

# BMJ Open Community-based health insurance and healthcare service utilisation, North-West, Ethiopia: a comparative, cross-sectional study

Desta Debalkie Atnafu,<sup>1</sup> Hiwot Tilahun,<sup>2</sup> Yihun Mulugeta Alemu<sup>1</sup>

**To cite:** Atnafu DD, Tilahun H, Alemu YM. Community-based health insurance and healthcare service utilisation, North-West, Ethiopia: a comparative, cross-sectional study. *BMJ Open* 2018;**8**:e019613. doi:10.1136/bmjopen-2017-019613

Received 13 September 2017  
Revised 11 June 2018  
Accepted 3 July 2018

## ABSTRACT

**Objectives** The objective of this study was to compare differences in healthcare utilisation between community-based health insurance member households and non-member households and to identify factors for community-based health insurance enrolment in South Achefer District.

**Design** Comparative, cross-sectional study.

**Settings** Community-based.

**Participants** A total of 652 selected households (326 insured and 326 uninsured households) participated in the study.

**Methods** A two-sample t-test (for proportions) and  $\chi^2$  (for categorical data) were computed.

**Main outcome measure** Utilisation of healthcare.

**Results** There was a significant difference in the rate of healthcare utilisation between insured (50.5%) and uninsured (29.3%) households ( $\chi^2=27.864$ ,  $p<0.001$ ). Significant variations of enrolment status in community-based health insurance were observed in the following variables: educational status, family size, occupation, marital status, travel time to the nearest health institution, perceived quality of care, first choice of place for treatment during illness and expected healthcare cost of a recent treatment.

**Conclusions** Utilisation of health services among insured households with community-based health insurance was higher. Educational status, family size, occupation, marital status, travel time to the nearest health institution, perceived quality of care, first choice of place for treatment during illness and expected healthcare cost of a recent treatment should be emphasised to enhance community health insurance enrolment.

## BACKGROUND

In the lower socioeconomic group of the society, out-of-pocket medical expenditure results in massive financial barriers and impoverished life in the households. Globally, approximately 44 million households (over 150 million people) face financial difficulties due to healthcare expenditure. Consequently, about 25 million households are in deep poverty each year.<sup>1 2</sup> Over 90% of healthcare financial difficulties and their

## Strengths and limitations of this study

- ▶ This is the first comparative, cross-sectional study in Achefer, North-West Ethiopia, which assessed healthcare utilisation among insured and uninsured rural households.
- ▶ The study identified factors linked with enrolment in a community-based health insurance that will be pertinent in expanding community-based health insurance scheme enrolment.
- ▶ As this study was cross-sectional, the factors do not establish temporal relationship; therefore, inference of causation is not possible.

consequences occurred in Sub-Saharan African countries, where resources are limited.<sup>3 4</sup> Seven to thirteen per cent of households in six Middle East and North African countries suffered from catastrophic medical expenditure.<sup>5</sup>

The economic burden of direct payments worsens among people in the lower income groups, who struggle to cover daily consumption of food and shelter expenses. In African countries, because of limited health insurance coverage, healthcare demands out-of-pocket payments by borrowing and selling properties.<sup>6</sup> The level of direct healthcare spending accounted for 42% in Kenya,<sup>7</sup> 27% in hospitals of Ghana<sup>8 9</sup> and 37% in Ethiopia.<sup>10</sup>

Countries should reduce direct payments of healthcare by introducing health insurance scheme.<sup>11</sup> Studies identified that health insurance increases healthcare utilisation.<sup>12–14</sup> In Ethiopia, inpatient healthcare utilisation was 6%, which is one of the lowest health service utilisation rates in Sub-Saharan African countries.<sup>6</sup> For the last several years, unimproved healthcare services and financial burdens of healthcare are the main issues of Ethiopian people.<sup>15</sup> Only about 1.2% of the citizens had health insurance from both private and public agencies.<sup>16</sup>



© Author(s) (or their employer(s)) 2018. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

<sup>1</sup>School of Public Health, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, Ethiopia

<sup>2</sup>Curative and Rehabilitative Core Process, Amhara Regional Health Bureau, Bahir Dar, Ethiopia

## Correspondence to

Mr. Desta Debalkie Atnafu; [destad2a@gmail.com](mailto:destad2a@gmail.com)

