Maternal healthcare insurance ownership and service utilisation in Ghana: Analysis of Ghana Demographic and Health Survey

Sanni Yaya, Feng Da, Ruoxi Wang, Shangfeng Tang, Bishwajit Ghose

1 School of International Development and Global Studies, University of Ottawa, Ottawa, Canada, 2 School of Pharmacy, Tongji Medical College, Wuhan, China, 3 School of Medicine and Health Management, Tongji Medical College, Wuhan, China, 4 Institute of Nutrition and Food Science, University of Dhaka, Dhaka, Bangladesh

These authors contributed equally to this work.

* sftang2018@hust.edu.cn (ST); brammaputram@gmail.com (GB)

Abstract

Objectives

Previous studies have attempted to assess the role of health insurance on health care utilization in African settings. However, there is limited evidence on the effects of health insurance on use of maternal health care. In the present study our objective was to measure the prevalence of insurance ownership, types of services covered by the insurance and the association of insurance ownership with the utilization of respective maternal health services in Ghana.

Methods

This study was based on nationally representative Demographic and Health Survey in Ghana (GDHS 2014) encompassing 4,293 mothers aged 15–49 years. Outcome variables were use of early antenatal care (ANC), facility delivery, and postnatal care (PNC) for mothers and children, and the explanatory variables were insurance coverage for these services. Associations were analysed using logistic regression models whilst controlling for potentially confounding variables.

Results

Prevalence of health insurance ownership was 66.8% (95% CI = 64.5–68.9) with significant socioeconomic disparities. The prevalence was higher particularly among women who were urban residents, had higher educational and wealth status. In general, insurance coverage for services such as ANC, childbirth and postnatal care was higher in rural areas, but that of cash benefit was higher in urban areas. Findings of multivariate analysis indicated that women who had ANC services covered had significantly higher odds of attending at least one and four ANC visits, as well as receiving PNC for child. Insurance coverage for childbirth services showed significant association with the PNC for child, not with choice of health facility delivery. Women who had cash benefit were twice as likely to use early ANC services.
visit (OR = 2.046, p < 0.05), facility delivery (OR = 1.449, p < 0.05), and PNC for mother (OR = 1.290, p < 0.05).

Conclusion

Overall prevalence of health insurance coverage has increased since 2008, with significant disparities across demographic and socioeconomic groups. Insurance ownership for different types of maternal health services showed positive association with service uptake, with exceptions for place of delivery, indicating that insurance coverage alone may not be able to promote facility delivery. More studies are required to measure the progress in maternal healthcare utilisation through the insurance programmes.

Introduction

Globally, there has been a substantial decline in maternal and child mortality rates since the 1990s. In sub-Saharan Africa, for instance, maternal mortality ratio fell by approximately 45%, however, unevenly across the countries [1]. This success is largely attributed to the active policy and programmatic efforts propelled by Millennium Development Goals (MDGs) along with the efforts by numerous national and international health and development organisations [1–5]. The recognition of the fact that maternal mortality is the leading cause of death among women of reproductive age in Africa and other low-middle-income countries has been a key driver for undertaking more intensive research and funding allocation in domain of reproductive health for improving the provision and utilisation of essential maternal healthcare services (MHS)[6–8]. Despite the strengthened efforts, progress remains far from being optimum and beset by a host of issues such as inequality in access to care, regional and structural barriers to promoting the coverage of MHS. Low-middle-income countries (LMICs) still account for almost all (99%) of maternal, newborn, and child deaths occurring globally[9].

Maternal healthcare services refer to a continuum of professional check-up, educational, nutritional, and other services for pregnant woman that take place during pregnancy, partum and postpartum period[3, 10]. Ensuring proper nursing of the mother over the course of pregnancy provides the opportunities for maintaining optimum health which is a crucial determinant for healthy birth outcomes[11, 12]. Although motherhood is meant to be a rewarding and positive psychosocial experience, a considerable proportion of the women in LMICs end up seeing pregnancy and childbirth as an afflicting encounter owing to issues arising mainly during peri- and postnatal period e.g. hemorrhage, infection, hypertension, obstructed labour, preeclampsia, premature labor and birth, unsafe abortion[13–17]. Although these complications are mostly avoidable through routine uptake of MHS, a large number of women in LMICs fail to avail these services owing to various socioeconomic, cultural, and healthcare system-related barriers.

Previous studies have identified the underlying barriers to utilisation of MHS at various individual and community levels[18–20]. From a behavioural perspective, women’s healthcare seeking behaviour can be influenced to a large extent by financial constraints and geographic distance. Various supply and demand side strategies have been proposed and implemented to promote MHS utilisation[9, 21] including home visiting, community education programmes and financial approaches e.g. maternal health insurance schemes in several Asian and African countries [22–24] including the National Health Insurance Scheme of Ghana[25, 26]. However, the impact of insurance programmes on promoting MHS has not been deeply studied to
understand to what extent the increasing utilisation resulted from insurance policies, which constraints reaching conclusive findings.

