

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Population aging and injurious falls among one million older people who used Emergency Medical Services from 2010 to 2017 in Beijing, China: a longitudinal observational study
AUTHORS	Zhao, Siyu; Cao, Yu; Lei, Yanni; Liu, Fangchao; Shao, Shiyu; Liu, Jue; Nie, Dongni; Yang, Nannan; Liu, Min

VERSION 1 - REVIEW

REVIEWER	Amal Wanigatunga Johns Hopkins Bloomberg School of Public Health
REVIEW RETURNED	05-Feb-2019

GENERAL COMMENTS	<p>General comments</p> <p>-Throughout the title and manuscript, please change “fall” to “falls” unless you are using the word for a singular format. Upon further review, it seems that there is a need for editing of English grammar errors (e.g., “The data of our study were the dispatch data from emergency medical center” where “center” should be “centers”). Though I completely understand English is more than likely the second language of the authors, a copy editor may be needed but this should not impact the acceptance of this paper if authors are able to correctly edit the manuscript.</p> <p>However, the authors present “rates of falls” but in fact the calculations presented are proportions of who have fallen (detailed more in my comments below). Also, there are numerous acronyms that are not defined upon first use (e.g., DALYs in the introduction) or the full phrase is used interchangeably with the acronym (e.g., EMS). I suggest replacing the phrase “degree of population aging and rate of fall” with “prevalence of falls in older adults using EMS” or something. The titles are not matching the content presented. Use sex instead of gender throughout all tables, figures, and manuscript. Lastly, the discussion is lacking tight discussion points on the results presented in this. I detailed my comments below.</p> <p>Title</p> <p>-It should be “falls”, not “fall”</p> <p>Abstract</p> <p>-Under the “measures” section, you are describing descriptive statistics, not measures. I suggest renaming this section “methods” and actually include how EMS data was extracted for your study.</p> <p>-What does “aOR” mean? I am guessing adjusted odds ratio but this needs to be defined for readers.</p> <p>-To me, you are misusing the term “population aging”. Population aging is how fast a community or population is aging. However, this is distinct from if a community tends to have more older adults or</p>
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	<p>not. For example, a “district” with a higher number of older adults may actually have slowed aging just because the mean age of that district is not increasing that high over time. Aging is a process and slowed or accelerated aging is a characteristic different from actual chronological age.</p> <p>-The conclusion is lacking; you are just rewording the results. What about this positive rate between EMS falls and older age can this provide for future research and intervention development?</p> <p>Strengths and limitations of this study</p> <p>-Remove “To our knowledge”. You already know this part.</p> <p>-Can you explicitly denote the limitations and strengths?</p> <p>Introduction</p> <p>-On page 4/line 19, “disability-adjusted life-year rank for falls” cannot “rise from 24 to 15”, it appears to be declining.</p> <p>-Choose one way to spell aging (or ageing).</p> <p>-The last sentence of the introduction, “dealing with ageing of population” seems negative. Reword to something positive like “enhancing care for older adults”.</p> <p>-Clearly state your hypothesis in the last paragraph.</p> <p>Methods</p> <p>-Your methods to quantify “population aging” are lacking. Please state how you estimated this over the years the data were collected.</p> <p>-The degrees seem to be three categories, correct? How were these categories created (e.g., tertiles)?</p> <p>-I think this entire section is a bit scattered and confusing. There needs to be a paragraph on study design and sample, a paragraph on fall assessment, and a paragraph on statistical approach.</p> <p>-You mention using multivariate logistic regression, do you mean multivariable? What are your covariates? This is not explicit.</p> <p>-There is no section on ethical conduct for this study.</p> <p>Results</p> <p>-Are the percents with 95% CI from statistical models? Are they adjusted and for what?</p> <p>-You state certain fall percentages rise and fall from 2010 to 2017 but did you actually test this with statistical modeling? If so, present the difference of percent and 95% CI from these models. Sometimes they are there and sometimes they are not.</p> <p>-A rate has time in the denominator. The percentages presented in this paper are the number who have fallen divided by total sample, correct? Therefore, you are not presenting any rates throughout the manuscript. These are proportional differences over a 7-year period. Please fix.</p> <p>-I am assuming aOR and cOR are adjusted and crude odds ratios, respectively. This needs to be clear to the readers. Also, when presenting the results, make sure in the first three paragraphs that crude or adjusted percentages are presented.</p> <p>Discussion</p> <p>-Again, aging is a process that everyone experiences no matter what age. You may mean to say that China's mean age is increasing with the proportion of older adults expanding.</p> <p>-I think some of the earlier points made in the discussion are a bit broad. To me, you should really hone in on why falls (based on EMS) differ or relate to other studies. Is the EMS system different in other countries, does EMS really capture falls well, how can EMS help prevent falls, etc.? I see what you are trying to do with by</p>
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	<p>saying older adults tend to fall more than other age groups and why that may be but it distracts from your paper's results. I do like the discussion about subgroup differences in falls over time. I would make recommendations into suggestions or future directions of science as recommendations cannot be developed from one study but from many.</p> <p>-I think you should rename falls to injurious falls. This increases the impact of your paper to me because falls that result in using EMS are probably the most detrimental to future health.</p> <p>Tables</p> <p>-In table 1, it is not clear what "accurate time is". Make sure the table can stand alone from the manuscript. Also, rename "gender" to "sex".</p> <p>-In table 2, remove "degree of population aging" in title. Is each below "overall" a statistical model? Are there covariates that need to be outlined in the table legend? Other than that, I think the table is very clean and easy to follow.</p> <p>-In table 3, it is not clear what "accurate time" means. Is this what time the fall event occurred during the day?</p> <p>-In additional table 1, the numbers in parentheses are not labeled. Also, if you are giving confidence intervals, please state how you are calculating them in the table legend. This goes for all tables.</p> <p>Figures</p> <p>-Figure 1 is clean and easy to understand, except for the percentages. They seem to be based off the previous box. It would be helpful to provide the calculation for the percentages to avoid confusion. For example, you provide the n and then in the parentheses, add numerator/denominator and percentage. Also, in your manuscript, your final sample is 987,190 not 82,694. Therefore anything below the former number should not be included as those boxes should be reported in the manuscript as results.</p> <p>-Figure 2 is very nice! As mentioned before, fix title to appropriately convey content of the figure.</p> <p>-Figure 3 is the only figure that seems to capture "population aging". There are typos (e.g., "o" instead of "of"), please fix. It is not clear what "overall" represents (60+?). Also everyone ages, whether you are 10 years or 50 years old. You should rephrase to older adult populations.</p>
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REVIEWER	Shan Liu Massachusetts General Hospital, USA
REVIEW RETURNED	18-Mar-2019

