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Estimating the distributional incidence of healthcare spending on curative health services in Sub-Saharan Africa: Analysis in Burkina Faso, Malawi and Zambia

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Estimating the distributional incidence of healthcare spending on curative health services in Sub-Saharan Africa: Benefit Incidence Analysis in Burkina Faso, Malawi and Zambia

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Abstract
Sub-Saharan African countries have been experiencing a persistently high level of inequality in access to healthcare services. Following the global call to eliminate health inequalities worldwide, different investments in health policies towards Universal Health Coverage (UHC) have been made in many Sub-Saharan African countries. However, evidence on the distributional incidence of health spending on these recent UHC-specific reforms is still limited. This paper aimed to close this gap in knowledge by conducting a quasi-longitudinal benefit incidence analysis to assess equality of both public and overall health spending on curative health services across socioeconomic groups in three Sub-Saharan African countries: Burkina Faso, Malawi and Zambia. The study relied on healthcare utilization data derived from different nation-level household surveys (including Living Condition and Monitoring Survey, Perfomance based Financing Survey, and Zambia Household Health and Expenditure Survey) and health expenditure data derived from National Health Accounts. The findings demonstrated increasing equality in the distributional incidence of health spending over time, but also considerable persistent heterogeneity across provinces/regions/district. Less health financing inequality was observed in Malawi than in the other two country. These findings suggest that the implementation of UHC-specific reforms was effective in increasing equality in the distributional incidence of health spending, meaning that more financial resources reached the poorest segments of society, but was not yet sufficient to remove differences across provinces/regions/districts. Further research is needed to investigate sources of heterogeneity within countries and identify strategies to overcome it.

Keywords
Benefit incidence analysis, health, curative services, inequality, health spending, Africa

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Résumé
Les pays d'Afrique subsaharienne connaissent un niveau d'inégalité élevé et persistant dans l'accès aux services de santé. A la suite de l'appel mondial à l'élimination des inégalités en matière de santé dans le monde, différents investissements dans les politiques de santé en vue d'une couverture sanitaire universelle (CSU) ont été réalisés dans de nombreux pays d'Afrique subsaharienne. Cependant, les preuves de l'incidence sur la répartition des dépenses de santé de ces récentes réformes spécifiques à la CSU sont encore limitées. Ce document visait à combler ce manque de connaissances en effectuant une analyse quasi-longitudinale de l'incidence des bénéfices afin d'évaluer l'égalité des dépenses publiques et globales de santé en matière de services de santé curatifs pour les différents groupes socio-économiques de trois pays d'Afrique subsaharienne : Burkina Faso, Malawi et Zambie. L'étude s'est appuyée sur des données relatives à l'utilisation des soins de santé provenant de différentes enquêtes nationales auprès des ménages (notamment l'enquête sur les conditions de vie et le suivi, l'enquête sur le financement basé sur la performance et l'enquête sur la santé et les dépenses des ménages en Zambie) et sur des données relatives aux dépenses de santé provenant des comptes nationaux de la santé. Les résultats ont montré une égalité croissante dans la répartition des dépenses de santé au fil du temps, mais aussi une hétérogénéité considérable et persistante entre les provinces/régions et les districts. On a observé moins d'inégalités dans le financement de la santé au Malawi que dans les deux autres pays. Ces résultats suggèrent que la mise en œuvre de réformes spécifiques à la CSU a été efficace pour accroître l'égalité dans la répartition des dépenses de santé, ce qui signifie que davantage de ressources financières ont atteint les plus pauvres de la société, mais cela n'a pas encore suffi à éliminer les différences entre les provinces/régions/districts. Des recherches supplémentaires sont nécessaires pour étudier les sources d'hétérogénéité au sein des pays et identifier les stratégies permettant de la surmonter.

Mots-clés
Analyse de l´incidence des bénéfices, services de santé curatifs, inégalité, dépenses de santé, Afrique

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Introduction

For the past decades, countries around the world have implemented different health policies aiming at achieving Universal Health Coverage (UHC), defined as access to quality health services and protection from the financial hardship due to ill health for all people. Equity in access and utilization of healthcare is an important prerequisite for achieving UHC (Khan *et al.*, 2017). However, in many low-and middle-income countries (LMIC), especially in sub-Saharan Africa, socioeconomically disadvantaged people, despite generally higher health needs, use less formal health services than better-off individuals. Many studies on the links between health and socioeconomic status (SES) have indicated that people with higher SES enjoy better health and longer life (Wilkinson, 1992; Marmot *et al.*, 1997; Marmot, 2002; WHO, 2001; Deaton, 2003).

To reverse persistent trends in health and access to healthcare inequalities, countries across the world are implementing reforms aimed at fostering progress towards UHC. Affordable access to quality healthcare is an essential prerequisite to achieving better health. In turn, affordable access to quality healthcare is only possible within the framework of sufficiently funded and efficiently functioning health systems, that can ensure an equitable distribution of health benefits across their population (WHO, 2015).

Evidence is growing on the ability of UHC-specific reforms to improve affordable access to quality healthcare, reduce financial hardship due to ill health, and ultimately improve health (Witter *et al.*, 2012; Hatt *et al.*, 2013; Johri *et al.*, 2014; Hunter *et al.*, 2017). Nevertheless, most impact analyses generating aggregated impact measures, fail to indicate whether a given reform has had different effects on people belonging to different social groups. The risk is that the improvements reported mask important inequities due to socio-economic status, location of residency, or gender. For instance, the limited available evidence appears to indicate that below the surface of the progress reported over the last few years in relation to the objectives set by the Millennium Development Goals, access to basic healthcare services, healthcare spending, and both child and maternal mortality continue to be largely unequally distributed across and within LMICs, with the poor enjoying less access to services, facing more regressive health payments, and experiencing higher mortality rates than the least poor (Hanratty *et al.*, 2007; Gwatkin and and Ergo, 2011).

Both the policy and the academic community are increasingly concerned by the equity implications of policies and reforms aimed at fostering UHC (D'ambruoso, 2013). As investments towards UHC continue to grow, it is important to ensure that no one is left behind and that the investments made effectively contribute to close existing gaps in access, health spending, and health rather than contributing to widening them, by producing benefits only for the least poor (WHO, 2014; O'Connell *et al.*, 2014). The evidence on whether these investments in

recent UHC reforms have altered spending on health by increasing the distributional incidence of this spending to benefit the poor rather than the least poor is still limited.

Our research contributes to filling this gap in knowledge by looking at the distributional incidence of public and overall health spending in three selected sub-Saharan countries - Malawi, Zambia, and Burkina Faso. We used Benefit Incidence Analysis (BIA) to measure the distribution of public and overall health spending on curative health services across socio-economic groups at three time points. The aim is to assess whether the distributional incidence of public (traditional BIA) and overall spending (comprehensive BIA) on curative care has become more equitable over time, especially as a function of introducing UHC-specific reforms in the study countries.

Brief literature review

Ensuring equity in access to and utilization of healthcare has been the key priority of governments all around the world. Access to equitable and adequate health services that are of acceptable quality for all socioeconomic groups is prerequisite to achieve UHC. This commitment is pledged by The United Nations in the frame of the Sustainable Development Goals (SDG) that "no one should be left behind" in accessing the needed health services regardless of the socioeconomic status of the individuals who need care (United National General Assembly, 2015). One of the UHC principles involves ensuring that health care benefits are distributed based on the need for care and not on ability to pay. The distribution of health care benefits among different socioeconomic groups is, therefore, a significant health policy question, which health systems should address to ensure healthcare access among the vulnerable and impoverished population. Many studies have suggested that UHC has the potential to reduce health inequalities between different socioeconomic groups in terms of income, region, age or gender (WHO, 2018). However, various studies have revealed that, despite positive results in reducing health inequalities for some health services, socioeconomically disadvantaged groups are less likely than better-off individuals to use health services, resulting in persistent healthcare inequalities, especially in low and middle-income countries (Van de Walle and Nead, 1995; Yazbeck, 2009; Akazili *et al*., 2012; Wagstaff *et al*., 2014). A study by Bloom and colleagues (2018) has indicated that reducing health inequality through UHC requires substantial financial and human resources. Bloom and colleagues indicate that LMICs lack the required capacities to invest in health and socioeconomic programs towards comprehensive UHC that leads to equitable health systems. Measuring the benefits of health spending across different socioeconomic groups is a crucial endeavor for monitoring the effectiveness of health policies such as UHC schemes.

Benefits incidence analysis (BIA) is a technique used to assess the distributional incidence of health spending on healthcare by assessing the extent to which individuals with different socioeconomic status benefit from that spending. BIA combines the cost of providing services with information on the use of these services to show how the benefits from spending are distributed across individuals of different socio-economic status (O'Donnell *et al*., 2008; MCIntyre and Ataguba, 2011). BIA has traditionally been used to analyze public health spending, especially in LMICs, and most studies have been conducted by the World Bank (Demery, 2000; MCIntyre and Ataguba, 2011). These studies have shown that least-poor people tend to benefit from public health spending than poor people (World Bank, 2004; Huber *et al*., 2006). A study in seven Sub-Saharan-African countries revealed that public health spending on curative care benefits mostly the least-poor rather than the poor. This study suggested that many contextual factors on both demand and supply sides, such as user fees, household perception of illness, availability of and access to health

facilities, and the quality of care, play an important role in hindering the poor to benefit from public health spending (Castro-Leal *et al*., 2000). Castro-Leal and colleagues suggested that governments allocate a high share of health expenditures to hospitals that are not generally used by the poor. The better-off groups benefit from public spending on high levels of care since they can afford the user fees charged for using care at these high levels of care. For example, 89% of public spending goes to hospitals in South Africa and two – third in Ghana. The authors suggest an increase in health spending at primary health care levels and to improve the access of poor groups to healthcare to improve health equity in favor of the poor. A global assessment in 69 countries at all levels of incomes showed that public health spending is significantly disproportionally distributed in favor of the better-off with a high heterogeneity on different levels of care across countries (Wagstaff *et al.* 2014). Two systematic reviews including 31 (Anselmi *et al*., 2015) and 17 (Asante *et al*., 2016) studies, respectively, conducted in LMICs indicated that public health spending at primary healthcare level (*e.g.* Health centres) is equally distributed or pro-poor.

In contrast, this review revealed that public spending is pro-least-poor at secondary and tertiary levels of care (hospitals). Asante and colleagues further indicated that only the better-off benefit from total public subsidies when public spending is aggregated across all levels of care. Anselmi and colleagues suggest that the allocation of public health spending based on geographical differences in need, improving the access of the poor to high levels of care as well as improving the overall access of poor to health care would reduce health inequalities. In contrast to similar studies, two studies in Thailand indicated that public health spending was overall pro-poor for both at primary healthcare levels and hospitals, except only at teaching hospitals which were pro-least-poor (Prakongsai *et al*., 2009; Limwattananon *et al*., 2012). These studies in Thailand attributed the pro-poorness distribution of public health spending to the health reforms towards UHC through a universal coverage scheme (UCS) financed by the general taxation which gives free care at the point of use to the majority of the population (74%) uninsured in any health insurance of either civil servants or private sector employees. The majority of the individuals covered by the UCS are poor and use more health services at primary healthcare levels and district hospitals than the better-off.

Healthcare systems are financed through a mix of financing arrangements, including public and private spending. In LMICs, healthcare systems receive funding through financial aid from different donor partners. McIntyre and Ataguba (2011) proposed to enlarge the scope of the BIA methodology to assess overall health system performance in terms of the distribution of service benefits, including but not limiting the analysis to public spending. They argued that enlarging the scope of BIA to include all different funding sources of healthcare delivery is essential given the growing emphasis on fostering UHC by combining multiple strains of funding and by fostering public-private

partnerships, often in LMICs relying amply on financial support by development partners. Mills and Colleagues (2012) further proposed that the assessment of the overall health system performance should also include the assessment of the distribution of health service benefits across all healthcare providers by including both the public and private health facilities in BIA studies. Most BIA studies that followed a health system-wide approach have focused on including public and private healthcare providers in their equity analyses (Akazili *et al*., 2012; Ataguba and MCIntyre, 2011; Mtei *et al*., 2012; World Bank, 2012).

Most existing BIA studies have been conducted at one point in time. Hence, they do not allow any comparison of the distributional incidence of health spending over different time points (Asante *et al*., 2016). Since the distributional incidence of health spending might evolve, especially after the introduction of UHC-specific reforms, there is a need to conduct a quasi-longitudinal analysis, replicating the same distributional analysis over different points in time. The very few BIA studies that assessed distribution trends of health spending over time were conducted in the 1990s and 2000s or used data from these years. These studies showed mixed trend results among countries due to different health policies towards UHC that were implemented in each study country. A study done in Thailand indicated that between 2003 and 2009, the distributional incidence of public health spending remained pro-poor at all levels of care (Limwattananon *et al*., 2012). Similar distribution patterns were found in a study conducted in Costa Rica between 1986 and 1992. Different results were found in Ghana, where a study conducted between1989 and 1992 showed a pro-least poor distribution of public health spending at both time points (Demery *et al*., 1995). Mixed results were observed in Kenya, where the least-poor benefited from total public health spending in 2003 and became equally distributed in 2007. However, a mixed distribution was observed at different levels of care; at primary health care level, public health spending changed from an equal distribution in 2003 to a pro-poor distribution in 2007 whereas the inpatient and outpatient care at the hospital remained equally distributed and pro-least-poor, respectively, between 2003 and 2007 (Chuma *et al*., 2012). Comprehensive BIA studies capturing more recent changes in overall health spending over time are needed to shed light on the effect of recent UHC reforms on health equity.