A growing volume of studies suggests a positive role of health insurance on health care seeking behaviour and health outcomes. In contrast, there is only a handful of studies assessing the influence of health insurance on MHS uptake. Countries in sub-Saharan Africa are generally characterised by low adoption of medical insurance. However, the prevalence of insurers is rising especially in the countries that have managed a modest economic growth in recent years e.g. Ghana, Nigeria\[22, 27\]. Ghana introduced its first National Health Insurance Scheme (NHIS) in 2005 as a demand-side strategy to promote service uptake, minimise the impact of exorbitant fees especially for the marginalized population who usually bear the highest burden of diseases and deepening poverty owing to catastrophic health expenditures [22, 28]. Several studies have attempted to identify whether the insurers are more likely to use ante-natal and skilled delivery services in Ghana. However, none of the studies have focused on the types of services covered by the insurance policies on the broad range of MHS including ante-natal, delivery services, and postnatal care for both mother and child. Therefore, in the present study, we aimed to investigate the differential influence of the types of services insured on MHS as well as postnatal care for the newborns. We hypothesise that having insurance coverage for a particular service will be associated with increased utilisation of that service.

Methods

Survey and sampling technique

Data for this study were collected from the Ghana Demographic and Health Survey (GDHS) conducted in 2014[25]. Specifically, the women and child files were used for the study. GDHS is carried out by the Ghana Statistical Service and Macro International under the auspices of DHS programs. The survey captures data on various aspects of maternal health conditions within the country and as such was deemed suitable for this study. The dataset was requested online from Measure DHS website on the 16th October, 2015. In all, 9,396 women (aged 15–49) from 11,835 households nationwide were interviewed. However, 4,294 women had birth history within the last 5 years preceding the survey and as such they constituted the sample size for this study. The 2014 GDHS was conducted with an updated frame from the 2010 Population and Housing Census (PHC) prepared by the Ghana Statistical Service (GSS). The frame exempted institutional and nomadic groups including hotel occupants and prisoners. The survey constituted a two-stage sample design for the purpose of allowing estimates of core indicators at the national level. The initial phase constituted selection of sample points (clusters) involving enumeration areas (EAs) outlined for the 2010 PHC in which 427 clusters were designated in all constituting 216 from urban and 211 from rural areas. The next stage utilised systematic sampling of households in which household inventory operation was carried out in all the identified EAs between January and March 2014.

Variables

Three types of services within the scope of pregnancy (Timing and Adequacy of Prenatal care), delivery (Health facility delivery) and post-delivery (Postnatal care for mother and child) for the latest childbirth (occurring within preceding five years of the survey) were the dependent variables. All the variables were measured based on the answers by the individual respondents and recoded as per the WHO guidelines. For instance, ANC was categorised as timely (1) if the first visit took place within the first trimester and late (0) if otherwise; adequate (1) if made at least 4 ANC visits and inadequate (0) if otherwise. Place of delivery as Home (respondents/others home) and Health facility (hospital, clinic, health centre.). We additionally calculated
the prevalence of making at least one ANC contact as a considerable percentage failed to make any ANC visit. The main explanatory variables were self-reported insurance coverage for ANC, childbirth and PNC services, which were coded as: Yes (1) and No (0).

To adjust the analysis for potential confounding variables, the following were included in the study based on the availability in the dataset and theoretical relationship with the dependent and explanatory variables: Age groups (15–24, 25–29, 30–34, 35–49); Residency (Urban, Rural); Educational status (No education, Primary, Secondary/higher); Wealth status (Poor, Non-poor); Occupation (Unemployed, Professional/technical/managerial, Sales/skilled, manual); Religion (Christian, Islam/other); Ethnicity (Akan, Ewe, Mole-Dagbani, Other); Parity (1–3, >3); Household head (Male, Female); Has health Insurance (Yes, No) [4, 18, 23, 25, 26, 28, 29]. The variables were listed and described in Table 1.

Household wealth status is calculated based on scores assigned to a range of household assets, for example, number of household members, floor, wall and roof material; type of cooking fuel; access to potable water and sanitation, ownership of radio, TV, refrigerator, motorcycle and others. These scores are used to perform principal components analysis that ranks the households according to their respective total scores. The final is further categorised into quintiles that classify the households into five groups from poorest to richest (Quintile 1/poorest, Quintile 2/poorer, Quintile 3/middle, Quintile 4/richer, Quintile 5/richest). Measurement of wealth index is explained in detail elsewhere[4, 29]. For health insurance, the following items were collected by the survey: Insurance covers ANC (Yes/No); Insurance covers Childbirth (Yes/No); Insurance covers mother’s PNC (Yes/No); Insurance covers child’s PNC (Yes/No); Insurance has cash benefit No (Yes/No). Analysis of the contextual items are more likely to provide a better picture of the association with the corresponding outcome variables e.g. receiving ANC. Apart from the direct coverage of the specific services, the insurance also includes a cash benefit scheme that is expected to improve the financial accessibility to the services.

