Author’s response to reviews

Title: The Impact of National Health Insurance (NHI) upon accessibility of health services and financial protection from catastrophic health expenditure: a case study of Savannakhet province, Lao PDR

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Answer to reviewers
Subject: Submission to Health Research Policy and Systems – HRPS- D- 19- 00016

HRPS-D-19-00016
The Impact of National Health Insurance (NHI) upon accessibility of health services and financial protection from catastrophic health expenditure: a case study-survey of Savannakhet province, Lao PDR
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Reviewer reports:

Reviewer #1: (Summary of paper)
This paper seeks to evaluate impacts of the National Health Insurance scheme on the accessibility and financial protection from catastrophic health expenditure. The data came from a survey of 342 households who visited Savannakhat Provincial Hospital and Champhone Districty Hospital. The authors estimate two binary logistic models to compare outcomes under CBHI and NHI schemes and report several differences between them.

As a whole, this paper is not clearly presented, and the estimated results might be biased.

(Comments)
1 Unsatisfactory introduction:
1.1 Introduction fails to present the research gap and motivation which should be based on adequate literature reviews.
It is a very important factor for potential readers of this paper. The research objective should be set up
to fill the research gap.

Answer 1.1: More information related to the statement of the problem has been added in the introduction part.

1.2 I think that NHI scheme is clearly different from the previous health insurance schemes (CBHI, SSO and HEF), because NHI does not require (potential) users to pay any premiums in advance. It just sets the low flat fee payment system for local healthcare services. (Strictly speaking, NHI is NOT health INSUARANCE.) If previous studies did not assess the impact of low-price fixed payment system on healthcare services, it is worthwhile to assess it.

Answer 1.2: Yes, it is true that NHI is clearly different from the previous schemes (CBHI, SSO and HEF) in term of payment system and managerial issue. However, there is one big similarity; which is NHI’s main objective is to enhance accessibility and financial protection against catastrophic expenditure. More importantly, NHI is currently replacing all the aforementioned schemes as they are sharing identical goals. From this point, it is worth to make a comparison CBHI and HEF. The reason to select CBHI (to compare with NHI) was because CBHI had highest target group or covering most of the population, whereas almost no HEF coverage in Savannakhet province, and only small amount of population were under SSO.

1.3 The current introduction does not play an essential role, but it seems to merely describe the health insurance issues facing developing countries and the history and current status of Lao health policy.

Answer 1.3: We will add more information (see manuscript for more information)

2 Inconsistency of research objectives, approach and method:
2.1 The research objective is "to access the effectiveness of the NHI in terms of its accessibility and financial protection from catastrophic health expenditure."
However, "the probability of health services utilization is analyzed as a proxy to accessibly (accessibility?) to health care services" without any discussion or explanation. It might confuse readers.

Answer 2.1: The probability of health service utilization has been used as a proxy to accessibility. We believed that this is the best way to measure accessibility. As mentioned in the manuscript, this assumption had been used in our previous studies about CBHI (published in 2013 and 2016). The best way to reduce bias is that conducted interview session in the OPD, in which the time at the hospital was not count. The study trace back 3 months and 1 year for OPD and IPD respectively.

2.2 To attain this research objective (access the impact of the NHI on behavioral outcomes), we have to consider how to deal with selection bias or endogeneity problems.
However, this study does not take into consideration for them at all from data collection to estimations.
It collected household data from respondents who are only actual users of healthcare service in district or referral hospitals.
All respondents (or their family members) must have serious health problems (the sample is initially selected, and it cannot be representative of the policy targeted population).
Is it really appropriate to evaluate the accessibility of the NHI comparing with CBHI?
Also, simple binary logistic model cannot estimate impacts of the NHI (or household characteristics) on the probability of health services utilization.
It can estimate only associations among them.

Answer 2.2: yes, it is really appropriate to compare the effectiveness of CBHI and NHI since they are sharing ultimate goals and objectives. Please see answer 2.1 and information provided in the revised manuscript for more detail.

