PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Health insurances determines antenatal, delivery and postnatal care utilization: evidence from Ghana Demographic and Health Surveillance data
AUTHORS	Browne, Joyce; Kayode, Gbenga; Arhinful, Daniel; Fidder, Samuel; Grobbee, Diederick; Klipstein-Grobusch, Kerstin

VERSION 1 - REVIEW

REVIEWER	Maxwell Dalaba Navrongo Health Research Centre, Ghana
REVIEW RETURNED	13-May-2015

GENERAL COMMENTS	Abstract • Page2, line 21, the CI stated was ; CI 1,92 to 2.74. However in the table 2 , and results (page 6, line 51) it was 1.91 to 2.74. Cross check this. • On page 2 line 27, you used MNCH. Given that it was the first time to be mentioned, you needed to write it in full. Methods • Define maternal health insurance. In fact, how was health insurance status ascertained, especially since this has been a controversial point in prior studies of NHIS enrollment? Did interviewers ask to see insurance cards to verify active enrollment? • Several studies have shown that the insured differ from non-insured in many ways (age, health status, wealth, education level, etc.), and some of these variables clearly have potential to confound the relationship between NHIS enrollment and utilization of MNCH. Hence the background characteristics should include, at minimum, basic descriptive statistics on the dependent variable (NHIS enrollment), and differences between insured and non-insured across potential confounding variables (such as age, occupation, wealth quintile etc.). • Given that data was not collected by simple random sampling method, did you consider the design effect during the analysis? it is necessary to consider the design effect in the analysis(i.e using the svy estat command) Results • Exactly how many women were involved in your analysis? The figure reported in the abstract (2,987), results section (3,000) and Table 1 (marital status= 2992, maternal occupation = 2978 etc) are not consistent. • You stated that “More than 90% of the women were co-habiting with their husbands”. Co-habiting was not mentioned in methods and not found on Table1. Check it again. • The statement “ After fully adjusting for socioeconomic, demographic and obstetric factors in Model IV the probability of attending antenatal clinic among women that were insured (OR

	1.96;95% CI 1.52 to 2.52) compared to those that were not insured." is not complete(page 6 line 30-35). Discussion • If a pregnant woman presents herself at the health facility for ANC or delivery without NHIS, will she be attended to free of charge? Or is it is only about exemption to enroll into the NHIS? If the case is for only the insured women (i.e. exemption to enroll into the NHIS), then the free policy has to be revisited. • Can you also state the NHIS coverage (maybe how many females) for readers to know the current enrollment? References • Reference number 14, 16, 17,18, 21,22,23,24, are not found in the main text.

REVIEWER	Violanda Grigorescu Centers for Disease Control and Prevention, USA
REVIEW RETURNED	08-Aug-2015

GENERAL COMMENTS	This paper needs many and major revisions. I did not reject it because the objective of the study is important. Below are a few comments and suggestion for changes: - the abstracts does not include statistical methods - the content of the background section could be improved. The authors mentioned both health care and community programs; however, the paper is focused on the health care only - next is the methods section that has a few sub sections, each needing revisions as mentioned below. The data source is the national survey that is not fully described. Given that it is not a common data source, I would recommend to include a more detailed description. There is no mention of the weighting methods although the authors referred to the survey sampling as representative. The analysis was performed only by including women who were surveyed (3,000 with a high response rate of ~95%). I strongly recommend to resubmit with weighted data Men were included in the survey but yet there is no explanation why was that given the analysis was based on women's responses as stated in the paper. There is also a 10 years age difference in the upper age limit between the two groups, women and men, but the authors did not explain the rationale behind. Three outcomes are mentioned but the description is not very clear for each. For instance, the authors mentioned that antenatal care is measured as the care received by women from their providers. Does that mean all women included in the study had health care? Four logistic regression models have been used and I think three would have been enough. The model number 2 and 3 could be combined. - the results are presented and the authors did their best to report them. Unfortunately, the meaning is limited given the data obtained via this survey were not weighted. - the discussion section is brief and general. The study has a few important limitations but none is mentioned. There is no clear translation of the findings

