Author's response to reviews

Title: Measurement and explanation of socioeconomic inequality in catastrophic health care expenditure: evidence from the rural areas of Shaanxi Province

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Author's response to reviews: see over
Dear Editors and Reviewers:

We are very grateful to both reviewers’ constructive comments and their appreciation of our paper titled “Measurement and explanation of socioeconomic inequality in catastrophic health care expenditure: evidence from rural area of Shaanxi Province” (ID: 8590133731405900). We tried our best to improve the manuscript and made some changes in the manuscript. Revised portion are marked in red in revised manuscript. Our responses are detailed below, following each original comment cited in red italics.

Response to Reviewer: Tin Tin TTS Su

A well written paper and it focused on financial protection which is important issue in order to reach universal health coverage.

Introduction: introduction is quite lengthy. It should be shortened and the authors should highlight the novelty of this research and how this manuscript could add a new body of knowledge to international readers. Moreover the write up from line 99 to 110 suits better to method.

We have rewritten introduction section as reviewer suggested. In brief, we have shorten the introduction by only introduced the most relevant social medical insurance scheme of the sample region and highlighted the novelty of this paper that this study further investigate the change of income-related inequality in CHE in western China along with the recent health insurance reform. The results of this paper will shed lights on policy suggestions regarding how to reduce the incidence of CHE and its inequality in developing countries.

There are already several publication on catastrophic health expenditure (CHE) and it’s determinants and it seems all determinants of CHE are well known such as low income people has more prone to CHE and there is socio-economic inequality in CHE incidence.

Previous studies mostly focused on CHE and its determinants based upon one-wave cross-sectional survey data. This paper is conducted by using two-wave large-scale cross-sectional representative household survey data that collected along with China’s major health reform. This study further compares the change of income-related inequality in CHE, and analyses the contributions of determinants to socioeconomic inequality in 2013. The results will provide helpful policy implication for the current health reform in rural western China (line111 to 123).
Methods

Study design

Comparison of two cross-section survey would be more suitable term rather than retrospective study.

We agreed with the reviewer and have revised this in the paper (line 126).

Data collection

The detailed write up of method section focused mainly on statistical analysis.

However following information are still missing

1) What is the recall period of reporting health expenditure?

The recall period is the one year prior the survey. We have added more detailed information regarding this survey in the revised manuscript (line157).

2) Only one round of data collection can get proper estimate of one year healthcare expenditure?

We understand reviewer’s worry and agreed that there could be recall bias in this variable. However, in the large scale household survey this is a widely used approach to estimate annual household health expenditure. The NHSS questionnaire which was developed by Center for Health Statistics and Information of the Chinese Ministry of Health was used for data collection in our study. Interesting readers could refer to the Analysis Report of National Health Services Survey in China for more details. In brief, after well-trained local health workers completed the household interviews, considerable quality assurance measures were implemented during the data collection. Survey supervisors revisited 5% of the sampled households to check the accuracy of data recorded by interviewers. In this process, 14 key questions were asked again to check the consistency of the information recorded. The consistency rates of the key questions recorded between the first and second visits was over 95%.

3) Health care expenditure collected is only for hospitalization or outpatient treatment?

Health care expenditure collected in our survey included all types of out-of-pocket health–related expenses a household actual paid in the past year. Therefore, both inpatient and outpatient are included. We have made it clear in the revised manuscript.

4) Is it only for western health care facilities or complementary and traditional medicine which is still very popular for China?
Health care expenditure collected in our survey included all types of out-of-pocket health–related expenses a household actually paid in the past year. Therefore, both western and traditional medicines are covered. Unfortunately, we can’t tell from our data whether majority of participants purchased western or traditional medicine.

5) Brief explanation on household survey questionnaire?

Thank you for this suggestion. We have now introduced the household survey questionnaire in detail in the revised manuscript (line149 to 157).

6) How representative the selected sample to the study population since the sampled household for 2013 is four times more than the sample in 2008?

Although the sampled households in 2013 was four times more than sampled population in 2008, sampled households in both years can represent the demographic and socio-economic characteristic of the population in Shaanxi Province. The quality of the data collected from the household health interview surveys is on the whole satisfactory in terms of representativeness of the sample and reliability of the data. The structure of the population sampled in the two surveys conducted in 2008 and 2013 was very similar to that of the population data derived from the population census in 2010. Triangulation with data from the routine health information system found that estimations of health facility use at a certain level, such as the township level, by the household survey were comparable with estimations of use at the same level by routine data. This finding, together with other tests (mentioned in detail in revised manuscript), has convinced us that the study population sampled was representative.

