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# Accepted Manuscript

Equitable access to health insurance for socially excluded children? The case of the National Health Insurance Scheme (NHIS) in Ghana

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**Equitable access to health insurance for socially excluded children? The case of the National Health Insurance Scheme (NHIS) in Ghana**

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ACCEPTED MANUSCRIPT

1 **Equitable access to health insurance for socially excluded children? The**  
2 **case of the National Health Insurance Scheme in Ghana**

3 **Abstract**

4  
5 To help reduce child mortality and reach universal health coverage, Ghana extended free  
6 membership of the National Health Insurance Scheme (NHIS) to children (under-18s) in  
7 2008. However, despite the introduction of premium waivers, a substantial proportion of  
8 children remain uninsured. Thus far, few studies have explored why enrolment of  
9 children in NHIS may remain low, despite the absence of significant financial barriers to  
10 membership. In this paper we therefore look beyond economic explanations of access to  
11 health insurance to explore additional wider determinants of enrolment in the NHIS. In  
12 particular, we investigate whether social exclusion, as measured through a sociocultural,  
13 political and economic lens, can explain poor enrolment rates of children. Data were  
14 collected from a cross-sectional survey of 4050 representative households conducted in  
15 Ghana in 2012. Household indices were created to measure sociocultural, political and  
16 economic exclusion, and logistic regressions were conducted to study determinants of  
17 enrolment at the individual and household levels. Our results indicate that socioculturally,  
18 economically and politically excluded children are less likely to enrol in the NHIS.  
19 Furthermore, households excluded in all dimensions were more likely to be non-enrolled  
20 or partially-enrolled (i.e. not all children enrolled within the household) than fully-  
21 enrolled. These results suggest that equity in access for socially excluded children has not  
22 yet been achieved. Efforts should be taken to improve coverage by removing the

23 remaining small, annually renewable registration fee, implementing and publicising the  
24 new clause that de-links premium waivers from parental membership, establishing  
25 additional scheme administrative offices in remote areas, holding regular registration  
26 sessions in schools and conducting outreach sessions and providing registration support  
27 to female guardians of children. Ensuring equitable access to NHIS will contribute  
28 substantially to improving child health and reducing child mortality in Ghana.

29 **Key words:** Universal health coverage; National Health Insurance Scheme; social  
30 exclusion; Ghana; children; enrolment

31

## 32 Introduction

33

34 Reaching universal health coverage (UHC) has become a primary goal of health systems  
35 globally to ensure that all people have access to quality health services in times of need  
36 and are protected from the financial hardships of health care costs (WHO, 2005, WHO,  
37 2013). Many low-and middle-income countries (LMIC) have made significant efforts to  
38 reach this goal in recent decades through implementation of a variety of ambitious pre-  
39 payment Social Health Protection (SHP) schemes that aim to reduce reliance on  
40 regressive out-of-pocket payments. Ghana has emerged as a pioneer of these health  
41 financing reforms in Sub-Saharan Africa, becoming the first country in the region to  
42 implement a National Health Insurance Scheme (NHIS) (Rajkotia and Frick, 2012).  
43 Passed into law in 2003 through the National Health Insurance Act (Act 650), the NHIS  
44 aims to promote equitable access to health care for all by abolishing the previous ‘cash  
45 and carry’ user fee system that posed significant financial barriers to access for poor and  
46 vulnerable groups (Mensah et al., 2010, Witter and Garshong, 2009). To help expand  
47 coverage, premium payments are kept low, with the scheme largely financed through  
48 government funds and value added taxes (VAT) (NHIA, 2012). In addition, a number of  
49 premium exemptions are offered to specific groups, including children under-18 years of  
50 age. However, despite significant efforts to achieve universal population coverage,  
51 membership remains low with just 38% of the population being active members (i.e. in  
52 possession of an up-to-date NHIS card) in 2013 (NHIA, 2013). Furthermore, coverage  
53 remains unequitable, with the poor, women and rural inhabitants consistently shown to be



54 disproportionately uninsured (Akazili et al., 2014, Atinga et al., 2015, Jehu-Appiah et al.,  
55 2011, Kusi et al., 2015a).

56 Previous studies have identified a number of causes of low overall enrolment in  
57 NHIS, including unaffordability of premiums, perceived poor quality of health care,  
58 perceptions of an inadequate benefit package due to some drugs and treatment for certain  
59 conditions not being covered, lack of trust in NHIS officials and a complicated enrolment  
60 process (Akazili et al., 2014, Atinga et al., 2015, Dixon et al., 2013, Jehu-Appiah et al.,  
61 2011, Kusi et al., 2015a, Sarpong et al., 2010). What remains less clear is why enrolment  
62 in NHIS continues to be unequitable, despite considerable efforts to enrol poor and  
63 vulnerable groups through targeted removal of financial barriers. In order to fully  
64 understand these inequities it is thus important to look beyond purely economic  
65 explanations to also consider how factors in the wider social, cultural and political  
66 environment may shape access to NHIS.

67 An important concept through which these wider determinants of access to SHP  
68 can be analysed is that of social exclusion. A relatively new concept in the field of health  
69 research, the social exclusion framework provides a holistic understanding of how  
70 unequal social interactions and organizational/institutional barriers hinder the  
71 effectiveness of equity-oriented interventions such as SHP (Mathieson et al., 2008). As  
72 explained by the WHO's Social Exclusion Knowledge Network (SEKN), exclusion  
73 consists of "dynamic, multidimensional processes driven by unequal power relationships  
74 interacting across four main dimensions – social, political, economic and cultural"  
75 (Popay et al., 2008). Social exclusion shapes deprivations, heightens inequalities, and  
76 restricts social, political and economic participation for marginalized individuals or

77 groups (Babajanian et al., 2012, Popay et al., 2008). As further explained by SEKN,  
78 “these exclusionary processes create a continuum of inclusion/exclusion characterised by  
79 an unjust distribution of resources and unequal access to the capabilities and rights”  
80 which are required to access SHP (Popay et al., 2008).

81         However, despite being an important concept through which to analyse SHP, few  
82 studies have thus far assessed how social exclusion occurring in the broader environment  
83 may affect access to health financing arrangements in LMIC (Williams et al., 2014). In  
84 this study we respond to this evidence gap by investigating how the social, political,  
85 economic and cultural dimensions of social exclusion influence access to NHIS and may  
86 help explain persistently unequitable enrolment for excluded individuals. We focus  
87 specifically on children aged under-18, a group that are eligible for a premium waiver.  
88 We first analyse enrolment determinants for individual children and then investigate  
89 exclusion of children *within* the household. Assessing intra-household exclusion is  
90 important given that enrolment in NHIS is at the individual level; households may  
91 therefore choose to enrol some children preferentially over others, for instance preferring  
92 to enrol sons over daughters. We hypothesize that children vulnerable to exclusion in all  
93 dimensions will be less likely to enrol in NHIS.

