Assessing catastrophic out-of-pocket payments in Ethiopia's health system

Amarech G. Obse (Amarech.Obse@uct.ac.za)
University of Cape Town https://orcid.org/0000-0002-4299-9559
John E. Ataguba
University of Cape Town

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Amarech G. Obse[1, ‡] and John E. Ataguba[1,]

[1]Health Economics Unit, School of Public Health & Family Medicine, University of Cape Town

[‡]Corresponding author: Health Economics Unit, School of Public Health and Family Medicine, Health Sciences Faculty, University of Cape Town, Anzio Road, Observatory, 7925, South Africa. Tel: +27-21-4066558; Fax: +27-21-4488152; E-mail: Amarech.Obse@uct.ac.za

Abstract

Background: Providing adequate financial protection for all remains an essential aspect of Universal Health Coverage (UHC). In Ethiopia, although the government has introduced reforms, out-of-pocket (OOP) spending accounts for 37% of current health expenditure in 2016. This is considered high enough to lead to financial catastrophe—a situation where a household spends more than a given fraction of its expenditure (or capacity to pay) OOP on health services. This study assessed financial catastrophe resulting from OOP health spending in Ethiopia.

Methods: Data come from the Ethiopian Household Consumption Expenditure Survey (HCES) 2010/11 with about 28,000 households. The incidence and intensity of catastrophic spending were estimated using rank-dependent thresholds that are different depending on household income levels—the thresholds become lower for low-income households. Initial thresholds used ranged between 5% and 25% of total household expenditure, and between 20% and 40% of household non-food expenditure. Concentration indices are used to assess whether financial catastrophe is more prevalent among the poor or rich.

Results: At the 10% initial threshold of total household expenditure, financial catastrophe was estimated at 4.08%, translating to over 668,000 households. At an initial threshold of 40% of total household non-food expenditure, about 0.82% or about 133,600 households incurred financial catastrophe, paying more than their rank-dependent thresholds. Financial catastrophe was more prevalent among poorer and urban households, but there was a mixed pattern across Ethiopia's 11 regions.

Conclusion: Financial catastrophe resulting from paying OOP for health services exists in Ethiopia, affecting over 100,000 households. The low incidence compared to other studies may suggest that government's initiatives like the fee-waiver and exemption systems have been successful, but the prevalence of financial catastrophe among the poor may signify that more is needed to achieve universal financial protection in Ethiopia.

Keywords: Universal health coverage; financial catastrophe; Ethiopia

Background

Many countries, including those in sub-Saharan Africa (SSA), have embraced the need to move towards achieving Universal Health Coverage (UHC). UHC entails, among other things, improving access to quality health services and providing adequate financial protection for all [1, 2]. Financial protection, an essential aspect of UHC, is about ensuring that people can use needed health services without reducing the demand for necessities such as food, shelter and clothing. Two different but related approaches are used to assess financial protection—financial catastrophe and impoverishment resulting from out-of-pocket (OOP) spending on health services [3]. Financial catastrophe occurs when OOP spending exceeds a particular share of a household's income or expenditure over a given time [4]. Impoverishing OOP spending is that which is sufficient to push a non-poor household into

poverty. In some cases, the deepening of poverty for already poor households could result from paying OOP for health services [5].

Despite the negative consequences associated with paying OOP for health services, these payments remain substantial in many countries in SSA and could exceed 50% of total health expenditures [6, 7]. Countries with a substantial share of OOP spending in total health expenditures, especially those that exceed 20%, face an increased likelihood of financial catastrophe and impoverishment [8]. Ethiopia is one of such countries that relies heavily on OOP spending on health services. In 2016, 37% of Ethiopia's Current Health Expenditure was OOP spending [9]. User fees are still charged at public facilities except for some primary health services such as immunisation, prenatal and postnatal care, family planning, tuberculosis and malaria, exempted from user fees [10]. The country's user fee system has been in place since the 1950s. It is supplemented by a fee waiver system to protect the poor by providing free health care services at all levels of care. However, the practice has been inconsistent due to lack of formalised policy and precise targeting mechanism [10, 11].

