Equity in public health spending in Ethiopia: a benefit incidence analysis

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Abstract

Inequality in access and utilization of health services because of socioeconomic status is unfair, and it should be monitored and corrected with appropriate remedial action. Therefore, this study aimed to estimate the distribution of benefits from public spending on health care across socioeconomic groups in Ethiopia using a benefit incidence analysis. We employed health service utilization data from the Living Standard Measurement Survey, recurrent government expenditure data from the Ministry of Finance and health services delivery data from the Ministry of Health's Health Management Information System. We calculated unit subsidy as the ratio of recurrent government health expenditure on a particular service type to the corresponding number of health services visits. The concentration index (CI) was applied to measure inequality in health care utilization and the distribution of the subsidy across socioeconomic groups. We conducted a disaggregated analysis comparing health delivery levels and service types. Furthermore, we used decomposition analysis to measure the percentage contribution of various factors to the overall inequalities. We found that 61% of recurrent government spending on health goes to health centres (HCs), and 74% was spent on outpatient services. Besides, we found a slightly pro-poor public spending on health, with a CI of −0.039, yet the picture was more nuanced when disaggregated by health delivery levels and service types. The subsidy at the hospital level and for inpatient services benefited the wealthier quintiles most. However, at the HC level and for outpatient services, the subsidies were slightly pro-poor. Therefore, an effort is needed in making inpatient and hospital services more equitable by improving the health service utilization of those in the lower quintiles and those in rural areas. Besides, policymakers in Ethiopia should use this evidence to monitor inequity in government spending on health, thereby improving government resources allocation to target the disadvantaged better.

Keywords: Benefit incidence analysis, health inequality, public health spending, Ethiopia

Introduction

The fundamental challenge that most countries face is health inequality due to the widening difference in income or socioeconomic status (Sheiham, 2009). Equitable access to health services regardless of socioeconomic status is a human rights issue. Therefore, inequality in access and utilization of health services is politically unacceptable and unjust (Braveman and Gruskin, 2003; Sheiham, 2009; United Nations, 2015; World Health Organization, 2014). Recently, the extent, its drivers and what should be done to reduce inequality have become the main concerns for health policymakers at all levels (World Health Organization, 2010).

The Ethiopian government considers that health inequality is one of the main challenges to achieving Universal Health Coverage Sustainable Development Goal (UHC-SDG) targets (Ministry of Health of Ethiopia, 2015a; 2015c; 2017a). The demographic and health surveys and other studies also indicate a substantial disparity in health status and service utilization between different socioeconomic groups in Ethiopia (Ambel *et al.*, 2017; Bobo *et al.*, 2017; Central Statistical Agency of Ethiopia, ICF, 2016; Tranvag *et al.*, 2013). Therefore, some strategies that can narrow the health inequality gap have been designed. For example, to provide essential health services to disadvantaged groups, the Ministry of Health (MoH) has spent substantial resources on expanding health infrastructure and deploying health workers, focusing on rural areas. To increase health service utilization by the poor segment of the population, a community-based health insurance (CBHI) programme has been implemented. CBHI is a government-subsidized health insurance scheme in addition to the voluntary contributions of household members. To provide financial risk protection to the poor, the government has largely subsidized health care costs at the point of care using cost-sharing and user-fee exemption schemes (Ministry of Health of Ethiopia, 2015a; 2015c; 2017a).

'Benefit' in this study is defined as receiving subsidies through utilization. There is consensus that health services' benefits should be equitably distributed across population

Key messages

- Our study examined the distribution of benefits from public spending on health care across socioeconomic groups in Ethiopia using a benefit incidence analysis.
- Total public health spending in Ethiopia was marginally pro-poor in general, while the findings across the types of services (i.e. outpatient versus inpatient) and facility (i.e. hospitals versus health centres [HCs]) were mixed. Public health spending on hospitals and inpatient services was in favour of the rich, while it was pro-poor at HCs and outpatient services.
- The difference in benefit distribution was huge between the poorest 20% of the population and the rest of the groups, unlike the findings from studies in many other countries. Among the poorest 20%, both health service utilization and the distribution of benefits from the public health subsidy are very low in all types of health services and facilities. The poorest 20% of the population receive less than 4% of the total share of public spending on health.
- The government allocated nearly 60% of health expenditures to HCs and 40% to hospitals. The government unit inpatient subsidy is substantially higher at the hospital level (i.e. US$8.9 at HCs versus US$95.7 at hospitals).

groups according to their needs and not according to their ability to pay. However, the better off (i.e. people with a better socioeconomic status, higher educational level and living in urban areas) are more likely to have a higher demand for health services than the worse off because of better awareness and the ability to pay. If government subsidies are not well monitored and targeted, a society's better-off segment can disproportionately benefit from them (Jacobs *et al.*, 2012). Therefore, evidence regarding how the overall health system performs in terms of the distribution of service benefits is essential.