Generally, health insurance coverage in Sub-Saharan countries is low.<sup>17</sup> The existing health insurances covered almost exclusively the formal sectors, which accounted for 10% of the population.<sup>18</sup> The majority of poor informal sector workers and rural self-employed residents in Africa had never accessed social protection related to health insurance programmes.<sup>19</sup>

Community-based health insurance (CBHI) scheme is an emerging alternative to increase primary healthcare access.<sup>20</sup> There is an increasing interest in the role of the CBHI schemes in improving equity and access to essential healthcare of the poor, particularly informal sector workers.<sup>7 10</sup>

Ethiopia has been implementing the CBHI scheme since 2011 to promote health of poor rural residents. However, all rural households are not enrolled in CBHI.<sup>4 10 16</sup> The meaning of enrolment in CBHI and the link between CBHI with healthcare utilisation are not well described. Hence, this study aimed to identify differences in enrolment in CBHI and to describe the link between CBHI enrolment and healthcare utilisation in the rural communities of Achefer District.

## METHODS

### Study design and setting

A community-based, comparative, cross-sectional study was conducted from February to March 2016 in a rural community of South Achefer District. The district is located in West Gojjam Zone Administration, North-West, Ethiopia. South Achefer District is divided into 20 kebele administrations. In the district a total of 36 204 households were located, of which 12 612 (34.8%) households were enrolled in CBHI. Participants who were insured in the CBHI scheme did not pay direct healthcare costs. However, the healthcare cost is calculated for the purpose of healthcare financing; then the CBHI agency reimburses the healthcare cost to governmental health institutions where patients are receiving healthcare.<sup>10</sup> In the setting of this study, subsistence agriculture is the main economic activity, and the income of majority of the households depends on agriculture.<sup>21</sup>

### Inclusion criteria

Household heads older than 18 years old were included in the study.

### Exclusion criteria

Either household head or spouse who was unable to communicate during data collection was excluded from the study.

### Sampling and sample size determination

The sample was estimated using two population proportion formula with the following assumptions: 80% statistical power with a level of significance at 5%, insured to uninsured ratio of 1:1, and the proportion of health service utilisation was 35% for the insured households

and 20% for the uninsured household.<sup>22</sup> The calculated sample sizes were 296 from insured households and 296 from uninsured households. Tolerable non-response rate was 10%; hence, the sampling procedure was a multi-stage sampling: the first stage was kebeles and then the second stage was households within the kebeles; we used a design effect of 2. The resulting sample size was 652 households (326 enrolled households and 326 unenrolled households).

### Sampling procedure

Multistage sampling procedure was employed. From South Achefer District, six kebeles were randomly selected. A total of 652 households were included in the study; sampled households were proportionally allocated to each sampled kebele. Furthermore, in each kebele households were proportionally allocated based on insurance status (insured and uninsured) and were systematically selected.

### Data collection procedure and studied variables

Ten diploma graduate data collectors were recruited and trained. Data collectors were supervised by two trained nurses. Face-to-face interviews with the household heads were conducted using structured questionnaires that were prepared in English, translated into Amharic and then back-translated. Pretesting was conducted for consistency and ease of understanding. We measured all variables at the household level; enrolment in CBHI is at the household level. The dependent variables were health services utilisation and enrolment in CBHI. The independent variables were sociodemographic factors (age, sex, education, family size); healthcare access-related factors (distance from health institutions, travel time, insurance membership, wealth); and health perception and healthcare needs variables (first choice of place for treatment, sickness of family member and health-seeking behaviour) as adapted from the Ronald Andersen behaviour model.<sup>23</sup>

### Operational definitions

Utilisation of healthcare was measured as the number of visit/s made by at least one household member at least once in the previous 6 months for health services (diagnostic or treatment). Perceived health status was the respondent's report about their health status, which was assigned with numerical values according to the following scale: very good=5, good=4, medium=3, poor=2 and very poor=1; then the value was recategorised into good, medium and poor. Perceived quality of care was the extent of the respondent's view on the quality of healthcare delivery; it was measured by Likert scale questions: very low, low, neutral, high and very high. Chronic illness is a disease condition that lasts more than 3 months. Wealth index was assessed by asking the following components of assets: livestock, crops production, infrastructure (radio, modern bed, mattress, phone, water pump, modern stove), latrine, housing condition (number of room, roof) and total farm size. Household

wealth index was computed using principal component analysis. Although there were large data sets, principal component analysis is a technique to reduce the dimensionality of large data sets. Wealth index was categorised as poor, medium and rich. The wealth index of study households ranges from poor to rich. Households indexed in the muster book of the CBHI schemes were recruited as insured, while households which were not indexed to the CBHI schemes were recruited as uninsured. Muster book is a registration book that indicates whether a household is a member of a CBHI or not.