The government's commitment to the health sector is also not sufficient as the health system remained underfunded. This resulted in poor health service delivery and poor health status in Ethiopia [12]. A Health Care Financing (HCF) strategy was developed by the Ministry of Health and approved by the Council of Ministers of the Government of Ethiopia in 1998 to improve healthcare financing and delivery. While this document is dated, it aimed at raising more revenue, improving efficiency in the use of available resources, ensuring quality, broaden coverage of health care services and promote sustainability [13]. The 1998 HCF strategy was the foundation of many reforms introduced in Ethiopia. The initial reforms focused on improving service delivery condition by addressing the availability

and quality of health services, including systematising the fee-waiver and exemption system [14]. A pre-payment system was also proposed with two types of health insurance schemes to be introduced: community-based health insurance (CBHI) for the informal sector population and social health insurance (SHI) for people in the formal sector. The SHI scheme, although established in 2010, its implementation has been a moving target [15, 16]. The CBHI scheme, on the other hand, was initially piloted between 2010 and 2013 and results show that the registration fee remained unaffordable for some of the members (16%). Other quality-related challenges, such as drug stockouts and inadequate laboratory facilities, were reported [17].

In 2015, Ethiopia developed a 20-year Health Sector Transformation Plan to achieve UHC through strengthening primary health care [18]. It is essential to assess, pre-2015, where the country is at with regards to financial protection, one of the objectives of UHC to assess the impact of the 2015 Transformation Plan. Such an assessment will provide baseline data and could form the basis for assessing progress towards ensuring financial protection and UHC in Ethiopia. In this regard, the objective of the paper is to assess the incidence and intensity of financial catastrophe resulting from OOP spending on health services in Ethiopia.

Methods

Data

Data come from the Ethiopian Household Consumption Expenditure Survey (HCES) 2010/11. HCES is a nationally representative household survey covering all rural and urban areas in Ethiopia except zones with a nomadic population. It used the 2007 population and housing

census as a sampling frame to select Enumeration Areas (EAs) and households. Households were selected from a cluster of 864 rural EAs and 1104 urban EAs. A total of 10,368 rural households and 17,664 urban households were sampled for the survey. This translates into 99.5% and 99.1% response rates, respectively [19]. The survey contains many household-level and individual-level information, including household expenditure on consumption and non-consumption goods. OOP payments include spending on consultation fees, laboratory tests, x-ray and other diagnostics, prescription drugs, over the counter drugs, and other medical costs for inpatient and outpatient services both at public and private facilities. Total household expenditure was computed from the HCES and household non-food expenditure was obtained by subtracting each household's food expenditures. In this paper, as noted elsewhere [5], food expenditure is used as a proxy for subsistence expenditure [5, 20]. Thus, capacity to pay is defined as total household non-food expenditure.

Assessing financial catastrophe

Formally, OOP spending on health services is catastrophic if it exceeds a predefined threshold or proportion (Z_{cat}) of household expenditure (income) or capacity to pay within a given period of time. There is no consensus on the appropriate threshold(s) for assessing financial catastrophe. Many studies use a variety of thresholds and present the results to show sensitivity to changes in thresholds. While 10% of total household expenditure and 40% of total household capacity to pay have been suggested [5], most commonly used thresholds vary between 5% and 25% of total household expenditure or between 20% and 40% of capacity to pay [5, 20, 21]. Ataguba [22] uses these as initial thresholds and defines rank-dependent thresholds that increase with household income (i.e. the rank of

households). This is to capture, among other things, low payments that are disastrous for poorer households [22].

Thus, as outlined in Ataguba [22], if an initial threshold for catastrophic expenditure is denoted as Z_{cat}, a rank-dependent threshold Z'_{cat} can be computed as:

$$Z'_{cat} = w(p{:}\gamma) * Z_{cat}$$

where p is the percentile of the household based on per capita household expenditure or income, $\gamma \in (0,1]$ is a parameter of inequality aversion and $w(p{:}\gamma) = \gamma(1-p)^{(\gamma-1)}$. The determination of γ depends on a society's concern for inequality. When γ is equal to 1, the $Z'_{cat} = Z_{cat}$, which means that the same threshold is used for all households (i.e. a uniform threshold).