As shown in the next section, the study countries in collaboration with international donors have introduced a number of UHC policies at different time periods – such as removal of user fees and financial incentives to healthcare providers – aiming at improving the access to and the quality of curative health services. However, the impact of these UHC reforms on the distributional incidence of public and overall health spending has not yet been object of systematic inquiry.

1. Context of the study countries

The study took place in three countries: Burkina Faso, Malawi, and Zambia. Hereafter, we provide a brief description of each country health financing context before we proceed to describe materials and methods. This is needed to be able to contextualize the methodological choices we have made as well as to be able to appraise findings accordingly.

1.1 Burkina Faso

Burkina Faso is a landlocked country located in West Africa, with a population of 18.5 million. In 2018, the country's GDP per capita stood at USD 731 placing it among the poorest countries in the world (World Bank, 2018). The 2014 Human Development Index ranked Burkina Faso 185 out of 188 countries (UNDP,2016).

In spite of substantial improvements over the course of the last few years, health indicators still largely lag behind regional averages. Life expectancy is at 58 years. Under-five mortality is estimated 102/1,000 live births (UNICEF, 2013). Malaria, acute respiratory infections, and diarrhea still account for the largest proportion of child mortality, often coupled with an underlying situation of malnutrition, with nearly 40% of all children being classified as stunted. Health service delivery is organized in a three-tier system, with primary facilities (Centre de Santé et Promotion Sociale - CSPS) located in rural areas; district hospitals located in each district capital; and regional and national referral hospitals located in the regional capitals and in the national capital Ouagadougou (Ministère de la Santé Burkina Faso,2016). Public facilities provide the vast majority of health services (WHO-African Health Observatory, 2015).

The health sector suffers from a generalized lack of resources. In 2016, total health expenditure was estimated at 7% of GDP, equivalent to Int. USD 124. Government expenditure amounts to 58% of total health expenditure, including contributions by development partners being estimated at 23% of this total. Private health expenditure is substantial as user charges continue to be applied across a variety of essential healthcare services, with more than 80% of all private expenditure on health not being channeled through pre-paid and pooled mechanisms (Su *et al.* 2006; Beogo *et al.* 2016).

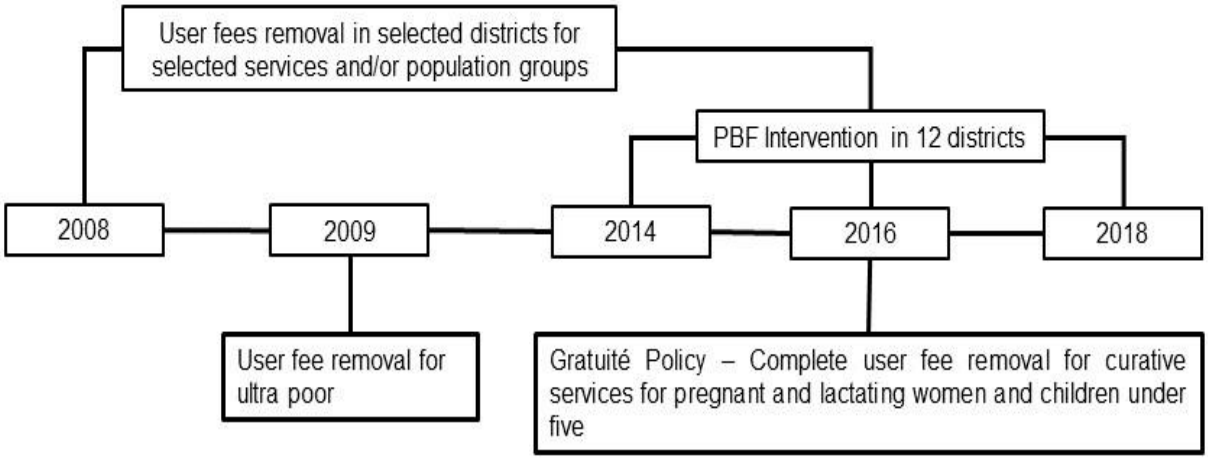
The poor health outcomes described above are largely the result of poor access to services, with people largely under-utilizing the care they need. The literature has consistently reported that geographical barriers, due to scarcity of health facilities, and financial barriers, due to user charges, continue to hamper access to healthcare services, especially for the indigents (Atchessi *et al.*, 2016; Dong *et al.*, 2008; Kadio *et al.*, 2014; Pokhrel *et al.*, 2010). Estimates from 2014 indicate that less than one out of three individuals reporting an illness episode sought care at a formal facility and that two-thirds of all these individuals reported a positive expenditure on health. Average expenditure fell just short of 10,000 CFA, equivalent to approximately 15 euros

(Nakovics *et al*., 2019). Specifically to children, evidence from 2014 indicated that only 2 out of 3 accessed care of adequate quality when ill (Koulidiati *et al*., 2018).

In line with the overall objective of achieving Universal Health Coverage, the ongoing launch of the Régime d'Assurance Maladie Universelle (RAMU) represents the first step towards implementing a nation-wide health financing reform aimed at lifting user charges for curative health services across all population groups. Prior to the RAMU, the country has put in place several health financing reforms aimed at removing user charges for selected population groups. In 2009, legislation was passed to remove user charges for the ultra-poor, leaving the task of identifying and paying for the ultra-poor to the single health facilities. Between 2008 and 2016, a number of pilot initiatives were implemented in single districts targeting removal of user charges for selected services and/or population groups. Moreover, between 2014 and 2018, the Ministry of Health, with financial and technical support by the World Bank, rolled out a complex PBF pilot intervention in 12 out of its 60 districts, combining in ten of the twelve implementing districts traditional PBF with three different equity measures to cover for the cost of care for the ultra-poor. Results from the impact evaluation point at modest and not homogenous effects, well below the expectations which had been placed on the program (De Allegri *et al*., 2018). In June 2016, the Ministry of Health launched the so-called *gratuité*, *i.e.* a free healthcare program targeting specifically pregnant and lactating women and children under five years of age. In addition, starting in 2009, the government prescribed that the worst-off (*les indigents*) should be fully exempted from paying user fees for all preventive and curative services provided by public facilities, but a recent study indicated that healthcare providers rarely apply this disposition also due to lack of knowledge (Ridde *et al*., 2018).

Emerging unpublished findings from some of our parallel work indicate that while user charges have declined dramatically for the children after the launch of the *gratuité*, making it the exeption that children pay for care at primary level, they continue to be high for adult consultations. Similarly, a different set of emerging unpublished results indicates that PBF has led to a reduction in out-of-pocket payments for the ultra-poor, persisting also after the end of the program, but that payments even for this population that should be fully exempted remain nevertheless high.

Figure 1. Health Policies and intervention timeline of curative health services in Burkina Faso
Source: Own illustration



1.2 Malawi

With a per capita GDP of approximately 300 USD (World Bank, 2018), Malawi is one of the poorest countries in the world, ranked 170 out of 188 countries on the Human Development Index (Jāhāna, 2016). The country has attained the Millennium Development Goals (MDG) targets related to child mortality (MDG 4) and HIV and AIDS (MDG 6) (MoH Malawi and ICF International., 2014; United Nations Malawi, 2015). Under-five mortality remains high at 63/1,000 live births (National Statistical Office (NSO) [Malawi] and ICF, 2017). HIV prevalence also remains high, at approximately 10% (National Statistical Office (NSO and ICF Macro, 2010), in a country progressively more challenged by the emergence of non-communicable diseases (MoH Malawi and WHO, 2010).

Since 2004, healthcare delivery is largely centered around provision of an Essential Healthcare Package (EHP) (including child health services, as well as services related to the prevention, detection and management of infectious and non-communicable health problems) which is intended to be provided free of charge at point of use either in public facilities or in private not-for-profit facilities contracted by the Ministry of Health (MoH). Approximately 60% of all health facilities belong to the government, 36% to the CHAM, and the remaining 4% belong to private for-profit and private not-for profit providers.

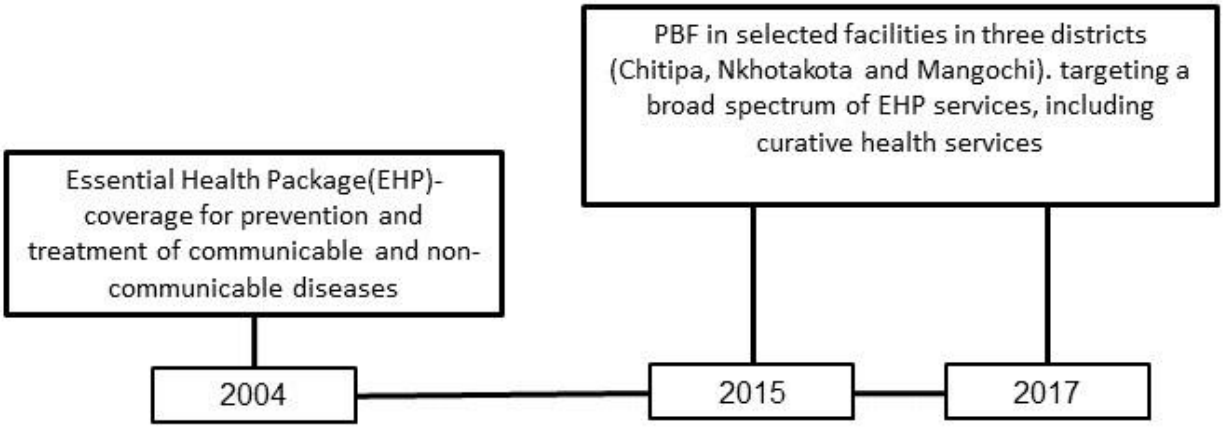
Evidence indicates, however, that services included in the EHP are not as available as they should be, thereby subjecting patients to substantial out-of-pocket payments (Bowie and Mwase, 2011; Mueller *et al.*, 2011; MoH Malawi, 2012; Abiiro *et al.*, 2014). A recent study indicated that two-thirds of individuals reporting an illness episode sought care at a formal facility and

of those, one fourth incurred into a positive expenditure, with a mean value of MKW 678 (approximately 2.5 euros) (Nakovics *et al*., 2020). An earlier study, focused specifically on care for chronic conditions, also indicated that the poorer continue to pay the higher price for health system failures, with payments for care remaining largely regressive and pushing a substantial proportion of poor people further into poverty every year (Wang *et al*., 2016).

In 2016, Malawi's total health expenditure was estimated at nearly 10% of GDP, equivalent to approximately Int USD 30 per capita, with the government contributing 16% of this value, out-of-pocket payments contributing 10% and the rest being covered by development partners (Health Policy Project, 2016). Due to the impact of the 2013 "Cashgate" government spending scandal, foreign support has substantially decreased over the last few years, leading Malawi to face a fiscal crisis in the health sector (Health Policy Project, 2016). Health service delivery has traditionally been financed using an input-based approach, with resources, such as infrastructure, equipment, drugs, and staff been assigned depending on population, presence of existing facilities, and available resources (WHO, 2015). Decentralization has been advocated for the past two decades, but in reality, single facilities retain very little autonomy over resource generation and management.

A health financing intervention targeting strategic purchasing through the introduction of performance-based financing (PBF), has been piloted with the intention of advancing progress towards UHC. Between 2015 and 2017, the Ministry of Health, with financial support from development partners, piloted a performance-based incentive program targeting a broad spectrum of EHP services, including curative health services, in three districts (Chitipa, Nkhotakota and Mangochi). Evidence emerging from studies accompanying the program suggests that it produced positive, albeit modest and not homogenous, improvements in both health service utilization and quality of service provision indicators (McMahon *et al.* 2016). The PBF intervention has not been shown to produce a narrowing of equity gaps, measured in terms of crude coverage, however, it has been shown to produce greater effects in rural primary level facilities than in urban secondary level ones (Brenner *et al*., 2020). A very recent study suggests that changing the composition of the EHP towards the inclusion of highly cost-effective interventions could result in substantial distributuional benefits (Arnold *et al*., 2020).

Figure 2. Health Policies and intervention timeline of curative health services in Malawi
Source: Own illustration



1.3 Zambia

Zambia is a landlocked country in sub-Saharan Africa with a population estimated at 13.1 Million on a land area of 752,612 square kilometers. Administratively, the country is divided into ten provinces and 74 districts. From the 10 provinces, 8 are predominantly rural (DHS, 2014). In 2010, 60 % of the Zambians were classified as poor with a high prevalence of poverty in rural than urban areas (78 percent versus 28 percent) (CSO, 2010). The overall mortality rate was estimated at 16.2/1,000 person-years for men and 12.3/1,000 person-years for women (Rathod *et al*., 2016). The under-five mortality decresed from 165/1,000 in 1980 to 100/1,000 in 2010 live births (Wang *et al.* 2012). The Zambian gross domestic product (GDP) has experienced a continuous decline between 2010 and 2015, from a GDP growth of 10.3% in 2010 to a growth of 2.9% in 2015 (CSO, 2016). To tackle this severe poverty, the government of Zambia has set different policies with the aim of transforming the country into a nation of healthy and productive people and achieve a middle-income country by 2030 (CSO, 2010). The health sector has to play a crucial goal in achieving this venture goal by keeping the people in Zambia healthy.