Which socioeconomic groups benefit more from public expenditure and public subsidies of services? Who benefits from the overall expenditure on public health services? Except for a few studies that examine the extent of inequality in health outcomes and service utilization, there is no study examining which socioeconomic group has disproportionately benefited from public health spending in Ethiopia (Ambel *et al.*, 2017; Bobo *et al.*, 2017; Tranvag *et al.*, 2013; Woldemichael *et al.*, 2019). Therefore, this study aimed to analyse inequality in public health spending in Ethiopia. Additionally, we examined to what extent public health spending was targeted to the poor.

Methodology
Country context
We conducted this study in Ethiopia in 2018. Ethiopia has a total population of more than 110 million. It is characterized by rapid growth and is dominated by young age groups (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2019). The gross domestic product (GDP) per capita in 2019 was US$953 (International Monetary Fund, 2020a). The economic system has shown substantial growth over the past two decades, and

the country aspires to attain lower middle-income country status by 2025 (National Planning Commission of Ethiopia, 2015; World Bank, 2020). The economy in Ethiopia is predominantly dependent on agriculture, which accounts for 34% of GDP. Over two decades, although the total per capita spending on health increased 8-fold (from US$4 in 1995 to US$33.20 in 2016/17), the country's total health expenditure remained low compared with that of other countries in Africa. The total health expenditure in 2016/17 was only US$3.1 billion, accounting for 4.2% of GDP (Ministry of Health of Ethiopia, 2019a). Furthermore, the recent COVID-19 pandemic has substantially affected both the economy and health expenditure (International Monetary Fund, 2020b).

Ethiopian health care delivery is organized in a three-level system: primary, secondary and tertiary. The primary level comprises primary hospitals serving 60 000–100 000 people, health centres (HCs) serving 15 000–25 000 people and, in rural areas, five satellite health posts serving 3000–5000 people each. The secondary level consists of general hospitals serving 1.0–1.5 million people. The tertiary level consists of specialized hospitals covering 3.5–5.0 million people. There is a referral system operating among the health facilities within and between the tiers based on the catchment network model. A total of 16 563 health posts, 3531 public HCs and 247 public hospitals render services to the population (Ministry of Health of Ethiopia, 2015).

Study design and data
We employed a benefit incidence analysis (BIA). BIA shows how benefits from public health spending are distributed across income groups. It is applied to monitor governments' effectiveness in targeting government spending (McIntyre and Ataguba, 2011). We used three sets of data for this BIA. First, data on the total number of outpatient and inpatient health services delivered were extracted from the MoH's Health Management Information System (HMIS) database for the period from July 2015 to June 2016 (Ministry of Health of Ethiopia, 2015b). This data set was generated through a routine report from all public health facilities. The data were taken from 3562 HCs and 241 hospitals that were functional during the study year. The service-use data obtained from the facility level were aggregated into the regional and national level by visit type (i.e. inpatient and outpatient). Second, health service utilization data by households' and individuals' characteristics were obtained from the most recent (2015/2016) Living Standard Measurement Survey (LSMS), which was jointly collected by the Central Statistics Agency of Ethiopia and the World Bank (Central Statistical Agency of Ethiopia, World Bank, 2016). This survey covers 23 393 households identified from throughout the country and provides information on basic demographics and the households' socioeconomic information (the data were obtained from the World Bank website, which is openly available for public use). Third, the government health expenditure data were obtained from the Ministry of Finance and Economic Development of Ethiopia. The expenditure data were disaggregated by region, facility type and administration level. We used recurrent budgets spent at the facility level from July 2015 to June 2016 (i.e. the Ethiopian 2008 fiscal year).

Data management
The analysis was done using ADePT software developed by the World Bank for health financing equity and poverty analysis. ADePT is a statistical analysis software that standardizes the production of analytical reports. The tool emphasizes the interpretation and policy implications of the results by quickly generating standardized tables and charts with summary results that are ready for use. We used STATA software to clean and organize the LSMS data. The average marginal exchange rate for the fiscal year (2016/17) was used to convert the currency from Ethiopian Birr (ETB) to US dollars (US$) (1 US$ = 21.1 ETB) (National Bank of Ethiopia, 2016/17).

Estimating government unit subsidy
The unit subsidy for a specific health service is the ratio of the total recurrent expenditure estimated for that service relative to the number of patients who utilize that specific health service.

$$S_{ik} = E_{ik}/U_{ik}$$

where S_{ik} represent a unit subsidy for service type i (inpatient, outpatient, overall) for k level of care (HC, Hospital and overall), E_{ik} is total recurrent expenditure for service type i at k level of care and U_{ik} is total service utilization at service type i at k level of care.

To calculate the outpatient unit subsidy for services at a particular level (i.e. HC, hospital or overall), we divide the total amount of recurrent government health expenditure on the service at that particular level by the corresponding total number of outpatient visits. To calculate the inpatient unit subsidy, we multiply the outpatient unit subsidy by the outpatient equivalent ratio (OER) and the average length of stay (ALOS) for that service level. We assumed that the OER for each inpatient day is equal to 2.78 at an HC and 4 at a hospital (Mann *et al.*, 2016). The ALOS was assumed to be one day at HCs and seven days at hospitals (Barnum and Kutzin, 1993; Beyera *et al.*, 2020; Kedir *et al.*, 2017; Accorsi *et al.*, 2010; Seyoum *et al.*, 2014).