	- there are problems with the tables (e.g., missing the sign for percentages (%); missing the headings for ORs and 95%CI) There are grammatical errors and the language is not always appropriate. Editorial revisions are necessary and recommended.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Reviewer Name Maxwell Dalaba
Abstract
1) Page2, line 21, the CI stated was ; CI 1,92 to 2.74. However in the table 2 , and results (page 6, line 51) it was 1.91 to 2.74. Cross check this.
Thank you for this observation. We have corrected the mistakes as follows “OR 2.29; 95% CI 1.92 to 2.74; P-value < 0.001”
2) On page 2 line 27, you used MNCH. Given that it was the first time to be mentioned, you needed to write it in full.
Thank you for this comment. We have defined MNCH as “Maternal, Neonatal and Child Health”
Methods
3) Define maternal health insurance. In fact, how was health insurance status ascertained, especially since this has been a controversial point in prior studies of NHIS enrollment? Did interviewers ask to see insurance cards to verify active enrollment?
Thank you for your comment. Women that have health insurance cover were defined as those that claimed to possess private or public health insurance when they were interviewed, and we added this to the methods section (paragraph 1, page 5).
We don’t have any reservation for the method that DHS used to assess maternal health insurance status as maternal health insurance status is a variable that can be ascertained well.
4) Several studies have shown that the insured differ from non-insured in many ways (age, health status, wealth, education level, etc.), and some of these variables clearly have potential to confound the relationship between NHIS enrollment and utilization of MNCH. Hence the background characteristics should include, at minimum, basic descriptive statistics on the dependent variable (NHIS enrollment), and differences between insured and non-insured across potential confounding variables (such as age, occupation, wealth quintile etc.).
Thank you for this comment. In table 1, we were primarily interested in general characteristics of the study population and as such did not describe the population based on maternal health insurance status. As we pre-determined which confounders to include in the regression analyses, this was not required to identify potential confounders.
To accommodate the reviewer and possible interested readers, we provided this information and amended table 1. In addition, we added to the results section the following paragraph: “Insured women were more frequently engaged in skilled labour (41.5% versus 29.9%), more often had completed secondary education or higher (50.3% versus 29.9%) and belonged to the highest quintile of wealth (40.4% versus 20.9 percent). Uninsured women more often indicated to have difficulty to access the health facility (37.4% versus 27.9%).”
5) Given that data was not collected by simple random sampling method, did you consider the design effect during the analysis? it is necessary to consider the design effect in the analysis(i.e using the svy estat command)
Thank you for this comment. We did not consider the hierarchical nature of the data in our analysis because our research question focused on individual-level data. We agree that this may lead to a slight under-estimation of the standard error and that might have affected the confidence interval of our estimates. However, it has no impact on the strength of the associations observed between maternal health insurance and continuum care service utilization.
Results

6) Exactly how many women were involved in your analysis? The figure reported in the abstract (2,987), results section (3,000) and Table 1 (marital status= 2992, maternal occupation = 2978 etc) are not consistent.
Thank you for this comment. 2992 women that delivered the preceding five years before the GHDS 2008 was conducted were involved in this study. The observed differences that the reviewer mentioned above was due to missing data, most of which were less than 0.25%.
7) You stated that “More than 90% of the women were co-habiting with their husbands”. Co-habiting was not mentioned in methods and not found on Table1. Check it again.
Thank you for this comment. We have rephrased this segment as follows “More than 90% of the women were married”
8) The statement “ After fully adjusting for socioeconomic, demographic and obstetric factors in Model IV the probability of attending antenatal clinic among women that were insured (OR 1.96;95% CI 1.52 to 2.52) compared to those that were not insured.” is not complete(page 6 line 30-35).
Thank you for this observation. We have amended this section as follows “After fully adjusting for socioeconomic, demographic and obstetric factors in Model IV the probability of attending antenatal clinic among women that were insured (OR 1.96; 95% CI 1.52 to 2.52) increased by almost two-fold compared to those that were not insured”
Discussion
9) If a pregnant woman presents herself at the health facility for ANC or delivery without NHIS, will she be attended to free of charge? Or is it is only about exemption to enroll into the NHIS? If the case is for only the insured women (i.e. exemption to enroll into the NHIS), then the free policy has to be revisited.
Thank you for this comment. As you have mentioned there is free maternal healthcare policy but the implementation has been inadequate due to insufficient funding; women without insurance cover still need to pay out-of-pocket.
10) Can you also state the NHIS coverage (maybe how many females) for readers to know the current enrollment?
Thank you for this comment. We have mentioned in the background that in 2011 up to 90% of Ghanaians had health insurance coverage.
References
11) Reference number 14, 16, 17,18, 21,22,23,24, are not found in the main text.
Thank you for this comment. The references that the reviewer mentioned were all cited in third paragraph of the background.