94         As far as we are aware, this is the first study of equity of enrolment in NHIS for  
95 children using a social exclusion perspective. Using the social exclusion lens to assess  
96 equity in health financing schemes will generate an improved understanding of the wider  
97 determinants of health insurance enrolment for children and will help expand access  
98 among this group. Reaching universal coverage of children is critical as it will contribute  
99 significantly to reducing preventable infant and child mortality in Ghana. Furthermore,

100 timely access to health interventions in early life will have important implications for  
101 improving future health and life outcomes (Blackwell et al., 2001, Marmot et al., 2008).

102

### 103 **The NHIS**

104 The NHIS has decentralised operations, with each district having its own insurance fund,  
105 financed from central-level resources. The primary source of funding is a 2.5% VAT  
106 levy, which contributes approximately 60% to total NHIS revenue (NHIA, 2012). Other  
107 primary sources of funding include investment income (17%), premium contributions  
108 from the Social Security and National Insurance Trust (SSNIT) pension scheme (16%)  
109 and premiums and registration fees from the remaining population (<5%) (NHIA, 2012).  
110 The scheme covers over 95% of disease conditions and includes inpatient, outpatient and  
111 emergency care, deliveries, dental care and essential drugs. Enrolment in the NHIS is at  
112 the individual level, with members required to register once to join the scheme and renew  
113 their NHIS card annually to remain active members. Registration and renewal is  
114 undertaken at a District Mutual Health Insurance Scheme (DHMIS) office or by a scheme  
115 agent. Premium payments for formal sector workers are automatically deducted from  
116 their SSNIT contributions, although renewal at a DHMIS is still required to become an  
117 active member. Other individuals aged 18-69 pay a premium contribution and registration  
118 fee which varies according to socioeconomic status and district (Kusi et al., 2015b,  
119 NHIA, 2012). To enhance enrolment of vulnerable groups, indigents identified through  
120 their community and pregnant women are exempt from paying premiums and registration  
121 fees, although proof of exemption status such as an antenatal card must be shown at a  
122 registration office. Older people aged over 70, SSNIT pensioners and children aged under

123 18 are exempt from paying premiums, but must pay an annual registration fee of  
124 approximately Gh¢4.0 (US\$2.7) (Kusi et al., 2015a). Until 2012, children aged under 18  
125 were only entitled to a premium waiver if at least one parent or guardian was a member  
126 of NHIS; this clause was abolished in 2010 for children under 5 and for all children in  
127 2012, but is yet to be fully implemented (Kusi et al., 2015a). In 2013, an estimated 10.1  
128 million people were NHIS members, corresponding to 38% of the Ghanaian population;  
129 children accounted for 46.5% of active members (NHIA, 2013).

130

## 131 Methodology

132

### 133 Study design and data

134 Data were collected from a cross-sectional household survey conducted in 2012 in five  
135 regions: Central, Eastern, Ashanti, Brong-Ahafo and Northern, that covered the three  
136 ecological zones of Ghana, coastal, forest and savannah. In each region, one district was  
137 selected for sampling in consultation with the Ghana Statistical Service (GSS). These  
138 districts are all relatively underdeveloped and were selected purposively to ensure a mix  
139 of urban and rural areas and to ensure that a random sample of households would elicit a  
140 significant sample of socially excluded individuals for our analysis. From each district,  
141 27 nationally representative Enumeration Areas (EAs) were randomly selected by GSS.  
142 EAs contain a mix of urban and rural areas and are determined by the GSS based on the  
143 2000 Ghana population and Housing census to ensure nationally representative surveys.  
144 Following MEASURE Demographic Health Surveys Program (ICF International, 2012)

145 guidance, 30 households were then randomly sampled for interviews from a household  
146 list created in each EA, generating a total sample of 4050 households.

147 The household survey consisted of two separate questionnaires. Part I collected  
148 data on basic demographics, the socio-economic situation of the household and its  
149 members and information on health status, healthcare utilisation and NHIS membership;  
150 this part of the questionnaire was administered to the household head or another adult  
151 member responsible for household decisions. Part II included questions on social  
152 exclusion and was administered to both the respondent to Part I and, where applicable,  
153 his or her spouse. For our analysis, social exclusion variables were created from answers  
154 provided by the respondent to Part I of the questionnaire for all households that contained  
155 a child under-18. The questionnaire was designed in English, with interviews conducted  
156 in local languages where appropriate.

157

### 158 **Social exclusion framework**

159 The analytical framework used to measure social exclusion follows the SEKN concept of  
160 social exclusion as a multidimensional, dynamic process of exclusion across four  
161 dimensions: social, political, economic and cultural (SPEC) (Popay et al., 2008). For each  
162 dimension, we first undertook a comprehensive literature review to identify the domains  
163 of resources and participation that influence social exclusion. Resources refer to means  
164 such as wealth, assets or education that can be used to meet needs, while participation  
165 describes the power and ability people have to utilise available resources (Popay et al.,  
166 2008). For each domain, measurable indicators that can be considered as ‘risk-factors’ or  
167 ‘drivers’ of social exclusion in the Ghanaian context were then identified, firstly, by

168 reviewing relevant literature and then by identifying relevant questions asked in previous  
169 household questionnaires such as the Demographic and Health Survey (DHS) and World  
170 Values Survey. Following the approach utilized by Parmar et al., (2014) in their paper  
171 investigating social exclusion of older people from SHP in Africa, we next combined  
172 these indicators to create indices for social and cultural, economic and political exclusion  
173 (Table 1). Given the close, interconnected relationship between social and cultural  
174 indicators, these were combined into one dimension – sociocultural.

175

### 176 **Empirical strategy**

177 The determinants of child enrolment in the NHIS were estimated using a binary logistic  
178 regression, following the basic model:

$$179 \quad \text{logit}(p) = \log(p/1-p) = \beta_0 + X_i \beta_{i1} + SV_i \beta_{i2}$$

180 The dependent variable, *Enrolled* is a binary variable indicating enrolment status as  
181 no=0/yes =1, with  $p$  the probability that an individual is enrolled.  $SV_i$  is a set of SPEC  
182 variables (described in Table 2),  $X_i$  is a set of remaining core variables that may influence  
183 enrolment, and  $\beta_s$  are the model parameters. Children were considered enrolled if they  
184 were registered, had renewed their NHIS membership and had a valid NHIS card for that  
185 year.

186

### 187 *Determinants of enrolment at the individual level*

188 Two logistic regression models were estimated to study determinants of children's  
189 enrolment status. We first estimated a regression model containing all  $X_i$  and  $SV_i$

190 variables (Model A), before next running a model containing  $X_i$  variables and *SPEC*  
191 *indices* (Model B).

192

### 193 *Determinants of enrolment at the household level*

194 We next explored determinants of enrolment for households. We categorised households  
195 into three categories: fully-enrolled (all children enrolled), partially-enrolled (some  
196 children enrolled) and non-enrolled (no children enrolled). We ran a multinomial logit  
197 regression (Model C) to compare how social exclusion was influencing the enrolment of  
198 three categories of households. The dependent variable was the enrolment status of  
199 household (1=fully-enrolled, 2=partially-enrolled and 3=non-enrolled). Variables  
200 included in the model pertained to characteristics of the household and household head.