Socioeconomic status measurement
The most popular and direct measures of living standards are the income-based and consumption-based living standard measures. Measuring consumption is more appropriate than income for developing countries in which formal employment is less common, and many households have multiple and continually changing sources of income. In this study, therefore, we employed a consumption-based living standards measurement using a wealth index from the LSMS. The wealth index is a composite measure of a household's cumulative living standard to compare individual households by their relative wealth. The index is separated into quintiles across the population (O'Donnell *et al.*, 2012).

Estimating benefits received
In this analysis, the variables analysed with public spending costs were inpatient admissions, outpatient visits, hospital utilization, HC utilization and total health service visits. Moreover, individual-level (i.e. age, gender and educational status) and household-level (i.e. residence and region) health determinant variables were used to assess health inequalities. The inpatient admission variable considers data reported in the past 12 months, and, for outpatient visits, those reported in the past month were taken and annualized. The analysis also assumed that those people who reported health facility visits more than 12 times per year were recorded as having visited a maximum of 12 times, and people who visited health posts were categorized under HC visit.

Benefit incidence analysis
The benefit incidence to one group depends on the use of publicly funded services by that group and the distribution of government spending for the services. Therefore, estimating the unit cost, identifying the users and aggregating the users into groups were the significant steps in conducting the BIA (McIntyre and Ataguba, 2011). We applied the following formula to examine the inequality in public health spending among different wealth quintiles.

$$Xj \equiv \sum_i Uij \frac{Si}{Ui} \equiv \sum_i \frac{Uij}{Ui} Si \equiv \sum_i eijSi$$

where X_j is the benefit incidence from the total health subsidy enjoyed by group j, U_{ij} is health service utilization of service i by group j, U_i is the utilization of health service i by the whole group, Si is government spending on health service i and e_{ij} is group j's share of the utilization of service i.

BIA tries to determine whether there is a disproportionate benefit in public health spending among the poor or the better-off households (McIntyre and Ataguba, 2011). The share of total government subsidy benefits that accrue to each wealth quintile was expressed by the CI (O'Donnell *et al.*, 2012). The CI values range from –1 to 1; a negative value signifies that the subsidy/utilization favours the lower income groups (pro-poor), and a positive value indicates that the subsidy/utilization is more concentrated in higher income groups (pro-rich).

During the configuration of the model using ADePT software, a 'constant unit cost assumption' was selected from the four different options (i.e. constant unit subsidy, constant unit cost, proportional subsidy and proportional cost assumptions). Therefore, in principle, out-of-pocket payment needs to be deducted from the total cost, and if the user-fee payment was made only to fill the budget gaps between the cost of care and the allocated budget, it could be excluded from the analysis (Wagstaff, 2012). In practice, although health service user-fees in public health facilities are relatively low in Ethiopia than the total cost (Ministry of Health of Ethiopia, 2019b), the LSMS data employed in this study include costs incurred for medicine and testing (in addition to consultation fee) purchased from private facilities. We, therefore, deducted out of pocket payment (OOP) in this analysis. An estimated unit cost of services was deducted from the reported OOP for all individuals, and when the OOP payment was less than the unit cost or became negative after deduction, it was taken as zero. The constant unit cost assumption considers that each health service unit has an equal cost but a different amount of subsidy per unit of utilization (Wagstaff, 2012).

Decomposition analysis
The relative contributions of a socioeconomic and demographic variable were identified using decomposition analysis.

We divided the overall inequality into justifiable and unjustifiable (inequity) components based on the variables' nature under consideration (O'Donnell *et al.*, 2012). The health determinants were grouped into two categories: standardizing and control. Standardizing variables, such as age and gender, were the determinants of health considered justifiable. In contrast, the control variables of wealth, residence, region and education were variables whose relationship with health is considered unfair or inequitable. Therefore, the decomposition of the CI quantifies the contribution of socioeconomic inequity in health service utilization. The concentration curves were used to illustrate each of the variables' contribution to the overall inequality (O'Donnell *et al.*, 2012).

Results

The results section is organized into three parts. In the first part, we present the amount of total government expenditure and the associated unit subsidy by facility type and service type. We then present the health service utilization, disaggregated by sociodemographic and socioeconomic variables. Finally, we present the BIA findings by combining the unit subsidy, utilization and distribution information.

Government recurrent spending per unit of service

Table 1 presents the number of health service visits (i.e. health service utilization) and the associated government unit subsidies for the health services provided. From July 2015 to June 2016, a total of 52 614 415 health service visits were registered. Outpatient service accounted for 82%, while inpatient services accounted for 18% of the services provided at either the HC or hospital level. For all inpatient services, the total outpatient equivalent days were 17 951 717. Hospitals accounted for about 94% (16 898 901), while HCs accounted for only about 6% (1 052 817) of the total outpatient equivalent days.

