Lau et al. [31] investigated the relationship ? However, Lau et al. [31] also reported that elderly people living with their adult offspring were less likely to use preventive care compared with those living alone.”

Comment: Those quoted references seem less relevant to the authors' findings. As the current manuscript didn't mention about the odd of dying, the delay of institutionalization and the use of preventive care services, they should provide more related references to support or argue against their results.

Response: We have revised that section and the references as follows.

Revised version: page 16, lines 1-6:

In a cross-sectional analysis, Wang et al. [36] found that living arrangements were significantly associated with activities of daily living. They also suggested that unmarried elderly people living only with their children had significantly greater disability than those in other living arrangements. Murayama et al. [37] reported that functional and cognitive conditions were associated with household composition, especially among elderly people living alone.

27. In page 14, “Our study did not analyze in detail elderly people who lived with their family members but not in non-three-generation households.”

Comment: How about the 5th household category? others?, does it contain those living with their family members?

Response: We analyzed data except for that fifth household category. We have clarified that point as follows.

Revised version: page 16, lines 6–8:

The present study did not analyze in detail the family members’ characteristics and living conditions for elderly subjects who lived with family.

28. In page 15, “In addition, although the participants of this study were all 70 or older, Takeda [32] has reported that the percentage of disability increases drastically in the 75+ age group and that deterioration after certification of long-term care is dominant in the
80+ age group. Thus, an analysis that examines each age group in each household is also needed.”

Comment: Based on Table 1, around 20% of elders are from the age group above 85 among children-only and living alone households, 19.8% and 20.4% respectively. Thus, it may partly explain why the rates of functional disability were much higher among these two types of households than that of other households as if the health of those elders may greatly deteriorate and therefore they are more likely to apply for LTCl.

Response: The proportion of subjects aged 85 years and older was approximately 20% among the children-only and living-alone households. We analyzed the data after adjustment for age.

As you pointed it out, a higher proportion of elderly people aged 85 years and older contributed to much higher percentage of new apply for LTCl. So, we revised the sentences as follows.

Revised version: page 17, lines 12-14:

Thus, using a large scale cohort including elderly people aged above 85, we need to analyzed the age stratified group in each household group.

29. In page 15, “The living with only children household group demonstrated a significantly higher risk for functional disability than the three generation household group (HR, 1.61, 95% CI, 1.08-2.40).”

Comment: Using the application date of LTCl as a benchmark of the onset of disability seems to be problematic as the results (table 3) show that there is no independent variable statistically significant associated with the functional disability among the children-only households. Thus, the authors should discuss about this limitation and explain why the percentage of newly occurred events (they defined as functional disability) to those elders living with children (29%) is much higher than that of other categories (20% for three-generation, 15% for spouse-only and 28% for living alone households) as shown in Table 2.

Response: We have revised that section as follows.

Revised version: page 17, line 14–24:

Health service authorities have focused on elderly people living alone or in couple-only households as a result of smaller family sizes and decreased family functions. However,
such authorities have little information about elderly individuals living only with their children. These children-only households showed the highest rate of functional disability in our results. From the perspectives of the elderly, the reasons for this could be advanced age, loss of the spouse, and deteriorating health; from the perspectives of the children, the reasons may be related to economic status or mental and physical status. We did not collect data related to the children’s characteristics, age, sex, marital status, or health condition. Future studies need to clarify such details with respect to middle-aged and older adults living with their elderly parents.

30. Another important issue the authors should consider is the change of household composition to the participants. As the observation period is pretty long (from July 2004-2005 till March 2011, about approximately 6 years), some elders may face up to the change of household type, such as from 3-generation to spouse-only households or from spouse-only to living alone households or from children only to living alone households, it is of prime importance that the authors should look over the data to see whether there is any impact for those who have experienced a change of household composition during the study period.

Response: We assume that changes would take place in the elderly subjects’ households during the observation period. According to the standard analytical design of a prospective cohort study, we analyzed functional disability by adjusting for age or sex with the baseline household types. We did not include changes in the household composition during the observation period in our analysis.