201

### 202 *Intra-household exclusion*

203 Last, we investigated individual-level intra-household exclusion. This analysis focussed  
204 only on partially-enrolled households to explore the enrolment determinants for children  
205 *within* the household. A binary logistic regression was estimated, with  
206 *IntraHH\_enrolment*, a binary outcome variable (1/0) indicating that a child is enrolled  
207 when other children in the same household are not or that a child is not enrolled when  
208 other children in the same household are enrolled (Model D). Variables included in the  
209 model pertained only to individual characteristics of the child and not characteristics of  
210 the household head or household.

211

212 As children may be from the same household, standard errors for binary regression  
213 analyses were adjusted for clustering at the household level using the SPSS complex  
214 sample procedure. All regression models were estimated using SPSS 21.

215

### 216 *Variables*

217 Variables included in our models are described in tables 2 and 3. Independent variables  
218 for the regression analysis were divided into core variables and social exclusion variables  
219 within the SPEC dimensions.

220

### 221 *Core variables*

222

223 Core variables included individual level variables for each child and variables measured  
224 at the household level. At the individual level two binary variables, *majority\_religion* and  
225 *majority\_ethnicity* were created as people belonging to a minority religion or ethnic  
226 group may experience discrimination that prevents them from enrolling in SHP (Langer  
227 and Ukiwo, 2008). The majority religion was defined as Christianity with the majority  
228 ethnicity Akan, the largest ethnic group in Ghana. To account for adverse selection,  
229 where unhealthier individuals that are more likely to use health care enrol more than  
230 healthier individuals, a health status variable. measured by whether a child had been  
231 hospitalised in the previous 12 months, was included. Relationship to household head  
232 was created as a binary variable that captured if an individual was a child or grandchild of  
233 the household head or another relation/not related. At the household level, variables for  
234 age and gender of the household head and residence in an urban or rural area were



235 included as previous studies have frequently demonstrated their importance in  
236 influencing enrolment in health insurance (Akazili et al., 2014, Parmar et al., 2014,  
237 Sarpong et al., 2010). A variable capturing household size was also included as an  
238 increasing number of members may reduce likelihood of enrolment. Lastly, a variable  
239 capturing household head enrolment status was included as premium waivers for children  
240 at the time of the survey were only available if at least one parent or guardian were  
241 enrolled.

242

#### 243 *Sociocultural variables*

244 Variables were included to capture existence of households' social networks and high  
245 social position in the community, both key indicators of social inclusion and drivers of  
246 increased participation in SHP (Mladovsky et al., 2014). The variable *association* was  
247 created to capture whether a household head or their spouse was a member of an  
248 association, including social or sports clubs, religious associations and women's groups.  
249 To capture social position, a variable, *meeting\_seat*, was created to show whether a  
250 household head sat in the first two rows in community meetings, a traditional indicator of  
251 high social standing and thus social inclusion in Ghana. In some LMIC, male children  
252 have better access to resources than female children, a difference further exaggerated if  
253 the male child is the only male child in the household (Garg and Morduch, 1998). A  
254 variable *only\_son*, was thus included as households with limited resources may choose to  
255 enrol just one child, with preference given to sons over daughters. Lastly, a variable  
256 capturing mother's education level was included as a measure of gender empowerment.  
257 Ensuring gender empowerment and equality has been shown to be fundamental for

258 improving health of women and their families (PPD, 2013, Cleland and Van Ginneken,  
259 1988) and may be important in determining health insurance enrolment. In Model D,  
260 mother's education was replaced by household head education as children in some  
261 extended households may not have the same mother.

262

### 263 *Political variables*

264 In the political dimension, power dynamics and discrimination generate micro-level  
265 inequalities that restrict some individuals from accessing essential resources and  
266 participating in public life. At the macro level, political exclusion results in rural, poor  
267 communities, being less able to influence and capture benefits of political decisions on  
268 allocation of physical resources such as health centres. Variables to measure political  
269 exclusion were therefore primarily related to access to resources, in particular health  
270 facilities (measured by walking distance to a NHIS accredited health facility), education  
271 (measured by whether households had difficulties accessing education due to physical or  
272 economic barriers) and information (measure by whether a household owned a TV or  
273 radio). A variable to capture whether household heads had trust in the national  
274 government was also included given that NHIS is a highly politicized, scheme, which  
275 may reduce enrolment of individuals lacking trust in government institutions.

276

### 277 *Economic variables*

278 Principle components analysis (PCA) was used to calculate relative household wealth,  
279 using variables including household ownership of durable goods (including a car, TV,

280 refrigerator, electric iron, bicycle etc), housing conditions (material of roof, source of fuel  
281 for cooking, sanitation facilities) and number of livestock. After calculating PCA scores,  
282 households were divided into quartiles, with Q1 representing the poorest households and  
283 Q4 the richest. Following DHS methodological guidance (Rutstein, 2008), PCA scores  
284 were calculated separately for urban and rural households due to the different  
285 composition and importance of assets in these areas; consequently households in each  
286 quartile for the sample may not exactly equal 25%. Additionally, a housing variable was  
287 included to capture if a household owned their current house, as precariousness of shelter  
288 is a key marker of material deprivation and social exclusion (Sen, 1992; Bhalla, 1997).  
289 Furthermore, previous studies have shown the difficulties of enrolling informal sector  
290 workers in LMIC in health insurance schemes (Ekman, 2004). A variable was therefore  
291 included to capture if a household head worked in the formal or informal sector.

292

### 293 **Ethical approval**

294 Ethical approval for this research was obtained from Noguchi Memorial Institute for  
295 Medical Research Institutional Review Board, Ghana [069/11-12].

296

## 297 **Results**

298

### 299 ***Descriptive statistics***

300 A total of 7686 children aged under-18 were recorded in 2819 households. The results  
301 show that 54.4% of children and 46.6% of household heads were currently enrolled in  
302 NHIS (Table 2). The average age of children was eight years and the majority of children  
303 were children or grandchildren of the household head, resided in an urban area and lived  
304 in a male-headed household. Only 4.7% of children had been hospitalised in the previous  
305 12 months. The majority of households had good access to media, but lived far from a  
306 health centre and did not have a household member that was a member of an association.

307 At the household level, a total of 446 households (15.8%) with children aged  
308 under-18 were partially-enrolled, 1174 were non-enrolled (41.6%) and 1199 were fully-  
309 enrolled (42.5%). A higher percentage of fully-enrolled than partially or non-enrolled  
310 households were located in urban areas, belonged to the richest two quartiles, had a  
311 female household head and had good access to media, health and education facilities  
312 (Table 3). Average household size ranged from 4.67 members for fully-enrolled  
313 households, to 5.00 for non-enrolled and 6.34 for partially-enrolled households.

314 Within partially-enrolled households, 1689 children (21.9% of the sample) had a  
315 different enrolment status to other household members aged under-18. Of these  
316 individuals, 50.9% were enrolled when other children in the household were not enrolled  
317 (Table 2).

