



Efficiency, equity and feasibility of strategies to identify the poor: An application to premium exemptions under National Health Insurance in Ghana

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ABSTRACT

Objectives: This paper outlines the potential strategies to identify the poor, and assesses their feasibility, efficiency and equity. Analyses are illustrated for the case of premium exemptions under National Health Insurance (NHI) in Ghana.

Methods: A literature search in Medline search was performed to identify strategies to identify the poor. Models were developed including information on demography and poverty, and costs and errors of in- and exclusion of these strategies in two regions in Ghana.

Results: Proxy means testing (PMT), participatory welfare ranking (PWR), and geographic targeting (GT) are potentially useful strategies to identify the poor, and vary in terms of their efficiency, equity and feasibility. Costs to exempt one poor individual range between US\$11.63 and US\$66.67, and strategies may exclude up to 25% of the poor. Feasibility of strategies is dependent on their aptness in rural/urban settings, and administrative capacity to implement. A decision framework summarizes the above information to guide policy making.

Conclusions: We recommend PMT as an optimal strategy in relative low poverty incidence urbanized settings, PWR as an optimal strategy in relative low poverty incidence rural settings, and GT as an optimal strategy in high incidence poverty settings. This paper holds important lessons not only for NHI in Ghana but also for other countries implementing exemption policies.

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1. Introduction

Currently many sub-Saharan African countries are exploring ways to replace user fees at point of service use

with more equitable alternatives. Indirect payment systems such as social and community health insurance are of increasing interest [1]. Whether with user fees or insurance financing, exemptions are needed for the poorest to improve equity. Apart from the challenges of how to mobilize and pool adequate resources to finance such systems, there are challenges with effectively identifying and targeting the most vulnerable groups for exemptions. In low income countries, these challenges are related in part to large non formal sectors and corresponding difficulties in assessing income and living standards to minimize errors

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of inclusion and exclusion; constrained health budgets to cover the costs of identification, as well as the financing of such mandates given the large numbers of poor and low tax base [2]. Feasibility concerns and trade-offs between equity and efficiency continue to be an important point of debate.

Ghana passed a National Health Insurance (NHI) act in 2003, as part of financing reforms to address financial access constraints especially for the poor and improve equity in access to affordable and good quality care. By the end of 2007 a total of 145 District Wide Mutual Health Insurance Schemes were established, and more than 11 million people had enrolled representing 55% of the population [3].

Despite such strides recent empirical evidence suggests enrolment among the informal sector (including the poor) is relatively low [4–6]. The NHI act makes a provision for premium exemptions for the core poor (indigents) [5], but only a small proportion actually benefits. This is in part due to implementation problems related to difficulties in identifying the poor in the absence of clear guidelines/criteria and lack of detailed costing analysis to implement and fund the mandate [14]. In addition, there is a group of people in the “very poor” category who fall between the indigent category and those able to pay the minimum premium. They represent 18% of the population [7]. This group requires special protection arrangements to benefits from the NHIS [8,9]. Consequently, to adopt a pro-poor strategy to the implementation of the NHIS, strenuous efforts to identify and enrol the poor are required as repeatedly stressed in MOH health sector reviews [10,11], and other documents [12–14].

Against this background, this paper aims to identify potential strategies to identify the poor, and to judge their efficiency, equity and feasibility. The paper first reviews local and international experiences on identification of the poor. Since identification of the poor is an issue of concern beyond the health sector, the review includes experiences in health and non-health sectors. Next, the paper estimates costs of each strategy, and presents the trade-offs between feasibility (defined as practical ability to identify the poor in a given context), efficiency (defined by cost per exempted poor individual, and equity (defined by error of exclusion) of the different strategies. Finally, results are translated into a set of clear policy recommendations. This work has relevance not only for the health sector in Ghana but for other low and middle income countries that are struggling with issues around equitable health care financial protection whether through premium exemption as part of health insurance systems, user fee exemptions or conditional cash transfers.