Using the methodology in Ataguba [22], γ was set as 0.8 and several initial thresholds of total household expenditure (5%, 10%, 20%, and 25%) and total household non-food expenditure (20%, 25%, 30%, and 40%) are used to generate rank-dependent thresholds.

Let total household expenditure (or non-food expenditure) and total household OOP payments be denoted by y_i and T_i, respectively, the rank-dependent overshoot (O'_i) for each household is denoted as:

$$O'_i = \max(0, (T_i/y_i) - Z'_{cat})$$

Further, if we denote $E'_i = 1$ when $O'_i > 0$ to indicate whether the household exceeded a rank-dependent threshold or not, a rank-dependent catastrophic headcount ratio (H'_{cat}) that represents the fraction of households with catastrophic payment is defined as:

$$H'_{cat} = \frac{1}{N}(\sum_{i=1}^{N} E'_i) = \mu'_{E'}$$

where $\mu'_{E'}$ is the average of E'_i and *N* is the sample size.

The rank-dependent mean catastrophic payment gap that captures deviations from the catastrophic thresholds is given by:

$$G'_{cat} = \frac{1}{N}(\sum_{i=1}^{N} O'_i) = \mu'_{O'}$$

where $\mu'_{O'}$ is the average of O'_i.

The mean positive rank-dependent catastrophic payment gap that averages the gap only among households that have incurred financial catastrophe is:

$$MPG'_{cat} = \frac{\sum_{i=1}^{N} O'_i}{\sum_{i=1}^{N} E'_i} = \frac{\mu'_{O'}}{\mu'_{E'}}$$

The incidence of catastrophic spending was estimated for the entire population and sub-groups categorised by region and residential area in Ethiopia. Catastrophic spending was analysed across the regions using the poverty levels of the regions. The national poverty line (Birr 3781 per person per year in 2011 prices, equivalent to USD 2.10 per person per day) was used to estimate the poverty level in each region [23].

The distribution of catastrophic payment headcount (H'_{cat}) and overshoot (G'_{cat}) was assessed using the concentration index [22, 24]. The concentration index indicates whether it is the poor or the rich that are faced more with financial catastrophe. A positive concentration index means that the rich, relative to the poor, face more financial catastrophe while the reverse is the case for a negative concentration index. Theoretically, the value of the concentration index will lie between –1 and +1.

The concentration index (C) can be obtained as:

$$C = \frac{2}{\mu_h} cov(h, r)$$

where h is the catastrophic payment headcount or overshoot; r is the rank of the household using per capita household expenditure and μ_h is the mean of h.

The headcount of catastrophic payments is binary. Therefore, the standard concentration index needs to be corrected as the value of the index will not lie between –1 and +1 [25, 26]. While there are competing ways of correcting the concentration index [27-29], this paper uses the methods proposed by Wagstaff [25]. Briefly, the corrected concentration index is obtained by dividing the original concentration index by $(1 - \mu_h)$.

Results

The descriptive statistics in Table 1 indicate that respondents from urban areas account for 22.32%. Less than half of the household heads (43.13%) had formal education, and 92.24% were engaged in productive work in the last one year before the survey. The average age of the household head was 42 years. Most (55.00%) of the households have children under five years, and the average household size was 5.02. The mean household OOP payment per capita was Birr 93.07 (USD 5.42).

Table 1. Descriptive statistics from the Ethiopian Household Consumption Expenditure Survey, 2010/11

	Weighted	
Variables	**%**	**Average**
Male-headed households	77.73	
Marital status of household head – married	77.87	
Household head with formal education	43.13	
Household head engaged in productive work in the last 12 months	92.24	
Area of residence – urban	22.32	

Area of residence – rural highland	11.39	
Area of residence – rural moderate	47.30	
Area of residence – rural lowland	19.01	
Households with under 5 years children	55.00	
Households with elderly (65+)	12.40	
Age of household head		42.87
Household size		5.02
Household out-of-pocket expenditure per capita (in Birr)		93.07
Household Food expenditure per capita (in Birr)		2538.25
Household total consumption expenditure per capita (in Birr)		5899.67