Data analysis

Data were analysed with SPSS 24. The dataset was prepared to select the variables of interest and drop the observation with missing values and outliers. Following that, the dataset was converted to adjusted for cluster design by accounting for sampling strata, primary sampling unit, and sampling weight. As the initial analysis, the basic socio-demographic characteristics of participants were presented in terms of frequencies and percentages. Prevalence of insurance ownership across the sociodemographic factors was calculated by Chi-square bivariate tests and was shown as percentages with 95% CIs. In the final step, binary logistic regression model was used to calculate the odds ratios of the associations between the measures of MHS with insurance coverage status while adjusting for the demographic and socioeconomic parameters empirically and theoretically pertinent to the outcome and exposure variables. Results of regression analysis were presented as odds ratios along with their 95% CIs as indicator of significance as well as precision of the OR values. For all associations, P-value of <0.05 was considered statistically significant.

Ethical approval

The protocol of DHS surveys is approved by the Ethics Committee of ORC Macro Inc. The study was based on analysis of anonymised secondary data available in the public domain of DHS, therefore no additional approval was necessary. However, approval for the reuse of the data was obtained by authors from DHS.
Table 1. Sample description. Ghana Demographic and Health Survey 2014.

| Variables               | Description                                                                 | N = 4,293 | %  |
|-------------------------|-----------------------------------------------------------------------------|-----------|----|
| Age groups              |                                                                             |           |    |
| 15–24                   | Age of the respondent in the interview year                                 | 923       | 21.5|
| 25–29                   |                                                                             | 1058      | 24.6|
| 30–34                   |                                                                             | 967       | 22.5|
| 35–49                   |                                                                             | 1345      | 31.3|
| Residency               | Whether the respondent is a rural or urban resident                         |           |    |
| Urban                   |                                                                             | 1778      | 41.4|
| Rural                   |                                                                             | 2515      | 58.6|
| Educational status      | Highest level of formal education attained by the respondent                |           |    |
| No education            |                                                                             | 1419      | 33.1|
| Primary                 |                                                                             | 869       | 20.2|
| Secondary/higher        |                                                                             | 1836      | 42.8|
| Wealth status           | Index of relative wealth status of households based on the possession of durable goods (e.g. refrigerator and TV) and building material (e.g. concrete and wooden), rather than personal income |           |    |
| Poor                    |                                                                             | 2241      | 52.2|
| Non-poor                |                                                                             | 2052      | 47.8|
| Occupation              | Type of employment of the respondent                                        |           |    |
| Unemployed              |                                                                             | 767       | 17.9|
| Professional/technical/managerial |                                                                             | 1542     | 35.9|
| Sales/skilled manual    |                                                                             | 1984      | 46.2|
| Religion                | Type of religious affiliation of the household                              |           |    |
| Christian               |                                                                             | 3084      | 71.8|
| Islam/other             |                                                                             | 1209      | 28.2|
| Ethnicity               | Type of ethnic affiliation of the household                                 |           |    |
| Akan                    |                                                                             | 1643      | 38.3|
| Ewe                     |                                                                             | 476       | 11.1|
| Mole-Dagbani            |                                                                             | 1151      | 26.8|
| Other                   |                                                                             | 1023      | 23.8|
| Parity                  | Total number of children ever born                                          |           |    |
| 1–3                     |                                                                             | 2505      | 58.4|
| >3                      |                                                                             | 1788      | 41.6|
| Household head          | Sex of the household head                                                   |           |    |
| Male                    |                                                                             | 3224      | 75.1|
| Female                  |                                                                             | 1069      | 24.9|
| Has health insurance    | Self-reported ownership of health insurance scheme                           |           |    |
| No                      |                                                                             | 1326      | 30.9|
| Yes                     |                                                                             | 2967      | 69.1|
| Early ANC               | Made ANC visit within first trimester                                        |           |    |
| No                      |                                                                             | 1568      | 36.5|
| Yes                     |                                                                             | 2725      | 63.5|
| At least 1 ANC          | Made at least one ANC visit during the most recent pregnancy                 |           |    |
| No                      |                                                                             | 131       | 3.1 |
| Yes                     |                                                                             | 4162      | 96.9|
| At least 4 ANC          | Made at least four ANC visits during the most recent pregnancy               |           |    |
| No                      |                                                                             | 577       | 13.4|
| Yes                     |                                                                             | 3716      | 86.6|

(Continued)
Results

Descriptive analysis

Sample population comprised of 4,293 women and the mean age was 30.66 years (SD = 7.128). Basic sociodemographic characteristics of the participants were summarised in Table 1. A greater proportion of the participants were aged above 34 years, rural residents, had secondary/higher educational level, employed, followers of Christianity, of Akan ethnicity, had 1–3 children, and lived in male-headed households. Little less than two-third of the women had early ANC contact. Prevalence of at least one and at least four ANC visits were 96.9% and 86.6%, and that of facility delivery was 72.4%. respectively 84% of the women and 72% of the children had received postnatal care.