2. Materials and methods

We conducted a literature search in Medline using the following Keywords: alone and in combination: ‘poor’; ‘identification’; ‘poverty measurement’; ‘health insurance’; ‘welfare analysis’; ‘Africa’; ‘Latin America’; ‘Asia’; ‘Pacific’ or ‘developing countries’. Snowballing techniques; contacting of individual authors; and grey literature searches were used to identify other relevant articles. We excluded

articles reporting on strategies with limited feasibility in the health sector. In total 62 articles were selected for inclusion in our analysis; which we classified into four broad strategies to identify the poor: (1) means testing; (2) proxy means testing (PMT); (3) geographic targeting (GT) and (4) participatory welfare ranking (PWR).

We estimated the implementation cost for three out of four strategies, i.e. PMT, GT and PWR in two regions in Ghana: Greater Accra Region (a region with relative low levels of poverty, up to a maximum of 15% in the districts), and the Upper West Region (a region with relative high levels of poverty, up to a maximum of 85% in the districts). Means testing was not subjected to a costing analysis as the high cost and small sample sizes of required surveys do not make it feasible to perform this strategy on a nationwide scale. Costing models were developed on the basis of a combination of empirical estimates and expert opinion [15–20], using the 2008 price level (for more detail on the costing model, see Table 1). Total costs of the strategies were estimated as the sum of the survey costs to identify the poor, and costs of premium exemptions. We defined the efficiency of the different strategies as the cost per identified poor individual. Sensitivity analysis was employed to assess the impact of varying assumptions on study results and study conclusions.

The different strategies exclude poor and include non-poor individuals to varying degrees. On the basis of a literature review, we assumed that PMT identifies 82% of the poor households (i.e. error of exclusion of 18% [20]), and PWR identifies 75% of the poor households (i.e. error of exclusion of 25% [21]). Leakages (i.e. errors of inclusion) to non-poor households are assumed at 34% for PMT [19] and 15% for PWR in high poverty rural areas and 33% in low poverty urban areas [22]. Since we know the proportion of non-poor households in our high and low poverty incidence study districts, these errors are estimated as a proportion of non-poor households. This translates into inclusion rates of non-poor individuals of 2% for PWR and 5% of PMT in high poverty incidence districts, and 28% for PWR and 29% for PMT in low poverty incidence districts. By definition, GT identifies 100% of the poor households. GT involves leakages to non-poor households, and this equals the incidence of non-poor households in given districts. We defined the equity of the different strategies as the error of exclusion (percentages).

3. Strategies to identify the poor

3.1. Background

A substantial body of literature exists on strategies to identify and target the poor [23–44]. An important distinction is made between welfare and non-welfare approaches, and between absolute and relative poverty lines. Also, several authors define conditions for successful strategies.

The *welfare approach* is the most commonly used way to measure poverty, and is based on incomes: a person is considered poor if his or her income level falls below

Table 1
Coverage, costs, and indicators of efficiency and equity of strategies to identify the poor in two districts in Ghana.^a.

District	Strategy	Coverage								
		Population (a)	People of eligible age for premium exemption (%) (b)	Poverty incidence (c)	Error of exclusion (d)	Error of inclusion (e)	Number of poor individuals exempted (f) = (a) × (b) × (c) × (1 – d)	Number of non-poor individuals exempted (g) = (a) × (b) × (e)	Total number of individuals exempted (h) = (f) + (g)	Number of poor excluded (equity indicator) (i) = (a) – (e)
Nadawilli	PWR ^c	95,748	56%	86%	25%	2%	34,584	1072	35,657	11,528
	PMT ^b	95,748	56%	86%	18%	5%	37,812	2681	40,493	8300
	GT	95,748	56%	86%	0%	14%	46,112	7507	53,619	–
Tema	PWR ^c	580,886	56%	15%	25%	28%	36,596	91,083	127,679	12,199
	PMT ^b	580,886	56%	15%	18%	29%	40,011	94,336	134,347	8783
	GT	580,886	56%	15%	0%	85%	48,794	276,502	325,296	–
District	Strategy	Costs (US\$)				Total costs (i) = (g) + (h)	Cost per identified poor individual (efficiency indicator) (j) = (i)/(f)	Incremental cost per extra exempted poor individual		
		Costs of surveys (g)	Costs of premium exemptions (h) = (f) × Φ							
Nadawilli	PWR ^c	45,799	356,566	402,365	11.63					
	PMT ^b	70,491	404,930	475,421	12.57			23		
	GT	–	536,189	536,189	11.63			7		
Tema	PWR ^c	239,855	1,276,787	1,516,642	41.44					
	PMT ^b	407,393	1,343,473	1,750,866	43.76			69		
	GT	–	3,252,962	3,252,962	66.67			171		