Note: 1 USD equals 17.18 Ethiopian Birr in 2011

The incidence of catastrophic payment was 9.66% at the initial threshold of 5% of total household expenditure (Table 2). The headcount ratio reduced to 4.08% at the 10% initial threshold. At the 10% initial threshold of total household expenditure, households with catastrophic expenditure paid on average 6.46% above their threshold. In general, depending on the choice of initial threshold and the measure of capacity to pay, this excess ranged between 5.51% and 10.50% (Table 2). Using an initial threshold of 40% of total household non-food spending, about 0.82% (i.e. 133,592) households incurred financial catastrophe by paying more than their rank-dependent thresholds (Table 2).

Table 2: Catastrophic out-of-pocket payments for health services, Ethiopia, 2010/11

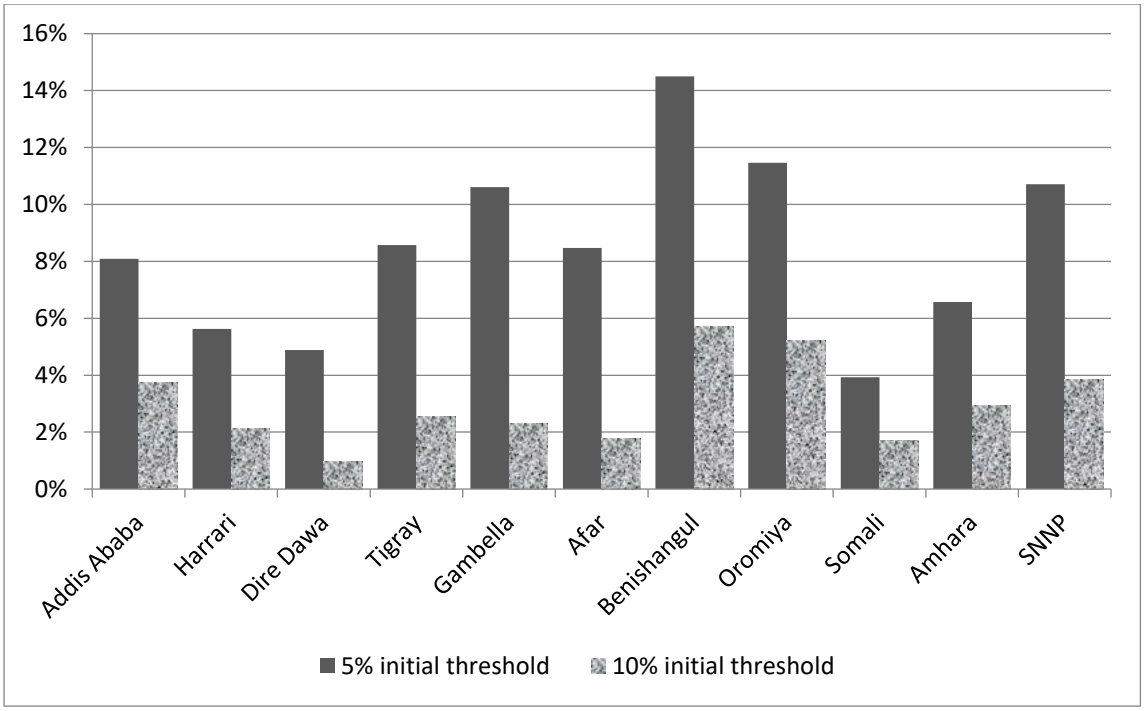
	As a proportion of total household expenditure				**As a proportion of total household non-food expenditure**			
Initial thresholds	**5%**	**10%**	**20%**	**25%**	**20%**	**25%**	**30%**	**40%**
Catastrophic headcount	9.66%	4.08%	1.16%	0.59%	3.68%	2.55%	1.64%	0.82%
Concentration index of headcount	-0.078	-0.078	-0.010	-0.010	-0.085	-0.048	-0.021	-0.056
Catastrophic gap	0.52%	0.26%	0.08%	0.05%	0.38%	0.26%	0.17%	0.08%
Mean positive gap	5.41%	6.46%	6.86%	7.96%	10.42%	10.02%	10.50%	9.35%
Concentration index of gap	-0.034	<0.001	0.040	0.040	-0.050	-0.041	-0.046	-0.025