2.3 In this study, "respondents were selected by systematic random sampling technique…"
It should be elaborated more.

Answer 2.3: Systematic random sampling is the most favorable mean of sampling technique; the reason is there is a long waiting list at OPD during the day time.

2.4 Table 4 and 5 provide CBHI results.
Are their data from same respondents or different respondents/study? In either case, it should be elaborated.

Answer 2.4: Table 4 and table 5 comes from identical data set (as mentioned in the manuscript). However, table 5 only patients reported to use IPD within 1 year.

Reviewer #2: General comments
Overall, the topic of the study is very relevant to public and policy interests. The authors state the objective of the study adequately but could be highlighted earlier in the introduction. The program background sections are well-explained. However, sections such as data collection and tables could be revised as follows.

General answer:

First of all, I would like to express a sincere thanks for the precious comments and specific questions, which is very useful for me to improve my research writing skill (even if I miss this great opportunity to publish with Health Research Policy and Systems). Specific question questions allow me to understand point to point and revise them as much as possible. Additionally, you also provide statistical interpretation method, that enlighten my knowledge about analysis. Thank you very much once again and I will try my best to answer all the questions.

Revision and Suggestions
1. Paper Title:
a. The reviewer suggests using "A Case Study", instead of "A Case Study-survey" in the title

Answer 1.a: the title has been changed, see manuscript title for more information

2. Introduction:
a. Further Clarification: On Page 5 line 14, clarification of "unofficial charges" may be needed.

Answer 2.a: “Unofficial charge” means non-medical expenditures. In order to avoid this confusion, we change to “non-medical expenditure”; which refers to other costs that may occur while receiving health services such as: transportation cost, opportunity cost of being unproductive, and more.

b. Grammatical errors: On Page 5 line 34, "has been" should be used instead of "been".
Answer 2.b: this has been changed, see manuscript title for more information

c. Other comments: On Page 5 line 34, For consistency, the reviewer suggests using "National health insurance" instead of "Social health insurance".

Answer 2.c: this has been changed

3. Research Design:
a. Comparing data from Savannakhet (pilot province) with other non-NHI provinces could yield powerful results. The authors may consider using data from other non-NHI provinces to compare with this latest wave of dataset in 2018 via approaches in RCT, difference-in-different, synthetic controls, etc. However, addressing validity of these approach such as selection bias (e.g. characteristics of NHI vs non-NH provinces) and additional assumptions may yield these methodologies challenging.

Answer 3.a: Comparing data from pilot province (Savannakhet province) and non-pilot province is such an excellent idea to yield stronger result. However, due to the budget and time constraint; we are not in the position to conduct another survey in non-pilot province. Additionally, as Savannakhet province is a relative better economic condition compared to other provinces; we afraid that comparing pilot and non-pilot province in different geographical location may also create biases in term of socio-economic status and other health service utilization behavior. Hence, we used preceding CBHI (which had highest possible number of members) to compare with newly established NHI. Moreover, the effectiveness in term of accessibility and financial protection had been assessed. Hence, we decided to compare with the NHI to find out if there is any improvement.

4. Data Collection:
a. On Page 9 line 49, further clarification on how the authors decided on the sample size of 342 observations and the selection of the two hospitals will provide more credibility to the survey data.

Answer 4.a: As this study was conducted in the identical study sites with the previous studies on the effectiveness of the CBHI scheme. In order to be comparable in term of sample size, we use 342 households equaled to the study about CBHI scheme in 2016. The sample size of 342 was acquired through the sample size calculation based on the proportion of CBHI enrollment.

b. More information regarding the similarities or differences between the two hospitals and the representativeness of the two hospitals in terms of sizes, patients' demographics, and disease cases would provide audience with helpful context when interpreting results.

Answer 4.b: As the referral hospital the Saannakhet provincial hospital consists of 200 beds where as Champhone district hospital only consists of 50 beds. Similar to the referral hospital, Champhone district hospital could handle most of health problem other than orthopedic surgery and brain operation.

c. On Page 9 line 54, it is unclear how the "proportional of the latest CBHI enrolment" was used in to decide the sample size in 2018 since in 2018, the CBHI was abolished.