In the same period, a total of US$231 850 208 was spent on public health facilities as recurrent government spending on health, and about 61% of it was spent on either HCs or health posts, while hospitals accounted for 39%. Similarly, about 72% of the spending was on outpatient services, while inpatient services accounted for 28%. Therefore, on average, the government spending per unit was US$4 per outpatient service at hospitals, US$3 per outpatient service at HCs/health posts, US$96 per inpatient service at hospitals and US$9 per inpatient service at HCs (Table 1).

Health service utilization

Table 2 shows that annual health service utilization per person varied across demographic characteristics. Overall, health service utilization was higher in the Addis Ababa and Tigray regions, while the Somali region had the lowest utilization rate. Mean inpatient service utilization and mean hospital service utilization was about 1.5 times lower among rural residents than urban residents.

Socioeconomic-related inequalities in the utilization of public facilities

The distribution of health care utilization by socioeconomic status is presented in Table 3. Overall, health service utilization showed a higher frequency among the wealthier

Table 1. Total and unit recurrent government spending on health at public health facilities (in 2016 US$)

Variable description	Values	%
Outpatient services (number)		
Hospital	8 684 391	17
Health centre	42 920 757	83
Overall	51 605 148	100
Inpatient services (number in terms of outpatient equivalent)[a]		
Hospital	16 898 901	94
Health centre	1 052 817	6
Overall	17 951 717	100
Total recurrent government spending on health services (in US$)		
Hospital	91 324 613	39
Health centre	140 525 595	61
Overall	231 850 208	100
Unit outpatient spending (in US$)		
Hospital	3.6	
HC	3.2	
Overall	Na	
Unit inpatient spending (in US$)		
Hospital	95.7	
HC	8.9	
Overall	Na	

[a] A total of 1 009 267 inpatient service were provided in 2015/16 (630 556 in hospitals and 378 711 in HC), Na = Not applicable.

quintiles relative to the poor. The average outpatient department (OPD) visits per person per year was 0.918 among people in the lowest wealth quintile and 1.996 among people in the highest wealth quintile. The average inpatient department (IPD) admissions per person per year were 0.042 for the lowest quintile and 0.075 for the highest quintile. The highest mean utilization of IPD was observed in the fourth wealth quintile (0.077), indicating a relatively higher utilization by the wealthiest quintile. The mean hospital visits were higher in the highest quintile (0.417) and lower in the poorest quintile (0.144).

A graphic comparison of the distribution of health care utilization by the service type (OPD, IPD) and facility type (HC, hospital) in terms of wealth quintile is presented in Figure 1. The distribution is presented as percentage shares of total health care utilization by the given income quintile. People in the wealthiest quintiles have utilized 46.4% of the hospital services, 39.5% of IPD services 39.5, 32.8% of OPD services and 25.2% of HC services. People in the poorest quintiles have utilized 6.2% of hospital service, 4.8% of inpatient service, 11.2% of outpatient services, 14.3% of HC services and 14.3% of health.

Decomposition of the concentration index

The decomposition of the health CI by health determinant (age, wealth, residence, region, gender and educational status) is presented in Table 4. For the overall CI, age contributed about –0.013, and sex contributed about 0.01. A negative value indicates that the contribution of age was more concentrated among the poor. The total inequity for OPD and HC visits was negative. The main contributors to inequality in OPD visits were residence (–0.002) and wealth status (–0.004). The main contributors to HC visits were residence (–0.058) and educational status (–0.001). Regional differences contributed to the pro-rich inequality except for IPD visits. The socioeconomic status-related inequity of all health

Table 2. Health service utilization by service types and facility types across sociodemographic characteristics

Demographic variable	Outpatient	Inpatient	HC	Hospital
Residence				
Urban	1.772	0.121	0.506	0.494
Rural	1.330	0.073	0.837	0.163
Region				
Tigray	1.965	0.078	0.591	0.408
Afar	2.401	0.098	0.707	0.293
Amhara	1.282	0.068	0.813	0.187
Oromia	1.205	0.058	0.727	0.272
Somali	1.509	0.053	0.877	0.123
Benshagul Gumuz	1.454	0.036	0.902	0.097
SNNPR	1.161	0.060	0.711	0.289
Gambela	1.658	0.018	0.846	0.154
Harari	1.575	0.059	0.793	0.206
Addis Ababa	1.911	0.091	0.424	0.576
Diredawa	2.405	0.079	0.734	0.265
Sex				
Male	1.293	0.063	0.733	0.266
Female	1.621	0.068	0.715	0.284
Educational status				
No formal education	1.720	0.125	0.571	0.428
Primary level education	1.216	0.056	0.704	0.295
Secondary level education	1.419	0.101	0.510	0.490
Above secondary level education	1.885	0.074	0.468	0.531
Age				
0–4	1.632	0.045	0.817	0.182
5–9	0.889	0.033	0.889	0.110
10–14	0.876	0.033	0.730	0.269
15–19	0.890	0.039	0.769	0.231
20–24	1.252	0.078	0.675	0.325
25–29	1.546	0.090	0.750	0.250
30–34	1.748	0.078	0.683	0.317
35–39	2.093	0.093	0.657	0.343
40–44	1.707	0.078	0.770	0.229
45–49	2.279	0.075	0.587	0.412
50–54	2.565	0.094	0.630	0.369
55–59	2.500	0.088	0.633	0.366
60–64	2.679	0.072	0.636	0.364
65+	2.415	0.084	0.632	0.368

Table 3. Annual health service utilization by service types and facility types across wealth quintiles

Indicator	Lowest	Second	Middle	Fourth	Highest
Outpatient visits	0.918	1.198	1.471	1.549	1.996
Inpatient visits	0.042	0.055	0.067	0.077	0.075
HC visits	0.855	0.825	0.783	0.715	0.582
Hospital visits	0.144	0.175	0.217	0.285	0.417

services gives an advantage to the highest quintile except OPD visits.