About two-third of the women reported having health insurance. Significance of the association between having health insurance across the sociodemographic variables were assessed by chi-square bivariate tests and was presented in Table 2. It shows that likelihood of having health insurance was higher among those aged above 34 years, urban residents, had secondary/higher educational level, from non-poor households, sales/skilled professional, followers of Christianity, belongs of Akan ethnicity, has 1–3 children, and from male headed households. Health insurance ownership also showed positive association with MHS and PNC for child such that women with health insurance had higher percentages of utilizing the services for themselves and children compared with those who did not have health insurance.

Fig 1 shows the percentage of types of services under the coverage of health insurance in urban and rural areas. In general, insurance schemes in urban areas had lower percentage of covering ANC, childbirth and postnatal services than in rural, but the differences were not statistically significant. However, urban women enjoy a significantly higher percentage of cash benefits within their insurance schemes compared with rural women.

Table 3 summarises the results of cross-tabulation between the types of services covered by health insurance and the respective percentage of utilizing that service. In general, having insurance for a particular type of services showed a higher percentage of uptake of that service. However, some exceptions were observed for certain combination of insurance coverage and service uptake. Having covered for ANC services showed higher percentages for making at least one and four ANC visits, but not on making early ANC contact, delivering at a health facility, and receiving PNC for mother.

Table 4 summarises the results of the multivariate association between the types of MHS with insurance coverage status. It indicated that women who had their ANC services covered had significantly higher odds of attending at least one and four ANC visits, as well as receiving PNC for the child. Notably, insurance coverage for childbirth services was associated with

Table 1. (Continued)

| Variables      | Description                                                                 | N = 4,293 | %   |
|----------------|-----------------------------------------------------------------------------|-----------|-----|
| Place of delivery | Place of delivery being respondents/relatives home of a health facility e.g. hospital, clinic, health centre. | 1186      | 27.6 |
| Health facility | Place of delivery being respondents/relatives home of a health facility e.g. hospital, clinic, health centre. | 3107      | 72.4 |
| PNC for mother | Respondent received professional postnatal care for herself                   | 688       | 16.0 |
| PNC for child  | Respondent received professional postnatal care for her child                 | 1183      | 27.6 |
|                |                                                                             | 3110      | 72.4 |

https://doi.org/10.1371/journal.pone.0214841.t001
Table 2. Bivariate association between health insurance ownership with the sociodemographic variables in Ghana.

| Variables            | Has health insurance |  p       |
|----------------------|----------------------|----------|
|                      | Yes                  | No       |<0.001   |
|                      | 66.8 (64.5–68.9)     | 33.2 (31.1–35.5) |<0.001   |
| Age groups           |                      |<0.001   |
| 15–24                | 19.9 (18.0–21.9)     | 24.6 (21.9–27.4) |<0.001   |
| 25–29                | 25.9 (24.0–27.9)     | 20.8 (18.5–23.3) |<0.001   |
| 30–34                | 24.0 (22.1–26.0)     | 22.2 (19.3–25.5) |<0.001   |
| 35–49                | 30.3 (28.1–32.6)     | 32.4 (29.4–35.5) |<0.001   |
| Residency            |<0.001   |
| Urban                | 52.5 (48.5–56.6)     | 56.3 (51.6–60.9) |<0.001   |
| Rural                | 47.5 (43.4–51.5)     | 43.7 (39.1–48.4) |<0.001   |
| Educational status   |<0.001   |
| No education         | 26.5 (22.8–30.6)     | 25.8 (22.5–29.4) |<0.001   |
| Primary              | 24.5 (21.8–27.5)     | 17.2 (15.4–19.1) |<0.001   |
| Secondary/higher    | 48.9 (44.7–53.2)     | 57.0 (53.5–60.5) |<0.001   |
| Wealth status        | 0.007    |
| Poor                 | 39.6 (35.8–43.5)     | 44.7 (40.0–49.5) |<0.001   |
| Non-poor             | 60.4 (56.5–64.2)     | 55.3 (50.5–60.0) |<0.001   |
| Occupation           |<0.001   |
| Unemployed           | 18.5 (16.6–20.6)     | 15.9 (13.8–18.1) |<0.001   |
| Professional/technical/managerial | 30.5 (27.8–33.3) | 31.9 (27.9–36.3) |<0.001   |
| Sales/skilled manual | 51.0 (48.1–53.9)     | 52.2 (47.9–56.5) |<0.001   |
| Religion             | 0.003    |
| Christian            | 75.4 (71.4–79.0)     | 78.7 (75.1–81.9) |<0.001   |
| Islam/other          | 24.6 (21.0–28.6)     | 21.3 (18.1–24.9) |<0.001   |
| Ethnicity            |<0.001   |
| Akan                 | 44.1 (40.2–48.2)     | 53.9 (49.1–58.6) |<0.001   |
| Ewe                  | 14.3 (12.1–16.8)     | 11.1 (8.9–13.9) |<0.001   |
| Mole-Dagbani         | 19.2 (15.4–23.5)     | 13.6 (11.0–16.6) |<0.001   |
| Other                | 22.4 (19.0–26.2)     | 21.4 (17.4–26.1) |<0.001   |
| Parity               | 0.001    |
| 1–3                  | 62.9 (60.8–65.1)     | 56.9 (53.6–60.1) |<0.001   |
| >3                   | 37.1 (34.9–39.2)     | 43.1 (39.9–46.4) |<0.001   |
| Household head       |<0.001   |
| Male                 | 75.3 (72.6–77.8)     | 67.4 (64.1–70.6) |<0.001   |
| Female               | 24.7 (22.2–27.4)     | 32.6 (29.4–35.9) |<0.001   |
| Early ANC            |<0.001   |
| No                   | 33.7 (30.8–36.8)     | 40.4 (36.9–44.1) |<0.001   |
| Yes                  | 66.3 (63.2–69.2)     | 59.6 (55.9–63.1) |<0.001   |
| At least 1 ANC       |<0.001   |
| No                   | 1.3 (0.8–2.1)        | 5.1 (3.6–7.2) |<0.001   |
| Yes                  | 98.7 (97.9–99.2)     | 94.9 (92.8–96.4) |<0.001   |
| At least 4 ANC       |<0.001   |
| No                   | 8.9 (7.6–10.5)       | 18.9 (15.6–22.7) |<0.001   |
| Yes                  | 91.1 (89.5–92.4)     | 81.1 (77.3–84.4) |<0.001   |

