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Identification of poor households for premium exemptions in Ghana's National Health Insurance Scheme: empirical analysis of three strategies

Genevieve Cecilia Aryeetey[1,2], Caroline Jehu-Appiah[1,3], Ernst Spaan[1], Ben D'Exelle[4], Irene Agyepong[5] and Rob Baltussen[1]

1 *Department of Primary and Community Care, Radboud University, Nijmegen Medical Center, Nijmegen, The Netherlands*
2 *School of Public Health, University of Ghana, Ghana, Africa*
3 *Ghana Health Services, Ghana, Africa*
4 *Faculty of Social Sciences, School of International Development, University of East Anglia, Norwich, UK*
5 *Greater Accra Regional Health Directorate Ghana Health Service, Accra, Ghana*

Summary

OBJECTIVES To evaluate the effectiveness of three alternative strategies to identify poor households: means testing (MT), proxy means testing (PMT) and participatory wealth ranking (PWR) in urban, rural and semi-urban settings in Ghana. The primary motivation was to inform implementation of the National Health Insurance policy of premium exemptions for the poorest households.

METHODS Survey of 145–147 households per setting to collect data on consumption expenditure to estimate MT measures and of household assets to estimate PMT measures. We organized focus group discussions to derive PWR measures. We compared errors of inclusion and exclusion of PMT and PWR relative to MT, the latter being considered the gold standard measure to identify poor households.

RESULTS Compared to MT, the errors of exclusion and inclusion of PMT ranged between 0.46–0.63 and 0.21–0.36, respectively, and of PWR between 0.03–0.73 and 0.17–0.60, respectively, depending on the setting.

CONCLUSION Proxy means testing and PWR have considerable errors of exclusion and inclusion in comparison with MT. PWR is a subjective measure of poverty and has appeal because it reflects community's perceptions on poverty. However, as its definition of the poor varies across settings, its acceptability as a uniform strategy to identify the poor in Ghana may be questionable. PMT and MT are potential strategies to identify the poor, and their relative societal attractiveness should be judged in a broader economic analysis. This study also holds relevance to other programmes that require identification of the poor in low-income countries.

keywords poverty, identification, exemptions, households, health insurance, Ghana

Introduction

Social health insurance initiatives have become important features in health policies of many low-income countries with the aim to achieve universal coverage and equitable access that does not exclude poor and vulnerable groups, who often are unable to afford health care. These initiatives often include exemption policies to exclude the poor from payment of insurance premiums, but many of these policies have failed to be effective in the absence of clear definitions of poverty and proper tools to identify the poor (Arhin-Tenkorang 2001; Tien & Chee 2002; Bitrán & Giedion 2003; Jaspars & Shoham (1999)). The National Health Insurance Scheme (NHIS) in Ghana is a social insurance scheme run at the district level (Ghana 2004; Agyepong & Adjei 2008), with equity and universal access as key policy objectives (MOH 2003, 2005). The NHIS policy stipulates premium exemptions for the core poor. However, despite the fact that some 18–28% of the population can be considered as poor (Ghana Statistical Service 2007) and thus require premium exemptions (MOH 2007, 2008), only about 2% of the insured actually benefit from premium exemptions for the poor. Among other reasons, difficulties in identifying the core poor account for this (Aikins & Arhinful 2006; Asante & Aikins 2008). To effectively implement pro-poor health financing

policies, strenuous efforts to identify and enrol the poor are required as repeatedly stressed in health sector reviews and other documents (MOH 2003, 2005; Nyonator *et al.* 2002; Garshong *et al.* 2002; Aikins & Arhinful 2006).

A number of strategies to identify the poor have been put forward in the international literature. Means testing (MT) identifies poor households or individuals on the basis of an income or expenditure threshold (Deaton 1997; Deaton & Zaidi 1999; Coady *et al.* 2003; Coady & Parker 2005; Grosh 1992). Proxy means testing (PMT) identifies poor households on the basis of criteria that relate to income such as education, housing characteristics and asset ownership (Filmer & Pritchett 2001; Montgomery *et al.* 2000; Sahn & Stifel 2003; Kauser *et al.* 1999; Sharif 2009; Johannsen 2006). Participatory wealth ranking (PWR) identifies poor households on the basis of criteria defined by the community in focus group discussions. (Chambers 1999; Laderchi 2001; Simanowitz 2000; Collins 2009; Feulfack & Zeller 2005; Bigman *et al.* 2000; Yates *et al.* 2006; Hargreaves *et al.* 2007; Ridde *et al.* 2009; Van Campenhout 2006; Zeller *et al.* 2006). Geographic targeting (GT) classifies areas or regions into poverty clusters on the basis of aggregate poverty indicators (Coulombe 2005; Kraybill & Bashaasha 2006; Baker & Grosh 1994; Hentschel *et al.* 2000; Minot 2000; Elbers *et al.* 2007). Among these strategies, MT is typically considered as the gold standard for the identification of the poor as it would best reflect poverty (Coady *et al.* 2003) – yet it is costly and requires considerable administrative capacity (Willis & Leighton 1995; Coady *et al.* 2003). Other strategies are said to be cheaper and easier to administer (Jehu-Appiah *et al.* 2010), but little is known on their effectiveness, or accuracy, to identify the poor.