7) Whether indirect medical cost such as food, and transport were included in data collection and data analysis

In the data collection, nine questions were preselected in the questionnaire to ask total annual household consumption and various aspects of household expenditure (such as food, clothe, transport and communication, housing, education, culture and entertainment, health, others). For the calculation of incidence of CHE, out-of-pocket health expenditure and food expenditure were included (line 180 to 190).

8) Is it reported income reliable or not?

Self-reported income is an easy approach to measure the economic status of a household.
However, the use of self-reported income for measurement of economic status is widely regarded to be problematic. In the literature it is suggested that in developing countries, household expenditure is a better proxy of household resource available for spending than income reported in household survey, whereas self-reported income is more likely to be under-reported. Therefore, self-reported household expenditure rather than self-reported income was used to measure household economic status in our study (line 244-248).

Result

Descriptive analysis on break down of health care expenditure according to outpatients versus inpatients and reimbursement versus OOP would be useful.

Thank you for this suggestion. We agree with you that it would be meaningful to present more detailed health care expenditure in the analysis; however, such information is unavailable. We have only collected annual total household OOP health expenditure in the NHSS.

Number of households which included in the data analysis should be reported in each and every table.

We have now added the number of household information in relevant tables.

Table 2. I would suggest re-categorizing two variables as presence of social health insurance and presence of commercial health insurance. It would be easier for the readers to follow and it is not difficult to interpret the odd ratio.

Since the main purpose of our study is to understand the risk of incurring CHE without health insurance, we prefer not to change these two dummy variables. Similar strategy has also been used elsewhere, such as Zahra Kavosi (2012) and Paul (1998).

What is the definition of “chronic disease”?

In our study “having chronic disease member(s)” refers to whether these was household member(s) had doctor-diagnosed chronic disease, which is based on the question “Have you ever been told by a doctor that you have chronic disease in the past six months” (line 237 to 238).

Table 3. It seems the results of the table three are from logistic regression or binary logit model. The authors need to report about the model such as R² value and assessment/diagnostic test for this model.
We did not report the Pseudo $R^2$ in logit model in our original manuscript since it is different from the traditional $R^2$ usually reported in OLS model. We have now added the Pseudo $R^2$ and other assessment/diagnostic test in Table 3.

Reference

Proper reference style is needed for example ref. no 4,5 and 11

*We have corrected the reference style as reviewer suggested.*

Response to Reviewer: Paul Marschall

Major Compulsory Revisions 1.

Abstract

a. Background

Estimation of the change in household catastrophic care expenditures (line 37): The reader gets the impression, that within the paper the expenditure change is analysed for each household. This is not true, because effects are only analysed on an aggregated level. You should also consider this point in the introduction and methods’ section

*Thank you for this suggestion. We have revised the relevant content in the revised manuscript.*

b. Methods

i. Include information about the included regression

*We have enriched the relevant information as reviewer suggested (line 49 to 50).*

c. Results

i. It is unclear if “inequality” only refers to CHE

*We have made it clear in the abstract (line 53).*

d. Conclusion

i. China is a large country. Your analyses concentrate on Shaanxi Province. It would me more appropriate if you could compare the situation in Shaanxi to the rest of the country (lines 52-53) – also consider that in the paper!

*We have enriched the comparison in the revised manuscript as reviewer suggested.*

2. Introduction

a. Per capita income (line 65): Even if “per capita income is far behind the eastern areas of China” it can be expected that the PPP in rural areas is quite different compared to more prosperous
regions.

We agree with reviewer that China is a large country with uneven development stages. The PPP in rural areas could be different from urban areas, however, such PPP data is unavailable. Generally speaking, China can be categorized into three economic areas: eastern area, central area and western area. The economic status in western area of China is the least developed region in three areas judged by per capita Gross Regional Product (Chen et al., 2014).

b. Concentration index (line 101): Provide some further background information about that concept in your paper

We have enriched the relevant introduction in the revised manuscript as reviewer suggested (line 192 to 196).

3. Methods:

a. Study design:

i. You should introduce the study area in more detail

We have enriched the relevant introduction in the revised manuscript as reviewer suggested (line 132 to 136).

ii. Give some information about the variables you used and what kind of information they covered.