318

### 319 *Determinants of enrolment at the individual level*

320 Table 4 presents logistic regression estimates of enrolment determinants in NHIS for all  
321 sampled children under-18. Results across all models indicate that geographic residence,  
322 child health status and household head gender and insurance status significantly and

323 consistently influence child enrolment. A child residing in an urban area was  
324 approximately 1.6 times more likely to be enrolled than their rural counterparts, with a  
325 male-household head increasing odds of enrolment by 1.7 times. Evidence of adverse  
326 selection was found, with children that were hospitalised two times more likely to be  
327 enrolled than children that were not hospitalised. A child with an insured household head  
328 was approximately 12 times more likely to be enrolled than a child with an uninsured  
329 household head. An older household head and a larger household size also increased odds  
330 of enrolment; however, odds ratios across all models were close to one.

331 Model A results show that a number SPEC variables significantly increased odds  
332 of enrolment. A child of a mother with some education was 1.6 times more likely to be  
333 enrolled than a child of a mother with no education. Similarly, children from households  
334 reporting no difficulties accessing education were 1.4 times more likely to be enrolled  
335 than counterparts in households experiencing difficulties in accessing education. A pro-  
336 rich bias was found, with children from Q2, Q3 and Q4, 2.3, 1.9 and 1.5 times  
337 respectively more likely to be enrolled compared to the poorest 25% of households.

338 Model B results indicate that children least vulnerable to economic and social  
339 exclusion were 1.5 and 1.3 times respectively more likely to enrol in NHIS, than children  
340 not at risk of exclusion in these dimensions. Political exclusion was not found to be  
341 significant.

342

### 343 *Determinants of enrolment at the household level*

344 Table 5 presents multinomial regression estimates of determinants of household  
345 enrolment status. Across all models (C and D), rural households were approximately 1.6

346 times more likely to be non-enrolled and 1.4 times more likely to be partially-enrolled  
347 than fully-enrolled in comparison to urban households. Larger households were also  
348 significantly more likely to be partially or non-enrolled than fully-enrolled in comparison  
349 to smaller households. Similarly, households with an older household head were more  
350 likely to be fully-enrolled rather than partially or non-enrolled than households with a  
351 younger household head, although odds ratios were close to one. Furthermore, the odds  
352 of being fully-enrolled in comparison to non-enrolled increased for female-headed  
353 households and households that had at least one member hospitalised in the previous  
354 year, although household head gender and hospitalization did not significantly influence  
355 enrolment status between partially and fully-enrolled households.

356 Model C results show that a number of SPEC variables influence household  
357 enrolment status. In comparison to households with a head with some education,  
358 households with an uneducated head were 1.8 times more likely to be non-enrolled and  
359 1.4 times more likely to partially-enrolled than fully-enrolled. Furthermore, households  
360 with no access to media and difficulties accessing education facilities were more likely to  
361 be non-enrolled or partially-enrolled than fully enrolled in comparison to households with  
362 access to media and educational facilities. Households with no trust in government were  
363 found to be more likely to be fully-enrolled than partially-enrolled. Households in Q1 are  
364 2.1 times more likely to be non-enrolled than fully-enrolled in comparison to the  
365 wealthiest households; however, no significant differences were found between partially-  
366 enrolled and fully-enrolled households in Q1 and Q4. Nonetheless, households from Q2  
367 and Q3 were found to be approximately 2 times more likely to be non-enrolled or  
368 partially-enrolled than fully-enrolled in comparison to households from Q4.

369 Lastly, results from model D indicate that households at risk of social, political and  
370 economic exclusion were between 1.4 and 1.7 times more likely to be non-enrolled or  
371 partially-enrolled than fully-enrolled in comparison to households not at risk of exclusion  
372 in these dimensions.

373

#### 374 *Intra household exclusion*

375

376 Table 6 presents binary logistic regression estimates of intra-household enrolment status  
377 – i.e. if a child had a differing enrolment status to other children in their household.  
378 Results indicate that age, gender and being an only son had no significant influence on  
379 intra-household enrolment. However, children that had been hospitalised in the 12  
380 months prior to the survey and children who were a child or grandchild of the household  
381 rather than another relative or non-relative were two times more likely to be enrolled  
382 when other child household members were not enrolled.

383

## 384 Discussion

385

386 This study analysed data from a household survey in Ghana to assess whether social  
387 exclusion is restricting access to NHIS for children. Our findings indicate that 45.6% of  
388 sampled children remain uninsured, despite the introduction of premium waivers for this  
389 group. Furthermore, only 42.5% of households enrolled all household children; 15.8% of  
390 households only insured some children, thus remaining partially-enrolled, while 41.6% of

391 households have not enrolled any child members. Inequalities in enrolment for children  
392 persist and are caused by a range of disadvantages across the sociocultural, political and  
393 economic dimensions of social exclusion. The inequalities generated across these  
394 dimensions are discussed in the remainder of this section.

395

### 396 **Sociocultural exclusion**

397

398 Our results indicate a strong link between gender empowerment and child enrolment in  
399 the NHIS. The finding that individual children from female (rather than male) headed  
400 households were significantly less likely to be enrolled contrasts with results from many  
401 studies which find female-headed households more likely invest in health and thus enrol  
402 in health insurance schemes due to their traditional roles as care givers (Chankova et al.,  
403 2008, Jehu-Appiah et al., 2011). However, results on household level enrolment indicate  
404 that female-headed households are more likely to be fully-enrolled than non-enrolled (i.e.  
405 have no children insured). These results are seemingly contradictory but suggest that  
406 when female-household heads have the capacity to invest in health insurance, they are  
407 likely to enrol all children. The fact that all children in some female-headed households  
408 remain uninsured could indicate that exclusionary mechanisms are operating against  
409 certain female-headed households in Ghana, restricting their ability to participate in  
410 NHIS.

411 Odds of enrolment were also significantly lower for children with mothers with  
412 no education. The positive relationship between education and health insurance  
413 enrolment (Chankova et al., 2008, Jehu-Appiah et al., 2011, Parmar et al., 2014) and



414 between maternal education and child health has been long established in existing  
415 literature (Cleland and van Ginneken, 1988, Marmot et al., 2008). Our findings thus  
416 underline the importance of conducting outreach and awareness campaigns with  
417 uneducated women to improve understanding of and enrolment in NHIS. They also  
418 highlight the importance of addressing the wider social determinants of health to improve  
419 health equity by improving educational attainment and gender empowerment of women  
420 and girls (Marmot et al., 2008).

421 Encouragingly, other sociocultural variables including ethnicity, religion and  
422 social networks did not significantly influence enrolment status at either the individual or  
423 household level. Nevertheless, SPEC indices in all models indicate that children from  
424 socioculturally excluded households were significantly less likely to be enrolled than  
425 children from socially included households. This supports our hypothesis that  
426 vulnerability to social exclusion is restricting access to NHIS.