The total inequity for a hospital visit (0.184), IPD (0.180) and total health service utilization (0.067) were benefiting the higher quintiles, with the positive contributions of the control variable wealth (0.028, 0.041, 0.013) and residence (0.115, 0.089, 0.043) indicating that the contribution of the unjustified inequality was concentrated among the higher quintiles. The total inequality for a hospital visit was concentrated among the higher quintile groups with all the control variables' contribution. HC visits with the unjustified inequality

of residence (–0.058) and education (–0.001) tended to benefit the poor.

The decomposition of the CI for total health service utilization by the determinant variables indicates that residence contributes primarily to making the CI more pro-rich, and all other determinants have similar effects except age, which contributed negatively (Figure 2A). In Figure 2B, we present the decomposed CI across HC utilization, hospital utilization, OPD visits and IPD visits by various determinants. The determinant variables were drawn above or below a horizontal line at zero; above the line indicates a positive contribution of the variable, making the CI more pro-rich; below the line indicates a negative contribution of the variable, making the CI more pro-poor. A variable with a larger area in the graph shows that it has a more significant contribution to make the CI more pro-rich or pro-poor. The residuals show the part of the CI that was not due to the determinants.

Benefit incidence of public spending on health

The share of government spending is presented in Table 5. The government allocated nearly 61% of the health expenditure to HCs and 39% to hospitals. Nearly, three-fourths of government spending is concentrated at the OPD. The government inpatient unit subsidy is substantially higher at the hospital level (US$95.7) compared to at the HC level (US$8.9).

The significant share of hospital spending goes to the wealthiest quintile (33%), while only 2.9% goes to the most deprived quintile. HC spending was concentrated on the second quintile and the fourth quintile, followed by the middle quintile and 4.1% in the lowest quintile. OPD and IPD service spending was more concentrated in the second quintile and least concentrated in the lowest quintile. In terms of health facility type, the hospital subsidy's significant share goes to the wealthiest quintile (33%) and the poorest get the very lowest share (2.9%). The second and fourth quintiles get an equal share of the HC subsidy, which is still the lowest subsidy at the lowest quintile (4.1%). The government spends 60.6% on HCs and 39.4% on the hospital subsidy.

The government spending on service type inequality shows that nearly two-thirds of the public spending share goes to OPD services, while 27.2% is for IPD. The share of government subsidy was very weak in the lowest quintile of the population and relatively highly concentrated in the second quintile except for the hospital service subsidy benefiting the wealthiest quintile. The poorest 20% of the population receive only 2.9% of public spending on hospital care subsidy and 4.1% HC care subsidy. The poorest 20% of the population receive only 7.5% of public spending on outpatient care subsidy and 7.2%% IPD care subsidy.

The public health spending for overall health service utilization in Figure 3 indicates that it was slightly above the 45° line. The concentration curve for the overall public health spending on health subsidy indicates a marginally pro-poor result (Figure 3).