Note: Parameter of inequality aversion, $\gamma = 0.8$

Concentration indices for the headcount ratios, using both total household expenditure and total household non-food expenditures, were all negative, indicating that catastrophic spending on health services was concentrated on poorer households in Ethiopia. Also, the concentration indices for the catastrophic gap, using total household non-food expenditure indicate that poorer households spend more in excess of their rank-dependent thresholds than more affluent households. This is not the same for the catastrophic gaps using total household expenditure as the concentration indices are all positive except for the 5% threshold of total household expenditure.

Catastrophic headcount ratios by regions in Ethiopia (Figure 1) show an indiscernible pattern—there is no unidirectional relationship between poverty levels and catastrophic health services spending in Ethiopia. A relatively large proportion (14%) of households from Benishangul Gumuz region faced catastrophic spending while less than 4% of households incurred catastrophic spending in the relatively more impoverished Somali region.

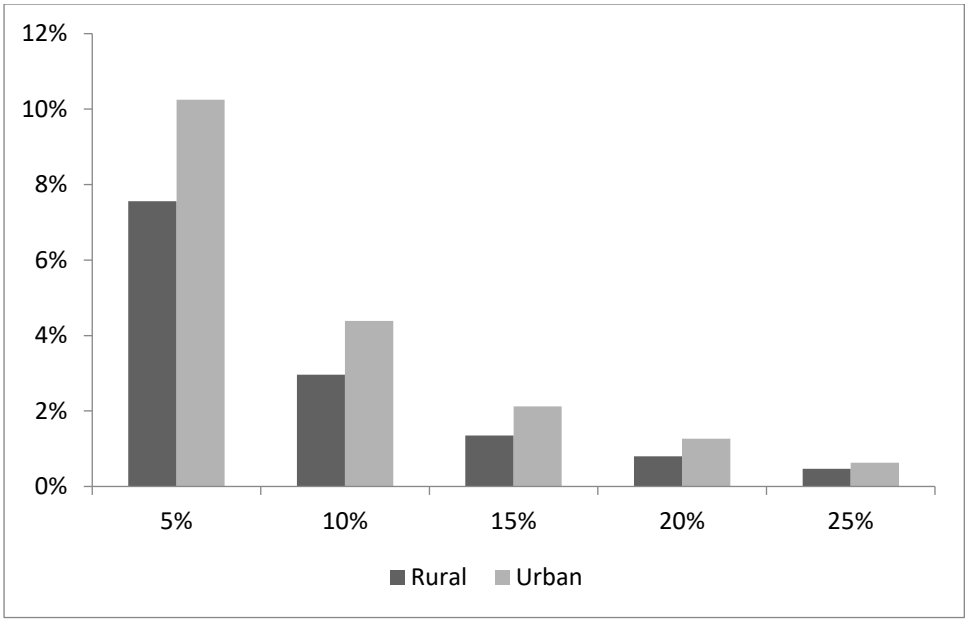
Figure 1: The incidence of catastrophic out-of-pocket payments for health services by regions in Ethiopia, 2010/11



Notes: (1) Regions are sorted by poverty headcount level, with poverty lowest in Addis Ababa.
(2) The initial thresholds are based on total household expenditure

While there is no discernible pattern in catastrophic health spending between regions in the country, the incidence of catastrophic spending is higher in urban areas compared to rural areas (Figure 2).

