

PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (<http://bmjopen.bmj.com/site/about/resources/checklist.pdf>) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Is enrolment in the National Health Insurance Scheme in Ghana pro-poor? Evidence from the Ghana Living Standard Survey
AUTHORS	Nsiah-Boateng, Eric; Prah Ruger, Jennifer; Nonvignon, Justice

VERSION 1 – REVIEW

REVIEWER	Nele van der Wielen University of Southampton, UK.
REVIEW RETURNED	09-Feb-2019

GENERAL COMMENTS	<p>Comments to the Authors</p> <p>This a very well written and interesting paper on NHIS enrollment in Ghana. Overall, this paper addresses an important knowledge gap. The method section needs further strengthening before publishing the results.</p> <p>Please find my detailed comments below:</p> <p>Page 3, line 14: Define UN.</p> <p>Page 3, line 34: Add that people aged 70 and above are exempt.</p> <p>Page 4, line 35: Did the authors use sampling weights to take into account the GLSS sampling design?</p> <p>Page 4, line 53: How was the wealth index computed?</p> <p>Table 1: Why did the authors decide to code age as below 46 and 46 and above?</p> <p>Page 4, line 55: The authors have not shown how the variable (NHIS enrolment) was extracted from the GLSS. How did the authors define NHIS enrolment? Based on NHIS registration or valid NHIS card ownership?</p> <p>Page 4, Methods: The GLSS is a household survey and it includes respondents from the same household. This creates the problem of dependence which can bias the estimates. The authors should address this methodological issue.</p>
-------------------------	--

REVIEWER	Professor Audrey R. Chapman Department of Community Medicine and Healthcare University of Connecticut School of Medicine Farmington, Connecticut, USA
REVIEW RETURNED	28-Feb-2019

GENERAL COMMENTS	<p>Overall I thought you wrote a good paper on an important subject. But it would be helpful to provide more data on the annual cost of enrollment in the NHIS as compared with the per capita income in Ghana and the per capita income of the lowest percentile. It would also be helpful for you to provide brief background on the health system in Ghana.</p>
-------------------------	--

	<p>It would be helpful to explain why you chose the statistical methods you used and what their strengths and weaknesses are.</p> <p>Your findings are that the poorest households enrolled in the NHIS more than the richest households but that the multivariate logistic regression showed that the likelihood of enrolling in the NHIS increases from poorer to richest quintile. You need to explain this apparent inconsistency in your findings.</p>
--	---

VERSION 1 – AUTHOR RESPONSE

Reviewer 1 comments	
<ul style="list-style-type: none"> • This a very well written and interesting paper on NHIS enrolment in Ghana. Overall, this paper addresses an important knowledge gap. The method section needs further strengthening before publishing the results. • Page 3, line 14: Define UN. • Page 3, line 34: Add that people aged 70 and above are exempt. • Page 4, line 35: Did the authors use sampling weights to take into account the GLSS sampling design? • Page 4, line 53: How was the wealth index computed? • Table 1: Why did the authors decide to code age as below 46 and 46 and above? • Page 4, line 55: The authors have not shown how the variable (NHIS enrolment) was extracted from the GLSS. How did the authors define NHIS enrolment? Based on NHIS registration or valid NHIS card ownership? 	<ul style="list-style-type: none"> • The methods section is strengthened with more information as specifically requested • UN is defined in paragraph 1 under the Introduction section • 70 years and above added to the exempt group in paragraph 1 under the Introduction section • The dataset requested from the Ghana Statistical Service had sampling weights and income quintiles already created and we indicated that in the Methods section • This was done by the Ghana Statistical Service based on the national wealth quintile • We wanted to know the odds of a survey participant enrolling in the NHIS if he/she is below or above the mean age of the participants. However, we have used the Medical Subject Headings (MeSH) age definition to categorise the 'Age' and made changes in the manuscript where applicable. • The dataset requested from the Ghana Statistical Service already contained a variable name "NHIS" and labelled as "NHIS enrolment status" with "1" as "active card-bearing members" and "0" inactive card-bearing members or never enrolled". We used this NHIS definition