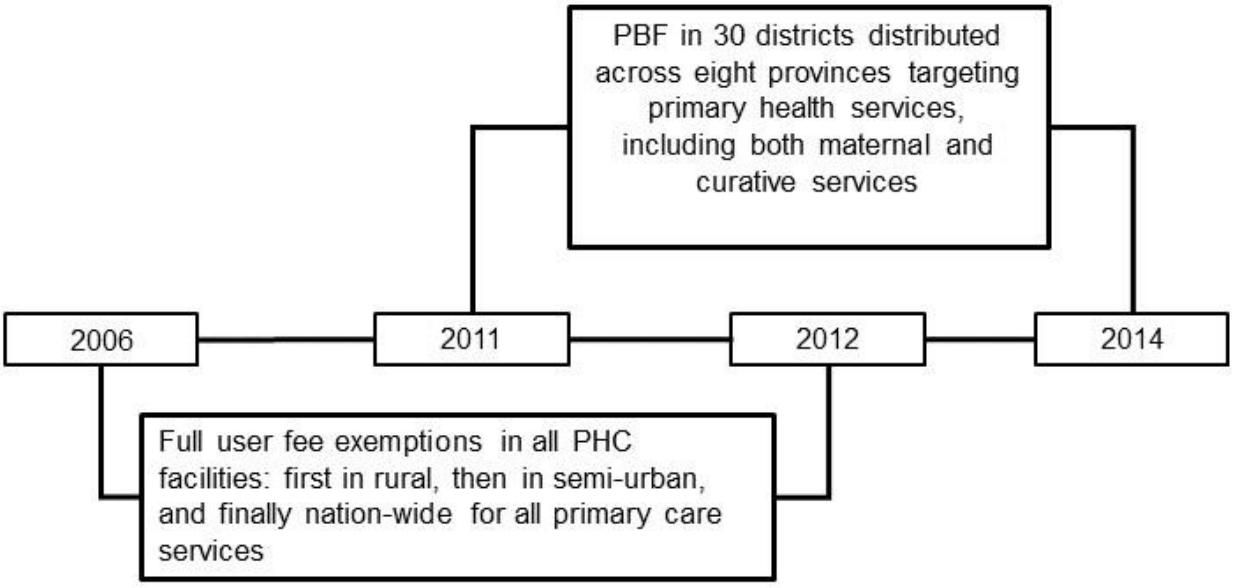
Since 1992, the health sector in Zambia follows mainly a primary healthcare approach (PHC) decentralized at provincial and district levels. The public sector is the biggest health provider in a proportion of 90% of all treated patients (Masiye *et al*., 2010). From 2010, Zambia increased the government health expenditure to expand the provision of health service, but the external funds still play a crucial role in financing the public health sector. In 2013, total health

expenditure in Zambia was estimated at nearly 5% of GDP, equivalent to approximately Int USD 195 per capita, with the government contributing approximately 38% of this value, out-of-pocket payments contributing 28% and the rest being covered by development partners.

Various reforms aimed at reforming the health sector to achieve universal health coverage by improving healthcare delivery has been put in place. One of the key health reforms was the removal of the user fees – that was introduced in 1992 - in all rural areas, peri-urban areas, and at the entire primary healthcare level in 2006, 2007, and 2012, respectively (Lepine *et al*., 2017, Lagarde *et al*., 2012). The user fees were introduced in 1992 following the Bamako initiative of 1987. The user fees as out-of-pocket payments impose significant financial burden on households and are seen as a financial barrier to access health services and also in many cases pushing poor households in impoverishment. Abolishing the user fees for primary healthcare, Zambia seeks to alleviate the financial burden, especially among the poor. In 2015, the government proposed the introduction of a Social Health Insurance scheme to progressively cover all of its citizens, but no concrete steps have yet been undertaken towards its implementation. Another key health reform was the implementation of results-based financing in of 30 districts distributed across eight provinces between 2011 and 2014 aimed at motivating healthcare providers to improve the utilization and the quality of health services (Shen *et al*., 2017). The user fee removal for primary healthcare in 2006 had led to a continuous decline in the share of out-of-pocket payments, from approximately 38% in 2007 to approximately 28% in 2013 (WHO, 2015). However, many public secondary and tertiary high-quality health services are still subjected to out-of-pocket payments. A recent study indicated that 11% of all households in need of seeking care had to borrow a substantial amount of money or sell valuable assets to pay for the care they needed (Kaonga *et al*., 2019). Similarly, recent literature highlights the persistence of socio-economic and geographical disparities in access to care and out-of-pocket expenditure (Masiye and Kaonga, 2016), even in a context of free healthcare provision. A study led by some of our authors has clearly indicated that the recent health financing reforms being implemented have largely favored urban compared to rural residents (Chitah *et al*., 2018).

Although the country has channelled substantial efforts towards achieving a universal health coverage, the country still faces many challenges such as a shortage of human resources, inadequate infrastructure, ineffective drugs and medical supplies, and a high burden of both communicable and non-communicable diseases. Despite those challenges, Zambia has made tremendous progress in reducing maternal, under-five, and infant mortality. For instance, the under-five and infant mortality rates have been halved between 2002 and 2015 (WHO, 2015).

Figure 3. Health Policies and intervention timeline of curative health services in Zambia
Source: Own illustration



2. Methods

2.1 Data sources

Our BIA relied primarily on two sets of data:

- Household survey data, including, depending on the specific setting: Living Condition and Monitoring Surveys (LCMS), and Zambia Household Health and Expenditure Survey (ZHHEUS). These data sources contain health service utilization information differentiating by the level of care and by provider typology as well as a measure of socio-economic status allowing us to group individuals in quintiles.

- Recurrent health spending as reported in the National Health Accounts (NHA).

In addition to the data sources outlined above, we made use of Health Management Information System (HMIS) data to assess and account for seasonality in health service use and on own survey data (i.e. data available to the PI and her partners) to quantify the distribution of out-of-pocket spending on health across quintiles (needed for the computation of benefit incidence of overall health spending).

Table 1. Summary of data sources and health services indicators

Country	Curative health service indicators	Data source (year)	NHA data (year)	Additional data sources for seasonality adjustment (year)	Sources for unit cost adjustment (year)
Burkina Faso	Curative health service utilization for adults and children in the prior 15 days; Health care providers and levels of care: Hospitals (inpatient care) and outpatient care	LCMS (2009; 2014) PBFS (2017)	2009 2014 2017	HMIS (2015)	Nakovics *et al.* 2019
Malawi	Curative health service utilization for adults and children in the prior two weeks; Health care providers: Public health facilities, mission health facilities and private health facilities	LCMS (2004; 2010; 2016)	2004 2010 2015	HMIS (2014-2018)	Nakovics *et al.* (forthcoming)
Zambia	Curative health service utilization for adults and children in the prior two weeks; Health care providers and levels of care: Public health centres, public district hospitals, public tertiary hospitals, mission facilities, private facilities, inpatient and outpatient care	LCMS (2006; 2010) ZHHEUS (2014)	2006 2010 2014	HMIS 2006	ZHHEUS (2014)

2.2 Household surveys

The LCMS and DHS household surveys are nationally representative repeated cross-sectional surveys in low- and middle-income countries. The LCMS uses a two-stage stratified cluster sample design to collect information on various aspects of the living conditions of the households such as agriculture, education, poverty, health, household consumption and expenditure, employment, housing conditions, among others. The LCMS is conducted by the National Statistical Office of each country with technical assistance from the World Bank (McIntyre and Ataguba 2011).

The Performance-Based Financing Survey (PBFS) used only for Burkina Faso collected data on illness reporting and health service utilization for both adults and children as well as on the use of maternal care services. The structure of the survey was based on an adaptation of the "PBF toolkit" developed by the World Bank (Fritsche *et al.* 2014) and has been described in detail elsewhere (De Allegri *et al.* 2019). Data collection was managed directly by the "Centre Muraz" in collaboration with researchers at the Heidelberg Institute of Global Health and funded by the Health Results Innovation Trust Fund.

The Zambian Household Health Expenditure and Utilization Survey (ZHHEUS) is a nationally representative health-sector specific household survey conducted in 2014 by the Zambian Government. This survey collected information on household and individual socioeconomic characteristics, inpatient admissions and outpatient visits on a sample of 11,927 households (Chitah *et al.* 2018).

2.3 National Health Account

National Health Accounts (NHA) provide detailed information on the financial flow related to healthcare in a country, using a standardized framework called System of Health Accounts (SHA). The SHA framework is defined by the World Health Organization (WHO) and classifies health expenditure using the following main dimensions (OECD 2017):

- Classification of financing schemes (HF): Government schemes (central government, state/regional/local government schemes), voluntary healthcare payment schemes, household out-of-pocket payment, rest of the world financing schemes, etc.
- Classification of health providers (HP): hospitals and ambulatory health centers (categorized as public, private-for-profit and private non-profit health centers), among others.
- Classification of healthcare functions (HC): inpatient care, outpatient care, immunization programmed, rehabilitation care, among others.

- Classification of financing agents (FA): central government (Ministry of Health, other ministries and public units, and central/regional/local government), insurance corporations, corporations (other than insurance corporations), and household.
- Classification of types of revenues of health financing schemes (FS): government domestic revenue (internal transfers and grants, and other transfer from government revenue), transfers distributed by government from foreign origin, other domestic revenues (other revenues from corporates and household), direct foreign transfers (direct bilateral financial transfers, direct multilateral financial transfers, other direct foreign financial transfers, etc.), etc.
- Classification of factors for healthcare provision (FP): Compensation of employees, materials and services used (healthcare services, pharmaceuticals, vaccines, diagnostic equipment, etc.), and other factors of healthcare provision.
- Classification of diseases and conditions (DIS): infectious and parasitic diseases (HIV/AIDS and other sexually transmitted diseases, malaria, tuberculosis, diarrheal diseases, etc.), reproductive health, non-communicable diseases, nutritional deficiencies, injuries, among others.
- Classification of institutional units providing revenues to financing schemes (FS. RI): Government, corporation, households, and the rest of the world (bilateral donors, multilateral donors, private donors, etc.).

NHA data were extracted from the relevant database as matrices of different classifications (*i.e.* HF x FS, HP x HF, HC x HP, HC x HF, HF x FA, DIS x FS. RI, DIS x FA, HP x FP).

2.4 Health management information system

Health Management Information System (HMIS) is a anational data collection system designed to manage healthcare data for policy planning and management of health facilities. Data on coverage, disease profiles, and health outcomes are collected from all health facilities in a country (Shaikh and Rabbani, 2005). HMIS data were only used to estimate the seasonality indices.

2.5 Variables and their measurement

2.5.1. Health care utilization

We estimated healthcare utilization by individuals across different socioeconomic groups in terms of the number of visits per year in each category of healthcare provider and at each level of care (inpatient and outpatient care).

The categorization of health service use by level and by provider varies depending on the specific survey available in each country.

2.5.2. Socioeconomic groups

We classified surveyed individuals in socioeconomic status quintiles by ranking individuals from the poorest to the least poor according to their current consumption based on food and non-food expenditure from LCMS and ZHHEUS and based on household asset ownership (wealth index) from PBFS. For the consumption expenditure, we classified the individuals into quintiles using the per capita expenditure by dividing the total household expenditure by the household size, and for the household´s assets, we used the household wealth index factor scores generated through the principal components analysis. We did not apply the equivalence scale to adjust the per capita consumption by the number of adults and children in households due to two main reasons. Firstly, the consumption information provided in LCMS data we used are totals of food and non-food expenditure, which makes difficult the choice of the appropriate equivalence scale parameters. Secondly, we cannot apply the equivalence scale to PBFS due to the fact that they do not collect consumption information. Nevertheless, we believe that not applying the equivalence scale do not compromise the robustness of our findings since there are many previous studies which used non-adjusted per capita consumption (McIntyre and Ataguba, 2011).

2.5.3. Cost unit subsidies

We focused on three sources of health spending in NHA: recurrent public health spending, donor health spending and household out-of-pocket expenditures (OOPE). For the public and donor subsides, we applied a constant unit subsidy assumption to estimate the unity cost at different levels of healthcare provision. For the OOPE, we relied on a constant unity cost for each quintile based on the percentage of OOPE distribution per quintile. The reasoning behind our approach is that different quintiles have different capacities to pay for health out-of-pocket, therefore using a constant unit cost OOPE (whiles ignoring percentage of OOPE distribution per quintile) would overestimate OOPE for the lower-income groups.

Following the constant unit subsidy/cost assumption, the unit subsidy/cost for healthcare level i is equal to total subsidies/expenditure for healthcare level i divided by total healthcare utilization for healthcare level i.

$$T_j \equiv \sum_{i=0}^{n} U_{ij} \frac{S_i}{U_i} \equiv \sum_{i=0}^{n} \frac{U_{ij}}{U_i} S_i$$

Where T_j is the value of the total health subsidy/cost imputed to the socioeconomic group j. U_{ij} represents the number of health visits (utilization of care) of socioeconomic group j at healthcare level or health facility type i, and U_i is the total healthcare visits at that healthcare level or health facility type by the different socioeconomic groups, and $\frac{S_i}{U_i}$ is the unit

subsidy/cost of healthcare provision at level i which is assumed to be constant at that level of care. S_i is the government, donor, and household OOPE health spending.

2.6 Analytical approach

We combined the traditional with the comprehensive benefit incidence analysis.

2.6.1. Traditional benefit incidence analysis

Traditionally, the equity in healthcare has been analyzed by looking at the distributional incidence of the public subsidy in public health facilities. We followed the same approach.

2.6.2. Comprehensive benefit incidence analysis

We expended the traditional benefit incidence by including other sources of healthcare financing to evaluate the equity in use of health services in the overall health system. In addition to public subsidy, we included donor subsidy and out-of-pocket expenditure.

2.6.3. Benefit incidence estimates

2.6.4. Disaggregated benefit incidence by provider category and level of care

The distribution of benefits was analyzed at each provider category (public facilities versus mission facilities versus private facilities, public hospitals versus public health centers versus mission hospitals versus mission health centers) and at each level of care (inpatient care versus outpatient care) for both the traditional and comprehensive BIA.