Answer 2.c: “proportional of the latest CBHI enrolment” refers to the proportion used to calculate sample size in the latest study in 2016 (to be comparable). To avoid confusion, we changed to “the proportion of the latest study”

d. On Page 10 line 6, more details on survey process will be informative such as the methods used to
contact or interview household heads. Was the data collection process implemented through face-to-face interviews at OPD? It would be helpful to provide context on refusal rate to give interview and the days of the week and time of the day the interviews were conducted since the day and time of hospital visits may reflect socio-economics status.

Answer 4.d: As there are number of questions involves with individual and household information in the structured questionnaire. The inclusion criteria of respondents were head of household, to ensure that they are able to answer all to questions related their household socio-economic condition. This study applied face-to-face interview with structure questionnaire containing socio-demographic, accessibility to health services, health service utilization and information about NHI.

During the interview process, we found some difficulties as number of people did not willing to participate in our study cited that they were not convenient and not interest about health financing system. There were 14 and 10 respondents refused to participate in Kaysone Phomvihane and Champhone districts respectively

e. On Page 10 line 10, the authors describe that the respondents were selected by systematic random sampling technique. Clarification will be helpful such as which ordered list was the systematic random sampling based on.

Answer 4.e: As mentioned in the manuscript study applied systematic random sampling because there were bunch of registered waiting list in each OPD section, this research systematically them from the list; where in interview took place prior or after receiving health services

f. Page 9 Line 58 - Accessibility (typo)

Answer 4.f: This typo has been changed throughout the manuscript

5. Data Analysis:

a. [major suggestion] The analyses for 2013 and 2016 datasets include "Insurance Status" variable while the analysis for 2018 datasets does not include due to the nature of the insurance landscape after the introduction of NHI, as explained in the paper. This difference in regressions may post some threat in the interpretations. The insurance status variable in 2013 and 2016 might absorb the roles of underlying health conditions and key demographics such as marital status and income levels in predicting the two key outcomes (hospital admission and catastrophic expenditure). For example, if people with chronic conditions tend to register for CBHI before 2017 (i.e. insurance status “Yes”), the role of chronic condition in predicting catastrophic expenditure will be dampened (i.e. less significance). This may explain why in Table 5, the OR for chronic conditions increases significantly in the 2018 Column. The authors should run analyses for 2013 and 2016 without the Insurance Status variables and compare with the results in 2018 Column.

Answer 5.a: This is very good comment, as NHI is not voluntary base health financing scheme. No “insurance status” variable in the 2018 data base. In order to be comparable with the previous study conducted in 2013 and 2016, we have added the regression without insurance status to compare with the outcome of NHI.

b. To the reviewer's understanding, one of the outcomes of interests is whether households experience hospital admission within the last 12 months. If the authors have data on the number of OPD/IPD
visits, as opposed to indicators, further analyses such as Poisson regression could shed light on health access after NH1. Additionally, the number of OPD visits would allow authors to analyze health utilization outcomes related to OPD since by data collection design, all interviewees are OPD visitors. Answer 5.b: To be honest, we do not familiar with the Poison regression model. we have consulted with the sta

6. Results:
a. [major suggestion] The paper suffers significantly from erroneous layout. The discussion in the text portion in numerous spots do not match with the figures presented in tables. For example, on Page 13 line 23-24, the OR "5.128" referred to OR of large household but is presented on the "small household" line in Table 4. On Page 13 line 26-34, the ORs referred to in the text do not seem to match the ORs presents in the table. For example, the text said the OR for household income >2.5 million is 0.135, but the table shows blank.

Answer 6.a: Pease accept my sincere apology for erroneous layout, it was due to the technical problems. We have fixed all the errors.

b. On Page 11 line 4 and 6, providing brief interpretation of the Pearson Chi-square P-values would be helpful to inter-disciplinary audience who may be less familiar with the tests.

Answer 6.b: regarding to the comments, we have provided brief interpretation about the Pearson Chi-square in the manuscript.

c. On Page 12 line 39, could this be influenced by time trend or non-NHI-related factors such as expansion of medical facilities in and outside Suvannakhet (which could refer cases to these selected hospitals). People could have more medical knowledge over time and visit hospital mores. Or people could have exposed to larger risk factors and NCDs over time resulting in higher hospitalization rates. The reviewer suggests that the authors address these aspects with some supporting evidence.