This study evaluated the effectiveness of PMT and PWR in comparison with MT, in terms of errors of exclusion and inclusion. Errors of exclusion concern the exclusion of poor households from premium exemptions and imply a societal loss because of withholding insurance from poor households. Errors of inclusion relate to the provision of premium exemptions to non-poor households and reflect a societal loss equal to the sum of these premiums (Fofack 2000; Jehu-Appiah *et al.* 2010). We defined an effective strategy as one that minimizes both errors of exclusion and inclusion in identifying the poor relative to the gold standard – MT.

Methods

Sampling

As anecdotal evidence suggests that both effectiveness and ease of administration of strategies differ across socio-economic settings, we evaluated all strategies in urban, rural and semi-urban settings. We selected the poorest district (63% of the population living below the income poverty line of GH¢ 370[1] per year per household) and the richest district (26% of the population living below the income poverty line) in the Central region of Ghana on the basis of the most recent poverty incidence data for Ghana (Coulombe 2005). Using Ghana's 2000 population census data classification of rural, urban and semi-urban enumeration areas (EA), we randomly selected a semi-urban EA in the poorest district and a rural EA in the richest district. In addition, we randomly selected one urban EA from the region's single metropolitan district (27% of the population living below the income poverty line). Within each of the three selected EAs, we listed all dwelling or residential structures and interviewed all households within the listed structures at the time of the survey (yielding 146, 147 and 145 households in the urban, rural and semi-urban settings, respectively).

Data collection

The survey data were collected in June 2009. As a basis for MT and PMT, we administered a structured questionnaire to all household heads (or an eligible adult member in the absence of the household head) in each setting. Data were collected on household characteristics (age, education, marital status and occupation of all household members), income and consumption expenditures, ownership of durable assets, land, livestock and dwelling characteristics. In addition, as a basis for PWR, we organized group discussions with 15–20 volunteer representatives in each setting to discuss indicators of poverty. We ensured a good mix of representatives by asking for equal representation from men and women who had in-depth knowledge about the community, opinion leaders as well as leaders of recognized groups within the community to participate in the ranking exercise. There were 17 participants in the urban setting (10 men and seven women), 16 participants in the rural setting (nine men and seven women) and 18 participants in the semi-urban setting (10 men and eight women). The groups described indicators of wealth and poverty status for their communities and then used these indicators to develop five wealth quintiles (from very rich to very poor) with descriptions of indicators for each category. The five categories were represented by differently coloured cards. Group members ranked households into one of the wealth quintiles by selecting the colour of card that represented each household.

[1]US$ 1 was approximately equal to GH¢ 1.4 at the time of the study.

In all settings, community and individual consents were obtained before research activities were carried out. The interviews and ranking exercises were conducted in the two main local languages, Twi and Fante. The data collection tools were tested before use, and standardized translations of the tools in the local language were given to the interviewers.

Data analysis

In MT, we estimated household wealth through monthly consumption expenditures. Following the definitions in the 2005 Ghana Living Standard Survey (GLSS V), we defined households to be poor in case their expenditures are below GH¢ 370 per year (Ghana Statistical Service, 2007). In PMT, we estimated households' socio-economic status (SES) index to rank them into poverty quintiles. We first selected household characteristics (such as assets) that were significantly correlated with consumption expenditures and these were considered as proxies for household wealth. We then used principal components analysis (PCA) to estimate a household SES score. PCA is a statistical procedure to determine weights for a linear index of a set of variables (Filmer & Pritchett 2001; McKenzie 2005; Vyas & Kumaranayake 2006). The household SES score was calculated as the sum of the weight of variables multiplied by their corresponding values (see additional information on the factor scores from principal component analysis in Appendix S1). Next, households were ranked into wealth quintiles based on their SES score. In PWR, we counted how often a certain household was ranked in each wealth category and subsequently classified the household into the wealth quintile it was most frequently ranked in. We repeated this procedure for all households. Households in the two lowest quintiles ('very poor' and 'poor') were considered as poor.