Figure 2: The incidence of catastrophic out-of-pocket payments for health services by urban/rural location in Ethiopia, 2010/11



Note: The initial thresholds are based on total household expenditure

Discussion

Financial catastrophe resulting from paying OOP for health services exists in Ethiopia. Depending on the choice of initial threshold, between 0.59% and 9.66% of households in Ethiopia incur catastrophic payments for health services. The headcount ratio was 4.08% at the 10% initial threshold, which translates to about 668,675 households facing financial catastrophe due to out-of-pocket payments for health services in Ethiopia. Using the initial threshold of 40% of total household non-food expenditure, the incidence of financial catastrophe was estimated at 0.82%. Compared to other studies that used similar thresholds, the incidence of financial catastrophe is lower in Ethiopia. For instance, using the Nigerian National Living Standard Survey (NLSS) 2003/04, about 18.19% of households in Nigeria incur financial catastrophe [22]. Based on health expenditure as a share of total household expenditure, in 2009/10, catastrophic headcount ratios were estimated at 38.0% and 22.8% in Uganda using the 5% and 10% initial thresholds, respectively [21]. In Swaziland, the incidence of catastrophic payment was estimated at 16.8% in 2009/10 (using

the 5% initial threshold of total household expenditure) and 9.7% (at the 10% of total household expenditure) [30]. There are also studies that estimated financial catastrophe using a uniform threshold [31-36]. For instance, using comparable household surveys and constant thresholds of 40% of non-food expenditure and 20% of total expenditure, catastrophic expenditure was found to be 1% and 3% in Lesotho; while it was estimated at 13.3% and 12.5% in Botswana, respectively [34]. A threshold of 20% of non-food expenditure resulted in 9.6% of Cambodian households incurring financial catastrophe in 2011 [35]. In Nepal, about 10.3% of households incurred financial catastrophe in 2010/11 using the 40% of non-food expenditure threshold [36].

Further analysis of the incidence of catastrophic spending by regions in Ethiopia shows that regions with lower poverty levels do not necessarily have a lower incidence of catastrophic spending. This is expected as catastrophic spending could be experienced by both the poor and rich and because catastrophic payments do not include those that forgo health services because of cost [37]. While this is the case, as reported elsewhere [32, 35, 36, 38, 39] and as shown in this paper, catastrophic spending occurs more frequently among the poor. Urban/rural analysis also shows that the incidence of financial catastrophe in urban areas in Ethiopia is generally higher than what is obtainable in rural areas, irrespective of the choice of initial thresholds. Results from the literature indicate that the incidence of catastrophic expenditure between rural and urban areas is mixed. For instance, in Lesotho, Botswana, Kenya, and Colombia, the incidence of catastrophic expenditure was high in rural areas compared to urban areas [34, 35, 38]. In Nigeria and India, financial catastrophe is more prevalent in urban areas [40, 41]. While this is the case, lower incidences in rural Ethiopia may be associated with the fee-waiver system that is providing financial protection to the

poorest and a fee-exemption system which provides free health care for selected services. Although the reformed fee-waiver system was not fully implemented in all region in 2011, "more than 1.4 million fee-waiver beneficiaries were screened for the service in the country" [14]. However, the total number of the population living in poverty account for 33 million (30%) in 2011 [42], thus the fee-waiver beneficiaries were only a marginal proportion of the total population which were below the poverty line. Thus, considering the low coverage of the fee-waiver system, lower prevalence of catastrophic payment in rural areas may also mean a higher level of unmet needs among the rural population [24]. In fact, health care utilisation rate remains very low at 0.43 per person per year in 2011, suggesting that there are access barriers to using health services in Ethiopia [19]. On the other hand, higher catastrophic payments in Ethiopia's urban areas may indicate that the urban population spends substantial amounts OOP on private health services, which are costly and predominantly concentrated in urban areas [43]. Previous studies in Ethiopia have also revealed that people (up to 80%) resort to home remedies, religious or traditional healing at times of illness with the cost of health services being the major reason for not seeking healthcare at modern healthcare facilities [44, 45].

It has been noted elsewhere that the fee-waiver system in Ethiopia may not be effective in protecting the poor [7]. However, the findings of this paper suggest that the fee-waiver and exemption system, which was strengthened as part of the HCF strategy [10, 11, 14], may have been successful in protecting the poor from adverse effects of OOP payments. However, this paper also showed that catastrophic spending was more prevalent among the poor compared to the rich. Also, low-income households spend larger amounts above their catastrophic payment thresholds compared to more affluent households. These results

indicate that access barriers facing the poor may limit their ability to take advantage of the exemption and fee-waiver systems, calling for more effort to reducing inequalities in the burden of healthcare costs between population groups in Ethiopia.