(Continued)
higher odds of delivering at a health facility, however, the association was not statistically significant, indicating the presence non-financial factors on women's preference for venue of delivery. Having insurance for PNC services for mothers showed significantly higher odds (OR = 1.316, p < 0.05) of receiving PNC for children, but not for mothers (OR = 0.863, p < 0.05). Having cash benefit showed a significantly positive association with making early ANC visit (OR = 2.046, p < 0.05), facility delivery (OR = 1.449, p < 0.05), and PNC for mother (OR = 1.290, p < 0.05).

Model quality was assessed by using pseudo-R² statistics, and the values ranged from .239 to .403 which indicated a satisfactory model fit.

**Discussion**

This study reports the prevalence of insurance ownership among women across various demographic and socioeconomic backgrounds, as well as the association between insurance ownership and utilisation of antenatal, professional delivery, and postnatal care for mothers and children. Overall, about two-third of the women reported having health insurance in 2014, compared with two-fifth in 2008[22]. Analysing by the background characteristics revealed that women from urban areas, with higher education and wealth status, were the ones more likely to have health insurance. In general, insurance programmes in urban areas had a lower percentage of covering for ANC, childbirth and postnatal services than in rural, with urban women having a significantly higher percentage of cash benefits within their insurance schemes compared with rural women. Addressing the socioeconomic gap in insurance ownership is likely to remain a challenge in the sub-Saharan African countries where a substantial proportion of the population live below poverty line and are least capable of accessing health-care services, despite sharing higher health risks and disease burden.

A recent study on health insurance policies in five sub-Saharan countries (Ghana, Tanzania, Kenya, Rwanda, and Ethiopia) has concluded that the existing programmes are leaving out the most marginalized, including Ghana, where many of the targeted services are not within the reach of the poor[30]. So far there are no large-scale researches focusing on the extent to which the most marginalised population are benefiting from the insurance programmes, especially in the context of reproductive and MHS. Many countries in sub-Sahara Africa have been able to increase the uptake of MHS and reduce maternal and child mortality rates. However, review of the literature suggests that the progress has not been even across and within countries and is occurring mostly among the relatively wealthier sections of the population. Therefore, it is essential that health policymakers pay special attention to the marginalised population and

---

**Table 2. (Continued)**

| Variables       | Has health insurance | p      |
|-----------------|----------------------|--------|
|                 | Yes                  | No     |        |
|                 | 66.8 (64.5–68.9)     | 33.2 (31.1–35.5) | <0.001 |

| Place of delivery | Home | Health facility | <0.001 |
|-------------------|------|----------------|--------|
| Home              | 21.0 (18.7–23.5) | 31.2 (27.2–35.5) |
| Health facility   | 79.0 (76.5–81.3) | 68.8 (64.5–72.8) |

| PNC for mother    | No  | Yes       | <0.001 |
|-------------------|-----|-----------|--------|
| No                | 11.8 (9.7–14.2) | 17.4 (14.3–21.0) |
| Yes               | 88.2 (85.8–90.3) | 82.6 (79.0–85.7) |

| PNC for child     | No  | Yes       | <0.001 |
|-------------------|-----|-----------|--------|
| No                | 26.3 (23.1–29.7) | 30.4 (25.9–35.3) |
| Yes               | 73.7 (70.3–76.9) | 69.6 (64.7–74.1) |

[https://doi.org/10.1371/journal.pone.0214841.t002](https://doi.org/10.1371/journal.pone.0214841.t002)
investigate the efficacy of the insurance and cash benefit programmes to promote MHS utilisation. In Ghana there has been an increasing percentage of population under various health and social insurance programmes and subsequent improvement in MHS uptake, as also supported by the present findings.