Comparative assessment of strategies

The comparative analysis evaluates, for each community, to what extent MT, PMT and PWR identify the same households as being poor. However, whereas MT is considered an absolute measure of poverty (by using a poverty line), PMT and PWR are relative measures of poverty (by classifying households in five equal wealth quintiles and by community perceptions on poverty, respectively). This prevents direct comparison of all strategies, as PMT and PWR do not provide a clear cut-off level on who is poor. Therefore, we assumed in the baseline analysis for PMT that the bottom 40% of all households (i.e. the lowest two quintiles) represent poor households, and for PWR that all households labelled as 'very poor' and 'poor' represent poor households. In an alternative analysis, we assume that PMT includes only the bottom 20% of the poorest households and PWR only includes those households selected as 'very poor'.

Errors of exclusion were defined as the number of the true poor households excluded over total number of poor households identified. Errors of inclusion were defined as the number of non-poor households identified as poor over the total number of households (Coady *et al.* 2003; Fofack 2000).

Let E = number of poor households identified by MT, Y = number of poor households identified by MT or PWR

$$\text{Exclusion error} = \frac{E - (E \cap Y)}{E}$$

$$\text{Inclusion error} = \frac{Y - (E \cap Y)}{\text{Total number of households sampled}}$$

Results

The household characteristics from the survey are shown in Table 1. Table 2 shows the indicators that were defined by the participants in the PWR to identify 'very poor' and 'poor' households. They were related to ten domains: income, type of employment, education, possession of goods and durable assets, land ownership, housing, food security, health status, physical appearance and savings.

The number of identified poor households varies by setting and by strategy (Table 3). In the urban and semi-urban settings, MT defined the least number of households as being poor and PWR identified most households as being poor. For PMT, the bottom 40% of households was used as the poverty cut-off line in all three settings. The strategies overlapped to varying extents in their identification of poor households but in all cases with 35% or less of overlap (Table 3). This is also illustrated in the Venn diagrams (Figure 1).

Table 4 shows the errors of exclusion and inclusion of PMT and PWR when compared to MT, in the baseline analysis. For illustrative purposes, we show the calculation of the exclusion and inclusion errors of PMT in the rural setting.

In the urban setting, PWR excludes fewer poor households (50%) than PMT (63%), but also includes more non-poor households (50%) than PMT (36%). In the rural setting, PWR excludes more poor households (73%) than PMT (53%), but also includes fewer non-poor households (17%) than PMT (21%). In the semi-urban setting, PWR excludes fewer poor households (3%) than PMT (46%), but also includes more non-poor households (60%) than PMT (27%). Table 5 shows the results of the alternative analysis where PMT now reveals lower errors of exclusion

Table 1 Descriptive characteristics of households (%)

	Urban	Rural	Semi-urban	Pearson's χ^2
Sample size	146 (33.3)	147 (33.6)	145 (33.1)	
Average household size	4.58	6.06	5.00	
Insurance status (%)				
Respondent household head	90.5	94.5	95.2	0.000
Respondent eligible adult	9.5	5.5	4.8	
Currently enrolled	186 (39.4)	167 (24.8)	52 (10.3)	
Previously enrolled	48 (10.3)	137 (20.3)	44 (8.7)	
Never enrolled	238 (50.4)	370 (54.9)	407 (80.9)	
Exemption category (%)				
Children <18 years	208 (43.9)	365 (54.7)	234 (46.2)	0.000
Elderly >69	19 (4.0)	30 (4.5)	41 (8.1)	
Household head				
Male	76 (52.1)	99 (67.3)	73 (50.3)	0.006
Female	70 (47.9)	48 (32.7)	72 (49.7)	
Household wealth				
Average monthly income (GH¢)	139.50	140.53	143.37	
Average monthly expenditure(GH¢)	222.76	213.48	196.42	
Assets ownership (%)				
Television	86 (58.9)	6 (4.1)	29 (20.0)	0.000
Refrigerator	48 (32.9)	2 (1.4)	14 (9.7)	0.000
Fan	73 (50.0)	12 (8.2)	20 (13.8)	0.000
Iron	53 (36.3)	1 (0.7)	23 (15.9)	0.000
Mobile phone	106 (72.6)	55 (37.4)	62 (42.8)	0.000
VCD/DVD	53 (36.3)	1 (0.7)	12 (8.3)	0.000
Record player	4 (2.7)	0 (0.0)	6 (4.1)	0.055
House	14 (9.6)	21 (14.3)	11 (7.6)	0.159
Livestock	26 (17.8)	88 (59.9)	71 (49.0)	0.000
Dwelling characteristics (%)				
Floor material: linoleum	54 (37.0)	11 (7.5)	14 (9.7)	0.000
Floor material: cement	86 (58.9)	115 (78.2)	124 (85.5)	0.000
Floor material: sand	0 (0.0)	21 (14.3)	5 (3.4)	0.000
Wall material: sand	9 (6.2)	70 (47.6)	44 (30.3)	0.000
Source of drinking water: public standpipe	130 (89.0)	45 (30.6)	109 (75.2)	0.000
Source of drinking water: well with pump	0 (0.0)	102 (69.4)	0 (0.0)	0.000
Fuel for cooking: gas	30 (20.5)	0 (0.0)	6 (4.1)	0.000
Fuel for cooking: charcoal	124 (84.9)	5 (3.4)	47 (75.2)	0.000
Fuel for cooking: wood	3 (2.1)	142 (96.6)	94 (64.8)	0.000