427

428

#### 429 **Political exclusion**

430

431 Our findings indicate that inequities in the politician dimension are important for  
432 determining NHIS enrolment. First, household head enrolment was significantly  
433 associated with child membership, an expected result given that, at the time of the survey,  
434 child premium exemptions were only available if at least one parent or guardian was  
435 enrolled. It is thus encouraging that a law was introduced in 2012 de-linking child  
436 membership from parental enrolment as this will likely increase enrolment rates for

437 excluded children (Kusi et al., 2015a). However, it has not been fully operationalized  
438 across Ghana, making it important that this is achieved quickly and efforts taken to make  
439 excluded households aware of this change in entitlement.

440         Geographic inequities in access to NHIS for rural communities identified in this  
441 study (models A-D) have previously been established in existing literature (Akazili et al.,  
442 2014, GSS et al., 2009, Parmar et al., 2014, Sarpong et al., 2010). Yet, in contrast to  
443 much existing evidence, our results intimate that distance to a health facility is not  
444 significantly related to enrolment. This suggests inequities are due instead to  
445 administrative barriers such as lack of access to scheme registration offices or poor  
446 quality of health care in these areas that deters individuals from enrolling. Current spatial  
447 inequities in distribution of these physical resources is likely driven by poor communities  
448 remote from Accra having limited political influence, and consequently less ability to  
449 shape and capture the benefits from political decisions on resource allocation.

450         Additional findings demonstrating the role of poor access to media (models A and  
451 C) further emphasise that political exclusion significantly reduces access to NHIS. This is  
452 likely due in part to more exposure to media campaigns on NHIS, improving awareness  
453 and understanding of the benefits of the scheme and child exemptions (Parmar et al.,  
454 2014, Schneider and Diop, 2004). Having trust in the national government decreased the  
455 odds of a household fully insuring all child members. This is likely due to the NHIS  
456 being associated with the New Patriotic Party (NPP) who introduced the scheme in 2003,  
457 but were not in power at the time of our survey. Thus some people who trusted the  
458 current government may be less likely to join if they associated NHIS it with the NPP.  
459 This highlights the importance of ensuring NHIS is not seen as a partisan issue but as a

460 cross-party political concern. An analysis of the SPEC indices of social exclusion  
461 emphasises that risk of exclusion in the political dimension significantly reduces  
462 enrolment in NHIS at both the individual and household levels.

463         These results clearly indicate that households with greater access to material and  
464 physical resources and information are more likely to enrol child household members.  
465 Reducing inequities in the political dimension by addressing the unfair distribution of  
466 resources in poor and rural communities is thus necessary to improve enrolment rates  
467 (Marmot et al., 2008). Sustained investment in rural development and poor communities,  
468 in particular targeting improvements in quality of care and establishment of more NHIA  
469 offices, should be undertaken to ensure equity in resources and opportunities in all  
470 regions in Ghana.

471

#### 472 **Economic exclusion**

473

474 Our analysis found significant evidence of economic inequalities in enrolment (models  
475 A-D). These findings are consistent with previous studies that have found strong  
476 evidence of persistently low enrolment for the poor in NHIS (Jehu-Appiah et al., 2011,  
477 Odeyemi and Nixon, 2013, Parmar et al., 2014, Sarpong et al., 2010).

478         The continuing pro-rich bias of NHIS comes despite considerable efforts to enrol  
479 poor children through implementation of a premium waiver scheme. Although this  
480 represents a laudable effort to promote enrolment, the requirement of paying a small,  
481 annually renewable registration fee to enrol children is likely creating financial barriers  
482 for the poorest households (Parmar et al., 2014, Wang et al., 2005). This is particularly

483 true for larger households, who were more likely to be partially-enrolled than smaller  
484 households, and extended families that were more likely to enrol children or  
485 grandchildren of the household head rather than other relatives or non-relatives. These  
486 results likely indicate households' willingness to enrol in health insurance, but inability to  
487 register all household members aged under-18. Removal of this registration fee is  
488 therefore fundamentally important to increase enrolment for poor children and improve  
489 equity within households (Kusi et al., 2015b, Parmar et al., 2014).

490         Despite strong evidence of a pro-rich bias, our study did not uncover inequalities  
491 in enrolment for children with a household head employed in the informal sector. This  
492 contrasts with results from other studies on health insurance in LMIC that report low  
493 enrolment for informal sector workers, often due to lack of understanding of insurance  
494 schemes and inability to afford premiums (Abel-Smith, 1992, Ekman, 2004, Mathauer et  
495 al., 2008). This finding is ostensibly encouraging given that enrolment of informal sector  
496 workers is often identified as a critical barrier to expanding population coverage of  
497 insurance schemes and may reflect high awareness of NHIS among the Ghanaian  
498 population. However, given low overall enrolment rates, it may also reflect that formal  
499 sector workers are unwilling to join the scheme. Constraints to enrolling formal sector  
500 workers are likely due to supply-side issues such as poor quality of health care and  
501 perceived limited benefits package (Jehu-Appiah et al., 2011, Kusi et al., 2015b). To  
502 expand enrolment of all children in the NHIS it is therefore important to address both  
503 systemic scheme issues, while simultaneously reducing social and institutional barriers to  
504 enrolment across the sociocultural, political and economic dimensions of exclusion.

505

## 506 **Limitations**

507 It should be noted that our study has some limitations. First, this paper conducted a  
508 quantitative investigation of the multiple indicators of social exclusion using a set of  
509 binary/dichotomous variables. Although this provided valuable insights into the influence  
510 of exclusion on access to SHP schemes, further mixed methods research is needed to  
511 fully understand the complex mechanisms behind social exclusion processes. Secondly,  
512 we did not analyse utilization of health care or health outcomes as this was beyond the  
513 scope of the study. However, even among enrolled children it is possible that benefits  
514 from the NHIS, in terms of health care access and reduced out-of-pocket payments, are  
515 disproportionately captured by socially included individuals. Further research is therefore  
516 needed to determine whether these benefits are distributed equally among enrolled  
517 children. Lastly, we did not explore supply-side constraints that may induce households  
518 to rationally choose not to enrol in the NHIS. Further research should be conducted to  
519 explore how supply-side constraints such as perceptions of the scheme and health care  
520 quality influence enrolment patterns of socially included and excluded groups.

521

## 522 **Conclusion**

523

524 Our study indicates that equity in access for socially excluded children has not yet been  
525 achieved within the NHIS. Despite children being exempt from paying premiums, the  
526 most economically vulnerable are still less likely to enrol. Efforts should be undertaken to  
527 enrol the poorest children by fully implementing the de-linking of premium waiver

528 entitlements from parental membership and removing the remaining registration fee.  
529 However, solely targeting the removal of financial barriers will be insufficient to enhance  
530 enrolment of children; it is also necessary to address wider disadvantages across the  
531 sociocultural and political dimensions of social exclusion. Additional scheme  
532 administrative offices should be established in rural and poor areas to register remote  
533 communities, with regular registration sessions held in schools. Community outreach  
534 workers should be utilised to provide information on the NHIS and support with the  
535 registration process to female guardians of children. Simultaneous efforts to address  
536 systemic issues associated with the scheme such as inconvenient enrolment processes and  
537 improving quality of health care should also be undertaken. Investing in these reforms  
538 will help reach universal coverage of children, thereby improving child health and  
539 contributing substantially to reductions in child mortality in Ghana.  
540

541

542

## References

543

544 Abel-Smith, B. 1992. Health insurance in developing countries: lessons from experience.

545 *Health Policy and Planning*, 7, 215-26.