Fig 1. Types of maternity services covered by health insurance in Ghana, 2014.

Table 3. Percentage of service uptake by insurance coverage status.

|                           | Early ANC | 1 ANC | 4 ANC | Facility delivery | PNC for mother | PNC for child |
|---------------------------|-----------|-------|-------|-------------------|----------------|--------------|
|                           | No        | Yes   | No    | Yes               | No             | Yes          |
| Insurance covers ANC      |           |       |       |                   |                |              |
| No                        | 30.8      | 69.2  | 3.8   | 96.2              | 15.1           | 84.9         |
| Yes                       | 34.7      | 65.3  | 1.6   | 98.4              | 10.0           | 90.0         |
| Insurance covers Childbirth|          |       |       |                   |                |              |
| No                        | 32.8      | 67.2  | 3.0   | 97.0              | 15.2           | 84.8         |
| Yes                       | 34.6      | 65.4  | 1.6   | 98.4              | 10.0           | 90.0         |
| Insurance covers mother’s PNC |         |       |       |                   |                |              |
| No                        | 32.2      | 67.8  | 2.5   | 97.5              | 12.3           | 87.7         |
| Yes                       | 34.7      | 65.3  | 1.6   | 98.4              | 10.1           | 89.9         |
| Insurance covers child’s PNC |         |       |       |                   |                |              |
| No                        | 31.5      | 68.5  | 2.9   | 97.1              | 11.9           | 88.1         |
| Yes                       | 34.9      | 65.1  | 1.5   | 98.5              | 10.1           | 89.9         |
| Insurance has cash benefit |           |       |       |                   |                |              |
| No                        | 34.9      | 65.1  | 1.7   | 98.3              | 10.4           | 89.6         |
| Yes                       | 23.0      | 77.0  | 1.1   | 98.9              | 9.2            | 90.8         |

https://doi.org/10.1371/journal.pone.0214841.t003
In general, having insurance for a particular type of services showed a higher percentage of uptake of that service. The positive impact of health insurance ownership on MHS utilisation was reported in Kenya, Rwanda and Tanzania[22, 23, 31]. However, some exceptions were observed in the present study for a certain combination of insurance coverage and service uptake. For instance, having covered for ANC services showed higher percentages for making at least one and four ANC visits, but not on making early ANC contact, delivering at a health facility, and receiving PNC for mother. The impact of health insurance on promoting the utilization of MHS is likely to vary depending on the characteristics, such as the amount of premiums, benefits plans, location and quality of healthcare services[32, 33]. In the present study, we had no information on whether the premiums were exempted and state of healthcare services, so it is possible that the inclusion of these variables could alter the strength of the associations. Regardless of that, we found that insurance coverage for specific types of MHS was generally associated with higher likelihood of utilising respective services. Some exceptions included early initiation of ANC, and choice of place of delivery. Having insurance for ANC care showed positive association with the number of minimum one adequate ANC visits, but it had no influence on the timely starting of visits. Insurance coverage for childbirth services had positive association with having adequate number of ANC visits, but not on venue of delivery. Of note, preference for venue of delivery was not influenced by having insurance for childbirth either. This finding partly reflects the influence of non-pecuniary factors that have shown to play strong roles in health perception and healthcare-seeking behaviour of individuals. However, offering cash benefits was associated with increased odds of choosing facility delivery, implying the direct cash offers can act as better motivating factors compared with insurance coverage for a particular service. More studies should be carried out to explore the relative benefits of various insurance schemes and ensure the efficacy of the existing interventions strategies.

**Conclusion**

Despite the increasing prevalence of having health insurance ownership and utilising essential maternal healthcare services, socioeconomic inequality in insurance ownership is still common. Our findings also indicate that comprehensive and equitable expansion of health insurance enrollment can lead to higher rates of maternal care utilization in Ghana. However, the results need to be interpreted with caution as the survey was cross-sectional and lacked...
information on behavioural and cultural factors that might have influenced the estimation of the positive effects of health insurance. Future researches should focus on exploring the causes of lower insurance coverage among certain population and analyse the effectiveness of health insurance programmes in promoting MHS among different socioeconomic groups.

Author Contributions

Conceptualization: Bishwajit Ghose.

Data curation: Bishwajit Ghose.

Formal analysis: Bishwajit Ghose.

Investigation: Shangfeng Tang.

Methodology: Sanni Yaya, Shangfeng Tang, Bishwajit Ghose.

Project administration: Feng Da.