Answer 6.c: Good comment. However, in “Result” part we only describe what we found about from statistical calculation. In other words, we only descript what those number show us. According to your comment stating that “People could have more medical knowledge over time and visit hospital mores. Or people could have exposed to larger risk factors and NCDs over time resulting in higher hospitalization rates. The reviewer suggests that the authors address these aspects with some supporting evidence”, we will add the answer to this comment in the “discussion” part as follows:

Regarding to the improvement in accessibility under the NHI scheme compared to it preceding CBHI; this improvement could be due to the fact that people could have more medical knowledge over time and visit hospital mores. Or people could have exposed to larger risk factors and NCDs over time resulting in higher hospitalization rates. However, this study was conducted not long after the introduction of the NHI (to replace the CBHI), targeting the identical group of population. In theory either CBHI or NHI aims to improve accessibility to all population group, but in practice most of the people enrolling CBHI scheme or using NHI were poor to middle poor income households, so that within a short period of time those could do not really improvement in term of medical knowledge. As there is no outbreak or sudden increase in occurrences of a disease, the increase in the probability of hospitalization should not affected aby those factors. This statement means that the NHI is effectively ease access for general people compared its predecessor.

d. On Page 12 line 17-21, the construction of the catastrophic expenditure variable needs some
clarification. For example, is the catastrophic expenditure is annual or one-time. Do the authors compare this expenditure to annual household income? Clarify the meaning of non-subsistence income, if possible. Further explanation on why larger households suffer more from catastrophic health expenditures than smaller household, e.g. more children would be helpful in understanding the data.

Answer 6.d: we have added information about catastrophic expenditure. According to the WHO, catastrophic health expenditure is a situation where health care expenditure is greater, or equal to, 40% of capacity to pay. Capacity to pay is defined as non-subsistence effective income, of which subsistence spending equals to one dollar a day per person

e. In Table 4, it is not clear what the value of reporting results from both 2013 and 2016 is. The reviewer suggests keeping the results but showcasing the value-added of analyzing both 2013 and 2016, such as discussing difference between 2013 and 2016 settings.
Answer 6.e: we have added the different between 2013 and 2016 in both table 4 and table 5.

f. Interpretation of OR could be very tricky. To the reviewer's knowledge, the OR in Table 4 should represent the ratio of odds of hospital admission when households have certain characteristics, compared to the counterparts (households lack such characteristics). For example, the OR reported for NHI Column for married household is 3.610. To the reviewer's knowledge, it should be interpreted as followings. A married household has 3.610 times higher chances of hospital admission than no admission (i.e. odds or probabilities) than a non-married household.

Answer 6.f: Thank you very much for your help on the statistical interpretation. we have added this in the manuscript.

g. On Page 13 line 27-28, adding currency units of household income could be useful. What's the counterpart to which the 1-2.5 million (currency units) households are compared to.

Answer 6.g: Its Lao Kip or LAK, we have added in the manuscript

h. Suggested interpretation on Page 13 line 26-34. Given that the OR is 0.516 for medium-income household variable. The medium-income households have 0.516 times higher chance of being admitted than not being admitted than low-income households (counterparts). In other words, the low-income households have 1.937 (=1/0.516) times higher chance of being admitted than not being admitted than medium-income households.

Answer 6.h: we have added in the manuscript

i. Suggested interpretation on Page 14 line 4-6. According to the table the middle-income household's OR is 0.049 while the high-income household's OR is 0.34. The odds of having catastrophic expenditure than not having catastrophic expenditure for middle-income households is 0.049 times that of the low-income households (counterparts). In other words, the low-income households have 20 (=1/0.049) times higher chance of having catastrophic expenditure than not having catastrophic expenditure, compared to the low-income households.

Answer 6.i: We have added in the manuscript

j. On Page 28 Table 5 Column 2016, the OR of Chronic Condition is 0.62, less than 1 and much lower
than that of 2013 and 2018. Is there explanation for this outcome?