546 Akazili, J., Welaga, P., Bawah, A., Achana, F. S., Oduro, A., Awoonor-Williams, J.,

547 Williams, J., Aikins, M. & Phillips, J. 2014. Is Ghana's pro-poor health insurance

548 scheme really for the poor? Evidence from Northern Ghana. *BMC Health Services*

549 *Research*, 14, 637.

550 Atinga, R., Abihiro, G., & Kuganab-Lem, R. 2015. Factors influencing the decision to

551 drop out of health insurance enrolment among urban slum dwellers in Ghana.

552 *Tropical Medicine & International Health*, 20, 312-321.

553 Babajanian, B., & Hagen-Zanker, J. 2012. Social Protection and social exclusion: an

554 analytical framework to assess the links. *ODI Background Note*. London:

555 Overseas Development Institute.

556 Blackwell, D., Hayward, M., & Crimmins, E. 2001. Does childhood health affect chronic

557 morbidity in later life? *Social Science & Medicine*, 52, 1269-1284.

558 ChankovA, S., Sulzbach, S. & Diop, F. 2008. Impact of mutual health organizations:

559 evidence from West Africa. *Health Policy and Planning*, 23, 264-76.

560 Cleland, J. & Van ginneken, J. 1988. Maternal education and child survival in developing

561 countries: The search for pathways of influence. *Social Science & Medicine*, 27,

562 1357-1368.

- 563 Dixon, J., Tenkorang, E. & Luginaah, I. 2013. Ghana's National Health Insurance  
564 Scheme: a national level investigation of members' perceptions of service  
565 provision. *BMC International Health and Human Rights*, 13, 1-10.
- 566 Ekman, B. 2004. Community-based health insurance in low-income countries: a  
567 systematic review of the evidence. *Health Policy and Planning*, 19, 249-70.
- 568 Garg, A. & Morduch, J. 1998. Sibling rivalry and the gender gap: Evidence from child  
569 health outcomes in Ghana. *Journal of Population Economics*, 11, 471-493.
- 570 GSS (Ghana statistical service). 2009. Ghana Demographic and Health Survey 2008.  
571 Accra, Ghana.
- 572 ICF International, 2012. ICF International Demographic and Health Survey Sampling and  
573 Household Listing Manual. MEASURE DHS, Maryland, USA: ICF International
- 574 Jehu-appiah, C., Aryeetey, G., Spaan, E., De Hoop, T., Agyepong, I. & Baltussen, R.  
575 2011. Equity aspects of the National Health Insurance Scheme in Ghana: Who is  
576 enrolling, who is not and why? *Social Science & Medicine*, 72, 157-65.
- 577 Kusi, A., Enemark, U., Hansen, K. & Asante, F. 2015a. Refusal to enrol in Ghana's  
578 National Health Insurance Scheme: is affordability the problem? *International*  
579 *Journal for Equity in Health*. 14, 2.
- 580 Kusi, A., Hansen, K. S., Asante, F., & Enemark, U. 2015b. Does the National Health  
581 Insurance Scheme provide financial protection to households in Ghana? *BMC*  
582 *Health Services Research*, 15, 331.
- 583 Langer, A. & Ukiwo, U. 2008. Ethnicity, Religion and the State in Ghana and Nigeria:  
584 Perceptions from the Street. In: Stewart, F. (ed.) *Horizontal Inequalities and*



- 585           *Conflict: Understanding Group Violence in Multiethnic Societies*. London:  
586           Palgrave Macmillan UK.
- 587   Marmot, M., Friel, S., Bell, R., Houweling, T., & Taylor, S. 2008. Closing the gap in a  
588           generation: health equity through action on the social determinants of health. *The*  
589           *Lancet*, 372, 1661-1669.
- 590   Mathauer, I., Schmidt, J., & Wenyaa, M. 2008. Extending social health insurance to the  
591           informal sector in Kenya. An assessment of factors affecting demand.  
592           *International Journal of Health Planning and Management*, 23, 51-68.
- 593   Mathieson, J., Popay, J., Enoch E., Escorel S., Hernandez M. (2008). Social Exclusion  
594           meaning, measurement and experience and links to health inequalities: A review  
595           of the literature. Lancaster: SEKN.
- 596   Mensah, J., Oppong, J. R. & Schmidt, C. M. 2010. Ghana's National Health Insurance  
597           Scheme in the context of the health MDGs: an empirical evaluation using  
598           propensity score matching. *Health Economics*, 19 Suppl, 95-106.
- 599   Mladovsky, P., Soors, W., Ndiaye, P., Ndiaye, A. & Criel, B. 2014. Can social capital  
600           help explain enrolment (or lack thereof) in community-based health insurance?  
601           Results of an exploratory mixed methods study from Senegal. *Social Science &*  
602           *Medicine*, 101, 18-27.
- 603   NHIA. 2013. NHIA Annual Report 2013. Accra, Ghana: NHIA
- 604   Odeyemi, I. & Nixon, J. 2013. Assessing equity in health care through the national health  
605           insurance schemes of Nigeria and Ghana: a review-based comparative analysis.  
606           *International Journal for Equity in Health*, 12, 9.

- 607 Parmar, D., Williams, G., Dkhimi, F., Ndiaye, A., Asante, F., Arhinful, D., & Mladovsky,  
608 P. 2014. Enrolment of older people in social health protection programs in West  
609 Africa--does social exclusion play a part? *Social Science & Medicine*, 119, 36-44.
- 610 Popay, J., Escorel, S., Hernandez, M., Johnston, H., Mathieson, J., & Rispel, L. 2008.  
611 Understanding and Tackling Social Exclusion. *Final Report to the WHO*  
612 *Commission on Social Determinants of Health Social Exclusion Knowledge*  
613 *Network*. Lancaster: SEKN.
- 614 PPD (Partners in Population and Development). 2013. Promoting women's  
615 empowerment for health outcomes for women and children. *Strategy Brief for the*  
616 *Inter Ministerial Conference on "South-South Cooperation in Post ICDP and*  
617 *MDGs"*, Beijing, China 22-23 October, 2013. WHO.
- 618 Rajkotia, Y. & Frick, K. 2012. Does household enrolment reduce adverse selection in a  
619 voluntary health insurance system? Evidence from the Ghanaian National Health  
620 Insurance System. *Health Policy and Planning*, 27, 429-37.
- 621 Rutstein, S. 2008. The DHS Wealth Index: Approaches for Rural and Urban Areas.  
622 *Demographic and Health Research Paper*. No. 60.
- 623 Sarpong, N., Loag, W., Fobil, J., Meyer, C., Adu-Sarkodie, Y., May, J. & Schwarz, N.,  
624 2010. National health insurance coverage and socio-economic status in a rural  
625 district of Ghana. *Tropical Medicine & International Health*, 15, 191-7.
- 626 Schneider, P. & Diop, F. 2004. Community-based Health Insurance in Rwanda. *Health*  
627 *Financing for Poor People-Resource Mobilization and Risk Sharing*. Washington  
628 DC: The World Bank.