and higher errors of inclusion compared to PWR, whereas PWR now (nearly) excludes all poor households and has a low error of inclusion.

Discussion

This study compared the effectiveness of PMT and PWR relative to MT to identify poor households. It reveals that both strategies have considerable errors of exclusion and inclusion – with variation depending on the setting. Moreover, in every setting in our study, no strategy yields both lower errors of exclusion and inclusion. In a strict sense, we can therefore not conclude whether PMT or PWR is a more effective strategy to identify the poor. For example, in the urban community, PWR excludes fewer poor households than PMT, but also includes more non-poor households than PMT does. Hence, in comparison with PMT, PWR would reduce social losses as it would insure more poor households, but it would also invoke social losses in paying premiums for non-poor households. It is then difficult to judge on the basis of this data which strategy is most effective.

However, whereas the errors of exclusion and inclusion for PMT remained relatively stable across the three

Table 2 Participatory wealth ranking indicators across rural–urban classification

Criteria/dimension	Very rich Yellow: 5	Rich Blue: 4	Middle class Green: 3	Poor Pink: 2	Very poor Orange: 1
Income (assumed average)	Monthly income of GH¢350.00	Monthly income of GH¢200.00	Monthly income of GH¢95.00	Money at hand not more than GH¢ 2.00 in a day	Money at hand not more than GH¢ 1.00 a day
Type of employment	Cash crop farmer Owner of a business	Cash crop farmer	Farer Artisan Table-top provision seller Able to hire labour for farm work	A farm labourer Sometimes sell farm produce for extra money	A farm labourer Unemployed Makes wooden mortar and pestle to pound 'fufu' for a fee
Education	Children are able to complete secondary and tertiary education	Children are able to complete secondary education	Children able to complete JHS	Children able to complete primary education	Children not in school or not regular because of inability to give daily school allowance.
Possession of goods and durable assets	Has 4 or more cars Owns a private school in the community Has a private flourishing Has a mobile phone	Has 1 car Farm size of 5 acres or more for planting cassava and maize Owner of provision store Owns a drug/agro-chemical store Mobile Phone	Small fridge from which he/she is able to retail frozen chicken and fish Owns spinning/audio system for use during ceremonies like funerals, marriages etc Owns a Taxi Mobile Phone	About 1 acre of farmland	Hoe/Cutlass for farming About 1 acre of farmland
Land ownership	More than 10 acres of land for cocoa cultivation	At most 10 acres of land	Between 5-10 acres	Small farm land of ½ acre	Small farm land of ½ acre
Housing	Many rooms, toilets, kitchen and bathroom enclosed	2 bedroom self-contain house	Single room self-contain	Mud-brick house that is not cemented	Mud-brick house that is not cemented No sleeping place
Food security	Enjoys three square meals a day	Enjoys three square meals a day	Enjoys three square meals a day	Usually feeds on credit	Sleeps on an empty stomach/ eat once a day
Health Status	Healthy, able to afford health care cost	Healthy, able to afford health care cost	Healthy, able to afford health care cost	Unable to afford health care cost	Sick and without a helper
Physical appearance and clothing	Looks healthy and in neat clothes.	Looks healthy and in neat clothes	Looks healthy and in neat clothes	Borrows clothes to attend programmes	No footwear/ clothes Children in tattered school uniforms
Savings (assumed)	Saves between GH¢100.00-GH¢200.00 a month	Saves at least GH¢ 50.00 a month	Saves at least GH¢ 30.00	No savings	No savings A beggar