^a In order to estimate the cost of each of the three strategies, the following general assumptions and explanations were made: (i) population estimates are extrapolated from census 2000 estimates to 2008 with an 8% growth rate; (ii) persons below 15 years (41% of population) and persons above 64 years (3% of population) are exempted from paying premiums under the NHIS regulations; the remaining 56% of the population represents the target population that is potentially eligible for premium exemptions, denoted in the table as (b); (iii) district-based poverty incidence levels were based on estimates from Coulombe et al. [72], denoted in the table as (c); (iv) number of households is calculated as population divided by average household size (equalling four (DHS-Ghana, 2003)); (v) cost of health insurance premium is US\$10, denoted in the table as Φ, based on the minimum amount that the poor pay for premium.

^b For PMT, we assumed an average of 60 days in a district with 15 interviews per enumerator per day. The per diem for field work per day equals US\$35.00. The estimated number of enumerators per day equals (number of households/60 days × 15 interviews per enumerator per day). The cost of field work, transport and telecommunications, data entry, and data analysis were modelled.

^c For PWR, there are 10 teams with every team working in 100 households every day. This results in 1000 households in a day. Each team consists of three facilitators and a supervisor in addition to selected community members. Per diem for field work per day US\$35.00 The cost of field work, transport and telecommunications, data entry, and data analysis were modelled. Number of days spent in a district equals number of households/1000. ^d Calculated as the difference in costs with the next most costly strategy divided by the difference in number of exempted poor individual of that strategy. In Nadawilli, PMT is dominated, and it is always more efficient to implement GT.

some minimum level necessary to meet basic need. The *non-welfare approach* is based on the recognition that monetary measures fail to capture other important aspects of well-being, such as community resources, social relations, culture, personal security, natural environment and captures the multidimensional nature of poverty [45,46]. Given the difficulty in measuring and quantifying poverty using non-welfare measures the vast majority of strategies rely on welfare measures.

The definition of a poverty line is essential in analyzing poverty, as it determines how many people are poor and how many are non-poor [47]. An *absolute poverty line* developed by the World Bank in the 1980s considers someone to be poor if surviving on less than US\$1 per person a day. In Ghana an absolute poverty line is anchored around nutritional intake: a lower poverty line focuses on what is needed to meet the nutritional requirements of household members and is equivalent to GH¢288 (US\$257) per adult per year. An upper poverty line incorporates both essential food and non-food consumption and is equivalent to GH¢370 (US\$330) per adult per year [48]. A *relative poverty line* defines poverty in relation to a generally accepted standard of living in a specific society at a specific time and goes beyond basic physiological needs. A commonly used relative poverty line is that of households living below half-average income.

Different authors have set conditions for successful strategies to identify the poor. Zeller [44] argues that the strategy should be verifiable by other investigators and the indicators employed should be visible, e.g. the condition of a house. Also, a good poverty assessment tool is one that minimizes cost and effort for a certain level of accuracy and can be useful for poverty targeting. Hentschel et al. [59] outlines that every poverty assessment tool should be evaluated under six criteria namely simplicity, practicality, cost, ability to discriminate among different levels of poverty, quality of data and reliability of data.

3.2. Identifying the poor by household income—means testing

Identification of the poor by means testing involves obtaining detailed information about household average incomes across different socio-economic groups. The Living Standards Measurement Survey (LSMS) developed by the World Bank, attempts to obtain information on household incomes using proxies such as expenditure and consumption. LSMS is the internationally accepted method for estimating household income (means testing) in developing countries, and are said to provide robust measures of poverty [27]. The Ghana Living Standards Survey (GLSS) is carried out in sample communities across the country, and is used to identify regional levels of poverty. It has been carried out every 5 years since the 1980s.

The LSMS's have a number of drawbacks. They require the collection of very detailed data on households, their high cost and small sample size precludes disaggregation of household income beyond the regional level and households may misrepresent their true income leading to errors of inclusion [27,49].