GENERAL COMMENTS	<p>My main concern is how does this study change current health care and EMS services? While interesting to note the epidemiology of EMS use for falls, my main questions was -- what now? What will the reader learn and take away from this that is applicable to future work -- how does the rest of the readership, those not in China, find something to take away from the study? I can see how it would be interesting for Chinese planners, but how can you make it apply to the rest of the world?</p> <ol style="list-style-type: none"> 1) Will EMS change? 2) Will you increase geriatric trained EMS? 3) Will they do home visits to look for safety issue? 4) Why do suburban areas have more falls, are the roads less safe?
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	<p>5) Who pays for EMS? Patients or government? Could differences in use be related to socioeconomic status? e.g. patients in suburban areas don't have cars so use EMS? or vice versa?</p> <p>Some specific thoughts</p> <p>1) Needs major English editing,</p> <p>2) Use raw numbers and percentages in abstract</p> <p>3) Intro – somewhat long, could minimize some of the population growth stats</p> <p>4)How will this over all improve fall prevention?</p> <p>5) Why did you do the analysis the way you did in terms of districts and times...one should have a sense of your analysis at the end of the intro and you should justify why you looked at those variable. \</p> <p>6) The last sentence of intro needs clarification—vague, how will this specific study add to literature</p> <p>7) Discussion, page 9 line 42- p10 line 6 should be rearranged. Typically first line of discussion should be your findings.</p> <p>8) what are some other explanations for your results?Are there more calls because more falls? More traffic and EMS makes it easier to get there, SES increased and people have insurance?</p> <p>9) extensive english editing needed</p> <p>Overall, obviously paper has large numbers but needs to make it interesting to the international reader.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name: Amal Wanigatunga

Institution and Country: Johns Hopkins Bloomberg School of Public Health

Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below

General comments

-Throughout the title and manuscript, please change “fall” to “falls” unless you are using the word for a singular format. Upon further review, it seems that be a need for editing of English grammar errors (e.g., “The data of our study were the dispatch data from emergency medical center” where “center” should be “centers”). Though I completely understand English is more than likely the second language of the authors, a copy editor may be needed but this should not impact the acceptance of this paper if authors are able correctly edit the manuscript.

Reply:

Thanks for your carefully helping me correct my grammatical errors. We have rechecked the whole article and revised “fall” into “falls”. The word “center” in our article was used in “Beijing Emergency Medical Center”, and “Beijing Emergency Medical Center” is the dispatch and command center of prehospital emergency medical services of Beijing. It is the centers name, so should not be used as a plural form.