Table 3 Number of poor households identified (%)

Strategy	Urban	Rural	Semi-urban
MT	16 (11%)	57 (38%)	35 (24%)
PMT (bottom 40% poorest households)	58 (40%)	58 (39%)	58 (40%)
PWR ('very poor' and 'poor')	81 (55%)	40 (27%)	121 (83%)
Identification by both MT and PMT	6 (4%)	27 (18%)	19 (13%)
Identification by both MT and PWR	8 (5%)	15 (10%)	34 (23%)
Identification by both PMT and PWR	40 (27%)	22 (15%)	51 (35%)
Identification by MT, PMT and PWR	4 (3%)	7 (5%)	19 (13%)
Identified exclusively by MT	6 (4%)	22 (15%)	1 (1%)
Identified exclusively by PMT	16 (11%)	16 (11%)	7 (4%)
Identified exclusively by PWR	37 (25%)	10 (7%)	55 (38%)

MT, means testing; PMT, proxy means testing; PWR, participatory wealth ranking.

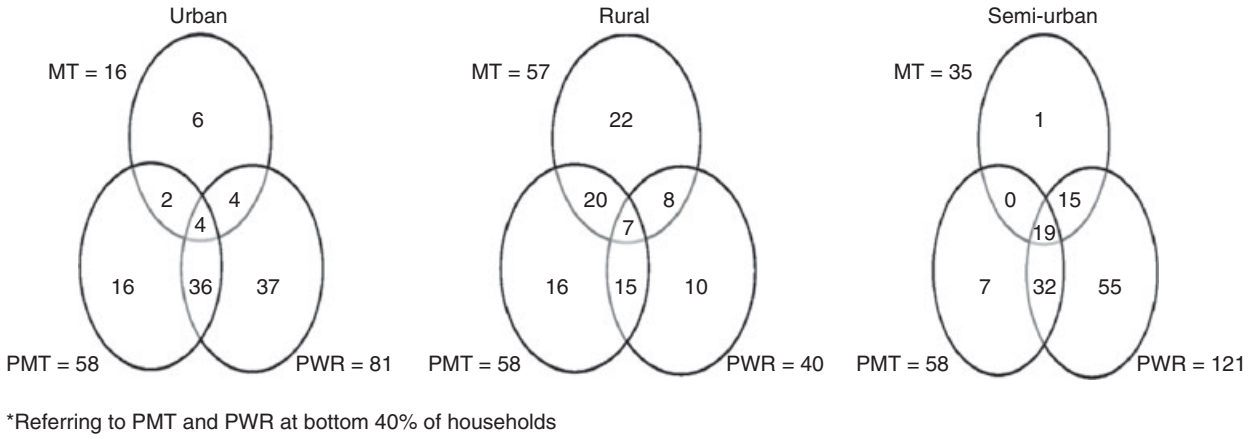

Figure 1 Venn diagram representing the accuracy of strategy to identify the poor in urban, rural and semi-urban settings*.

Table 4 Errors of exclusion and inclusion and exclusion of PMT and PWR in comparison with means testing – baseline analysis

Strategy	Error type	Urban	Rural	Semi-urban
PMT (bottom 40% poorest households)	Error of exclusion	0.63	0.53	0.46
	Error of inclusion	0.36	0.21	0.27
PWR ('very poor' and 'poor')	Error of exclusion	0.50	0.73	0.03
	Error of inclusion	0.50	0.17	0.60

PMT, proxy means testing; PWR, participatory wealth ranking.

settings, they varied widely for PWR. In the semi-urban setting, only a minority of all households' live below the MT poverty line, but the vast majority were rated as poor by PWR. Possible explanation is that many households were farmers involved in non-cash crop farming, while their location near a relatively wealthy urban area may increase the community's perception of their poverty. In the rural setting, only a minority of all households (typically those that were not involved in cash-cropping) were rated as poor by PWR, whereas the MT poverty line rated more households as poor. In the urban setting, our study revealed that many more households were rated as being poor than the MT poverty line suggests. This may be related to weak community cohesion: people may not know each other well enough to adequately assess their poverty status. The suitability of subjective measures of poverty such as PWR, *vs*. objective (monetary) measures of poverty such as MT, is an ongoing debate (Rio Group 2006). On the one hand, subjective measures have appeal, as pointed out by Ruggles: ''After all, 'poverty' is a socially determined state, and in the end official thresholds come down to what some collection of politicians and program administrators consider an adequate level of resources to support a life in a particular community. It seems in many ways more appropriate to ask the members of that community directly what they consider a minimally adequate income level'' (Ruggles 1990). On the other hand,