Discussion

This study estimated inequalities in health service utilization and the public subsidy distribution for health services in Ethiopia across socioeconomic groups. Our findings demonstrate that total public health spending in Ethiopia was marginally pro-poor in general, while the findings across the
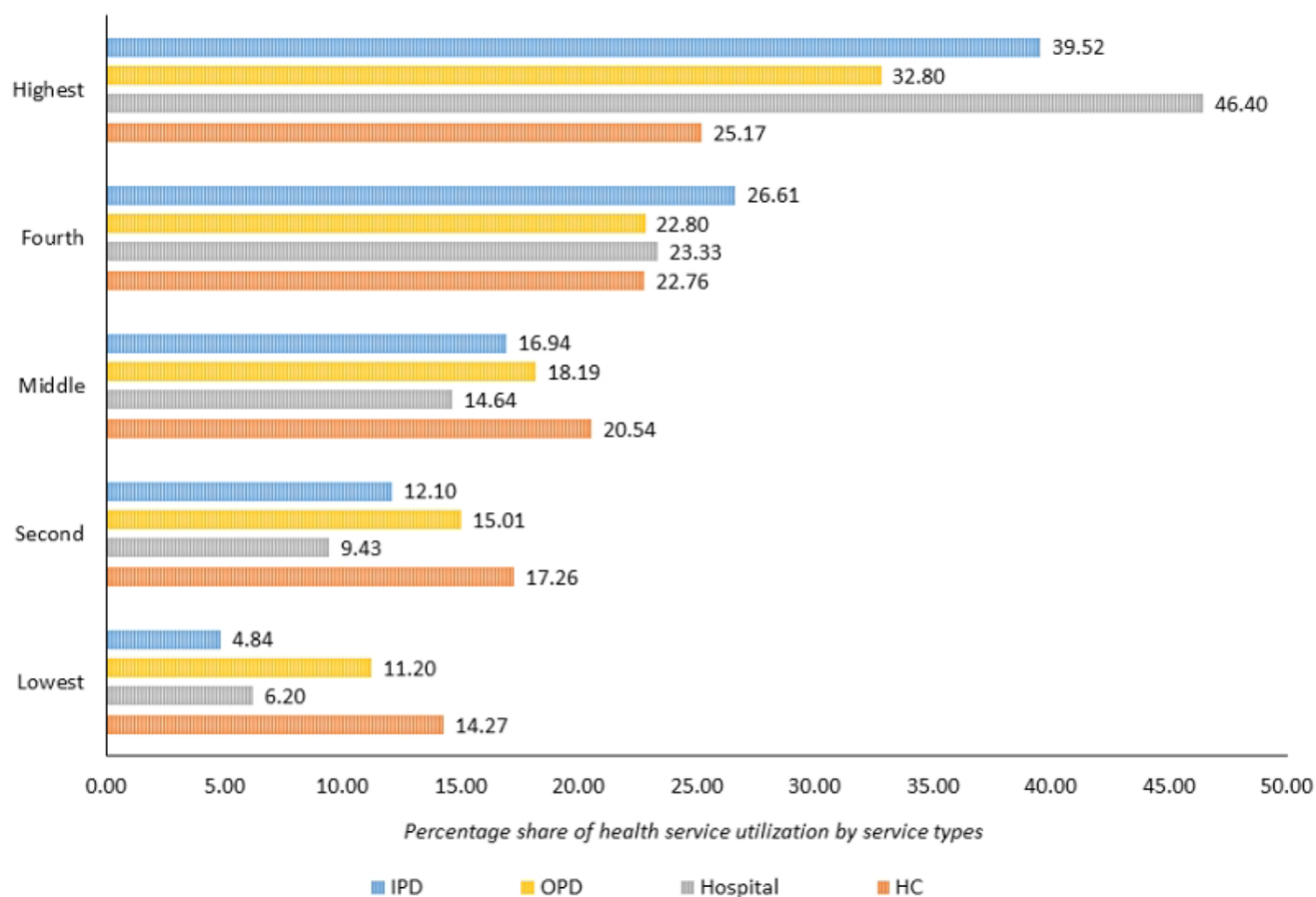
Figure 1. Percentage distribution of health service utilization by service types and facility types across wealth quintile

Table 4. Decomposition of concentration index for the health service utilizations' (using a linear model)

	Justifiable		Control variables					
Indicator	Sex	Age	Region	Wealth	Residence	Education	Total Inequality	Inequity
Services								
OPD	−0.004	0.001	0.000	−0.004	−0.002	0.000	−0.005	−0.008
IPD	0.022	0.010	−0.017	0.041	0.089	−0.001	0.180	0.155
Facilities								
Hospital	−0.03	−0.026	0.034	0.028	0.115	0.002	0.184	0.131
HC	0.015	0.006	0.001	0.007	−0.058	−0.001	−0.063	−0.032
Overall	0.011	−0.013	0.003	0.013	0.043	0.002	0.067	0.058

types of services (i.e. outpatient versus inpatient) and facilities (i.e. hospitals versus HCs) were mixed. Public health spending on hospitals and inpatient services was in favour of the higher quintile groups. However, HCs and outpatient services were pro-poor. These findings, to some extent, could be attributed to the clearly articulated pro-poor health policy, with emphasis on primary health care, that the Ethiopian government implemented in the past couple of decades (Croke, 2021).

Although the magnitude of inequalities differed across countries, a comparative study involving countries from Africa, Asia and Latin America generally indicates that hospital-level inpatient care is pro-rich and primary health care is pro-poor primarily (Kirigia *et al.*, 2013). The findings from a study by Ataguba and McIntyre in Kenya are also in line with our findings in that they found that poor

people gain significantly less from government health subsidies at the highest level of health care delivery (Ataguba and McIntyre, 2012). However, contrary to our findings, a multicountry study in several African countries found a generally pro-rich distribution of benefits from the government health subsidy (Castro-Leal *et al.*, 2000). Another study from South Africa also similarly reported a pro-rich distribution of benefits from public health expenditure (Chuma *et al.*, 2012).