### Data analysis and management

Data were entered into Epi Info and transported to STATA version 9 for analysis. Frequencies and proportions were used to describe the study households in relation to the studied variables. Data were presented using tables. To compare households' characteristics between insured and uninsured households, t-value with 95% CI was computed using two-sample (independent sample) t-tests.  $\chi^2$  test was computed to compare healthcare utilisation between insured and uninsured households.

### Ethical considerations

Permission to conduct the study was obtained from each kebele administration involved in the study. The data collectors read the informed consent to study participants who were not able to read and write. Study participants who were able to read were offered to read the informed consent sheet. Then written informed consents were obtained from all study participants either by finger printing or signing on the informed consent sheets.

### Patient and public involvement

No patients or the public were directly involved in the development of the research questions and outcome. No patients were involved in recruitment and design of the study. However, the study participants and administrative officials are informed about the research questions and study objectives. The findings of this research have been planned to be disseminated to Amhara Regional Health Bureau, Ethiopia; furthermore, the results of this research will be disseminated to several stakeholders after being published in scientific journals.

## RESULTS

A total of 594 households participated in the study; the response rate was 91.1%, and a subtotal of 297 households were insured.

### Sociodemographic characteristics

Majority of the respondents were male, both among the insured (69.02%) and the uninsured (62.96%). Educational status, family size, occupation and marital status showed significant difference between the insured versus the uninsured households, but the variables age

and sex did not show variation between the insured and uninsured households (table 1).

### Healthcare access-related factors

Ninety one per cent of the insured and 87.2% of the uninsured households were receiving health services from health centres. Travel time to the nearest health institution varies significantly with a household's CBHI enrolment status. However, the type of nearby health institution and household wealth index did not vary significantly with a household's CBHI enrolment status (table 2).

### Health perception and healthcare needs

Fifty one per cent of the uninsured respondents were identified as not healthy, while 39% of the insured respondents were identified as not healthy. The study variables perceived quality of care, first choice of place for treatment during illness and expected healthcare cost of a recent treatment were significantly different among the insured and uninsured households. However, perceived health status, current health status and chronic illness were not significantly different with respect to enrolment in CBHI by households (table 3).

### Utilisation of healthcare service and CBHI

In the past 6 months prior to data collection, households who were enrolled in CBHI (50.5%) were more likely to use healthcare services than households who were not enrolled (29.3%) ( $\chi^2=27.86$ ,  $p<0.001$ ) (table 4).

## DISCUSSION

This study aimed to compare differences in healthcare utilisation between CBHI member households and non-member households, and the study identified factors for CBHI enrolment. Consistent with previous studies,<sup>8 24 25</sup> in this study the households enrolled in CBHI were more likely to use health services than the households not enrolled in CBHI. The health service utilisation rate was higher among households who were members of a risk-sharing institution (tax-based health insurance, national health insurance, social health insurance and private health insurance).<sup>17 26–28</sup> Even if the patient wants to visit a healthcare institution for diagnostic and therapeutic purpose, direct payment for healthcare hinders utilisation of health services.<sup>29–32</sup>

A research finding identified that a higher number of study subjects with chronic illnesses were observed among the insured households than the uninsured households<sup>8</sup>; this finding is similar to our research finding. Adverse selection is a critical concern for voluntary-based health insurance. CBHI is a targeted subsidy to the poor households. At the same time this targeted subsidy to the highest risk group increases adverse selection. Therefore, the plan to bridge the financial gap due to adverse selection is crucial in continuing CBHI service to the community.<sup>33</sup>

**Table 1** Sociodemographic characteristics of insured and uninsured study participants in South Achefer District, March 2016 (n=594)