Reviewer: 2
Reviewer Name Violanda Grigorescu
1) the abstracts does not include statistical methods
Thank you for this comment. We have included statistical analysis in the abstract as follows “Multivariable logistic regression was applied to determine the independent association between maternal health insurance and utilization of antenatal, skilled delivery, and postnatal care”
2) the content of the background section could be improved. The authors mentioned both health care and community programs; however, the paper is focused on the health care only.
Thank you for this comment. In line with your suggestion we revised the background section to improve on content and to clarify that we examined in the current analysis the component of the MNCH continuum of care being delivered at the health facilities.

3) next is the methods section that has a few sub sections, each needing revisions as mentioned below.
The data source is the national survey that is not fully described. Given that it is not a common data source, I would recommend to include a more detailed description.

Thank you for this comment. We have amended this section as follows “This population-based cross-

sectional study used 2008 Ghana Demographic and Health Survey data (GDHS). Detailed information on data collection has been published elsewhere.[28] In summary, a two-stage stratified cluster sampling technique was applied to identify households that were interviewed. 412 sampling units were selected symmetrically from the 10 regions using probability proportional sampling. 6,180 households, 5,300 women and 5,000 men were identified for interviews. All women and men of reproductive age in all the selected households, aged 15 to 49 and 15 to 59 years respectively were interviewed face-to-face with the aid of questionnaires (household, women's and men's questionnaires). Information on socioeconomic, demographic and health indicators was covered in questionnaires. The household, women's and men's response rates of 98.9% (6,141), 96.5% (5,096) and 95.8% (4,769) respectively were observed.[28] Finally, weighting adjustment was applied because number of people interviewed per sampling unit was not proportion to its population. Only those that delivered in the last five year (2992 women) preceding the survey were examined in these study."

4) There is no mention of the weighting methods although the authors referred to the survey sampling as representative. The analysis was performed only by including women who were surveyed (3,000 with a high response rate of ~95%). I strongly recommend to resubmit with weighted data

Thank you for this comment. We used weighted data in this analysis, which we denote in the description of the statistical analysis undertaken.

5)Men were included in the survey but yet there is no explanation why was that given the analysis was based on women's responses as stated in the paper.

Thank you for this comment. We have stated under methods that both men and women were interviewed as part of the GDHS and this information was used for the socio-economic and socio-demographic baseline information. However, as the outcome assessment pertains directly to maternal health, only the women's answers were included, and we have not specifically mentioned this in the discussion. For clarity we included in the result section a note that about 3,000 women aged 15 to 49 years were interviewed for the current analysis.

6) There is also a 10 years age difference in the upper age limit between the two groups, women and men, but the authors did not explain the rationale behind.

Thank you for this comment. We based our analysis on the Ghana DHS data considering reproductive age for women and men to be 15 to 49 and 15 to 59 years, respectively. For clarity, we added this to the methods section under data collection.

Three outcomes are mentioned but the description is not very clear for each. For instance, the authors mentioned that antenatal care is measured as the care received by women from their providers. Does that mean all women included in the study had health care?

Thank you for this comment. As observed by the reviewer, the following three outcomes were examined in this study:

1) Whether the women reported up to four antenatal care visits or not
2) Whether the women reported to have delivered via skilled delivery or not
3) Whether the women reported to have utilized postnatal care after delivery or not

In the methods section of the manuscript we had earlier defined these three outcomes as follows "Antenatal care was defined as care that women receive from their healthcare providers during pregnancy. Skilled delivery was defined as delivery that is performed by healthcare professionals

(doctor, midwives, and nurses) while postnatal care was defined as care that women receive from their health providers post-delivery. Skilled delivery and postnatal care were coded “yes/no” based on whether the women received it or not. Similarly, antenatal care was classified into two categories: those that had up to four antenatal visits and others that had less than four.”

7) Four logistic regression models have been used and I think three would have been enough. The model number 2 and 3 could be combined.

Thank you for this comment. We do agree with your suggestion that model 2 and 3 could be combined, but we prefer to observe the effect of these cofounders on the crude estimates separately.

8) the results are presented and the authors did their best to report them. Unfortunately, the meaning is limited given the data obtained via this survey were not weighted.

Thank you for this comment. We have stated under methods that we analyzed the weighted data.