Our study showed the pro-poor finding at OPDs and HCs, while inpatient and hospital service were pro-rich may be due to the disproportionate concentration of the poor in rural areas, on one hand, and due to the disproportionate distribution of hospitals in urban areas (major cities), on the other hand (Ministry of Health of Ethiopia, 2017b). Major cities are where the large majority of the better off are living. According
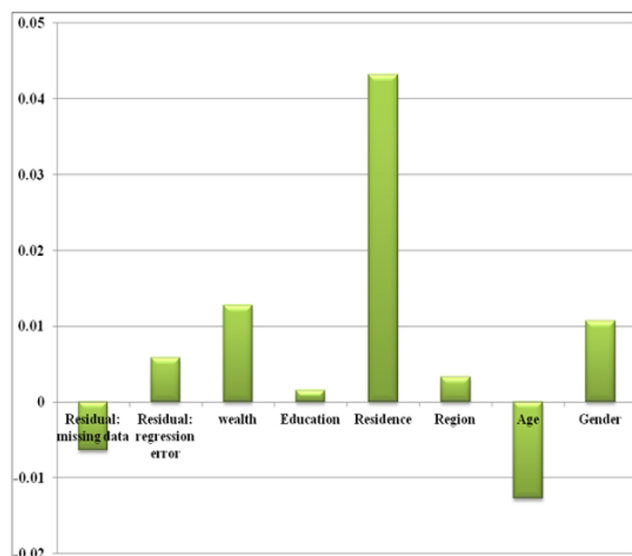
A. Percentage contribution of sociodemographic variables for the overall inequality in health service utilization
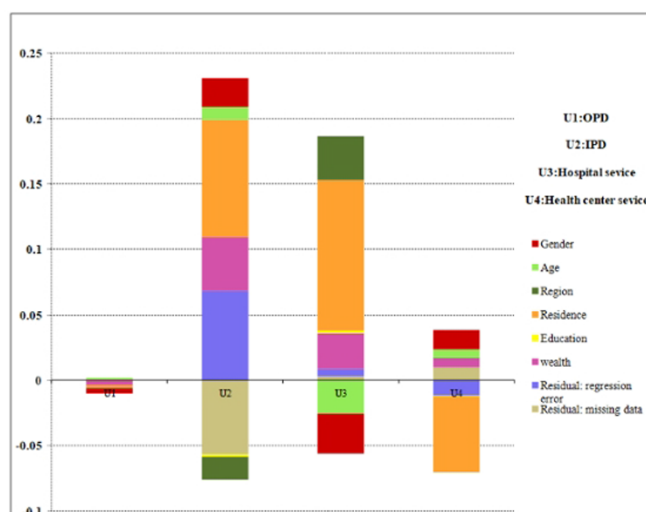
B. Decomposition of the contribution of sociodemographic variables by service types and facility types

Figure 2. Decomposition of CI for overall health service utilization (A) and service types and facility types (B)

to the HMIS data, most of the OPD services were conducted at the HC level, and most HCs/health posts are in rural areas (Ministry of Health of Ethiopia, 2015b). The decomposition analyses findings also support that the urban–rural gap was the key driver for the inequality, which corresponds with findings in many other low-income countries (Langa and Bhatta, 2020; Okoli *et al.*, 2020; Say and Raine, 2007).

Most inpatient services were provided at the hospital level, and tertiary and secondary hospitals are primarily located in relatively bigger cities. Thus, people from rural areas, primarily poor, are less likely to access the services due to a lack of transportation infrastructure. Besides, the cost of service at hospitals is relatively expensive, and it can hinder their utilization by the poor (Ensor and Cooper, 2004; Say and Raine, 2007). This is also reflected in the national health account study finding that inpatient service utilization is relatively higher in the wealthiest households and among urban residents than among rural residents and those living in the poorest households (Ministry of Health of Ethiopia, 2019b). Thus, poor availability and utilization of hospital level service by the rural population can be one reason for disproportionality high maternal, infant and child mortality among poor households in Ethiopia (Ambel *et al.*, 2017). Therefore, this inequality can be substantially reduced by addressing key health systems issues.

The Ethiopian MoH should commit substantial resources to expand access to primary health care by increasing capital and the recurrent budget allocated to health facilities. The current decentralized three-tier service delivery arrangement, with the primary health care approach as the centrepiece, should be strengthened by allocating an adequate health workforce and other resources. The revitalization of the Health Extension Programme (HEP) should be a priority for the MoH. The MOH has been implementing the HEP for the past 15 years, and the major success of the HEP lies in increasing health service utilization by rural households by providing health education

Table 5. Distribution of government spending on health subsidy by facility types and service types across wealth quintile

	Health facility		Health service	
Wealth quintile	HC	Hospital	OPD	IPD
Lowest	4.1	2.9	7.5	7.2
Second	25.2	27.1	37.8	30.0
Middle	24.8	18.8	17.9	19.9
Fourth	25.2	18.2	17.4	19.1
Highest	20.7	33.0	19.5	23.9
Share in total subsidy (%)	60.6	39.4	72.5	27.5
Concentration index	−0.058	0.103	−0.060	0.134

and information. The HEP has facilitated equitable care across the country, increased the coverage of high impact interventions and increased all essential health services at the primary level. This strategy can make the HC subsidy more pro-poor. However, the HEP has been challenged recently because of demotivated and poorly coordinated extension workers (Assefa *et al.*, 2019; Fetene *et al.*, 2016; Tilahun *et al.*, 2017).