However, the authors present “rates of falls” but in fact the calculations presented are proportions of who have fallen (detailed more in my comments below). Also, there are numerous acronyms that are not defined upon first use (e.g., DALYs in the introduction) or the full phrase is used interchangeably with the acronym (e.g., EMS). I suggest replacing the phrase “degree of population aging and rate of

fall" with "prevalence of falls in older adults using EMS" or something. The titles are not matching the content presented. Use sex instead of gender throughout all tables, figures, and manuscript. Lastly, the discussion is lacking tight discussion points on the results presented in this. I detailed my comments below.

Reply:

Thanks for correcting our mistakes. We misused "rate" here. What we intended to say was proportion of falls among older people using EMS. We have revised all the "rate of fall" in our article into "proportion of falls".

We did not give the definition when using abbreviations. We have revised "DALYs" into "Disability Adjusted of Life Years (DALYs)" when it first appeared in the introduction, and revised others into DALYs. Also, we have revised "EMS" into "Emergency Medical Services (EMS)" when it first in the abstract and in the introduction, and revised others into "EMS".

We misused "population aging" because of wrong understanding of the word. We have revised "degree of population aging" in the title into "proportion of older population".

We have revised all the "gender" in our article into "sex".

Title

-It should be "falls", not "fall"

Reply:

Thanks for correcting our mistakes. We have rechecked the whole article and revised "fall" into "falls".

Abstract

-Under the "measures" section, you are describing descriptive statistics, not measures. I suggest renaming this section "methods" and actually include how EMS data was extracted for your study.

Reply:

Thanks for pointing that out. The title "measures" and the content were inconsistent. We have replaced "measures" with "methods", and added how the data was extracted: Data were from emergency dispatch database of Beijing Emergency Medical Center.

-What does "aOR" mean? I am guessing adjusted odds ratio but this needs to be defined for readers.

Reply:

Thanks for pointing that out. We didn't indicate the meaning when using abbreviation because of carelessness. "aOR" in our article means "adjusted odds ratio". We have added an explanation in the statistical analyses part that "Crude odds ratios (cORs) and adjusted odds ratios (aORs) with 95% CIs were used to quantify effect size".

-To me, you are misusing the term "population aging". Population aging is how fast a community or population is aging. However, this is distinct from if a community tends to have more older adults or

not. For example, a “district” with a higher number of older adults may actually have slowed aging just because the mean age of that district is not increasing that high over time. Aging is a process and slowed or accelerated aging is a characteristic different from actual chronological age.

Reply:

Thanks for correcting our mistakes. We made a mistake with the concept of “population aging”. We have replaced “population aging” with “proportion of older population”. As for the grouping of regions, we also removed the usage of “degree of aging”, and replaced it with “proportion of older population”.

-The conclusion is lacking; you are just rewording the results. What about this positive rate between EMS falls and older age can this provide for future research and intervention development?

Reply:

Thanks for pointing that out. We only reworded our results in the conclusion, and didn’t explain the significance of our study. We have added that “taking care of older people and preventing falls among them, especially among those with higher age, should be one of the key issues to be handled in aging society.”

Strengths and limitations of this study

-Remove “To our knowledge”. You already know this part.

Reply:

Thanks for correcting our mistakes. We have removed “to our knowledge” in this part.

-Can you explicitly denote the limitations and strengths?

Reply:

Thanks for your reminding. We have revised the strengths and limitations into four points:

- It was a long-term study of injurious falls among older people using EMS in a metropolis with the largest sample size till now.
- Our study was the first to study the correlation between proportion of older population and injurious falls among older people, which was of great value to enhancing care for older adults in metropolises.
- Some people use taxis or private cars instead of calling for an emergency ambulance in an emergency, so that could not be calculated in our study.
- Our study were not able to identify and specifically describe those who used EMS for more than one time during the study period.

Introduction

-On page 4/line 19, “disability-adjusted life-year rank for falls” cannot “rise from 24 to 15”, it appears to be declining.

Reply:

Thanks for correcting our mistakes. We use wrong verb here. We have revised “risen” into “declined”.

-Choose one way to spell aging (or ageing).

Reply:

Thanks for pointing that out. Some words were not canonical in our manuscript. We have revised all the “ageing” into “aging” in our manuscript, except those in the references part.

-The last sentence of the introduction, “dealing with ageing of population” seems negative. Reword to something positive like “enhancing care for older adults”.

Reply:

Thanks for correcting our mistakes. We used inappropriate expressions here. We have revised “dealing with ageing of population” in the abstract, introduction and discussion into “enhancing care for older adults”.