2.6.5. Aggregated benefit incidence across provider categories and levels of care

To analyze the overall benefit incidence of total health subsidies and expenditure, we aggregated the healthcare utilization and health subsidies and expenditure at all provider categories and all levels of care. Heath care utilization at all provider categories (visits at public facilities, visits at mission facilities and visits at private facilities) and at all levels of care (inpatient days and outpatient visits) as well as their related health spending (public subsidy, donor subsidy and out-of-pocket expenditure) were summed up for both the traditional and comprehensive BIA.

2.6.6. Heterogeneity and geo-spatial analysis

The ultimate aim of BIA is to assess whether the poorest benefit as much as the least poor from financial investments in the health sector. Given that the majority of poor people live in rural areas and given that poverty rates may be more pronounced in some regions and districts, we also made an explicit effort to examine the heterogeneity of benefit incidence. To do so, as the final step in our analysis, we calculated the heterogeneity of financial benefits across location of residency (urban and rural) as well as across districts and regions (depending the data available). Since NHA data do not provide disaggregated health spending data at rural/urban and regions and district levels, we assumed a constant unit health subsidy at each level of analysis.

The analysis of heterogeneity served as the basis for our geo-spatial analysis, aimed at visualizing differences across areas and over time. The geo-spatial analysis also served as an attempt to look for a more intuitive manner to convey information on inequity, as measured by concentration indices, to policy makers to favor discussion and uptake of measures aimed at enhancing equity.

2.6.7. Seasonality adjustment as sensitivity analysis

Seasonality patters such as weather variations may influence both disease incidence and healthcare utilization, especially in tropical areas like in Sub-Saharan Africa. This means that health utilization collected in household surveys may be understated or overstated depending on the period of data collection (Ataguba, 2019). To adjust healthcare utilization for seasonality variation requires to have aggregated nationally representative data such as Health Management Information System (HMIS) that can be used to estimate a seasonality index for each month. For our analyses, we used HMIS data and estimated seasonality indices for inpatient admissions and outpatient visits.

Seasonality index is defined by:

$$Seasonality\ index = \frac{value\ for\ season\ (\ i.e. month\ of\ the\ household\ survey}{Seaonal\ average}$$

To deseasonalize healthcare utilization for each category of care from household surveys, when relevant, we divided healthcare utilization in each month by its seasonality index.

2.7 Benefit incidence computation

We estimated the distribution of financial benefits accruing to different socioeconomic groups as follows:

$$B_{ij} = P_{ij} / P_j * S_j$$

Where B_{ij} is a benefit incidence for socioeconomic group *i* at the level of care *j*, P_{ij} is the number of people in socioeconomic *i* using health services at the level of care *j*, P_j is the total of people using health services at the level of care *j, and* S_j is the share of health expenditure at the level of care *j.*

We used the following steps and techniques to estimate the financial benefits accruing to different socioeconomic groups:

(1) We grouped the individuals in quintiles using per capita expenditure for LMCS and ZHHEUS data and wealth index for PBFS data;
(2) We estimated healthcare utilization at different levels (*e.g.* inpatient admissions *vs* outpatient visits, public hospitals *vs* public health centers, public health facilities *vs* mission health facilities *vs* private health facilities, hospitals *vs* health centers) of care by each quintile in each household survey. We annualized healthcare utilization by multiplying healthcare utilization by 26 for a recall period of two weeks, by 25 for a recall period of 15 days and by 13 for a recall period of four weeks;
(3) We calculated the unity subsidy and unity cost for different types of health services (*e.g.* Inpatient admissions, outpatient visits, public, mission or private health facilities) by dividing health spending by total utilization of health services at each level of care or for each type of health services;
(4) We multiplied utilization of health services by unity subsidy/cost for each type of health services for each quintile;
(5) We aggregated the monetary benefits of healthcare utilization for each type of services for each quintile by estimating the share of the monetary benefits for each quintile;
(6) We computed concentration curves to illustrate the distribution of each type of health spending across quintiles, the concentration indices (including standard errors and significance levels of 1%, 5% and 10%) to estimate the degree of the inequality in the distribution of health spending across socioeconomic groups, the dominance test to assess the dominance between the concentration curve and the line of equality.

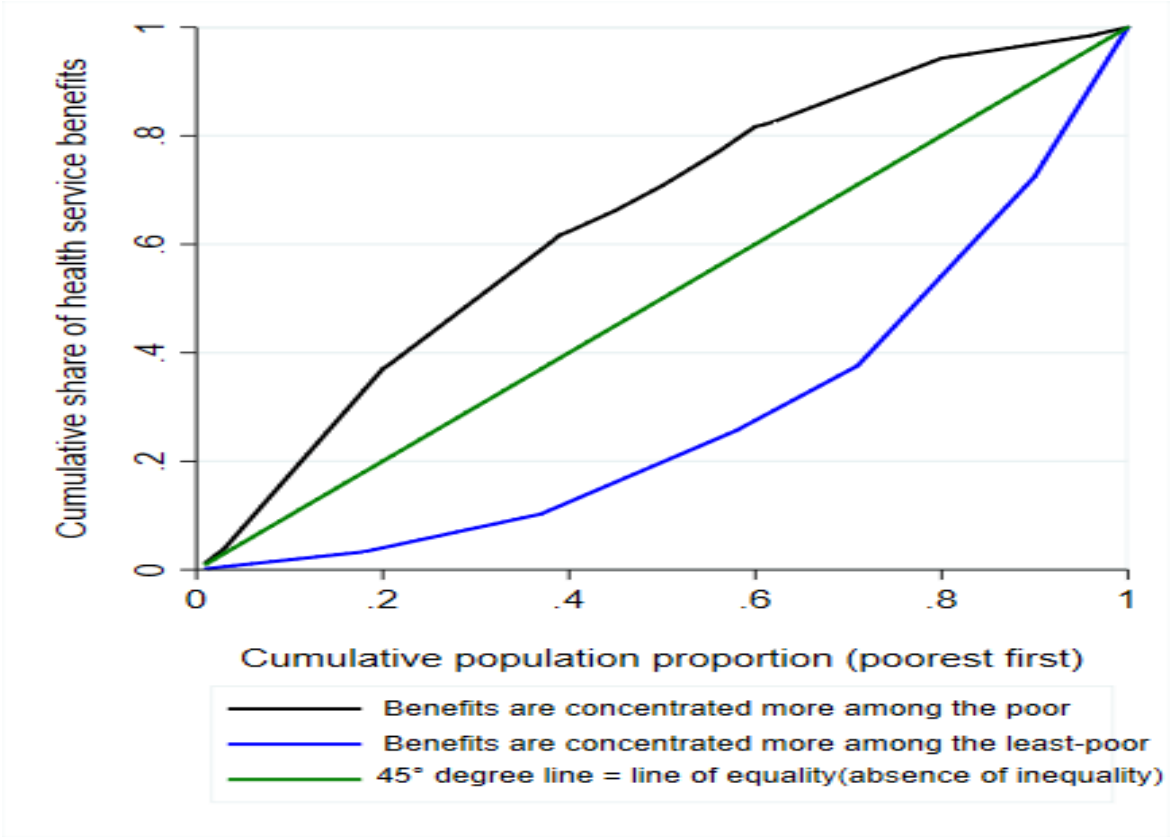
2.7.1. Descriptive statistics

We estimated the shares of health services visits and their related shares of unit subsidy/cost for each quintile at each level of care and for each provider category.

2.7.2. Concentration curve

The concentration curve illustrates the existence of wealth-based inequality in the distribution of a health measure across different socioeconomic groups (Castro-Leal *et al.* 2000, Wagstaff 2000). The concentration curve indicates the extent of wealth-related inequality and represents the cumulative proportion of the health variable (y-axis) against the cumulative proportion of the population (x-axis), ranked by socioeconomic status or living standards, from the poorest to the wealthiest group. If the health variable is equally distributed among the socioeconomic groups, there is no wealth-based inequality, and the concentration curve is a 45° line which is the line of equality, running from the bottom left-hand corner to the top right-hand corner of the XY-axis. The distribution of the health variable is concentrated among the poor when the line lies above le line of equality and concentrated among the least poor when the concentration curve lies below the line of equality. The farther the concentration curve lies above (below) the line of equality, the more the health variable is concentrated among the poor (the least poor).

Figure 4: Concentration curve
Source: Own illustration



2.7.3. Concentration index

The concentration index quantifies the degree of wealth-related inequality and is defined as twice the area between the concentration curve and the line of equality (Wagstaff *et al.* 2008).

The standardized concentration index (C_h) is estimated as follows (Wagstaff *et al.* 2008):

$$C_h = \frac{2Cov\ (h_i, R_i)}{\mu}$$

Where h_i is the health variable (*e.g.* healthcare utilization) for individual i, μ is the mean of health variable, R_i is individual i's fraction socioeconomic rank, and $Cov\ (h_i, R_i)$ is the covariance.

We used convenient regression (Kakwani *et al.* 1997) to allow the calculation of the standard errors of the concentration index. The formula is:

$$2\sigma_R^2\left[\frac{h_i}{\mu}\right] = \alpha + \beta R_i + \varepsilon_i$$

Where $2\sigma_R^2$ is the variance of the fractional rank variable. β is the estimator of the concentration index.

The concentration index takes a negative (positive) value when the concentration curve lies above (below) the line of equality, indicating a pro-poor (pro-least poor) distribution of the health variable. If there is no wealth-related inequality, the concentration index is zero.

2.7.4. Dominance test

To test if the concentration curve dominates (lies above) or is dominated (lies below) by the line of the equality at all its ordinates, we computed the test of the dominance of the concentration curve against the 45-degree line of equality at a 5 per cent significant level (Wagstaff 2008).

The test of dominance is essential, especially when concentration curves cross each other or the 45-degree line of equality (Davoodi *et al.* 2010). In this situation, it is not clear if the distribution of the health variable is pro-poor or pro-least poor. In case the concentration curve dominates, the distribution of the health variable is pro-poor; and when the 45-degree line dominates, the distribution of the health variable is pro-least poor. A non-dominance test means that there is no clear distributional pattern of the health variable across the different socioeconomic groups.

2.8 Limitations

There are four main limitations that should be taken into account by interpreting the findings of this study in relation to their relevance for policy.

First, NHA data differed across countries. While in principle NHA data should be standardized, in practice NHA data structure varies across countries and years. Health spending data are displayed at higher level of aggregation in Burkina Faso and Malawi compared to Zambia. This was a challenge for us to make comparisons between the study countries and over the years. This forced us to aggregate data on health service utilization by level of care and provider typology only in relation to the availability of matching NHA data. In addition, only in Malawi, was it possible to generate an analysis that also captured spending on private health facilities. In all other countries, private (and donor) spending on private facilities was not traceable.

Second, health service utilization data from household surveys also differed substantially across countries. First, in no country, could we obtain nationally representative service utilization data more recent than 2017. This means that inevitably the results produced do not truly reflect today's reality in relation to the distributional incidence of health spending. In addition, surveys followed different sampling and data collection strategies, so we could not capture exactly the same information and generate exactly comparable results. In particular, only in Malawi, service utilization data could be traced all the way to the district level, making a truly disaggregated analysis of distributional incidence feasible.

Third, our study does not account for differential healthcare needs across socio-economic groups (horizontal equity) nor for differences in quality of services received. Both elements, health needs and quality of health services should be taken into consideration in further research.

Fourth, we applied the constant subsidy assumption for public and donor subsidy, and under this assumption it is assumed that all population groups receive the same subsidy at each level of care. However, it is very likely that the analysis produces a more pro-least poor (or pro-poor) picture of health spending than the other, depending on whether utilization is more pro-least poor (or pro-poor).

Fifth, and last, NHA data do not provide disaggregated data by regions/provinces/districts. To overcome this challenge, we assumed a constant allocation of health expenditure across regions/provinces /districts. This means that our heterogeneity and the matching geo-spatial analysis serve only as an initial insight into the magnitude of the equity disparities that exist within a country. A more accurate analysis based on data reflecting the actual allocation of financial resources across regions/provinces/districts is needed.

3. Results and discussion

To ease reading, we integrate an appraisal of the findings with their presentations. Due to the COVID-19 pandemic, we have not been able to hold the in-country policy appraisal discussions we had planned. Hence, we are not always able to explain our emerging findings. This process will inevitably need to continue in the months to come.

3.1 Burkina Faso

Our descriptive analysis (appendix 1) indicates that from 2009 to 2014, the least poor segments of the population used more outpatient and inpatient services than the poorer ones, especially so for inpatient services. This inequality in service use increased substantially for inpatient care between 2009 and 2014, but decreased again in 2017 for both levels of care.

The 2017 data from the PBF survey were collected only in 6 of 13 regions of the whole country. To test the robustness of our results, we conducted a sensitivity analysis by including only the same 6 regions in our analysis for the other two years and found no changes in our results.

3.1.1. Benefit incidence of public spending

Inequality in financial benefits of public health spending increased significantly from 2009 to 2014 but decreased significantly from 2014 to 2017 (Table 2). The benefit for the total public spending was pro-least-poor in 2009 (CI = 0.119) and 2014 (CI = 0.186), and shifted to a slight pro-poor distribution in 2017 (CI = -0.024). The decomposition of public spending into inpatient and outpatient care showed that inpatient care remained largely pro-least-poor in all years. With regard to outpatient care, public spending was significantly pro-least-poor in 2009 (CI = 0.108) and 2014 (CI = 0.152) and dropped into pro-poor in 2017 (CI = -0.049). The upward drive in inequality between 2009 and 2014 was consistent in both inpatient and outpatient care; likewise, the downward trend between both 2014-2017 and 2009-2017.