We have added a separated variable section to introduce more details on the NHSS data (line 229-248).

iii. Please state if there are any methodological changes at the survey level between both data collections (2008 & 2013)

There are no major methodological changes between two-wave data collection. In both waves, a four-stage, stratified, random sampling method has been adopted. In brief, the first stage sampled counties/districts, the second townships/streets; the third stage randomly sampled two villages (rural areas) or residents’ committees (urban areas) in each township or street. The last stage randomly sampled households in selected villages/residents’ committees (line 138 to 144).

iv. Provide some background information about how OOPs were covered in the survey

The OOP expenditure include all types of direct household health-related expenses, primarily
for the purchase of medications (including self-medication), payments for outpatient and/or inpatient care, preventive care, maternal and child health services. One question was preselected in the NHSS questionnaire to ask household out of pocket payment health expenditure, which came from the question “How much did your household actual pay (deducting reimbursement from health insurance schemes and other subsidies) for seeking health care in the last year” (line 186 to 189).

b. Statistical health care expenditure

i. Non-subsistence expenditure/ total household expenditure: It is not clear, if all income components are included in the survey. If not, this could cause a severe bias

All annual household expenditure in the past year is considered. The NHSS questionnaire was developed by Center for Health Statistics and Information of the Ministry of Health of China was used for data collection in our study. Nine questions were preselected in this questionnaire to ask total annual household consumption and various aspects of household expenditure (such as food, clothe, transportation and communication, housing, education, culture and entertainment, health, others) (line154 to 157).

ii. Was "household size" considered in the analyses?

In our analyses, household size was considered in both logit model and concentration index decomposition process. Our study found that households with 1-2 members were 3.68 times in 2013 and 3.04 times in 2008 more likely to suffer from CHE than households having more than 5 members. From the decomposition analysis of concentration index, it is evident that household size explained 44.11% socioeconomic CHE inequality in 2013.

c. Methods to measure CHE inequality

i. Please introduce the concentration index approach (line 159)

We have enriched the introduction on the concentration index in the revised manuscript as reviewer suggested (line 192 to 201).

4. Results:

a. Catastrophic health care expenditure

i. Explain the currency conversion to USD 492.10 (table 2; line 204). Did you consider PPP?

In our study, we converted Chinese Yuan - RMB into its equivalent US Dollars - USD (1 USD = 6.2038 CNY) based on exchange rate in August of 2014. In the literature, exchange rate is
widely used, see papers published at Health Affairs, Health Economics for examples. We did not use PPP in this study.

5. Discussion

a. The reader gets the impression that you only analysed determinants of CHE in general (line 283). However, it could be a good idea to add some further analyses about how the change in your study area can be explained. What are the influencing factors? In addition, changes at the population level must be considered – as a consequence of migration and/or fertility for the structure?

Thank you. We have enriched the relevant discussion as reviewer suggested (line 340 to 360).

b. Limitations: Please explain consequences of missing information in more detail (severity of problem) (line 259)

Thank you. We have enriched the relevant discussion as reviewer suggested (line 395 to 398).

c. It is quite astonishing that no further data problems are mentioned

We have enriched the limitation section in the revised manuscript (line 393 to 398).

Minor Essential Revisions

a. Introduction

a. Define non-subsistence income (line 72)

In our manuscript, we use non-subsistence income to describe household income remaining after household subsistence needs have been met. We have changed this word in revised manuscript (line 81 to 82).

b. Universal health coverage and insurance schemes (line 83): Provide some further information about the corresponding health financing.

We have enriched the introduction section as reviewer suggested (line 96 to 100).

b. Methods a. Methods to measure CHE inequality: Income-related factors (line 172): give some examples; did you consider them in your paper?

We are very sorry for our incorrect writing. We have re-written this part

c. Conclusion a. “Message” should be improved. What are the recommendations for the regional level? What is possible? The direct link between Shanxi Province and the national level is not
clear.

*We have enriched the policy implication in the discussion section.*

Discretionary Revisions

a. Result – Decomposition of socio-related inequality – please explain meaning of subscript CHE in Ln odds CHE (line 236)

*To be consistent with previous studies, we used Ln odds<sub>CHE</sub> to stand for natural logarithm of the odds of CHE in our manuscript. See for example, Hosseinpour et al used Ln odds<sub>infant death</sub> to stand for the natural logarithm of the odds of infant death.*

We appreciate for Editors/Reviewers’ warm work earnestly, and hope that the correction will meet with approval.

Once again, thank you very much for your comments and suggestions.

Yours sincerely,

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