-Clearly state your hypothesis in the last paragraph.

Reply:

Thanks for correcting our mistakes. We did not clarify our specific hypothesis. We have delated “this study aimed to explore the epidemiological characteristics of older people using Emergency Medical Service (EMS) due to fall in the past eight years, and to analyze association between population aging and falls among older people” in introduction and added “this study aimed to explore the epidemiological characteristics of older people using EMS due to falls in the past eight years in terms of month, time during a day, sex, age, region, and to analyze if prevalence of falls in older adults was correlated with proportion of older population” to state the hypothesis.

Methods

-Your methods to quantify “population aging” are lacking. Please state how you estimated this over the years the data were collected.

Reply:

Thanks for correcting our mistakes. Here we misused “population aging”. The grouping of regions in our study was according to the proportion of older population in each region. We have deleted “to estimate the degree of population aging of dwelling environment for the participants, we used proportion of older population in each year” in the methods part.

-The degrees seem to be three categories, correct? How were these categories created (e.g., tertiles)?

Reply:

The three categories of the proportion of older population was determined by the upper and lower limits throughout the eight years. The class interval was one third of the interval between the upper and lower limits. We have revised our grouping methods into “the proportion of older population in each district every year was categorized as three groups according to the maximum (29.2%) and the minimum (15.8%): low proportion of older population (15.0% - 19.9%), medium proportion of older population (20.0% - 24.9%) and high proportion of older population (25.0% - 30.0%). The group interval was equal to one third of the difference between the upper limit (30.0%) and the lower limit (15.0%).”

-I think this entire section is a bit scattered and confusing. There needs to be a paragraph on study design and sample, a paragraph on fall assessment, and a paragraph on statistical approach.

Reply:

Thanks for pointing that out. The structure of the methods part was not clear enough. We have rearranged the structure of this part. Now, the methods part includes four parts: “study design and sample”, “data collection”, “measures” and “statistical analyses”. And, the “measures” part includes two parts: “injurious falls” and “socio-demographic factors”. The “injurious falls” part explains the assessment of falls, and the “socio-demographic factors” part explains the grouping of other socio-demographic factors.

-You mention using multivariate logistic regression, do you mean multivariable? What are your covariates? This is not explicit.

Reply:

Yes, we mean multivariable logistic regression models here. We have revised “univariate and multivariate logistic regression methods” into “univariable and multivariable logistic regression models”. The variables in this study: month, time during a day, sex, age, region, proportion of older population, after dividing into groups, were all included in the multivariable logistic regression model as independent variables. We have revised our manuscript into “univariable and multivariable logistic regression models were used to analyze determinants related to proportion of falls. Month, time during a day, sex, age, region, and proportion of older population were all included in the multivariable logistic regression model as independent variables.”

-There is no section on ethical conduct for this study.

Reply:

Thanks for pointing that out. We have added ethical considerations in the methods part: the study was approved by Beijing Municipal Commission of Health and Family Planning. The study used information that is available in the emergency dispatch database of Beijing Emergency Medical Center, and all identifiable information was removed.

Results

-Are the percents with 95% CI from statistical models? Are they adjusted and for what?

Reply:

The percentages and 95% CI in our study were calculated by normal distribution method. We have stated in the statistical analyses that “percentages with 95% CI were unadjusted and were calculated by normal distribution method”. We have also stated it in the legends of table 2, table 3, additional table 1, additional table 2 and additional table 3.

-You state certain fall percentages rise and fall from 2010 to 2017 but did you actually test this with statistical modeling? If so, present the difference of percent and 95% CI from these models. Sometimes they are there and sometimes they are not.

Reply:

The upward and downward trends of proportion of falls were evaluated by linear trend chi-square test. We have stated in the statistical analyses that “the analyses of trends of the proportion of falls from 2010 to 2017 were evaluated both overall and for participants in urban and suburban regions separately using percentage, 95% CI and linear trend chi-square test.” The 95% CI were unadjusted and were calculated by normal distribution method.

-A rate has time in the denominator. The percentages presented in this paper are the number who have fallen divided by total sample, correct? Therefore, you are not presenting any rates throughout the manuscript. These are proportional differences over a 7-year period. Please fix.

Reply:

Thanks for correcting our mistakes. We misused “rate” in our manuscript. Now we have revised all the “rate of fall” in our manuscript into “proportion of falls”.

-I am assuming aOR and cOR are adjusted and crude odds ratios, respectively. This needs to be clear to the readers. Also, when presenting the results, make sure in the first three paragraphs that crude or adjusted percentages are presented.