Table 2: Benefit incidence of public spending on curative care in Burkina Faso

Source: Authors' calculations LMCS 2009-2017, PBFS 2017

Year	2009	2014	2017	Diff 2014-2009	Diff 2017-2014	Diff 2017-2009
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total public spending	0.119[a]*** (0.013)	0.186[a]*** (0.010)	-0.024[b]* (0.014)	0.067*** (0.016)	-0.210*** (0.015)	-0.143*** (0.016)
Hospitals (inpatient care)	0.261[a]*** (0.046)	0.525[a]*** (0.049)	0.237[a]*** (0.047)	0.264*** (0.068)	-0.288*** (0.050)	-0.024 (0.056)
Outpatient care	0.108[a]*** (0.013)	0.152[a]*** (0.010)	-0.049[a]*** (0.014)	0.044*** (0.017)	-0.0201*** (0.016)	-0.157*** (0.017)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

3.1.2. Benefit incidence of overall spending

Table 3 shows the results of the comprehensive benefit incidence, which included donor spending and OOPE in addition to public spending. Total overall health spending shows a resembling pattern as total public spending in table 2: an already pro-least-poor inequality increased slightly from 2009 (CI = 0.119) to 2014 (CI = 0.186), and decreased substantially from 2014 to 2017 (CI = -0.024), but still stayed pro-least-poor. The breakdown of health spending into inpatient and outpatient care exhibited a similar pro-least-poor trend, except for outpatient care in 2017 which was pro-poor. Though the inequality decreased significantly for both inpatient and outpatient care between 2014-2017, a major decrease was observed for inpatient care, although it remained pro-least poor.

Table 3. Comprehensive benefit incidence of health spending on curative care in Burkina Faso

Source: Authors' calculations LMCS 2009-2017, PBFS 2017

Year	2009	2014	2017	Diff 2014-2009	Diff 2017-2014	Diff 2017-2009
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total health spending	0.222[a]*** (0.032)	0.256[a]*** (0.019)	0.105[a]*** (0.025)	0.034 (0.037)	-0.151*** (0.028)	-0.117*** (0.033)
Hospitals (inpatient care)	0.252[a]*** (0.045)	0.349[a]*** (0.037)	0.231[a]*** (0.048)	0.097 (0.059)	-0.118 (0.052)	-0.021 (0.057)
Outpatient care	0.156[a]*** (0.013)	0.160[a]*** (0.010)	-0.012[b] (0.144)	0.004 (0.016)	-0,172*** (0.015)	-0.168*** (0.017)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

The increase in inequality observed for both public and overall spending in 2014 cannot easily be explained by the information at our disposal. Nevertheless, evidence suggests that the exemption policy targeting the ultra-poor introduced in 2009 was not implemented effectively and that the poorest in Burkina Faso continued to use fewer curative health services than the non-poor, due to additional barriers to access (Yaogo, 2017; Atchessi *et al.*, 2016). Implementation failures of the 2009 exemption policies, however, are not sufficient to explain the increase in the pro-least-poor distribution observed in our data between 2009 and 2014, since even if implemented effectively, the policy would have targeted only a small percentage of the population, the ultra-poor. The emerging explanation here is that health service availability and quality improved over this period, due to government investments in the health sector, and that as it often the case, the least poor were the first ones to benefit from it (Victora *et al.*, 2018). Our data indicating a shift in the CI values moving towards 2017 would suggest that as the these improvements settled in and as specific UHC policies are implemented, poorer people started to make greater use of health services and hence ultimately benefit from the financial investments made by government and donors. While marking a substantial improvement compared to 2014, these policies still fell short of ensuring equality in the distribution of both public and overall spending on health. Our emerging hypothesis, however, would need to be verified through further analysis and discussion with policy makers. In addition, we wish to note that without a specific analysis of the benefit incidence of spending on gratuité and PBF, it will remain impossible to discern the impact on

increased equality in health spending of one *vs* the other. This matter would deserved further investigation, looking at expenditure for the single programs and using utilization data disaggregated at district not at regional level.

3.1.3. Heterogeneity and Geo-spatial analysis

This section explores the rural-urban distribution of the benefits of healthcare spending at the different healthcare provider levels. Results revealed that important differences persisted between urban and rural settings, with values capturing inequality differing substantially across settings, mostly in magnitude and at times only also in direction. This pattern is probably an indication of more equitable service use in the rural areas resulting from the implementation of UHC-specific reforms. In particular, the PBF program targeted almost exclusively rural health facilities and might therefore have contributed towards fostering greater equality in health spending at this level.

Table 4 shows the benefit incidence of public spending on curative care. The results for total public subsidies revealed a pro-least-poor trend in urban settings for all years. Inequality increased in urban setting from 2009 to 2014, and decreased markedly in 2017, yet stayed slightly pro-least-poor. For rural areas, the distributional incidence of total public spending was close to equality in 2009, pro-least-poor in 2014 and pro-poor for 2017. Strikingly, the benefit incidence in 2014 revealed significantly higher inequality in rural setting compared to urban settings. At the inpatient level care, public health spending disproportionately benefited the pro-least poor inequality for all years in both urban and rural areas. Contrastingly, the benefit incidence of outpatient care showed less inequality at all levels and years when compared to inpatient care. The benefit incidence in urban settings decreased from a least-poor inequality towards equality between 2009 and 2017.

Table 4: Benefit incidence of public spending on curative care in Burkina Faso
Urban *vs* rural heterogeneity
Source: Authors' calculations LMCS 2009-2017, PBFS 2017

Year	**2009**			**2014**			**2017**		
	Urban	Rural	Diff	Urban	Rural	Diff	Urban	Rural	Diff
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total public spending	0.124*** (0.023)	0.097*** (0.015)	-.0275 (.0276)	0.136*** (0.021)	0.216*** (0.011)	0.080*** (0.024)	0.053 (0.056)	-0.027* (0.017)	-0.081 (0.059)
Hospitals (inpatient care)	0.155*** (0.053)	0.141* (0.081)	-.014 (.096)	0.201*** (0.045)	0.453*** (0.063)	0.252*** (0.078)	0.481*** (0.119)	0.121** (0.061	-0.361*** (0.134)
Outpatient care	0.119*** (0.027)	0.096*** (0.015)	-0.023 (0.031)	0.114*** (0.025)	0.205*** (0.010)	0.091*** (0.027)	-0.058 (0.060)	-0.039** (0.017)	0.019 (0.062)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

Table 5 shows the comprehensive benefit incidence of health spending on curative care. Total health spending tended towards pro-least-poor distribution for both urban and rural in all years. The pro-least-poor distribution pattern decreased between 2009 and 2014 but increased remarkably in 2017. For the rural areas, the pro-least-poor distribution pattern increased between 2009 and 2014 and decreased massively into slightly pro-poor in 2017. The inequality between urban and rural setting was marginal and not significant in 2009, but was substantially significant in 2014 and 2017. The benefit incidence at the inpatient and outpatient levels of care revealed a dominant pro-least-poor distribution for both urban and rural, though the distribution of overall health spending for outpatient care shifted to equality in 2017. Here, we wish to remind the reader that one of the abovementioned interventions, PBF, targeted almost exclusively rural areas (De Allegri *et al*., 2019). District hospitals in the twelve concerned districts were also included in the PBF program, but the focus of the intervention was really on the rural primary level care facilities. This may explain why in 2017, we observe less inequality in both public and overall spending in rural than in urban settings, particularly so for outpatient services, the core of the PBF program.

Table 5. Comprehensive benefit incidence of health spending on curative care in Burkina Faso
Urban *vs* rural heterogeneity
Source: Authors' calculations LMCS 2009-2017, PBFS 2017

Year	**2009**			**2014**			**2017**		
	Urban	Rural	Diff	Urban	Rural	Diff	Urban	Rural	Diff
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total health spending	0.141*** (0.044)	0.144*** (0.039)	0.002 (0.060)	0.042 (0.032)	0.243 (0.018)	0.202** (0.038)	.337*** (.089)	.051* (.030)	-.286*** (.095)
Hospitals (inpatient care)	0.142*** (0.052)	0.136* (0.080)	-0.007 (0.095)	0.020 (0.043)	0.293*** (0.052)	.274*** (.067)	0.485*** (0.121)	0.121* (0.063)	-.364*** (.137)
Outpatient care	0.137*** (0.024)	0 .152*** (0.015)	0.015 (0.029)	0.115*** (0.025	0.217*** (0.011)	.102*** (.027)	-0.021 (0.061)	-0.003 (0.017)	.019 (.063)

Note: CI= concentration index; SE= standard errors

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

Turning to the regional disparities, we observed a high heterogeneity in the distribution of both public and overall spending across regions, but a greater heterogeneity remained larger for overall spending. Overall, the least-poor disproportionately benefited from health spending countrywide. The inequality was higher in 2009 and 2014 but declined over time to become smaller in 2017. Comparing the levels of care, a higher pro-leat–poor inequality is observed for inpatient services.

As shown in Figure 5, the pro-least poor distribution of total public spending generally declined over time from 2009 throug 2010 to become pro-poor in 2017, except for the regions Centre-Est and Sud-Est which remained pro-least poor. A different picture is observed for the distribution pattern of overall spending (Figure 6) which remained pro-least poor in the most regions, particularly for Centre-Est and Sud-Oust.

Similar regional disparities were observed when assessing health service coverage in a study by Zon *et al*. (2020). Zon and colleagues indicated that the main underlying causes of inequality in health service coverage across regions and districts are economic differences and an inadequate health resource (financial resources, health infrastructure, and health personel) allocation policy across the country. This study suggested a more transparent allocation of health resources based on the districts and regions needs to address health inequality across the country. Still, the observed distribution patterns of health spending are

difficult to explain thoroughly without direct appraisal with concerned policy makers. We recognize that aggregated national-level estimates mask local disparities and that those represent a fundamental challenge to equity. As such, we urge further research to unravel their causes and better understand drivers of differential spending and health service use across regions.

Figure 5: Regional heterogeneity in distributional incidence of total public spending over time

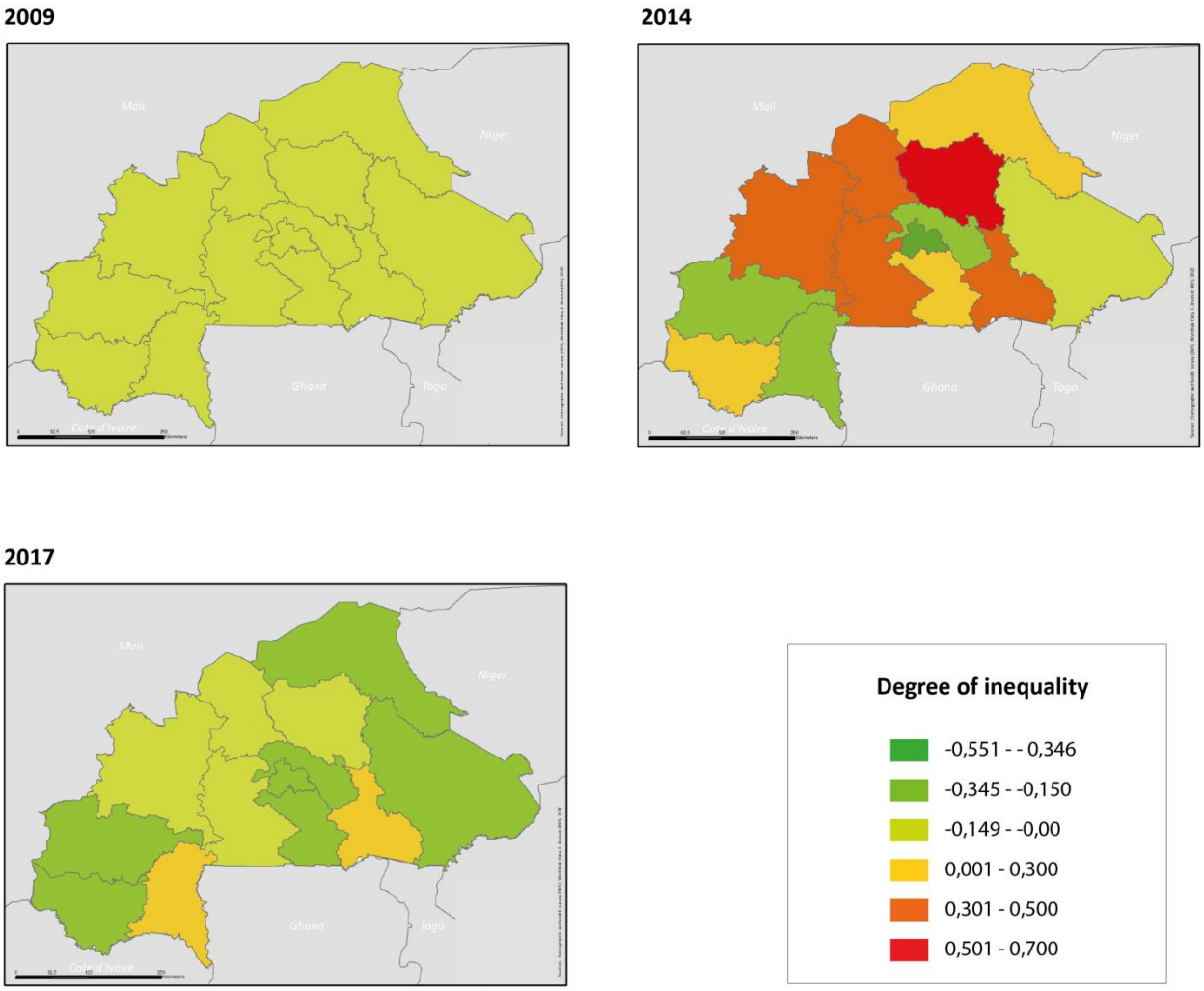
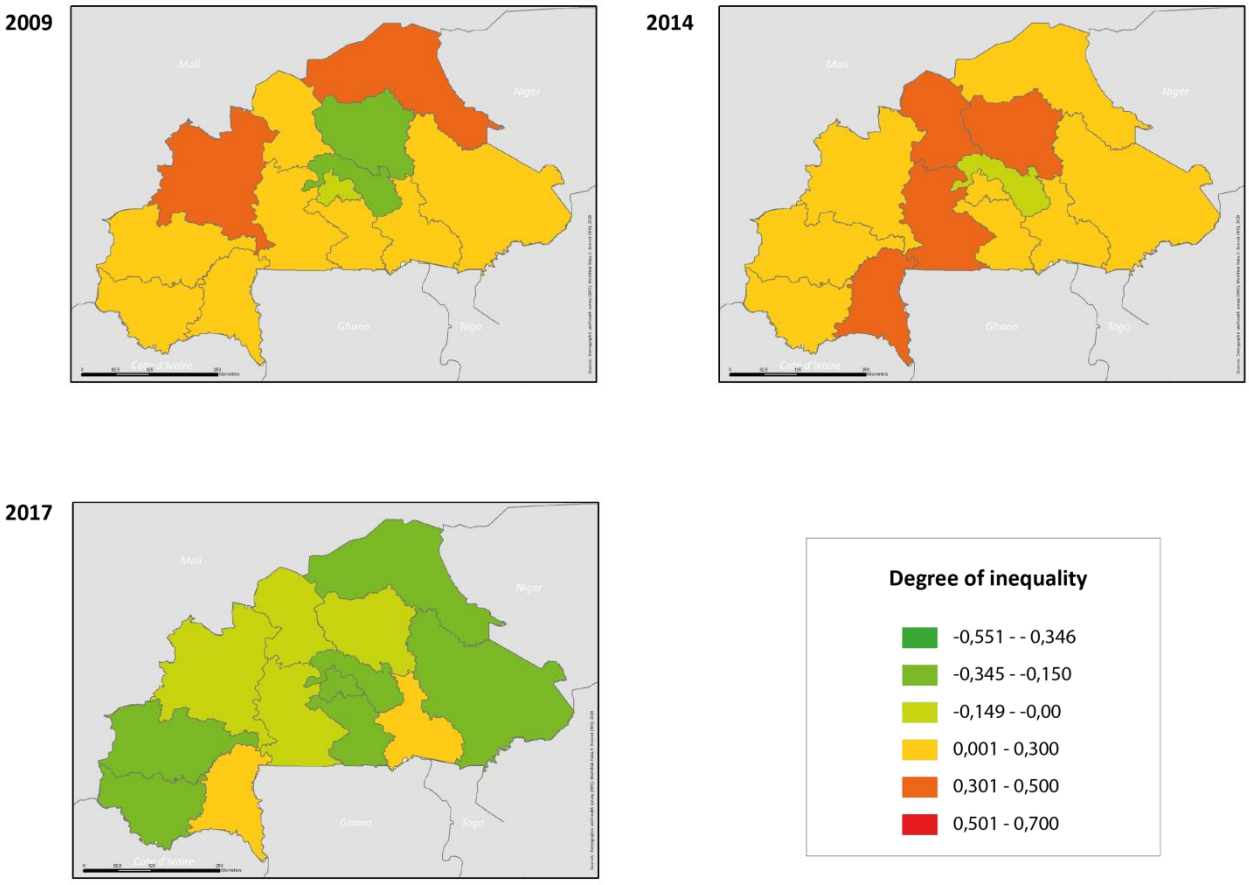