Resources: Ruoxi Wang.

Software: Feng Da, Ruoxi Wang, Bishwajit Ghose.

Supervision: Feng Da, Ruoxi Wang, Bishwajit Ghose.

Visualization: Shangfeng Tang, Bishwajit Ghose.

Writing – original draft: Sanni Yaya, Shangfeng Tang, Bishwajit Ghose.

Writing – review & editing: Sanni Yaya, Ruoxi Wang, Bishwajit Ghose.

References

1. Kuruvilla S, Schweitzer J, Bishai D, Chowdhury S, Caramani D, Frost L, et al. Success factors for reducing maternal and child mortality. Bull World Health Organ. 2014; 92:533–544B. https://doi.org/10.2471/BLT.14.138131 PMID: 25110379

2. Assefa Y, Damme WV, Williams OD, Hill PS. Successes and challenges of the millennium development goals in Ethiopia: lessons for the sustainable development goals. BMJ Glob Health. 2017; 2. https://doi.org/10.1136/bmjgh-2017-000318 PMID: 29081999

3. Ghose B, Deng D, Tang S, Yaya S, He Z, Udenigwe O, et al. Women’s decision-making autonomy and utilisation of maternal healthcare services: results from the Bangladesh Demographic and Health Survey. BMJ Open. 2017; 7. https://doi.org/10.1136/bmjopen-2017-017142 PMID: 28882921

4. Yaya S, Bishwajit G, Shah V. Wealth, education and urban-rural inequality and maternal healthcare service usage in Malawi. BMJ Glob Health. 2016; 1:e000085. https://doi.org/10.1136/ bmjgh-2016-000085 PMID: 28588940

5. Cha S. The impact of the worldwide Millennium Development Goals campaign on maternal and under-five child mortality reduction: ‘Where did the worldwide campaign work most effectively?’ Glob Health Action. 2017; 10. https://doi.org/10.1080/16549716.2017.1267961 PMID: 28168932

6. de Masi S, Bucagu M, Tunçalp Ö, Peña-Rosas JP, Lawrie T, Oladapo OT, et al. Integrated Person-Centered Health Care for All Women During Pregnancy: Implementing World Health Organization Recommendations on Antenatal Care for a Positive Pregnancy Experience. Glob Health Sci Pract. 2017; 5:197–201. https://doi.org/10.9745/GHSP-D-17-00141 PMID: 2865799

7. Tsawe M, Susuman AS. Determinants of access to and use of maternal health care services in the Eastern Cape, South Africa: a quantitative and qualitative investigation. BMC Res Notes. 2014; 7. https://doi.org/10.1186/1756-0500-7-722 PMID: 25315012

8. Yaya S, Bishwajit G, Ekholuenuetal M, Shah V, Kadio B, Udenigwe O. Timing and adequate attendance of antenatal care visits among women in Ethiopia. PLoS One. 2017; 12. https://doi.org/10.1371/journal. pone.0184934 PMID: 28922383

9. Lassi ZS, Middleton PF, Bhutta ZA, Crowther C. Strategies for improving health care seeking for maternal and newborn illnesses in low- and middle-income countries: a systematic review and meta-analysis. Glob Health Action. 2016; 9. https://doi.org/10.3402/gha.v9.31408 PMID: 27171766
10. Yaya S, Bishwajit G, Ekholuenetale M, Shah V, Kadio B, Udenigwe O. Timing and adequate attendance of antenatal care visits among women in Ethiopia. PLoS ONE. 2017; 12:e0184934. https://doi.org/10.1371/journal.pone.0184934 PMID: 28922383

11. Kerber KJ, de Graff-Johnson JE, Bhutta ZA, Okong P, Starrs A, Lawn JE. Continuum of care for maternal, newborn, and child health: from slogan to service delivery. Lancet. 2007; 370:1358–69. https://doi.org/10.1016/S0140-6736(07)61578-5 PMID: 17933651

12. Lassi ZS, Salam RA, Das JK, Bhutta ZA. Essential interventions for maternal, newborn and child health: background and methodology. Reprod Health. 2014; 11 Suppl 1:S1.

13. Bonzini M, Coggon D, Palmer KT. Risk of prematurity, low birthweight and pre-eclampsia in relation to working hours and physical activities: a systematic review. Occup Environ Med. 2007; 64:228–43. https://doi.org/10.1136/oem.2006.026872 PMID: 1790552

14. Von PD, Magee LA. Strategies to reduce the global burden of direct maternal deaths. Strategies to reduce the global burden of direct maternal deaths. Obstet Med. 2017;10, 10:5, 5–9.

15. Black RE, Levin C, Walker N, Chou D, Liu L, Temmerman M. Reproductive, maternal, newborn, and child health: key messages from Disease Control Priorities 3rd Edition. The Lancet. 2016; 388:2811–24.