3.3. Identifying the poor by household indicators—proxy means testing (PMT)

PMT using indicators of household welfare such as ownership of selected assets and other social characteristics are being increasingly used to measure household welfare. Instead of collecting income or expenditure data these surveys collect easy-identifiable information on indicators that correlate with or are good predictors of poverty. Traditionally these indicators are captured by the Demographic and Health Survey (DHS) and Core Welfare Indicator Questionnaire (CWIQ) surveys. Resulting data on ownership of assets and access to services can then be used to derive indicators of household socio-economic status [50,51]. Using principal component analysis, a poverty index can be computed to provide a nationally representative benchmark measure of relative poverty [52].

Examples of proxy means testing include the use of two indicators (number of children under five and pregnant women) to identify the poor in a food subsidies program in Columbia (World Bank 1986a), and external housing conditions as a proxy for welfare in the CASHPOR House Index, which has been applied in over 17 countries in Asia [27,53].

PMT has a number of drawbacks. The high cost of survey and associated small sample sizes, make the strategy difficult to apply nationwide; and there is mixed evidence that asset indices are good proxies for welfare [51,53,54]. Experiences with proxy means testing show exclusion of 16–20% of the poor [20] and also considerable leakages to the non-poor [17,19]. The use of proxy indicators is strictly limited to providing *relative* poverty levels, as they do not inform about levels of absolute poverty.

3.4. Geographic targeting (GT)

GT involves targeting groups of people, rather than individuals living in a defined locality. Its rationale is the large variation in the standard of living between different geographic areas, and the concentration of poverty in particular areas. The strategy typically combines detailed income survey data with national census surveys, and extrapolates the former to the national level through variables that are common in the two surveys [71]. Examples of GT in Africa include applications in Burkina Faso [55] Ghana [56], Mozambique [57] and Uganda [58].

Geographic targeting can entail considerable leakage to the non-poor who live in these areas. Studies in India [38], Ecuador [59], Vietnam, Venezuela, Mexico and Jamaica [60–62] demonstrated that improved efficiency can be achieved by targeting on smaller geographic areas. GT has also been used in combination with other strategies to further refine the targeting of poor households. The PROGRESA social safety net program in rural areas in Mexico identified the poorest rural localities using geographic targeting and, within participating localities, used a proxy means test to identify poor households on its eligibility for benefits [39]. Evaluations of PROGRESA's targeting performance showed it to be very effective, with 79% of program benefits going to the poorest 40% of households [63].

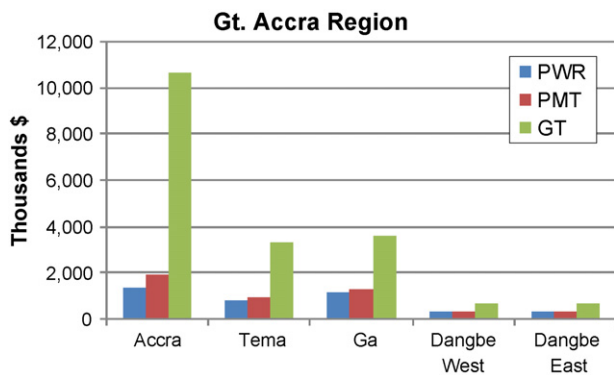


Fig. 1. Total costs of PWR, PMT and GT in the Greater Accra Region.

3.5. Targeting by participatory welfare ranking (PWR)

PWR identifies poor households in a community on the basis of a community's own definitions and perceptions. It has been advocated as a low cost and relatively effective method of ranking households by poverty level [64], if implemented by well-trained staff with internal checks for consistency [65]. PWR provides an opportunity to capture new settlements, street children and orphans who are traditionally missed by surveys [27]. PWR has been used extensively in India, Nepal and South Africa over the past 10 years [53], and has recently also been tested in Ghana to identify the poor for premium exemptions [66].

The potential drawback is that the method relies on detailed knowledge of the community structures and households, and is as such unlikely to work in contexts where the community networks are weak (which may be the case in some urban areas), or where there are high levels of conflict or mistrust [27]. Results report on relative not absolute poverty levels.

4. Costs of different strategies to identify the poor in Ghana

Fig. 1 shows the resulting cost estimates for a number of districts in the two regions studied, with details for two of its districts in Table 1.