Variables	Insurance status of households		Difference (%)	P values
	Insured n (%)	Uninsured n (%)		
<b>Age (years)</b>				
18–24	8 (2.6)	6 (2)	0.69	0.794
25–44	126 (42.42)	113 (38)	4.42	0.277
45–65	135 (45.45)	139 (46.8)	–1.35	0.742
>65	28 (9.43)	39 (13.1)	–3.67	0.154
<b>Sex</b>				
Male	205 (69.02)	187 (62.96)	6.06	0.119
Female	92 (30.98)	110 (37.04)		0.991
<b>Education</b>				
Unable to read and write	175 (58.92)	204 (68.7)	–9.78	0.013*
Able to read and write	50 (16.84)	33 (11.1)	5.74	0.034*
Primary education and above	72 (24.24)	60 (20.2)	4.04	0.201
<b>Family size</b>				
<5	110 (37.04)	142 (47.8)	–10.76	0.008*
≥5	187 (62.96)	155 (52.2)		0.005*
<b>Occupation</b>				
Farmer	6 (2.02)	17 (5.7)	–3.68	0.019*
Merchant	290 (97.64)	272 (91.6)	6.04	0.01*
Others†	1 (0.34)	8 (2.69)	–2.35	0.019*
<b>Marital status</b>				
Married	265 (89.22)	226 (76.1)	13.12	<0.001*
Single	33 (11.11)	70 (23.57)		

\*Statistically significant at p&lt;0.05.

†Others: housewife, unemployed.

**Table 2** Healthcare access-related factors and enrolment of study participants in community-based health insurance in South Achefer District, March 2016 (n=594)

Variables	Insured n (%)	Uninsured n (%)	Difference %	P values
<b>Nearest health institution</b>				
Health centre	271 (91.25)	259 (87.2)	4.05	0.113
Others†	26 (8.75)	38 (12.8)		
<b>Distance from health facility in KM Killo metres</b>				
<5	156 (52.53)	165 (55.6)	3.07	0.46
≤5	141 (47.47)	132 (44.4)		
<b>Travel time in hours</b>				
<1	183 (61.62)	138 (46.8)	14.82	<0.001*
≥1	114 (38.38)	159 (53.2)		
<b>Household wealth index</b>				
Poor	93 (31.31)	105 (35.4)	–4.09	0.297
Medium	97 (32.66)	101 (34)	–1.34	0.397
Rich	107 (36.03)	91 (30.6)	5.43	0.164

\*Significant at p&lt;0.05.

†Others: private clinic, hospital.

**Table 3** Perceived needs to community-based health insurance enrolment among respondents in South Achefer, March 2016 (n=594)

Variables	Insured n (%)	Uninsured n (%)	Difference	P values
<b>Perceived health status</b>				
Poor	39 (43.3)	51 (56.7)	13.4	0.28
Medium	127 (45.8)	150 (54.2)	8.4	0.06
Good	131 (57.7)	96 (42.3)	15.4	0.05
<b>Perceived quality of care</b>				
Very low	20 (6.75)	31 (10.4)	3.65	0.108
Low	110 (37.04)	137 (46.1)	9.06	0.025*
Neutral	21 (7.07)	42 (14.1)	7.03	0.05
High	115 (38.72)	69 (23.2)	-15.52	<0.001*
Very high	31 (10.44)	18 (6.1)	4.34	0.02*
<b>Current health status</b>				
Healthy	258 (86.87)	246 (82.83)	4.04	0.83
Not healthy	39 (13.13)	51 (17.17)	-4.04	0.17
<b>First choice of place for treatment during illness</b>				
Health institution	279 (93.94)	221 (74.41)	19.53	<0.001*
Traditional healer	18 (6.06)	76 (25.59)	-19.53	
<b>Chronic illness</b>				
Yes	59 (19.9)	45 (15.2)	4.72	0.131
No	238 (80.1)	252 (84.8)	-4.7	0.869
<b>Expected healthcare cost of a recent treatment</b>				
<500 birr	211 (71.04)	292 (98.32)	-27.28	<0.001*
≥500 birr	86 (28.96)	5 (1.68)		

\*Significant at  $p < 0.05$ .

On the other hand, this study showed that the proportion of healthy study subjects during time of data collection was higher among the insured respondents than the uninsured respondents, which was consistent with a study conducted in Nigeria.<sup>34</sup> In our study settings, household heads were categorised as healthy or not healthy using perceived health status assessment. Often, household members who were relatively healthier, that is, household members who did not develop a chronic disease, became active household heads and underwent the study interview. The proportion of perceived health status among the interviewed household heads could be higher even though non-household head members with chronic disease were living in the

households. Similar to our research finding, in Ghana respondents who perceived their own health condition as good were more likely to be enrolled in the national health insurance scheme.<sup>35</sup> A higher proportion of interviewed household heads who were enrolled in a health insurance could have better awareness and practice in disease prevention, health-seeking behaviour and general health; consequently, cumulative perceived health status would be better among enrolled respondents.