- 629 Wang, H., Yip, W., Zhang, L., Wang, L. & Hsiao, W. 2005. Community-based health  
630 insurance in poor rural China: The distribution of net benefits. *Health Policy and*  
631 *Planning*, 20, 366-374.
- 632 WHO. 2005. Sustainable health financing, universal coverage and social health  
633 insurance. *Resolution WHA58.33*. Fifty-eighth World Health Assembly: Geneva:  
634 WHO.
- 635 WHO. 2013. Health systems financing: the path to universal coverage. The world health  
636 report 2010. Geneva: WHO.
- 637 Williams, G., Mladovsky, P., Dkhimi, F., Soors, W., & Parmar, D. 2014. *Social exclusion*  
638 *and social health protection in low- and middle-income countries: an*  
639 *introduction.*, Antwerp: ITG Press.
- 640 Witter, S., & Garshong, B. 2009. Something old or something new? Social health  
641 insurance in Ghana. *BMC International Health and Human Rights*, 9, 1-13.
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644 **Tables and figures**

645

646 **Table 1:** SPEC Indices of social exclusion

<b>SPEC indices for individual level analysis of determinants of enrolment</b>		
<b>Dimension</b>	<b>Domain</b>	<b>Variables</b>
Sociocultural	Gender empowerment	Mother's education*
	Social participation of household	Household head/spouse not a member of any association/club
	Gender discrimination	Only son in household**
	Social status	Household head does not sit close to the front in community meetings (i.e. no decision making role)
Political	Access to information	Household has no access to a television or radio
	Trust in government	Household has no trust in national government
	Access to healthcare	Household has no health facility close by
	Access to education	Household has difficulty accessing education due to physical (distance) and economic (cost) barriers
Economic	Wealth inequality	Household belongs to the poorest two quartiles
	Precariousness of shelter	Not living in a family-owned household
	Economic participation	Household head does not have a professional

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	occupation in the formal sector
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\*For analysis of household level enrolment, mother's education is replaced by household head education as children from the same household may have different mothers

\*\*Only son is not included as a SPEC variable for analysis of household level enrolment

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**Table 2: Descriptive statistics for the entire sample of children <18 and children < 18 in – partially-enrolled households**

Variables	Definition	Percentage/mean for all children	Percentage/mean for children in partially-enrolled households
Enrolled	1=currenty enrolled; 0=otherwise	54.4%	
Intra_enrolled	1=enrolled when other household members under 18 are not enrolled; 0=not enrolled when other household members under 18 are enrolled		50.9%
<i>Core variables</i>			
Age	scale	8.07	7.54
Male	1=male; 0=female	50.4%	49.9%
Majority_ethnicity	1=majority ethnicity; 0=otherwise	54.1%	
Majority_religion	1=majority religion; 0= otherwise	64.0%	

Illness	1=hospitalised; 0=otherwise	4.6%	4.7%
Relationship_HHH	1= Child or grandchild of household head; 0= Other relative or non-relative	94.8%	92.4%
Age_HHH	scale	39	
Male_HHH	1=Male household head; 0=otherwise	73.6%	
Insured_HHH	1=Household head currently insured; 0=otherwise	46.6%	
Urban	1=Living in an urban area; 0=otherwise	51.6%	
Household_size	scale	6.32	
<i>Sociocultural (SC) variables</i>			
Association	1=A household member belongs to an association or club; 0=otherwise	45.5%	
Meeting_seat	1=Household is an official or sits in front two rows at community meeting; 0 = otherwise	24.1%	
Mother_education	1=Mother has some education; 0=otherwise	54.0%	
Only_son	1= Only son in family; 0=Female child or not only	13.4%	7.6%

	son in family	
<i>Political (P) variables</i>		
Access_media	1=Household has access to radio or television; 0=otherwise	79.6%
Trust_government	1= Household has trust in government; 0=otherwise	71.1%
Distance	1=Walking time to nearest health facility is 15 minutes or less; 0=otherwise	47.4%
Access_education	1=Household has no physical or economic difficulties in accessing education; 0=otherwise	58.6%
<i>Economic (E) variables</i>		
Housing	1=Family owns current house; 0=otherwise	88.1%
Professional	1=Household head has professional occupation in formal sector; 0=otherwise	33.3%
Wealth	Q1-Q4; Q1 = poorest 25% of	



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households; Q4 = richest 25%

of households

Q1 26.4%

Q2 24.9%

Q3 25.4%

Q4 23.3%

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654 **Table 3: Descriptive statistics for households with at least one child aged under 18**

<b>Variables*</b>	<b>Fully- enrolled</b>	<b>Partially- enrolled</b>	<b>Non- enrolled</b>
HH_Enrolled	42.5%	15.8%	41.6%
<i>Core variables</i>			
Majority_ethnicity	63.5%	54.7%	55.5%
Majority_religion	71.7%	62.6%	62.8%
Age_HHH	47.42	45.48	43.64
Male_HHH	62.9%	73.50%	72.9%
Urban	58.3%	49.3%	46.5%
Household_size	4.67	6.34	5.00
Hospitalized	3.4%	5.5%	8.2%
<i>Sociocultural (SC) variables</i>			
Association	48.0%	47.4%	43.3%
Meeting_seat	25.5%	21.1%	19.7%
Education_HHH	72.5%	63.4%	61.7%
<i>Political (P) variables</i>			
Access_media	83.9%	77.1%	73.9%
Trust_government	70.2%	75.9%	65.2%
Distance	53.7%	46.5%	42.4%
Access_education	68.7%	56.4%	55.6%

<i>Economic (E) variables</i>				
Housing		86.0%	89.0%	85.3%
Professional		42.4%	35.10%	31.4%
Wealth				
	Q1	17.8%	24.0%	31.3%
	Q2	22.9%	29.0%	26.1%
	Q3	25.1%	25.3%	25.3%
	Q4	34.2%	21.7%	17.3%

655 \*HH\_enrolled = enrolment status of children in household (2=fully-enrolled; 1=partially-  
 656 enrolled; 0=non-enrolled); other variables are defined in Table 2