Reply:

Thanks for pointing that out. The “cOR” in our manuscript was “crude odds ratio”, and the “aOR” was “adjusted odds ratio”. We have added in the statistical analyses that “crude odds ratios (cORs) and adjusted odds ratios (aORs) with 95% CIs were used to quantify effect size.” The data we used in this study was not a sample. So, we think it is better not to adjust it, and only calculated the crude percentages. We have stated in the methods that “percentages with 95% CI were unadjusted and were calculated by normal distribution method”.

Discussion

-Again, aging is a process that everyone experiences no matter what age. You may mean to say that China’s mean age is increasing with the proportion of older adults expanding.

Reply:

Thanks for correcting our mistakes. We misunderstood the concept of “aging”. We have revised the misusing of “population aging” in the discussion into “proportion of older population”.

-I think some of the earlier points made in the discussion are a bit broad. To me, you should really hone in on why falls (based on EMS) differ or relate to other studies. Is the EMS system different in other countries, does EMS really capture falls well, how can EMS help prevent falls, etc.? I see what you are trying to do with by saying older adults tend to fall more than other age groups and why that may be but it distracts from your paper’s results. I do like the discussion about subgroup differences in falls over time. I would make recommendations into suggestions or future directions of science as recommendations cannot be developed from one study but from many.

Reply:

Thanks for carefully helping us revise the discussion. The structure of our discussion was unclear, and lacked some necessary contents. We have rewritten the first paragraph of our discussion and changed it into: “Our study found that the overall proportion of falls among older people in Beijing was 8.38%, and the proportion of falls increased with years during the eight years. A previous study among people aged 70 years or older who presented to Vancouver General Hospital Emergency Department in 2008 found that among all the older visits, 19% were fall-related.² The proportion of falls in our study is lower than results of the study in Vancouver, maybe due to differences in family structures and or because of the differences in the prevalence of other diseases between the two countries. A previous study in 2013 based on a community questionnaire in China indicated that the overall prevalence of falls among people aged 60 or above in the previous six months was 8.0%.¹⁴ And the prevalence of falls among community-dwelling older people in Beijing and Shanghai had been increasing with years.⁸ In our study, we found the same rising trend. EMS in China’s megacities like Beijing is the most widespread and affordable emergency medical service for residents, and plays

a very important role in the timely treatment and care of older people. Sometimes it is even the only available health resources. Thus, it is a good indicator of older people's injuries which require medical assistance. However, to our knowledge, there are no researches on the proportion of falls among people using EMS based on Chinese population." At the end of the discussion, we added our suggestions for future studies: "moreover, more studies focused on geriatric emergency medical assistance and injury prevention should be conducted, especially for those developing countries which were becoming or have already turned into aged societies."

-I think you should rename falls to injurious falls. This increases the impact of your paper to me because falls that result in using EMS are probably the most detrimental to future health.

Reply:

Thanks for your valuable suggestion. Falls in our study were those leading to using EMS, so were all injurious falls. It is more precise to use "injurious falls" in our manuscript, and this kind of expression makes our study more significant. We have revised "falls" in our manuscript into "injurious fall", including the article title.

Tables

-In table 1, it is not clear what "accurate time is". Make sure the table can stand alone from the manuscript. Also, rename "gender" to "sex".

Reply:

Thanks for correcting our mistakes. The time in our study was the time when the emergency medical center received the call. We have revised "month" in table 1 into "month of the call", and revised "accurate time" in table 1 into "time of the call during a day". Time in other parts of our article have also been revised like this.

We have revised "gender" into "sex" in our manuscript.

-In table 2, remove "degree of population aging" in title. Is each below "overall" a statistical model? Are there covariates that need to be outlined in the table legend? Other than that, I think the table is very clean and easy to follow.

Reply:

Thanks for correcting our mistakes. We misused "aging" here. We have revised "degree of population aging" in the title of table 2 into "proportion of older population".

The overall proportion of falls was the ratio of number of falls and number of people using EMS, respectively in urban and suburban regions. The value was not standardized and there were no covariates. Because the data we used were not a sample, but were the whole group. So, we thought it is better not to do standardization. The calculation of overall proportion of older population was same to it, with no standardization. We have stated in the legend that "Percentages with 95% CI were unadjusted and were calculated by normal distribution method."

-In table 3, it is not clear what "accurate time" means. Is this what time the fall event occurred during the day?

Reply:

The time in our study was the time when the emergency medical center received the call. We have revised “month” in table 3 into “month of the call”, and revised “accurate time” in table 3 into “time of the call during a day”. Time in other parts of our article have also been revised like this.