<ul style="list-style-type: none"> Page 4, Methods: The GLSS is a household survey and it includes respondents from the same household. This creates the problem of dependence which can bias the estimates. The authors should address this methodological issue. 	<p>in the dataset for the analysis and have stated it in the “Data collection and analysis” section. We have indicated this and made it clear in the revised manuscript in the Methods section</p> <ul style="list-style-type: none"> This was addressed by using only household level data for the study. As explained in the Methods section under “Data collection and analysis” the unit of analysis was the household. Therefore, the variables used are mainly related to the household head who responded to the survey questions
<p>Reviewer 2 comments</p>	
<ul style="list-style-type: none"> Overall, I thought you wrote a good paper on an important subject. But it would be helpful to provide more data on the annual cost of enrolment in the NHIS as compared with the per capita income in Ghana and the per capita income of the lowest percentile. It would also be helpful for you to provide brief background on the health system in Ghana. It would be helpful to explain why you chose the statistical methods you used and what their strengths and weaknesses are Your findings are that the poorest households enrolled in the NHIS more than the richest households but that the multivariate logistic regression showed that the likelihood of enrolling in the NHIS increases from poorer to richest quintile. You need to explain this apparent inconsistency in your findings. 	<ul style="list-style-type: none"> Annual cost of enrolment for both exempt and non-exempt groups is provided and compared with per capital income as well as the daily minimum wage (kindly see Introduction section, paragraph 3). As suggested, a brief background on the health system in Ghana is also included in the Introduction section, paragraph 4. Explanation for the use of both concentration curves and logistic regression analysis is offered in the Methods section under “Data collection and analysis”, paragraph 2. This seeming contraction is explained in the “Discussion” section, paragraph 2. The 2012-2013 GLSS survey shows higher number of the poor enrolled in the NHIS, but when other factors were introduced as controls, wealth quintile, age and education predicted enrolment strongly.

VERSION 2 – REVIEW

<p>REVIEWER</p>	<p>Nele van der Wielen University of Southampton, UK</p>
<p>REVIEW RETURNED</p>	<p>23-Apr-2019</p>
<p>GENERAL COMMENTS</p>	<p>Many thanks for addressing my comments. The paper reads very well and addresses an important research gap.</p>

	<p>I only have some minor comments:</p> <p>Page 1 line 50: Delete full stop after education. Page 3 line 8: Delete space after "and" and before "associated" Page 3 line 14: Define WHO</p> <p>Page 5 Data collection: In line 23 the authors refer to income quintiles, however, the rest of the document refers to wealth quintiles. It would be useful to clarify how the Ghana Statistical Services constructed the wealth/ income quintiles. In addition, I would recommend to use a consistent terminology referring to wealth or income quintiles.</p> <p>Finally, the GLSS 7 is now available if the authors prefer to use up to date data.</p>
--	--

REVIEWER	Audrey R. Chapman UConn Health, United States
REVIEW RETURNED	30-Apr-2019

GENERAL COMMENTS	Thank you for responding to the issues I raised. I think your article will be an important contribution to the literature on universal health coverage and health care access in Africa.
-------------------------	--

VERSION 2 – AUTHOR RESPONSE

Reviewer 1 comments	Authors' response
<ul style="list-style-type: none"> • Page 1 line 50: Delete full stop after education. • Page 3 line 8: Delete space after "and" and before "associated" • Page 3 line 14: Define WHO • Page 5 Data collection: In line 23 the authors refer to income quintiles, however, the rest of the document refers to wealth quintiles. It would be useful to clarify how the Ghana Statistical Services constructed the wealth/ income quintiles. In addition, I would recommend to use a consistent terminology referring to wealth or income quintiles. • Finally, the GLSS 7 is now available if the authors prefer to use up to date data. 	<ul style="list-style-type: none"> • Correction effected • Correction effected • WHO defined • "Income quintiles' is changed to "wealth quintiles" for consistency. Explanation is also offered regarding how the Ghana Statistical Service constructed the wealth income.

	<ul style="list-style-type: none">• The authors intend to use the last data (GLSS 7) to examine equity in enrolment and health services utilization in their next project. We prefer using the GLSS 6 for this paper because there was an introduction of a policy in 2012 to ensure equity in NHIS enrolment by making the NHIS card a pre-requisite for enrolment into secondary and tertiary educational institutions after one obtains offer of admission. In addition, there was also enrolment of beneficiaries of the Livelihood and Empowerment Against Poverty (LEAP) programme and Prisoners through Ministry of Gender, Children and Social Protection. Thus, it is imperative to examine the effect of this policy and make informed recommendations to NHIS Management.
--	--