Figure 6: Regional heterogeneity in distributional incidence of total overall spending over time



3.2 Malawi

Our descriptive analysis (appendix 2) shows that the least poor groups of the population use more health services than poor groups. The inequality is more pronounced at CHAM health facilities compared to public health facilities, probably as a reflection of their respective utilization patterns. Inequality at public facilities remained constant between 2004 and 2016, while opposite to this, inequality increased at mission health facilities overtime. This distribution pattern appears surprising considering that increases in inequality followed the implementatiotion of Service Level Agreements, which were intended as a measure to increase service use for population groups that traditionally lacked it.

3.2.1. Benefit incidence of public spending

Public sending was equality distributed at public health facilities and pro-least poor distributed at CHAM health facilities for all years (table 6). Total public spending was slightly pro-least-poor in 2004 (CI = 0.037) , declined in 2010 (CI = 0.028) and shifted to equality in 2016 (CI = 0.004). When we disaggregate the distribution of public health spending by health provider types, we note that public spending benefited more poorer groups between 2004 and 2016 in public health facilities, though the distribution remained almost equally distributed. There was no clear pattern of change in CHAM health facilities as inequality slightly increased from 2004 (CI = 0.180) to 2010 (CI = 0.190) and decreased similarly from 2010 to 2016 (CI = 0.187), but remained pro-least poor.

Table 6: Benefit incidence of public spending on curative care in Malawi
Source: Authors' calculations LMCS 2004-2016

Year	2004	2010	2016	Diff 2010-2004	Diff 2016-2010	Diff 2016-2004
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total public spending	0.037[a]*** (0.013)	0.028[b] (0.021)	0.004[c] (0.011)	-0.009 (0.025)	-0.024 (0.024)	-0.033** (0.017)
Public health facilities	0.022[c] (0.013)	0.014[a] (0.023)	-0.006[a] (0.011)	-0.008 (0.026)	-0.020 (0.025)	-0.028 (0.017)
CHAM health facilities	0.180[a]*** (0.038)	0.190[a]** (0.089)	0.187[a]*** (0.044)	0.010 (0.097)	-0.003 (0.099)	0.007 (0.058)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

****, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively***

3.2.2. Benefit incidence of overall spending

As shown in table 7, overall health spending mainly benefited the least-poor except for public health facilities in 2017 where it was equal distributed. Total health spending exhibited an increased pro-least poor distribution between 2004 (CI = 0.084) and 2010 (CI = 0.114), but declined to a marginal pro-least-poor distribution in 2016 (CI = 0.068). The benefit incidence in public health facilities was slightly pro-least-poor compared to the mission and private health facilities for all years. There was a considerable and significant inequality decrease for public health facilities between 2010 (CI = 0.047) and 2016 (CI = 0.007). The CHAM health facilities observed slightly less pro-least-poor inequality than private health facilities, but we did not observe a remarkable and significant deacrease in inequality over the time for these both health facilities.

Table 7: Comprehensive benefit incidence analysis of health spending on curative care in Malawi

Source: Authors' calculations LMCS 2004-2016

Year	2004	2010	2016	Diff 2010-2004	Diff 2016-2010	Diff 2016-2004
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total health spending	0.084[a]*** (0.014)	0.114[a]*** (0.021)	0.068[a]*** (0.015)	0.03 (0.025)	-0.046* (0.026)	-0.016 (0.021)
Public health facilities	0.047[a]*** (0.013)	0.082[a]*** (0.023)	0.007[c] (0.011)	0.035 (0.027)	-0.075*** (0.026)	-0.040* (0.018)
CHAM health facilities	0.209[a]*** (0.04)	0.241[a]** (0.093)	0.196[a]*** (0.045)	0.032 (0.102)	-0.045 (0.103)	-0.013 (0.062)
Private health facilities	0.270[a]** (0.125)	0.266[a]*** (0.083)	0.282[a]*** 0.034	-0.004 (0.150)	0.016 (0.090)	0.012 (0.130)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

The fact that both public and overall health spending at CHAM health facilities remained largely unchanged overtime, displaying one of the most pro-least-poor distributional patterns observed in our analysis, is worriseome. SLAs have been established with the aim of increasing access to healthcare services for poorer people who live in areas only served by CHAM facilities, but our findings indicate that their efficacy has been limited, probably due to implementation failures. Further analyses are needed to identify the extent to which CHAM facilities need to continue to rely on out-of-pocket spending to understand what where further public-private partnerships ought to be set up to compensate for existing inequities. Moreover, as indicated in the background section, underfunding of the EHP (Bowie and Mwase; 2011) entails a large discrepancy between what stipulated in the policy and what applied in practice, so that people still too often have to pay for services (Nakovics *et al*., 2020; Abiiro *et al*., 2014). This is likely to discourage the poorest from utilizing formal health services, resulting in the unequal distribution of benefits we observe in our analysis. The pro-least poor inequality observed at private health facilities is not surprising since these facilities, relying exclusively on user charges, absorb mostly demand from the least poor segments of the population. Further investments in public-private partnerships which can effectively increase access to healthcare for the poorer are needed to ensure greater equality in the distribution of health benefits.

3.2.3. Heterogeneity and Geo-spatial analysis

Tables 8 and 9 show the rural-urban distribution of the benefits of public and overall health spending on curative services at the different health care provider levels in Malawi. Overall, the financial benefits were equally or pro-poor distributed in urban areas while they benefitet mainly pro-least poor in rural areas. This finding appears surprising and in a way counter-intuitive, hence further research is needed. One possible explanation could be that distance to health facilities continue to impose a barrier to access in rural more than in urban settings, so that in these contexts only the least poor have means to overcome them, irrespective of the fact that services are free at point of use. Here, we remind the reader that out-of-pocket spending on transport or indirect costs associated with seeking care are not included in our analysis. A study by Nakovics indicated that transport costs can represent as much as 43% of the total cost of care (Nakovics *et al.*, 2020). This does not represent a limitation of the method per se, but one of its prerogative, the focus of BIA being exclusively on the distributional incidence of direct medical costs (McIntyre and Ataguba, 2011) Nevertheless, we do recognize the additional financial burden imposed by travel costs shapes utilization patterns and as a consequence, the results of our distributional analysis.

Public spending to public health facilities followed a similar trend like the total public spending: the distribution of the financial benefits for urban shows a pro-poor tendency whiles rural distribuion exhibits a slightly pro-least-poor behavior. The urban pro-poor distribution pattern in 2004 increased to higher pro-poor benefit distribution in 2010 and reduced again in 2016 whiles remaining pro-poor. There was a steady increase in the slightly pro-least-poor benefit distribution in rural areas between 2004 and 2010, which then reduced slightly in 2016. Public spending in CHAM health facilities remained pro-least poor especially in rural areas for all years between 2004 and 2016. Similarly to what noted above, the interesting element here is the lack of change over time. Distributional patterns remain the same in both urban and rural areas indicating that UHC-policies did not result in differential effects across both urban and rural settings.

Table 8: Benefit incidence of public spending on curative care in Malawi
Rural and urban heterogeneity
Source: Authors' calculations LMCS 2004-2016

Year	**2004**			**2010**			**2016**		
	Urban	Rural	Diff	Urban	Rural	Diff	Urban	Rural	Diff
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total public subsidies	-0.054 (0.042)	0.061*** (0.012)	0.115*** (0.044)	-0.108*** (0.040)	0.060** (0.023)	0.168*** (0.047)	-0.091*** (0.029)	0.049*** (0.011)	0.140*** (0.031)
Public health facilities	-0.052 (0.043)	0.041*** (0.013)	0.093* (0.045)	-0.120*** (0.040)	0.045* (0.025)	0.165*** (0.048)	-0.096*** (0.030)	0.035*** (0.012)	0.131*** (0.032)
CHAM health facilities	-0.089 (0.125)	0.234*** (0.041)	0.323* (0.131)	0.436 (0.326)	0.221** (0.093)	-0.215 (0.337)	0.105 (0.152)	0.283*** (0.050)	0.178 (0.160)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

As shown in table 9, overall health spending tended to be more equal or pro-poor distributed in urban areas whereas it tend to be pro-least poor in rural areas for all years. Total health spending in urban health facilities was pro-poor in 2014, close to equality in 2010 and slid back into pro-poor in 2016; it was pro-least-poor for facilities in rural settings for all years, the inequality increased steadily between 2004 and 2010 and reduced in 2016. The overall health spending in public health facilities achieved pro-poor benefit incidence. In CHAM health facilities, the benefit incidence distribution was either equally distributed or pro-poor in urban areas, while it remained pro-least-poor in rural areas over the time. In private health facilities, the financial benefits of overall spending reveals an unsurprising pro-least-poor benefit incidence distribution across all years, but was hihly pronounced in rural areas.

Table 9: Comprehensive benefit incidence on curative care in Malawi
Urban *vs* rural heterogeneity
Source: Authors' calculations LMCS 2004-2016

Year	**2004**			**2010**			**2016**		
	Urban	Rural	Diff	Urban	Rural	Diff	Urban	Rural	Diff
Health care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total heath spending	-0.024 (0.043)	0.112*** (0.014)	0.136*** (0.045)	0.007 (0.043)	0.142*** (0.023)	0.135*** (0.049)	-0.020 (0.031)	0.122*** (0.017)	0.143*** (0.036)
Public health facilities	-0.021 (0.044)	0.065*** (0.014)	0.086* (0.046)	-0.042 (0.041)	0.111*** (0.027)	0.154*** (0.049)	-0.079*** (0.029)	0.046*** (0.012)	0.125*** (0.032)
CHAM health facilities	-0.050 (0.126)	0.262*** (0.044	0.312** (0.133)	0.452 (0.327)	0.272*** (0.097)	-0.180 (0.3411)	0.118 (0.148)	0.291*** (0.051)	0.173 (0.157)
Private health facilities	0.213 (0.193)	0.270** (0.140)	0.057 (0.239)	0.251*** (0.090)	0.246** (0.111)	-0.005 (0.143)	0.317*** (0.050)	0.240*** (0.040)	-0.077 (0.064)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

****, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively***

Looking at the disparities across districts, we observe a high heterogeneity in the distribution of both public and overall spending across districts, with greater heterogeneity for overall spending. In 2004 and 2010, the least-poor disproportionately benefited from health spending countrywide, but this inequality declined to become more pro-poor in 2016. Overall, a higher pro-leat–poor inequality is observed in CHAM health facilities for public spending and CHAM and private health facilities for overall spending, especially in districts such as Likoma, Zomba, and Nkhotakota compared to districts such as Ntcheu, Lilongwe City, Zomba City, Phalobe, and Salima. Figures 7 and 8, show the high heterogeneity of the distribution of total public and overall health, respectively, indicating a higher heterogeneity of the overall health spending.