16. Gravett CA, Gravett MG, Martin ET, Bernson JD, Khan S, Boyle DS, et al. Serious and Life-Threatening Pregnancy-Related Infections: Opportunities to Reduce the Global Burden. PLoS Med. 2012; 9. https://doi.org/10.1371/journal.pmed.1001324

17. Wildman DE, Uddin M, Romero R, Gonzalez JM, Than NG, Murphy J, et al. Spontaneous Abortion and Preterm Labor and Delivery in Nonhuman Primates: Evidence from a Captive Colony of Chimpanzees (Pan troglodytes). PLoS ONE. 2011; 6. https://doi.org/10.1371/journal.pone.0024509

18. Singh A. Supply-side barriers to maternal health care utilization at health sub-centers in India. PeerJ. 2016; 4:e2675. https://doi.org/10.7717/peerj.2675 PMID: 27833824

19. McNamee P, Ternent L, Hussein J. Barriers in accessing maternal healthcare: evidence from low-and middle-income countries. Expert Rev Pharmacoecon Outcomes Res. 2009; 9:41–8. https://doi.org/10.1586/14737167.9.1.41 PMID: 19371178

20. Gage AJ. Barriers to the utilization of maternal health care in rural Mali. Soc Sci Med. 2007; 65:1666–82. https://doi.org/10.1016/j.socscimed.2007.06.001 PMID: 17643685

21. Till SR, Everett DS, Haas DM. Incentives for increasing prenatal care use by women in order to improve maternal and neonatal outcomes. Cochrane Database Syst Rev. 2015;:CD009916. https://doi.org/10.1002/14651858.CD009916.pub2 PMID: 26671418

22. Wang W, Temsah G, Mallick L. The impact of health insurance on maternal health care utilization: evidence from Ghana, Indonesia and Rwanda. Health Policy Plan. 2017; 32:366–75. https://doi.org/10.1093/heapol/czw135 PMID: 28365754

23. Kibusi SM, Sunguya BF, Kimunai E, Hines CS. Health insurance is important in improving maternal health service utilization in Tanzania-analysis of the 2011/2012 Tanzania HIV/AIDS and malaria indicator survey. BMC Health Serv Res. 2018; 18:112. https://doi.org/10.1186/s12913-018-2924-1 PMID: 29436993

24. Gouda HN, Hodge A, Ii RB, Zeck W, Jimenez-Soto E. The Impact of Healthcare Insurance on the Utilization of Facility-Based Delivery for Childbirth in the Philippines. PLOS ONE. 2016; 11:e0167268. https://doi.org/10.1371/journal.pone.0167268 PMID: 27911935

25. Fenny AP, Asuman D, Crentsil AO, Odame DNA. Trends and causes of socioeconomic inequalities in maternal healthcare in Ghana, 2003–2014. Int J of Social Economics. 2018; 46:288–308.

26. Dalinjong PA, Wang AY, Homer CSE. Has the free maternal health policy eliminated out of pocket payments for maternal health services? Views of women, health providers and insurance managers in Northern Ghana. PLOS ONE. 2018; 13:e0184830. https://doi.org/10.1371/journal.pone.0184830 PMID: 29389995

27. Ameyaw EK, Kofinti RE, Appiah F. National health insurance subscription and maternal healthcare utilization across mothers’ wealth status in Ghana. Health Econ Rev. 2017; 7. https://doi.org/10.1186/s13561-017-0152-8 PMID: 28444572

28. Bosomprah S, Ragoon PL, Gros C, Bansko H. Health insurance and maternal, newborn services utilization and under-five mortality. Arch Public Health. 2015; 73. https://doi.org/10.1186/s13690-015-0101-0 PMID: 26715986

29. Yaya S, Bishwajit G, Shah V. Wealth, education and urban–rural inequality and maternal healthcare service usage in Malawi. BMJ Glob Health. 2016; 1. https://doi.org/10.1136/bmjgh-2016-000085 PMID: 28588940

30. Fenny AP, Yates R, Thompson R. Social health insurance schemes in Africa leave out the poor. Int Health. 2018; 10:1–3. https://doi.org/10.1093/inthealth/ihx046 PMID: 29325056
31. Kanya L, Obare F, Warren C, Abuya T, Askew I, Bellows B. Safe motherhood voucher programme coverage of health facility deliveries among poor women in South-western Uganda. Health Policy Plan. 2014; 29 Suppl 1:i4–11.

32. Frimpong JA, Helleringer S, Awoonor-Williams JK, Aguilar T, Phillips JF, Yeji F. The complex association of health insurance and maternal health services in the context of a premium exemption for pregnant women: a case study in Northern Ghana. Health Policy Plan. 2014; 29:1043–53. https://doi.org/10.1093/heapol/czt086 PMID: 24262280

33. Robyn PJ, Sauerborn R, Bärnighausen T. Provider payment in community-based health insurance schemes in developing countries: a systematic review. Health Policy Plan. 2013; 28:111–22. https://doi.org/10.1093/heapol/czs034 PMID: 22522770