A prepayment system, especially mandatory systems, where there are cross-subsidies between the rich and the poor, and between the healthy and sick will be effective for guaranteeing financial protection [1, 46, 47]. In line with this, the Ethiopian government is currently focusing on expanding health insurance schemes to the whole population [18]. The pilot of CBHI has been implemented in 13 Woredas[1] in 2010/11 and expanded to 161 Woredas in 2013. The government is providing subsidies for the CBHI premiums to increase participation by low-income households. Initial assessment of the CBHI scheme pilot indicates that utilisation rate and financial protection among the CBHI beneficiaries increased [17]. Thus, there is a need to facilitate the implementation and national scale-up of a health insurance system both for the formal and informal sector to ensure cross-subsidies to reduce catastrophic spending for all substantially.

The findings of this paper add to the growing literature on financial protection in general and serve as a baseline for further analysis of financial protection in the Ethiopian health system. Further studies may assess the trend and factors associated with financial protection and explore determinants of regional and urban-rural differences in catastrophic spending. Contributions of the health system reforms to financial protection and achievement of UHC also warrants further investigation.

[1] Woredas are the third lower level administrative division

The paper has some limitations. Although the use of rank-dependent thresholds has the advantage of incorporating vertical equity and diminishing marginal utility of income [22], the choice of the inequality aversion parameter is arbitrary. Ideally, society should determine this based on concerns for equity and fairness [22]. The paper is also limited to the analysis of financial catastrophe for those who sought medical care and excluded those who were sick but did not seek medical care because they could not afford the payment. This may underestimate the incidence of financial catastrophe.

Conclusion

In Ethiopia, there is a likelihood of incurring catastrophic expenditure when seeking healthcare as a result of OOP payments. Inequalities in the incidence of catastrophic OOP spending on health care also exist, to the disadvantage of low-income households. Reducing the high concentration of catastrophic payments among low-income households needs to be a key policy issue to achieve universal financial protection in Ethiopia. It appears that the provision of free healthcare either through the fee-waiver or exemption system may have benefited the rural population by reducing catastrophic expenditure. While this may not be inferred directly from this paper, there is a need to ensure that efforts to attain universal financial protection must aim to remove access barriers and not just about the direct costs of health service utilisation.

Abbreviations

CBHI: community-based health insurance; EA: enumeration areas; HCES: household consumption and expenditure survey; HCF: health care financing; NLSS: national living standard survey; OOP: out-of-pocket; SHI: social health insurance; SSA: sub-Saharan Africa; UHC: universal health coverage

Declarations

Ethics approval and consent to participate

This paper uses secondary data that have received ethics approval. Therefore, no further consent was required.

Consent for publication

Not applicable.

Availability of data and materials

The dataset analysed for this study can be obtained from the Ethiopian Central Statistical Agency.

Competing interests

The authors report no conflicts of interest.

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Authors' contribution

AGO: Study conceptualisation and design; data acquisition and analysis; data interpretation; writing; and approving the final draft.

JEA: Study conceptualisation and design; data analysis; data interpretation; writing; and approving the final draft.

