Reviewer’s report

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

Version: 0 Date: 15 Mar 2019

Reviewer: Siprapai Sitapong

Reviewer's report:

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.

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

2. Introduction:
   a. Further Clarification: On Page 5 line 14, clarification of "unofficial charges" may be needed.
   b. Grammatical errors: On Page 5 line 34, "has been" should be used instead of "been".
   c. Other comments: On Page 5 line 34, For consistency, the reviewer suggests using "National health insurance" instead of "Social health insurance".

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.

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.
   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.
   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.
   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-economic status.

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.

f. Page 9 Line 58 - Accessibility (typo)

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.

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 NHI. 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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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?

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

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.

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.

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.

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.

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

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.

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?

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.

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?
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.
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.
d. Table 4 & 5 could provide additional tests whether the ORs across survey years are statistically different.

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