Our study showed that a higher proportion of household heads whose wealth index category was the richest were enrolled in CBHI compared with households whose wealth index category was the poorest.<sup>36</sup> However, the difference was not statistically significant. In Ethiopia the CBHI scheme payment per year to enrol in CBHI is less than \$10.<sup>37</sup> The poorest can afford the year-based payment to enrol in CBHI. Therefore, in this circumstance wealth could not be a factor for enrolment in CBHI. In descriptive statistics a higher proportion of the wealthiest households were enrolled in CBHI than the households whose wealth indexes were categorised as poor. This could mean better awareness about the merit of CBHI among the higher wealth index group than the lower wealth index group. This study has limitations. As this study was cross-sectional, the factors do not establish temporal relationship.

**Table 4** Healthcare utilisation and community health insurance enrolment in South Achefer District, March 2016 (n=594)

Variables	Health service utilisation		$\chi^2$	P values
	Yes n (%)	No n (%)		
Non-insured	87 (29.3)	210 (70.7)	27.864	<0.001*
Insured	150 (50.5)	147 (49.5)		

\*Statistically significant at  $p < 0.05$ .

Therefore, inference of causation is not possible. This study did not use matching criteria for insured and uninsured households.

## CONCLUSION

Utilisation of health services among insured households in CBHI was higher. Educational status, family size, occupation, marital status, travel time to the nearest health institution, perceived quality of care, first choice of place for treatment during illness and expected healthcare cost of a recent treatment should be emphasised to enhance community health insurance enrolment, which leads to universal health coverage.

**Acknowledgements** We gratefully acknowledge the University of Gondar, data collectors and study participants. We sent our gratitude to Geta Asrade for reviewing this manuscript. We would also like to send our gratitude to the household heads and administrative officials.

**Collaborators** Geta Asrade.

**Contributors** All the authors (DDA, HT, YMA) conceived and designed the experiments, performed the experiments, analysed the data, contributed materials/analysis tools and wrote the paper.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent** Obtained.

**Ethics approval** Ethical approval from the University of Gondar ethics committee was obtained. In addition, ethical approval from Amhara Regional Health Bureau was granted.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data sharing statement** No additional data are available.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