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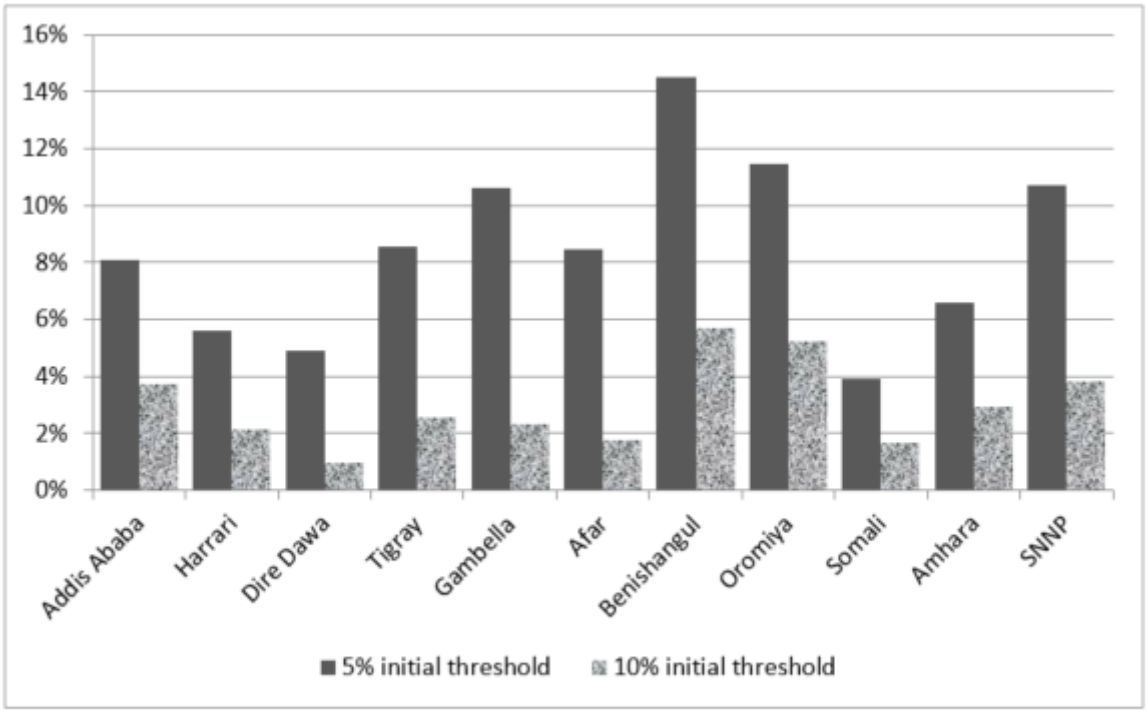
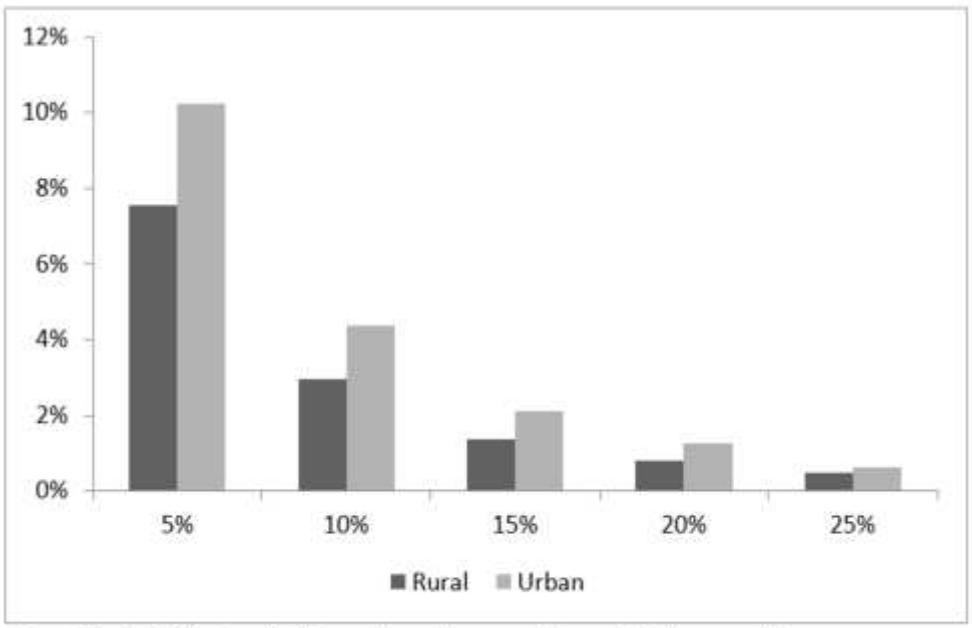
Figures



Notes: (1) Regions are sorted by poverty headcount level, with poverty lowest in Addis Ababa.
(2) The initial thresholds are based on total household expenditure

Figure 1

The incidence of catastrophic out-of-pocket payments for health services by regions in Ethiopia, 2010/11



Note: The initial thresholds are based on total household expenditure

Figure 2

The incidence of catastrophic out-of-pocket payments for health services by urban/rural location in Ethiopia, 2010/11