-In additional table 1, the numbers in parentheses are not labeled. Also, if you are giving confidence intervals, please state how you are calculating them in the table legend. This goes for all tables.

Reply:

Thanks for correcting our mistakes. We didn't write the label of 95% CI out of carelessness. We have revised the label “Rate of fall (%)” in additional table 1 into “Proportion of falls (%) (95% CI)”.

The percentages and 95% CI in our study were calculated by normal distribution method. We have stated in the statistical analyses that “percentages with 95% CI were unadjusted and were calculated by normal distribution method”. We have also stated it in the legends of table 2, table 3, additional table 1, additional table 2 and additional table 3.

Figures

-Figure 1 is clean and easy to understand, except for the percentages. They seem to be based off the previous box. It would be helpful to provide the calculation for the percentages to avoid confusion. For example, you provide the n and then in the parentheses, add numerator/denominator and percentage. Also, in your manuscript, your final sample is 987,190 not 82,694. Therefore anything below the former number should not be included as those boxes should be reported in the manuscript as results.

Reply:

Thanks for correcting our mistakes. Figure 1 did not clearly explain the calculation method of percentages. We have repainted figure1, and added “ $(1\ 528\ 938 / 2\ 516\ 128 = 60.77\%)$ ” and “ $(987\ 190 / 2\ 516\ 128 = 39.23\%)$ ” to proper places.

The objects of our study were the 987 190 older people who used Beijing EMS from 2010 to 2017. The processes below were actually the classification method of falls. We drawn these in figure 1 because of inconsiderateness. We have deleted these processes from figure 1, and added in the measures that “patients were determined as using EMS due to falls if falls were mentioned in the call reasons. We excluded reexaminations for a fall-related injury, fall histories and falls related to suicide.”

-Figure 2 is very nice! As mentioned before, fix title to appropriately convey content of the figure.

Reply:

Thanks for correcting our mistakes. We have revised “degree of population aging” in the title of figure 2 into “proportion of older population”.

-Figure 3 is the only figure that seems to capture “population aging”. There are typos (e.g., “o” instead of “of”), please fix. It is not clear what “overall” represents (60+?). Also everyone ages, whether you are 10 years or 50 years old. You should rephrase to older adult populations.

Reply:

Thanks for carefully correcting our mistakes. The mistake of “of” was caused by our carelessness. We have revised it in figure 3.

The “overall” was not clearly expressed. We meant the proportion of falls among all the older people using EMS, respectively in urban and suburban regions. In [A], it represented all the age groups. In [B], it represented all the sex groups. We have revised “overall” into “overall proportion of falls” in figure 3.

The word “aging” was misused here. We have revised “population aging” into “proportion of older population” in figure 3.

Reviewer: 2

Reviewer Name: Shan Liu

Institution and Country: Massachusetts General Hospital, USA

Please state any competing interests or state ‘None declared’: None

Please leave your comments for the authors below

Thank you for submitting this work on falls. I think falls are very important and of increasing concern in aging populations.

My main concern is how does this study change current health care and EMS services? While interesting to note the epidemiology of EMS use for falls, my main questions was -- what now? What will the reader learn and take away from this that is applicable to future work -- how does the rest of the readership, those not in China, find something to take away from the study? I can see how it would be interesting for Chinese planners, but how can you make it apply to the rest of the world?

Reply:

For Beijing, our study can be a direct reference for improving the dispatch command system of prehospital emergency medical services in Beijing. It provides theoretical basis for rationally allocating prehospital emergency medical resources according to the time characteristics of falls, improving prehospital emergency services in Beijing, and enhancing care for older adults. For all the older people, not only those in China, the results of our study showed that women and older people with advanced age were at higher risk of falls. Therefore, in the prevention of falls among older people, more attention should be paid to women and those with higher age. Our study also found that the time of falls among older people was closely related to their daily activities, and we revealed the time and activities which should be paid special attention to. Finally, our study was the first to prove there were correlations between the proportion of older people and falls among them, and emphasized that for all the aging societies, not only China, the care and fall prevention of older people were crucial to achieve a healthy and active aging.

1) Will EMS change?

Reply:

Yes. Now, EMS in Beijing is composed of Beijing Emergency Medical Center, sub-centers in outlying districts, and emergency medical stations. This huge system undertakes the prehospital emergency medical tasks of the whole city. Beijing Emergency Medical Center Command and Dispatch Center is in charge of commands, dispatches and information management of the system. Recent years, government of Beijing has issued a series of policies to continuously integrate and improve the prehospital emergency medical system and the dispatch command system, in order to provide better services for residents of Beijing.

2) Will you increase geriatric trained EMS?