In all districts in the Greater Accra Region, the costs of PMT and PWR are relatively low compared to GT (Fig. 1). The main reason is the relative low incidence of poverty in the districts. Whereas PMT and PWR only provide premium exemptions to those households who are identified as poor, GT exempts every household in the district, and thus incurs high costs in doing so. Although PMT and PWR incur the costs of running surveys, these costs are small in comparison to the costs of including non-poor (i.e. leakages) in GT. The results are different in the Upper West Region (Fig. 2). With a high poverty incidence, costs of leakages to the non-poor by exempting all households in GT are relative small. These costs are comparable to the costs of running surveys in PMT and PWR. As a result, cost differences between the various strategies are smaller than in Greater Accra Region.

Table 1 further details the analyses for two districts with varying incidences of poverty (Nadawilli—high poverty incidence, and Tema—low poverty incidence), and provides indicators of equity and efficiency. In terms of equity, in both districts, the error of exclusion are larger for PMT and PWR in comparison to GT, and the former strategies are therefore less equitable. In terms of efficiency, in Nadawilli, the cost to exempt a poor individual is more or less similar across strategies (between US\$11 and US\$13). In Tema, cost differences are much larger (for reason mentioned above), and PMT and PWR are more efficient than GT.

The trade-off between efficiency and equity is made explicit through analysis of the incremental cost per exempted poor individual when moving from the most efficient and least equitable strategy (PWR), to less efficient and more equitable strategies (PMT and GT). In Nadawilli district, it costs US\$7 per extra exempted poor individual when GT would be adopted instead of PWR (and a total of 11,528 poor individuals would then be extra included). PMT would never be adopted as PWR exempts more poor individuals in a more efficient way. In Tema district, it would cost US\$69 to identify one extra poor individual when PMT would be adapted instead of PWR—to further increase coverage of poor people, it would cost US\$171 to exempt one extra poor individual when GT would be adapted instead of PMT. Whether the equity gain in terms of exempting one extra poor individual is worth the costs (between US\$7 and US\$171) is a matter of judgement.

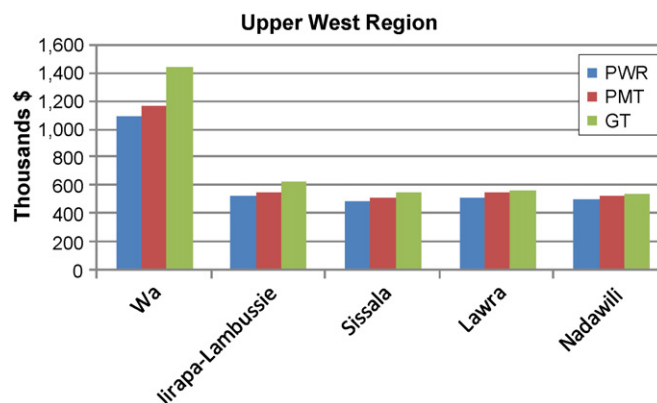


Fig. 2. Total costs of PWR, PMT and GT in the Upper West Region.

Table 2

Decision framework to guide decision making on optimal strategies to identify the poor on the basis of efficiency, equity and feasibility.

Strategy	Efficiency	Equity	Feasibility		Recommendation
			Degree of urbanization	Administrative complexity	
PMT	Survey costs are significant. Premium costs increase as poverty incidence rises	Significant errors of exclusion	Experience in urban and rural settings	Capacity to conduct household surveys and analyze results is needed	Optimal strategy in relative low poverty incidence urbanized settings
PWR	Survey costs are significant. Premium costs increase as poverty incidence rises	Significant error of exclusion	Little experience of usefulness in urban settings	Capacity to facilitate PWR at community level is needed	Optimal strategy in relative low poverty incidence rural settings. Work needed on usefulness in urban settings
GT	No survey costs. Premium costs independent on poverty incidence	No errors of exclusion	Experience in rural settings. Applicable in urban settings when poverty incidence is high	Simplest to administer	Optimal strategy in relative high incidence poverty districts

The total costs of paying health insurance premium subsidies for all poor households (based on the estimated number of eligible adult poor people multiplied by the premium costs but excluding costs of strategies to identify the poor) in Ghana would equal around US\$22 million. These costs would consume around 4% of the total health sector resource envelope for 2008 (US\$513 million), and 16% of total NHI budget (US\$142 million). This illustrates the policy dilemma and tough choices posed by the gap between the desired mandate under the NHI to exempt the poor based on equity considerations and the financing constraints.