Improving and scaling up the CBHI can increase health service utilization by the poor community because it covers the out-of-pocket payment (Nageso *et al.*, 2020). The CBHI system should be redesigned to have a bigger pool for cross-subsidization among members. The MoH should also encourage all partners and donors to put their money in the CBHI pool to benefit all in every health programme without disparity instead of investing in a specific programme (Hailu *et al.*, 2021).

Improving the fee waiver system is another critical area to increase service utilization by the poor without financial hardship. In Ethiopia, a fee waiver system has been implemented for a relatively long time to enable those who cannot
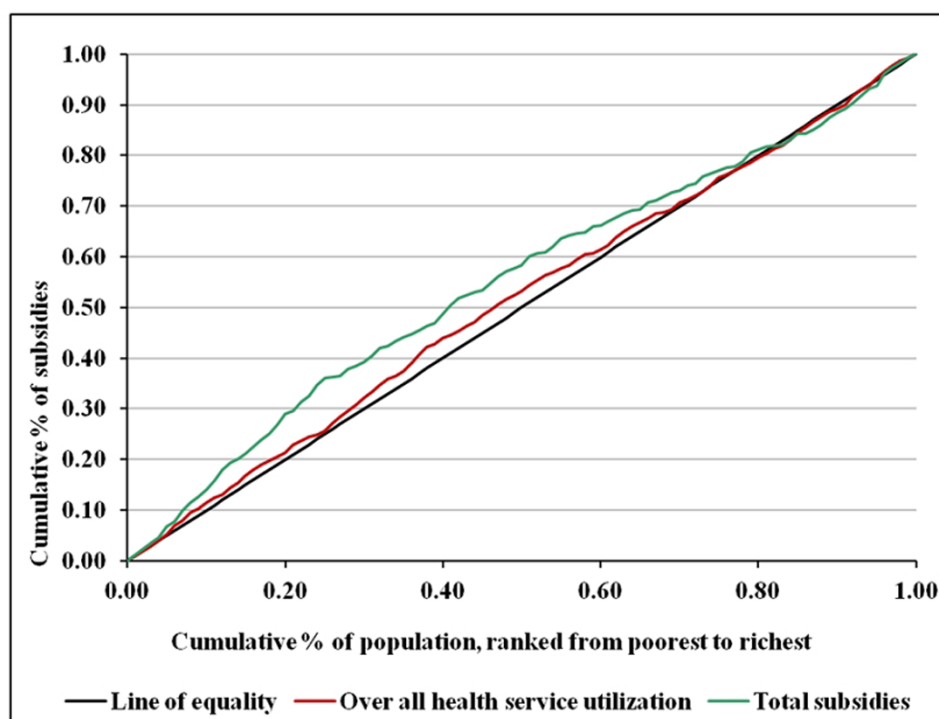
Figure 3. Concentration curve for government health subsidy by socioeconomic status

pay for their health care. However, some studies indicate that people belonging to the very lowest quintile are not benefiting as intended from the government subsidy because of the week selection and administration mechanism enacted (Ashagrie and Abebe, 2004; Engida and Mariam, 2002; Woldie *et al.*, 2005). Therefore, the targeting and selection process should be revised to create accountability and transparency. Furthermore, there should be a continual activity of creating awareness by establishing community dialogue forums with health facilities and other strategies to benefit the poor through free services.

Limitations
This study has some limitations that need careful consideration. First, we used secondary data, which is difficult to disaggregate to enough granularity. For instance, the analysis cannot tell whether a particular intervention against a specific disease or health problem is pro-poor or not. Furthermore, the LSMS uses self-reported illness as a proxy for utilization, and self-reported data are usually prone to information bias. The seasonal effects were also not considered in annualizing outpatient visits from LSMS data. Therefore, this might cause over-or underestimated health service utilization for some areas. Second, we assumed an equal unit cost per service across all income groups, while the actual expenditure could vary to some extent across groups. This study also does not account for the potential differences in service provision costs that vary according to facilities' catchment population and service volume. This study also does not consider the difference in health service quality and health facilities' efficiency.

Third, besides focusing on recurrent expenditure, this analysis does not include other essential capital input of health service delivery (e.g. infrastructure and equipment). Fourth, this BIA does not investigate specific reasons for incidence outcomes, mainly as they involve individual behaviour in addition to supply-side factors. BIA does not consider factors at individual, household and facility levels. Understanding the specific causes would have been helpful for decision-making and policy design. However, there is no health equity monitoring system in Ethiopia at either the federal or regional level. Therefore, the Ethiopian government should establish a continuous health equity monitoring system with a clear mandate to provide detailed evidence on the state of inequality and its determinants.

Conclusion
In conclusion, this study revealed that BIA without disaggregation by health service types and facility type could mask essential disparities. In general, the total public health spending in Ethiopia was marginally pro-poor. Public health spending at hospitals and inpatient services was pro-rich, while public health spending at HCs and outpatient services was pro-poor. Therefore, an effort is needed in making inpatient care and hospital services more accessible to those in the lower quintiles and those in rural areas. Besides, policymakers in Ethiopia should use this evidence to monitor inequity in government spending on health, thereby improving government resources allocation to target the disadvantaged better.

Data availability
The data sets supporting the conclusions of this article are publicly available.

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