## REFERENCES

1. WHO. *Sustainable health financing, universal coverage and social health insurance, proceedings, The fifty-eighth world health assembly*. Geneva: WHO, 2005.
2. WHO. *Health systems financing: the path to universal coverage World health report in, Vol*. Geneva: WHO, 2010.
3. Xu K, Evans DB, Carrin G, et al. Protecting households from catastrophic health spending. *Health Aff* 2007;26:972–83.
4. Wang H, Ramana GNV. *Universal Health Coverage for Inclusive and Sustainable Development: Country Summary Report for Ethiopia, in, Vol*. Washington, DC: World Bank, 2014.
5. Elgazzar H, Raad F, Arfa C, et al. *Who Pays? Out-of-Pocket Health Spending and Equity Implications in the Middle East and North Africa, in, Vol*. Washington, DC, USA: World Bank, 2010.
6. Leive A, Xu K. *Coping with Out-of-Pocket Health Payments: Empirical Evidence from 15 African Countries*. 2008.
7. Mwaura JW, Pongpanich S. Access to health care: the role of a community based health insurance in Kenya. *Pan Afr Med J* 2012;12:35.
8. Blanchet NJ, Fink G, Osei-Akoto I. The effect of Ghana's National Health Insurance Scheme on health care utilisation. *Ghana Med J* 2012;46:76–84.
9. Nyonator F, Kutzin J. Health for some? The effects of user fees in the Volta Region of Ghana. *Health Policy Plan* 1999;14:329–41.
10. Ethiopian health insurance agency. *Evaluation of communitybased health insurance pilot schemes in Ethiopia: final report in, Vol*. Addis Ababa, Ethiopia: Ethiopian health insurance agency, 2015.
11. Nimpagaritse M, Bertone MP. The sudden removal of user fees: the perspective of a frontline manager in Burundi. *Health Policy Plan* 2011;26 Suppl 2:i163–71.
12. Bitran R, Giedion U. *Waivers and Exemptions for Health Services in Developing Country*, 2003.
13. Masiye F, Kaonga O, Kirigia JM. Does User Fee Removal Policy Provide Financial Protection from Catastrophic Health Care Payments? Evidence from Zambia. *PLoS One* 2016;11:e0146508.
14. Nabyonga J, Desmet M, Karamagi H, et al. Abolition of cost-sharing is pro-poor: evidence from Uganda. *Health Policy Plan* 2005;20:100–8.
15. Aregawi. *Community health insurance in Ethiopia*, 2010.
16. Feleke S, Mitiku W, Zelelew H, et al. *Ethiopia's Community-based Health Insurance: A Step on the Road to Universal Health Coverage in, Vol*, 2015.
17. Wang W, Temsah G, Mallick L: Health insurance coverage and its impact on maternal health care utilization in low- and middle-income countries, in DHS Analytical Studies No. 45, Vol. Rockville, Maryland, USA, ICF International 2014.
18. Wiesmann D, Jütting J: The emerging movement of community based health insurance in sub-Saharan Africa: Experiences and lessons learned. *Africa spectrum* 2000:193–210.
19. Basaza R, Pariyo G, Criel B. What are the emerging features of community health insurance schemes in East Africa? *Risk Manag Healthc Policy* 2009;2:47–53.
20. FDRE Ministry of health. *Health Sector Development Program IV 2010/11 – 2014/15 in, Vol*, 2010.
21. Sibhatu KT, Qaim M. Rural food security, subsistence agriculture, and seasonality. *PLoS One* 2017;12:e0186406.
22. Mebratie A. *Essays on evaluating a community based health insurance scheme in rural Ethiopia*: International Institute of Social Studies of Erasmus University (ISS), 2015.
23. WHO. Global health observatory data repository, World Health Organization Data by Countries. 2014 <http://apps.who.int/gho/data/view.main.HEALTHEXPRATIOKEN?lang=en> (accessed 21 Nov 2017).
24. United nation development programme. Millennium Development Goals: A compact among nations to end human poverty. In: Fukuda-Parr S, Gresser C, Ross-Larson B, *Human Development Report*. New York: United nation development programme, 2003.
25. Witter S, Garshong B. Something old or something new? Social health insurance in Ghana. *BMC Int Health Hum Rights* 2009;9:9–20.
26. Agarwal P, Bias TK, Vasile E, et al. Exploring Health Insurance Status and Emergency Department Utilization. *Health Serv Res Manag Epidemiol* 2015;2:233339281560609.
27. 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.
28. Ayindenaba Dalaba M, Akweongo P, Aborigo R, et al. Does the National Health Insurance Scheme in Ghana reduce household cost of treating malaria in the Kassena-Nankana districts? *Glob Health Action* 2014;7:23848.
29. Lee WY, Shaw I. The impact of out-of-pocket payments on health care inequity: the case of national health insurance in South Korea. *Int J Environ Res Public Health* 2014;11:7304–18.
30. Ansah EK, Narh-Bana S, Asiamah S, et al. Effect of removing direct payment for health care on utilisation and health outcomes in Ghanaian children: a randomised controlled trial. *PLoS Med* 2009;6:e1000007.
31. Leive A, Xu K. Coping with out-of-pocket health payments: empirical evidence from 15 African countries. *Bull World Health Organ* 2008;86:849–56.
32. Ruhweza M, Baine SO, Onama V, et al. Financial risks associated with healthcare consumption in Jinja, Uganda. *Afr Health Sci* 2009;9 Suppl 2:S86–9.
33. Parmar D, Souares A, de Allegri M, et al. Adverse selection in a community-based health insurance scheme in rural Africa: implications for introducing targeted subsidies. *BMC Health Serv Res* 2012;12:181.
34. Auwal Sani Saliu ASU. Health Services Utilization and Health Status of Insured versus Uninsured Nigerian Children with Sickle Cell Disease. *Health* 2016;8:971–7.
35. Mensah J, Oppong JR, Schmidt CM. Ghana's National Health Insurance Scheme in the context of the health MDGs: an empirical evaluation using propensity score matching. *Health Econ* 2010;19 Suppl:95–106.
36. Ginde AA, Lowe RA, Wiler JL. Health insurance status change and emergency department use among US adults. *Arch Intern Med* 2012;172:642–7.
37. EFDRE Health insurance Agency. *Evaluation of community-based health insurance pilot schemes in Ethiopia final report, in, Vol*: EFDRE Health insurance Agency, 2015.