5. Discussion

This paper shows that proxy means testing (PMT), participatory welfare ranking (PWR), and geographic targeting (GT) achieve efficiency and equity objectives to different degrees. On the one hand, PWR appears the least costly and therefore most efficient strategy, but is also the least equitable. On the other hand, GT covers all (poor) individuals in a given area, and is therefore the most equitable but also the most costly. Our analysis reveals that the incremental costs of exempting one extra poor individual, by adopting a less efficient strategy, ranges between US\$7 and US\$171. It is a matter of judgement whether society considers this investment as value for money.

Our analysis demonstrates that the efficiency and equity of the various strategies, and therefore the choice of optimal strategy, is highly dependent on the poverty incidence in a certain setting. Our review of strategies also shows that the choice of optimal strategy also depends on the feasibility of implementation (i.e. on the complexity of administration and the capacity to handle it). Selection of a strategy therefore has to be contextualised, and it is not advisable to apply a single strategy across the entire country.

We therefore propose a simple decision framework on a number of criteria, i.e. feasibility of implementation (determined by the extent of urbanization and administrative

complexity), efficiency (determined by poverty incidence) and equity (Table 2). We recommend PMT as an optimal strategy in relative low poverty incidence urbanized settings, and PWR as an optimal strategy in relative low poverty incidence rural settings. PWR has been successfully applied in rural settings [21,25,35,53,67,68] where it allows communities to determine which households or individuals can be exempted based on their own local criteria and rank households by prioritizing the allocation to those in greatest need, provide an opportunity to capture new settlements, such as street children, orphans who are traditionally missed by surveys [27]. The potential drawback is that the method relies on detailed knowledge of the community structures and households, and is as such unlikely to work in (urban) contexts where the community networks are weak. Furthermore, we recommend GT as an optimal strategy in relative high poverty incidence settings (be it rural or urban). In all of this, the more precise definition of 'low' and 'high' poverty incidence levels is dependent on the setting, and is eventually related to the willingness to pay for exempting one poor individual (e.g. if society is willing to pay up to US\$171 per exempted poor individual then GT can already be implemented at poverty incidence levels above 15%. If this willingness to pay is maximally US\$7, GT can only be implemented at poverty incidence levels above 86%).

A related concern on the implementation of a strategy to exempt the poor is the available funding. In its past, Ghana, for example, has tended to exempt comprehensive groups of individuals for user fees, e.g. all pregnant women for maternal deliveries, and all services for under fives, poor and elderly. This was primarily driven by concerns around ease of administration, but inconsistent and insufficient funding proved these programs to be ineffective [12,69,70]. Our crude analysis show that total funding required to pay exemptions to all poor households in Ghana exceeds US\$22 million, which is well above the current exemption fund, and the next question is then on how to prioritise the allocation of scarce exemption funds. Our proposed strategies provide a ranking of poverty levels, and offer a basis for such an allocation at the household level (with the caveat

that the poverty ranking of PWR cannot be compared across communities).

This paper has a number of limitations. Our analyses are based on a combination of expert opinion and literature review, and not on empirical observations. Research is needed to verify the assumptions. Second, our assessment of the various strategies is only partial, and excludes the perception of the community and policy makers on the acceptability of the various strategies. Third, the decentralized nature of NHIS in Ghana makes it possible to implement a combination of different strategies. The acceptability of doing so in less decentralized health systems in other countries is not clear.

This paper has assessed the efficiency, equity, and feasibility of different strategies to identify the poor. This may be an important contribution to the pragmatic challenges faced in the further development of NHIS in Ghana. In addition, it is also instrumental to other developing countries struggling with the issues around identification and targeting of the poor for health insurance and other programs such as user fee exemptions, conditional cash transfers, and high priority interventions.

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Contributions: CJA was responsible for the study design, analysis, interpretation of the data and writing of the paper. GA and ES contributed to analysis and interpretation of the data. RB and IA contributed to formulating the study design, interpreting the data and revising the manuscript.

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