These patterns are difficult to explain without direct appraisal with concerned policy makers. We recognize that aggregated national-level estimates mask local disparities and that those represent a fundamental challenge to equity. As such, we urge further research to unravel their causes and better understand drivers of differential spending and health service use across regional settings.

Figure 7: Regional heterogeneity in distributional incidence of total public spending over time

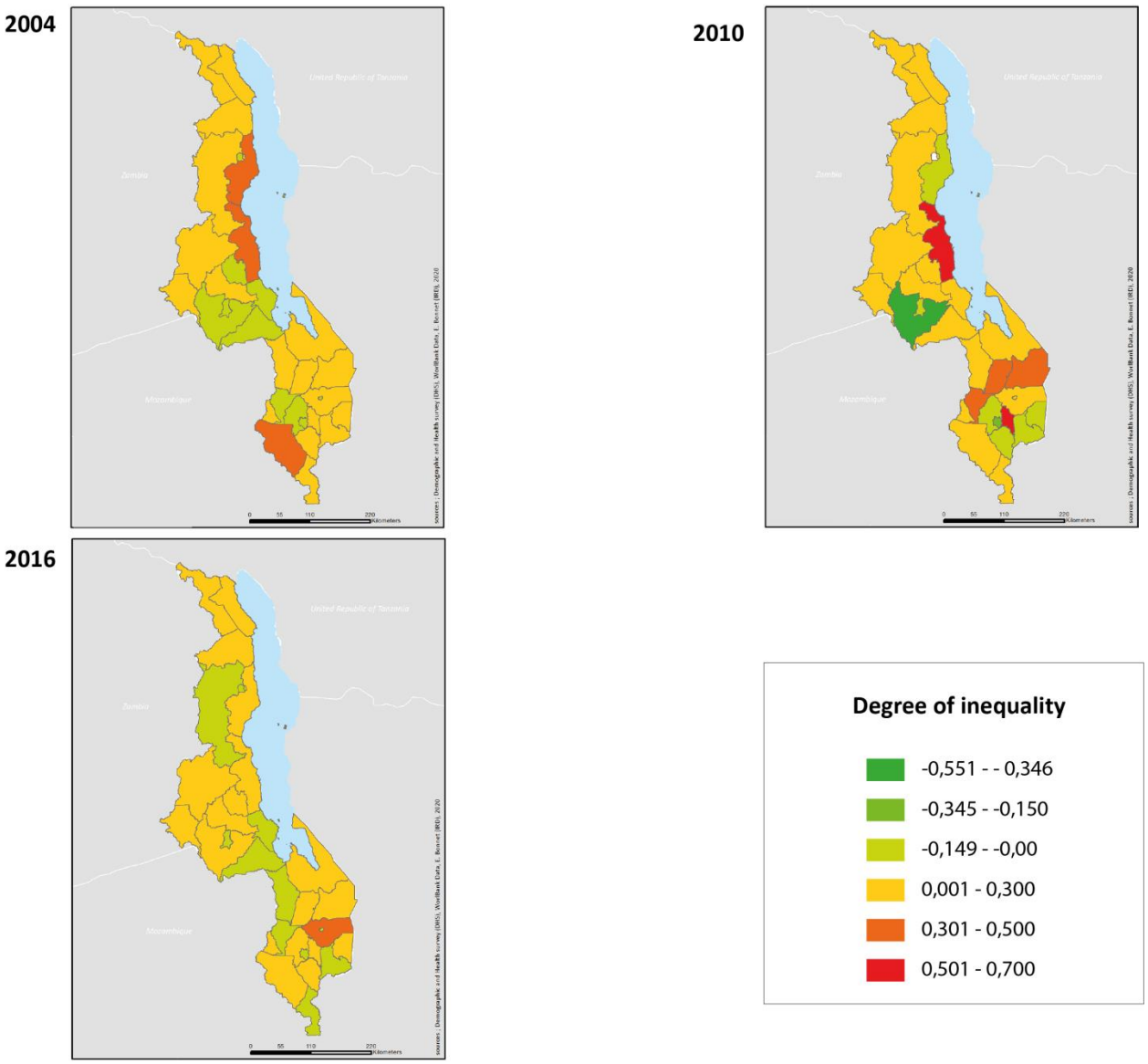
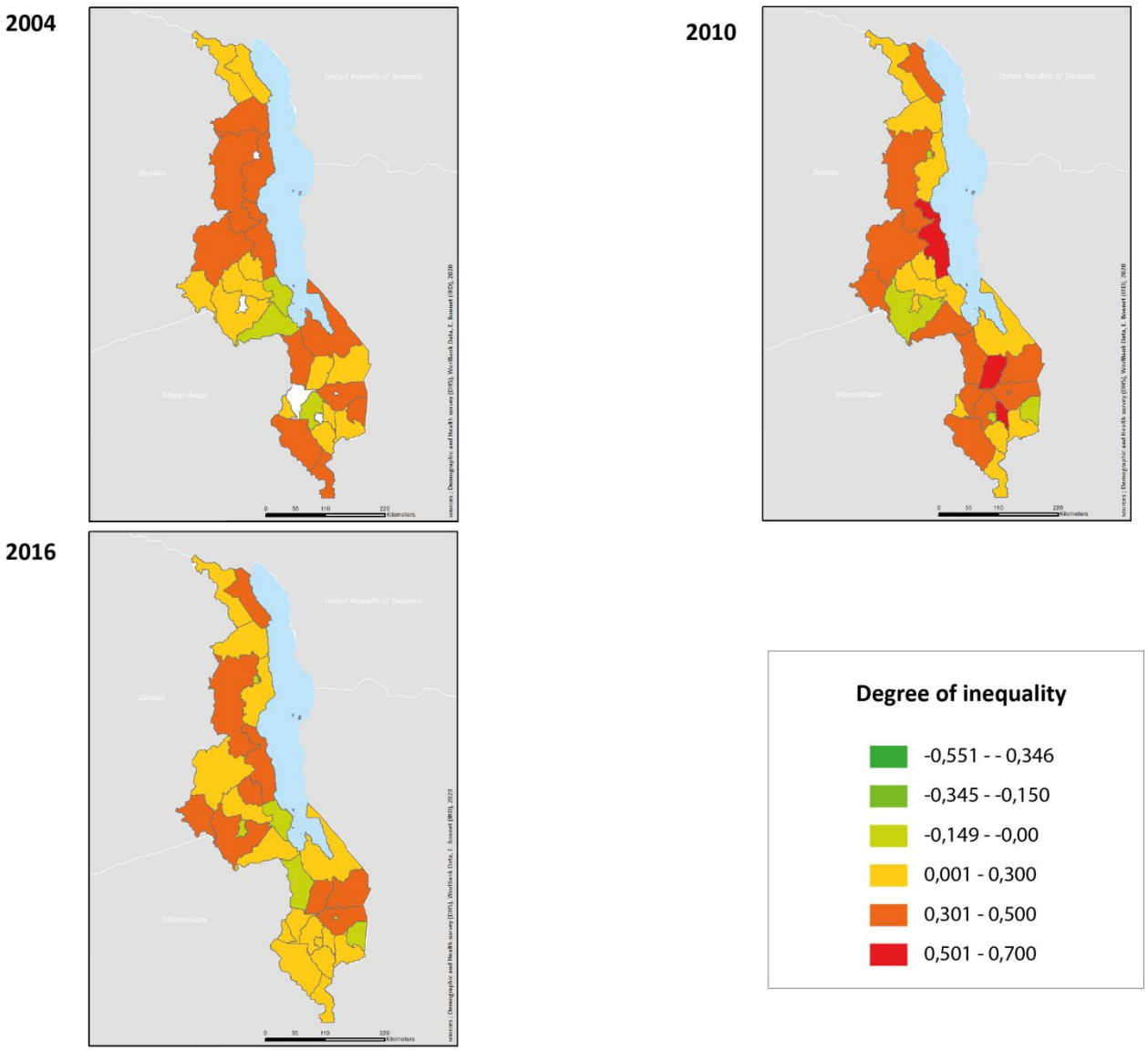


Figure 8: Regional heterogeneity in distributional incidence of total overall spending over time



3.3 Zambia

Our descriptive analysis (appendix 3) shows that the poor groups of the population use more health services all all levels of care than the least-poor groups. The inequality is more pronounced at health centers which represent the lower levels of care. The inequality at public hospitals and mission health centers is almost the same at all years. This distribution pattern is likely explained by the use fee removal that led the increase of health services utilization among the poor groups.

3.3.1. Benefit incidence of public spending

Benefit incidence analysis is presented for both the public and overall health spending in tables 10 and 11, respectively. Public health spending over the study period tended to be pro-poor at public health centers and mission facilities, but to be pro-least poor at public hospitals.

The bias of public health spending over the study period shows the public health centers to favour the poorer quintiles as do mission health facilities. The distributional incidence of public spending at public health centers was near equality in 2006 (CI = 0.025) but shifted to a slightly pro-poor distribution in 2010 (CI = -0.033) and increased to a CI of -0.163 in 2014. The pro-poor inequality at mission health facilities steadily increased from a CI of -0.081 in 2006 to a CI of -0.225 in 2014. Public health spending at public hospital stayed relatively in favor of the least-poor segments of the population overtime. The pro-least poor inequality at public hospitals significantly increased from a CI of 0.083 in 2006 to a CI of 0.207 in 2014. This is attributed to the fact that public hospitals continued to use user fees wheras user fees were removed at primary healthcare level since 2006.

Table 10. Benefit incidence of public spending on curative care in Zambia
Source: Authors' calculations LMCS 2006-2010, ZHHEUS 2014

Year	**2006**	**2010**	**2014**	**Diff 2010-2006**	**Diff. 2014-2010**	**Diff. 2014-2006**
Heath care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total health spending	-0.003 (0.027)	-0.049*** (0.005)	-0.207*** (0.011)	-0.045* (0.027)	-0.158*** (0.012)	-0.203*** (0.011)
Public health centers	0.025 (0.042)	-0.033* (0.019)	-0.163** * (0.014)	-0.058 (0.046)	-0.129** * (0.0233)	-0.187*** (0.038)
Public hospitals	0.083*** (0.028)	0.092*** (0.023)	0.207*** (0.015)	0.009 (0.037)	0.115*** (0.041)	0.124*** (0.038)
Mission health facilities	-0.081 (0.066)	-0.022 (0.076)	-0.225** * (0.059)	-0.059 (0.101)	-0.203** (0.090)	-0.144** (0.075)

3.3.2. Benefit incidence of overall spending

As shown in table 11, overall health spending has been characterized by a pro-poor distributional pattern, except for public hospital, reflecting the same pattern displayed by public spending. Total overall health spending in 2006 was close to equality, but shifted to a pro-poor distribution by 2010 already. Overall health spending at public health centers and mission health facilities tended to be pro-poor across all years. Contrary to public spending, the overall spending at public hospitals shifted from a slightly pro-least-poor in 2006 and 2010 to near equality in 2014.

In line with prior research indicating that the removal of user fees had resulted in greater increases in health service utilization for the poor (Masiye *et al*., 2010), our findings confirm that distributional benefits measured in terms of health spending became pro-poor over time. This marked pro-poor distribution of benefits is positively surprinsingly, considering the universal nature of the country policies, with no specific provision being made to protect the ultra poor.

Similarly to what observed for institutional delivery services, distributional benefits of public spending remain pro-least poor only at the level of the hospital. This is likely the combined effect of increased investments in secondary care made by the government and continued lack of access, due to both geographical and financial barriers, to these facilities by the poorest. Interestingly, however, this pro-least-poor orientation is reversed when considering also donor and out-of-pocket expenditures. While explaining this finding comprehensively is impossible in the absence of an active discussion with concerned stakeholders, we postulate that it may indicate two things: a. an effective application of exemption policies for the poor at the secondary care level; b. an effective allocation of donor funding to compensate for inherent gaps in public funding. Further research is needed to shed light onto the matter.

Table 11. Comprehensive benefit incidence analysis of health spending on curative care in Zambia
Source: Authors' calculations LMCS 2006-2010, ZHHEUS 2014

Year	2006	2010	2014	Diff. 2010-2006	Diff. 2014-2010	Diff. 2014-2006
Heath care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total health spending	0.050 (0.033)	-0.030*** (0.003)	-0.169*** (0.011)	-0.080** (0.033)	-0.139*** (0.011)	-0.220*** (0.031)
Public health centers	-0.003 (0.036)	-0.056*** (0.014)	-0.135*** (0.010)	-0.062 (0.041)	0.079*** (0.018)	-0.141*** (0.035)
Public hospitals	0.069** (0.029)	0.085*** (0.022)	-0.066 (0.048)	-0.011 (0.036)	-0.152*** (0.052)	-0.140*** (0.052)
Mission health facilities	-0.081 (0.065)	-0.088 (0.058)	-0.216** (0.066)	-0.007 (0.067)	-0.128* (0.085)	-0.136* (0.079)

3.3.3. Heterogeneity and Geo-spatial analysis

Tables 15 and 16 show the geo-spatial analysis of the distributional incidence of public and overall health spending on curative health services across urban and rural areas. The dominance of public health centers and mission health facilities and their clientele are reflected in the results which show a skewness towards the least poor income groups, particularly in urban areas as compared to rural areas. These results can be explained by location of mission health facilities in rural areas and the fact that these facilities, together with rural public health centers, cater primarily to low income people seeking treatment, especially so after user fee removal. Over the last few years, considerable investments has been channeled towards increasing health service provision in rural settings, by increasing the number of primary healthcare facilities and helath posts. Similarly to what observed for the pooled analysis, at hospital level, the distributional incidemce of public spending continues to favor the least poor even in 2014, but the opposite is true for the distributional incidence of overall spending. Again, we attribute this difference to an effective implementation of exemption policies and donor subsidies at this level.