Answer 6.j: According to table 5, in 2016 the OR of chronic condition 0.62 is much lower when comparing to that of 2013 and 2018. Firstly, the OR value in 2016 is not statistically significant; it means that the chronic condition does not affect catastrophic health expenditure in 2016. The surprisingly low value of OR in 2016 possibly due to the fact that government tried provide financial assistant from the poor and underserved (subsidizing the transportation cost that immensely lower their non-medical expenditure). Under the NHI, most of the government fund are used to subsidize medical expenditure.

k. On Page 14 line 28-30, why does this value increase in 2018?

Answer 6.k: The OR value of chronic condition in 2018 is relatively high (and statistically significant) compared to the value in 2013 and 2016 (under the CBHI). After the introduction of NHI, poor and existence of chronic condition households could easily go to hospitals without having insurance and require to pay only flat contribution rate as mentioned in table 1. However, patients are expected to pay up to 25% for medical expenditure. Despite NHI being able to poor and chronic patient in term of accessibility; at the same time, the scheme also indirectly increases the possibility of suffering from financial catastrophic due to the copayment. On the other hand, CBHI scheme required to pay small amount of monthly or yearly contribution rate but no copayment required during the time hospitalization.

7. Discussion

a. On Page 15 line 9-20, the authors suggest that the low-income households have larger odds of being admitted compared to the middle-income households. The paper could convince readers more by providing information that the underlying health across income levels remain unchanged during 2013-2018 since some could argue that the poorer households became relatively less healthy and hence had relatively larger odds of being admitted.

Answer 7.a: According to the statement showing that low-income households have larger odds of being admitted compared to the middle-income households. This condition possibly affected by the health condition of respondents from 2013-2018, poor households may relatively less health compared to richer quintiles; however, it can be said that income level remain unchanged or do not have affect possibly of hospitalization CBHI scheme in 2013 and 2016. Additionally during period of 2013 and 2018, there was no disease outbreak, natural disaster and other crisis they may create higher hospitalization in the study sites.

b. On Page 15 line 22-28, this narrative weakens the authors' main finding that NHI increases healthcare accessibility among poorer households. Without NHI introduction, if wealthier households seek care abroad, the authors should get similar results (i.e. observe relatively higher odds of admission among low-incomers than high-incomers). In other words, the odds of poor people being admitted could be driven by the fact that the wealthy people change behaviors and seek better care abroad after NHI.

Answer 7.b: the statement has been changed to avoid confusion. it has been changed to: therefore, the NHI offers better health service distribution to low income household. People in any income quintile could equally go to public hospital without bearing full health expenditure. The introduction of NHI
subsequently creates more health service utilization. Without improvement and expansion of hospitals’
capacity and human resource, public hospital will end up very crowded and overloaded. As a result,
most of patients in upper income quintiles prefer to travel to neighboring countries (with the believe of
receiving better health services)

c. On Page 17 line 40-48, additional data on whether the OPD and IPD costs decrease between 2013-
2018 since the country changed the health insurance system could support this claim.

Answer 7.c: This information has been added “from 2013-2018, there were improvements in term of
accessibility and financial protection. Accessibility to health service have been significant improved for
poor households under NHI compared to preceding CBHI scheme. In term of financial protection, the
model found that income levels do not have any significant impact on possibility of experience
financial catastrophe. In order words, NHI ease financial issue for any income quantiles and lower the
cost of health service utilization in general.

d. Revision of the discussion on policy relevance is highly recommended. Additional discussion on
implication to other provinces outside Savannakhet could be of interest if policy makers and
academics. For example, whether there are features that drive or limit success of Savannakhet or
whether there are learning lessons for other provinces to consider.