657

658

**Table 4: Binary logistic regression estimates of determinants of enrolment in NHIS for all children aged under 18**

VARIABLES	Model A			Model B		
	OR	SE	CI	OR	SE	CI
Male	1.020	(0.076)	0.880-1.184	1.028	(0.064)	0.906-1.165
Age_child	1.003	(0.008)	0.989-1.018	1.005	(0.008)	0.991-1.020
Majority_religion	0.891	(0.172)	0.637-1.249	1.036	(0.163)	0.752-1.425
Majority_ethnicity	0.807	(0.153)	0.597-1.089	0.933	(0.149)	0.697-1.249
Urban	1.652	(0.113)***	1.322-2.063	1.561	(0.106)***	1.269-1.920
Hospitalized	1.964	(0.189)***	1.356-2.845	1.944	(0.189)***	1.341-2.816
Relationship_HHH	1.427	(0.206)	0.952-2.137	1.420	(0.206)	0.949-2.126
Male_HHH	1.679	(0.129)***	1.302-2.163	1.809	(0.123)***	1.423-2.301
Age_HHH	1.013	(0.0045)*	1.004-1.022	1.015	(0.004)**	1.006-1.023

	Insured_HHH	12.410	(0.112)***	9.961-15.462	12.819	(0.111)***	10.315-15.931
	Size_HH	1.065	(0.025)*	1.014-1.119	1.076	(0.025)**	1.025-1.130
	Mother_education	1.633	(0.139)***	1.234-2.145			
<i>Sociocultural</i>	Only_son	1.154	(0.120)	0.912-1.460			
	Meeting_seat	1.024	(0.134)	0.788-1.331			
	Association	1.062	(0.108)	0.859-1.313			
	Trust_government	0.962	(0.116)	0.766-1.207			
<i>Political</i>	Acces_media	0.796	(0.149)	0.594-1.068			
	Access_edu	1.408	(0.108)***	1.139-1.740			
	Distance	0.956	(0.109)	0.773-1.183			
	Professional	0.867	(0.131)	0.670-1.121			
<i>Economic</i>	Housing	1.203	(0.166)	0.868-1.668			
	Wealth: Q2	2.339	(0.185)*	1.627-3.362			
	Wealth: Q3	1.887	(0.173)***	1.343-2.651			
	Wealth: Q4	1.489	(0.159)***	1.089-2.034			
	SC_Index				1.356	(0.105)**	1.103-1.666
	P_Index				1.192	(0.109)*	0.962-1.476
	E_Index				1.505	(0.111)***	1.210-1.871
	Observations		6370			6370	

Dependent variable: Binary choice variable for enrolment

Acronyms: Odds Ratio (OR); Standard Errors (SE); Confidence Interval (CI); Socio-cultural (SC); Political (P); Economic (E);

Robust SE in parenthesis: \*\*\* p<.001, \*\* p<.01, \* p<.05

659

**Table 5: Multinomial logistic regression estimates of household enrolment status**

**Model C**

**Non-enrolled\***

**Partially-enrolled\***

	VARIABLES	OR	SE	CI	OR	SE	CI
	Majority_religion	1.105	(0.153)	0.818-1.493	0.807	(0.203)	0.542-1.202
	Majority_ethnicity	0.711	(0.143)	0.538-0.977	0.873	(0.184)	0.609-1.252
	Urban	1.650	(0.111)***	1.328-2.052	1.389	(0.143)*	1.050-1.838
	Male_HH	0.677	(0.127)**	0.524-0.874	0.886	(0.169)	0.637-1.234
	Age_HH	0.969	(0.004)***	0.961-0.977	0.964	(0.006)***	0.954-0.975
	Size_HH	1.098	(0.026)***	1.045-1.155	1.359	(0.030)***	1.282-1.411
	Hospitalized	2.706	(0.248)***	1.666-4.395	1.355	(0.278)	0.786-2.338
<i>Sociocultural</i>	Education_HH	1.818	(0.134)***	1.398-2.365	1.386	(0.172)**	0.989-1.943
	Meeting_seat	1.239	(0.124)	0.971-1.580	1.555	(0.164)*	1.127-2.145
	Association	0.994	(0.106)	0.807-1.223	0.943	(0.136)	0.722-1.232
	Trust_government	0.941	(0.111)	0.757-1.171	0.671	(0.149)**	0.501-0.898
<i>Political</i>	Access_media	1.430	(0.148)*	1.071-1.911	1.607	(0.188)*	1.109-2.314
	Access_edu	1.327	(0.109)**	1.072-1.642	1.362	(0.138)*	1.072-1.844
	Distance	1.175	(0.105)	0.957-1.444	1.020	(0.135)	0.783-1.328
<i>Economic</i>	Professional	1.157	(0.120)	0.914-1.465	0.979	(0.154)	0.723-1.325
	Housing	1.574	(0.154)	1.163-2.130	1.038	(0.212)	0.685-1.571
	Wealth: Q1	2.583	(0.178)***	1.821-3.665	1.516	(0.230)	0.966-2.378
	Wealth: Q2	2.120	(0.161)***	1.546-2.909	1.819	(0.202)**	1.225-2.703
	Wealth: Q3	2.086	(0.146)***	1.568-2.776	1.435	(0.189)*	0.991-2.076
	<b>Observations</b>	1764					

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	Model D	Non-enrolled			Partially-enrolled		
	VARIABLES	OR	SE	CI	OR	SE	CI
Co ;	Majority_religion	1.307	(0.146)	0.982-1.738	0.890	(0.194)	0.608-1.303

SPEC indices	Majority_ethnicity	0.853 (0.136)	0.653-1.113	0.960 (0.179)	0.676-1.363
	Urban	1.621 (0.101)***	1.329-1.977	1.393 (0.131)*	1.076-1.802
	Male_HH	0.863 (0.120)	0.682-1.091	1.119 (0.157)	0.823-1.522
	Age_HH	0.973 (0.004)***	0.966-0.981	0.966 (0.005)***	0.956-0.976
	Size_HH	1.103 (0.025)***	1.050-1.158	1.362 (0.029)***	1.286-1.442
	Hospitalized	2.667 (0.245)***	1.649-4.313	1.369 (0.276)	0.798-2.350
	SC Index	1.369 (0.104)**	1.117-1.679	1.361 (0.136)*	1.084-1.845
	P Index	1.453 (0.104)***	1.186-1.781	1.561 (0.134)**	1.124-1.993
	E Index	1.734 (0.107)***	1.407-2.137	1.417 (0.138)**	1.111-1.883
<b>Observations</b>		2028			

661 \*Comparison category: fully-enrolled

**Table 6: Binary logistic regression estimates of intra-household exclusion**

VARIABLES	OR	SE	CI
Gender	1.049	(0.104)	0.855-1.287
Age	0.994	(0.010)	0.975-1.014
Hospitalised	2.951	(0.271)***	1.736-5.017
Only_son	1.041	(0.197)	0.708-1.534
Relationship_HHH	2.005	(0.198)***	1.359-2.956
Observations	1689		

Dependent variable: Binary choice variable for enrolled when other household members under 18 are not enrolled

Robust SE in parenthesis: \*\*\* p<.001, \*\* p<.01, \* p<.05

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ACCEPTED MANUSCRIPT

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**Research highlights**

- Study analyses if social exclusion determines enrolment of children in Ghana's NHIS
- Removing financial barriers has not promoted equitable enrolment for children
- Inequitable access for socially, economically and politically excluded children
- Need to address social, economic and political factors to improve child enrolment