Table 5 PMT and PWR in comparison with means testing – alternative analysis

Strategy	Variable	Urban	Rural	Semi-urban
PMT (bottom 20% poorest households)	Number of poor households (%)	29 (20%)	29 (20%)	28 (20%)
	Error of exclusion	0.63	0.88	0.77
	Error of inclusion	0.16	0.15	0.14
PWR ('very poor')	Number of poor households (%)	1 (1%)	1 (1%)	5 (3%)
	Error of exclusion	1.00	1.00	0.94
	Error of inclusion	0.01	0.01	0.02

PMT, proxy means testing, PWR, participatory wealth ranking.

the use of subjective measures implies that the definition of who is poor may vary widely across settings, as sometimes people's expectations about benefits of the identification process and variations in relative perceptions of 'poverty' may exaggerate or underestimate the numbers of identified poor. This may provoke in some way unequal exemption policies in a country like Ghana. Hence, the acceptability of PWR, in the population and among policy makers, as a uniform strategy to identify the poor in Ghana may be questionable.

Given the relatively large errors of exclusion and inclusion of PMT and PWR in comparison with MT, the question emerges whether MT would not be a suitable strategy to identify the poor. MT has been criticized for being relatively costly to conduct and relatively difficult to administer (Willis & Leighton 1995; Coady *et al.* 2003), and this study suggests the same. However, it is not clear whether these (survey) costs are indeed larger than the social losses associated with PMT and PWR. Only an economic analysis, including all relevant societal costs, which is beyond the scope of the present study, would provide insight into the societal attractiveness of MT *vs.* PMT *vs.* PWR.

A number of issues are important in the interpretation of results. First, in the present study, we selected the assets in PMT on the basis of its statistical relationship to detailed measures of poverty as estimated in MT. As selected assets are bound to be context specific, any further application of PMT beyond the present study setting would again require the same procedure – i.e. collection of data on assets and income (or expenditure), and statistical analysis. In Ghana, the GLSS provides such data on a regular basis in different parts of the country and can support the broader use of PMT. Second, in MT, we used consumption expenditure as a proxy for wealth rather than income data, as the latter is said to be more subject to seasonal fluctuations (Deaton 1997; Deaton & Zaidi 1999). Third, the transitory nature of poverty requires that the identification process should be carried out periodically. Fourth, community acceptance and legitimacy of the process is crucial to minimize the stigmatization of beneficiaries, and any selection of strategy should take this into account. Fifth, GT is another potential strategy to identify the poor, with no errors of exclusion but with significant errors of inclusion (equal to the number of households above the poverty line). This strategy is relatively attractive in settings with a high incidence of poverty and requires little administrative capacity (Jehu-Appiah *et al.* 2010). Also, an economic analysis of GT could prove its societal attractiveness vis-à-vis other strategies. Sixth, our findings partially overlap with those from other studies. Studies in Bangladesh reported errors of exclusion of 25% for PWR (Feulfack & Zeller 2005), and between 34% and 68% for PMT (Sharif 2009), whereas we found rates of 3–73% and 46–63%, respectively (all in comparison with MT). One possible explanation for the wider divergence of our rates is that we evaluated strategies in three different settings.

In conclusion, this study shows that PMT and PWR have considerable errors of exclusion and inclusion in comparison with MT. PWR is a subjective measure of poverty and has appeal because its reflects community's perceptions on poverty. However, as its definition of the poor varies across settings, its acceptability as a uniform strategy to identify the poor in Ghana may be questionable. PMT and MT are potential strategies to identify the poor and their relative societal attractiveness should be judged in a broader economic analysis. This study was carried out in the context of identifying the poor for premium exemptions in Ghana's national health insurance scheme, but also holds relevance to other programmes that require identification of the poor in low-income countries.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Factors scores from principal component analysis and correlation.

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Corresponding Author Genevieve Cecilia Aryeetey, Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands.
E-mail: G.Aryeetey@elg.umcn.nl; cecearyeetey@yahoo.co.uk