Answer 7.d: more information about policy have been added. As this is policy recommendation, we opt
to put this in the conclusion part.
The finding of this study is able to prove that the newly piloted NHI is able to promote both
accessibility and financial protection. However, it does not mean that every sick and people with health
problem could access to health facilities without the improvement and increasing number of health
facilities, medical equipment and health personnel. Before fully implementing the NHI throughout the
country, the government should improve those aforementioned factors to be able capable within the
large inflow of patients. Additionally, under the NHI patients responsible for the copayment, which
may push them into catastrophic condition and poverty. Regarding to this issue, policy related to the
copayment system should be revise for example allowing patients and their family to pay by
installment or specially copayment rate for very poor households.

e. Several claims or narratives, e.g. the lack of confident in health systems, in the conclusion and
discussion section may need supporting evidence.

Answer 7.e: Lack of confident in health system has been viewed by locals and foreigner residing in
Laos. For instance: Australian embassy provide medical advice through its official website claiming
that medical facilities outside Vientiane capital are limited and totally not adequate in rural areas
(especial in the northern parts). People with medical issues should consider in advance about travelling
to remote areas as there is no health practitioner and suitable health facilities to treat serious health
condition. Despite of the availably of western trained physician, but health facilities and equipment are
not properly maintained. the Australian embassy in Laos recommends their people who need health
service to go to hospitals in Udon Thani province, Thailand (DFAT, 2019).

f. The paragraph on page 16 discusses limitations of health systems in Laos: availability, affordability
and acceptability. It would be interesting to link this discussion more to NHI. For example, the paper
claims that NHI increases accessibility but may lack these aspects, resulting in lower estimates of
certain users. Discussion on how these aspects interact with accessibility and impact people's
healthcare utilization will clarify the intention of this paragraph and provide depth to the discussion.
Answer 7.e: the information related availability, affordability and acceptability has been added in the manuscript

8. Conclusion
a. On Page 18 line 22-23, Difference in what extent? Do the authors mean comparing the difference of outcomes of the two systems?
Answer 8.a: Initially we would like to mentioned that since the NHI is very new. People may not know about the NHI since its introduction. However, the good thing about assessing effectiveness in this period of time is that there is not much change in people knowledge about health and no outbreak occurred. To avoid this confusing, we will remove this statement and add the limitation as suggested in 8b.

b. The authors may address other limitations such as small sample size and external validity, as well as mention further tests (related to the analyses in this paper) or outcomes that could be useful to analyze.
Answer 8.b: this information has been added in the manuscript.

10. Tables
a. Table 1 should clarify that it's out-of-pocket contributions from patients, as well as details on surgery and referral cases. What are meaning of the numbers in parentheses?
Answer 10.a: more information has been added in the table and the manuscript. “as mentioned in table 1, patients are expected to pay a flat contribution for both OPD and IPD services. however, patient are expected to pay 25% (as co-payment if the treatment costs over 5 million LAK or 600 USD). District hospital such like Champhone district hospital are unable to handle with orthopedic and brain surgery. Patients staying in district hospitals more than 3 days are advised to transfer to hospital if necessary.

b. Table 2 & 3 should clarify the meaning of percentages in the parentheses and the Pearson chi-square values and provide total number of observations. If possible, the authors should include data summary from the previous surveys in 2013 and 2018.
Answer 10.b: the percentage in the parentheses showing percentage each group within the variable for instance: in table 2 shows that there were 131 male and 105 female respondent reporting not having hospitalization within 1 year, yielding the percentage of male and female population without hospitalization of 55.5% and 44.5% respectively.

c. Table 4 & 5 should provide confidence interval of the odd ratios, specify the significance level of star (*) and provide number of observations and the goodness-of-fit information. Standard table should contain coefficients, standard errors, p-value, odds ratios and confidence interval of odds ratios.
Answer 10.c: Please see the manuscript for more information.

d. Table 4 & 5 could provide additional tests whether the ORs across survey years are statistically different.
Answer 10.d: we did not provide additional test, the 3 studies is conducted in different period of time.

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Journal Experts (http://bit.ly/AJE-HS) for help with English usage. Please note that use of an editing service is neither a requirement nor a guarantee of publication. Free assistance is available from our English language tutorial (https://www.springer.com/gb/authors-editors/authorandreviewertutorials/writinginenglish) and our Writing resources (http://www.biomedcentral.com/getpublished/writing-resources). These cover common mistakes that occur when writing in English.

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