Reply:

Yes. According to the researches based on the prehospital emergency medical data, Beijing Emergency Medical Center is constantly optimizing the prehospital emergency dispatch command system, and at the same time, it is equipped the vehicles with appropriate equipment and professional personnel according to the dispatch command system, including sending medical staff familiar with geriatrics for some older patients and bringing equipment for carrying older people.

3) Will they do home visits to look for safety issue?

Reply:

Yes. Now, many communities in Beijing are trying to improve safety by providing multiple services to older people based on communities and institutions. The services included providing meals for older people, installing emergency medical rescue callers for pure older families in urban regions, and opening spiritual care hotlines for older people. These kinds of services are playing a role in preventing older people from falling and helping them get emergency medical assistance in time after falling.

4) Why do suburban areas have more falls, are the roads less safe?

Reply:

Our study found that the proportion of falls in suburban regions has grown rapidly. We explained that in the discussion that “compared to urban regions, suburban regions have witnessed great changes in economic structure in the past decade. The proportion of agriculture in GDP has been decreasing and young adults have tended not to living in a big family with their old parents any more. These might lead to a faster increase of the proportion of falls in suburban regions.” In the discussion, we focused on the impact of social and economic development on suburban family structures which led to the rapid rise in the proportion of falls in suburban regions. At the same time, social and economic development also has important impacts on the road conditions of suburb regions. On the one hand, the road quality and infrastructure construction are of better quality, which may reduce the occurrence of falls. On the other hand, the increase of traffic and constructions makes road conditions more complex and changeable, which may increase the risk factors of falls. Due to the limitations of our data, in this study, we could not analyze and discuss the relationship between road conditions and falls among older people in detail. We have added some explanations in the third paragraph of the discussion that besides, rapid development of road construction and traffic also have complicated impact on residents' health and safety in both urban and suburban regions, and may lead to changes in prevalence of falls among older people.²⁶ This should be studied in future researches.”

5) Who pays for EMS? Patients or government? Could differences in use be related to socioeconomic status? e.g. patients in suburban areas don't have cars so use EMS? or vice versa?

Reply:

The costs of EMS are paid by both the patients and the government, and the government is affording quite a large part of it. There are differences in traffic conditions, prehospital emergency medical resources and residents' economic level between urban and suburban regions, but due to the data's limitations, our study could not analyze and discuss the impact of other socio-economic factors on falls in EMS. We have given some explanations in the limitations of our manuscript that “firstly, some people use taxis or private cars instead of calling for an emergency ambulance in an emergency, so that could not be calculated in our study.” The main variable we looked into in our study was the

proportion of falls among older people using EMS, so we think the impact of different traffic and EMS accessibility on our analysis may be limited.

Some specific thoughts

- 1) Needs major English editing,
- 2) Use raw numbers and percentages in abstract

Reply:

Thanks for carefully correcting our mistakes. We have rewritten the abstract and included both raw numbers and percentages of the results.

- 3) Intro – somewhat long, could minimize some of the population growth stats

Reply:

Thanks for helping revise our introduction. The introduction about the severity of China's ageing is long-winded. We have deleted some less important contents like “the pace of population aging is much faster in China than many other high-income or low- and middle-income countries⁶” and “from 2010 to 2017, the proportion of population over 60 years old in China has increased from 13.3% to 17.3%.⁹ Older people will make up an increasingly larger proportion of the population in the future.” And we revised “moreover, as the capital of China, Beijing is an extremely large city with a population of 20 million. The degree of population aging and infrastructure construction such as roads in urban and suburban regions are different from each other” into “moreover, the degree of population aging and infrastructure construction such as roads in urban and suburban regions of Beijing are quite different from each other.”

- 4) How will this overall improve fall prevention?

Reply:

The results of our study revealed that women and older people with advanced age were at higher risk of injurious falls. Therefore, in the prevention of falls, special attention should be paid to the falls of women and older people with advanced age. Our study also found that the time of falls was closely related to older people's daily activities, and the results pointed out the times and activities that should be paid more attention to in the prevention of falls. Finally, our study is the first to demonstrate the relationship between the proportion of older population and falls among older people. It highlighted the importance of care and fall prevention for older people in all aging societies, not just in China.

- 5) Why did you do the analysis the way you did in terms of districts and times...one should have a sense of your analysis at the end of the intro and you should justify why you looked at those variables.