9) the discussion section is brief and general. The study has a few important limitations but none is mentioned. There is no clear translation of the findings

Thank you for this comment. The discussion section has been improved, by including additional limitations of this study. Policy implications of our findings have been highlighted as follows “Our findings will inform health policy makers that implementing universal health insurance is one of the main interventions to ensure access to MNCH continuum of care regardless of their demographic, obstetrics and socioeconomic differences among women and their children.” “In the DSH data only surviving mothers have the opportunity to be interviewed which might have caused under-estimation of the observed associations if those that died during delivery were uninsured women that had no antenatal, skilled delivery and postnatal care.”

10) - there are problems with the tables (e.g., missing the sign for percentages (%); missing the headings for ORs and 95%CI)

Thank you for this comment. We have checked the tables and all the omissions mentioned have been amended.

11) There are grammatical errors and the language is not always appropriate. Editorial revisions are necessary and recommended.

Thank you for this comment. We have proofread the manuscript to correct for grammatical errors

VERSION 2 – REVIEW

REVIEWER	Maxwell Ayindenaba Dalaba Navrongo Health Research Centre, Ghana
REVIEW RETURNED	21-Oct-2015

GENERAL COMMENTS	Minor comments • On page 3, line 39- 40, you said “in 2011, up to 90% of Ghanaians had health insurance coverage” . Please cross check that information. You know there used to be confession between cumulative enrolment and those who have valid cards. Currently only about 34% are enrolled. It has never gotten to 90%. • Page 4, line 29, start a sentence with Capital letter, change “all” to “All”

	• On page 4, line 5, you said antenatal was classified into two categories: those who had up to four antenatal visits and others who had less than four. It is not clear in your analysis and results which of these categories you used. • Page 6, line 24, co-habiting is not the same as currently married. Clarify this. • Page 6, line 29, you stated that approximately two-thirds of the women had difficulty to healthcare facility. This is not consistent with Table 1. • Page 9, line 6, check the acronym “GDSH”, which should rather be GDHS. • There is the need for proof reading of the manuscript before publishing to correct typos and some grammatical errors. .

VERSION 2 – AUTHOR RESPONSE

1. On page 3, line 39- 40, you said "in 2011, up to 90% of Ghanaians had health insurance coverage" . Please cross check that information. You know there used to be confession between cumulative enrolment and those who have valid cards. Currently only about 34% are enrolled. It has never gotten to 90%.

Thank you for this comment. We have rephrased this section as follows “In 2011, the cumulative enrollment for national health insurance was 21.4 million; however only 8.23 million have active health insurance protection.

2. Page 4, line 29, start a sentence with Capital letter, change "all" to "All"
Thank you for this observation; we have changed “all” to “All”

3. On page 4, line 5, you said antenatal was classified into two categories: those who had up to four antenatal visits and others who had less than four. It is not clear in your analysis and results which of these categories you used.
Thank you for this comments. As you have rightly stated we classified antenatal visits into two categories: those who had up to four antenatal visits and others who had less than four. In response to your comment, we have restructured two sentences in the results section on page 7 as follows: “The crude association was estimated in Model 1; the likelihood of attending up to four antenatal clinics increased by 2.7 fold (OR 2.71; 95% CI 2.13 to 3.44) among women who were insured.” “After fully adjusting for socioeconomic, demographic and obstetric factors in Model IV the probability of attending up to four antenatal clinics among women who were insured was nearly twofold (OR 1.96; 95% CI 1.52 to 2.52) compared to those who were not insured.”

4. Page 6, line 24, co-habiting is not the same as currently married. Clarify this.
Thank you for this comment. We have amended this section as follows “More than 90% of the women were married and 60% of them had no health insurance coverage”

5. Page 6, line 29, you stated that approximately two-thirds of the women had difficulty to healthcare facility. This is not consistent with Table 1.
Thank you for this observation. We have corrected this sentence as follows “Approximately two-thirds of the women had no difficulty to reach the healthcare facility”

6. Page 9, line 6, check the acronym "GDSH", which should rather be GDHS.
Thank you for this comment. We have changed “GDSH” to “GDHS”

7. There is the need for proof reading of the manuscript before publishing to correct typos and some grammatical errors.
Thank you for this comment. This manuscript has undergone further proof reading as you have requested.

VERSION 3 - REVIEW

REVIEWER	Maxwell Ayindenaba Dalaba Navrongo Health Research Centre, Ghana
REVIEW RETURNED	25-Nov-2015

GENERAL COMMENTS	Concerns adequately addressed