Reply:

Thanks for pointing that out. We did not clearly explain why we looked into these variables and analyzed in terms of time and regions. We have revised the introduction and changed “the degree of population aging and infrastructure construction such as roads in urban and suburban regions are different from each other. Therefore, it is necessary to look into the current situation, trends and differences between urban and suburban regions about the use of emergency medical services due to falls among older people, so as to enhance the ability of emergency medical services in Beijing” into “moreover, previous studies have indicated that prevalence of falls among older people changed over time and living environment,^{12,13} and the degree of population aging and infrastructure construction such as roads in urban and suburban regions of Beijing are quite different from each other. Therefore, it is necessary to look into the current situation, trends and differences among different time and

regions about the use of EMS due to injurious falls among older people, so as to enhance the ability of EMS in Beijing.”

6) The last sentence of intro needs clarification—vague, how will this specific study add to literature

Reply:

Thanks for correcting our mistakes. We have revised the last sentence “we sought to provide the basis for prevention and timely treatment of falls among older people, enhancing the level of emergency medical services, and dealing with ageing of population.” of introduction into “the results of this study would fill the blank of literatures on injurious falls among older people in Chinese EMS, arouse the attention to injurious falls among older people in aged society, and provide the basis for prevention and timely treatment of injurious falls among older people, enhancing the level of EMS, and enhancing care for older adults”.

7) Discussion, page 9 line 42- p10 line 6 should be rearranged. Typically first line of discussion should be your findings.

Reply:

Thanks for pointing out our deficiencies in the discussion. The first paragraph of our discussion was confusing and lacked some necessary content. We have rearranged the structure and content of first paragraph. It was revised as follows: our study found that the overall proportion of falls among older people in Beijing was 8.38%, and the proportion of falls increased with years during the eight years. A previous study among people aged 70 years or older who presented to Vancouver General Hospital Emergency Department in 2008 found that among all the older visits, 19% were fall-related.² The proportion of falls in our study is lower than results of the study in Vancouver, maybe due to differences in family structures and or because of the differences in the prevalence of other diseases between the two countries. A previous study in 2013 based on a community questionnaire in China indicated that the overall prevalence of falls among people aged 60 or above in the previous six months was 8.0%.¹⁴ And the prevalence of falls among community-dwelling older people in Beijing and Shanghai had been increasing with years.⁸ In our study, we found the same rising trend. EMS in China's megacities like Beijing is the most widespread and affordable emergency medical service for residents, and plays a very important role in the timely treatment and care of older people. Sometimes it is even the only available health resources. Thus, it is a good indicator of older people's injuries which require medical assistance. However, to our knowledge, there are no researches on the proportion of falls among people using EMS based on Chinese population.

8) what are some other explanations for your results? Are there more calls because more falls? More traffic and EMS makes it easier to get there, SES increased and people have insurance?

Reply:

The increasingly convenient transportation and abundant prehospital emergency medical resources have indeed increased the accessibility of EMS to urban and suburban residents, and the number of people using EMS for various diseases is rising. However, the main variable of our study is the proportion of falls among older people who used EMS, so we think the influence of the improvement of traffic and EMS accessibility on our main variable may be limited. We have also give some explanations in the limitations of our manuscript that “firstly, some people use taxis or private cars instead of calling for an emergency ambulance in an emergency, so that could not be calculated in our study.”

9) extensive english editing needed

Reply:

Thanks for your reminding. We have examined our manuscript and corrected several language errors.

Overall, obviously paper has large numbers but needs to make it interesting to the international reader.

VERSION 2 – REVIEW

REVIEWER	Amal Wanigatunga Johns Hopkins Bloomberg School of Public Health
REVIEW RETURNED	09-Apr-2019

GENERAL COMMENTS	I think the paper reads much better! The authors addressed my comments. However, there are still some (but not as many) grammatical errors that the authors should correct before final acceptance (e.g., In the abstract, "Among the 987 190 participants, 82 694 using EMS due to injurious falls, with a proportion of 8.38%." should be "82,694 who used EMS fell" or the use of "researches" where it should be "research".
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VERSION 2 – AUTHOR RESPONSE

Reviewer: 1

- I think the paper reads much better! The authors addressed my comments. However, there are still some (but not as many) grammatical errors that the authors should correct before final acceptance (e.g., In the abstract, "Among the 987 190 participants, 82 694 using EMS due to injurious falls, with a proportion of 8.38%." should be "82,694 who used EMS fell" or the use of "researches" where it should be "research".

Reply:

Thanks a lot for carefully helping point out our mistakes. According to your reminding, We have revised "Among the 987 190 participants, 82 694 using EMS due to injurious falls, with a proportion of 8.38%." to "Among the 987 190 participants who used EMS, 82 694 fell, with a proportion of 8.38%." both in abstract and in results. We have also revised all the "researches" to "research" in our manuscript. Moreover, we examined our manuscript again and asked some professionals to help fix language errors.