Table 12: Benefit incidence of public spending on curative care in Zambia
Rural and urban heterogeneity
Source: Authors' calculations LMCS 2006-2010, ZHHEUS 2014

Year	**2006**			**2010**			**2014**		
	Urban	Rural	Diff	Urban	Rural	Diff	Urban	Rural	Diff
Heath care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total health spending	0.003 (.052)	0.046** (0.017)	-0.043 (.055)	-0.063*** (0.008)	-0.019*** (0.005)	-.044*** (.010)	-.154*** (.025)	-.040*** (.007)	-.115*** (.025)
Hospitals	-0.103 (0.079)	0.102* (0.055)	0.205** (0.096)	-0.021 (0.025)	0.093*** (0.029)	-.113*** (0.039)	-0.278*** (0.037)	-0.019 (0.018)	-0.259*** (0.041)
Health Centres	0.066 (0.054)	0.044 (0.029)	0.021 (0.062)	-0.027 (0.030)	-0.018 (0.021)	-0.008 (0.036)	-0.097** (0.031)	0.001 (0.012)	-0.097*** (0.033)
Mission health facilities	-0.061 (0.105)	0.119* (0.062)	-0.180 (0.121)	0.002 (0.169)	0.081 (0.091)	-0.079 (0.192)	-0.251 (0.138)	0.062 (0.084)	-0.314* (0.162)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

Looking at provincial heterogeneity, the distribution of both public and overall health spending has followed a trend in which the benefits are distributed towards the poorer sections of the population for all health facilities across all provinces, especially in Lusaka and Copperbelt. Now it is important to mention that whereas some provinces are largely rural, such as include Western, Luapula, Northern and North-Western, the fact remains that each province has both rural and urban areas so what could distinguish provinces is that some, such as Lusaka, Copperbelt, Central and Southern are largely urban, though they do have a substantial rural areas. It is interesting to note that our analysis detected less heterogeneity than in the other two countries.

Table 13. Comprehensive benefit incidence on curative care in Zambia
Urban *vs* rural heterogeneity
Source: Authors' calculations LMCS 2006-2010, ZHHEUS 2014

Year	**2006**			**2010**			**2014**		
	Urban	Rural	Diff	Urban	Rural	Diff	Urban	Rural	Diff
Heath care provider	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)	CI (SE)
Total health spending	.078 (.046)	.050*** (.016)	0.027 (.049)	-0.020*** (.004)	-.014*** (.004)	-.007 (.005)	-.072** (.022)	-.036*** (.007)	-.036** (.023)
Hospitals	-0.015 (0.076)	0.094* (0.052)	-0.198** (0.092)	-0.039 (0.026)	0.086*** (0.029)	-0.125*** (0.026)	-0.223*** (0.031)	-.026 (.038)	-.197*** (0.049)
Health Centres	0.051 (0.053)	0.035 (0.028)	0.016 (0.060)	-.038 (0.026)	-0.035** (0.016)	-0.003 (0.030)	-0.061* (0.027)	0.006 (0.011)	-0.067** (0.029)
Mission health facilities	-0.061 (0.105)	0.119* (0.062)	-0.180 (0.122)	0.060 (0.123)	0.041 (0.052)	-0.101 (0.134)	-0.161 (0.099)	0.050 (0.077)	-0.211* (0.126)

Note: CI= concentration index; SE= standard errors; dominance test: a = dominance, b= non-dominance, c= curves cross

***, **, *** statistically significant at the 10%, 5%, and 1% levels, respectively**

Looking at the distribution of financial benefits for health centers in 2006, half of the provinces favored the poorer while the remainer favored the least-poor. In 2006, only Copperbelt province mainly favored the poorer while the other provinces were neither for the poor nor for the least-poor. The distribution picture improves greatly in 2010 and 2014 where all provinces indicate a favor for the poorer, especially in the provinces Central, Lusaka and Northern and Southern in 2010 and Central Eastern and Lusaka in 2014.

For health spending at public hospitals, we observe mixed distribution patterns though they generally favored the least poor groups across all years. In 2006, Central and Northern provinces had a pro-least poor distribution pattern while Lusaka had a pro-poor distribution. In 2010, the majority of provinces show that public hospitals favored the least-poor, specially in the pronvices Northwestern and southern provinces. The distribution picture in 2014 is slightly mixed: some provinces showing pro-least poor and other pro-poor distribution patterns. This can be explained by the fact that the public hospitals in the 2014 household survey, only include public district hospitals most of which are in rural areas, while for the household survey of the other years may have included some public hospitals of the second and third levels

from urban areas. Health spending at mission health facilities exhibits mixed distribution patterns, favoring neither the poor nor the least-poor for all three years.

The patterns observed may be the result of the fact that the resource allocation criteria differentiating districts by deprivation and disease prevalence, in addition to basic population size, are no longer applied by government when distributing health budget. This may be at the root of some of the pro-least poor values observed in more recent years and is expected to create further inequalities in the future.

Figure 9: Regional heterogeneity in distributional incidence of total public spending over time

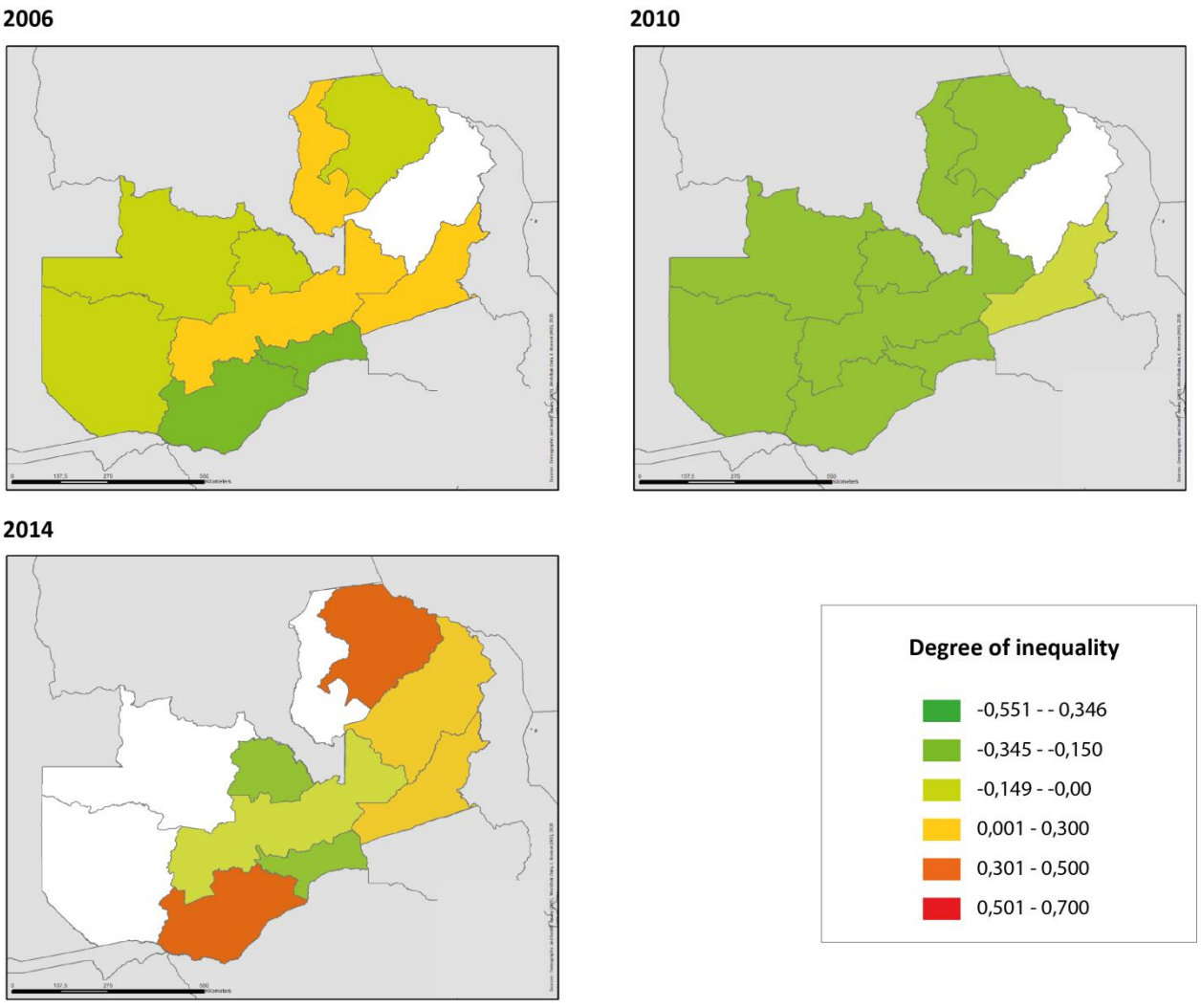
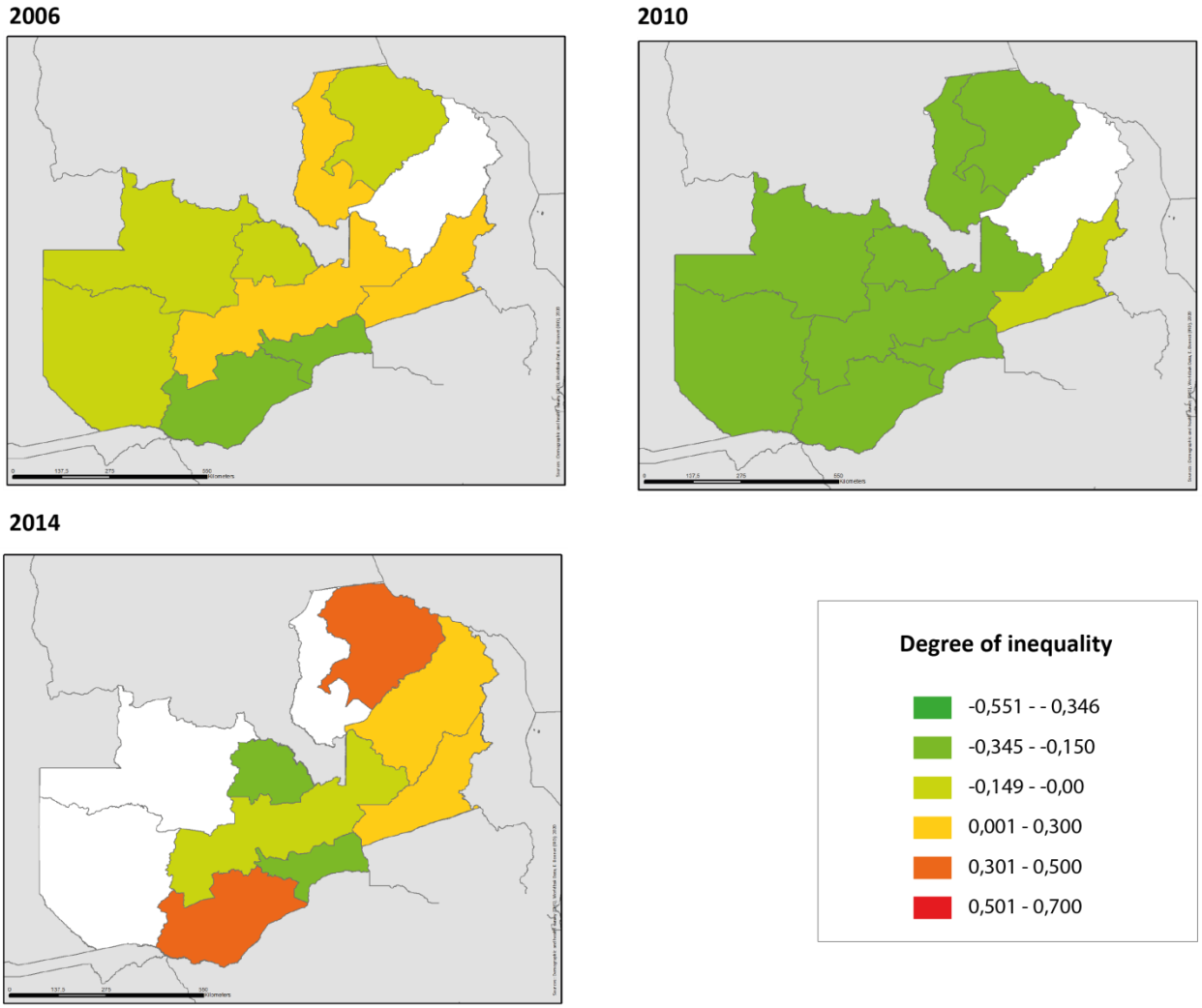


Figure 10: Regional heterogeneity in distributional incidence of total overall spending over time



3.4 Sensitivity analysis: seasonality adjustments

As mentioned in section 2.7.4, as sensitivity analysis, we adjusted our BIA findings to take into account seasonality patterns in utilization of curative health services. For Burkina Faso, we use monthly average of used curative health services recorded in HMIS between 2014-2018; and for Malawi and Zambia, we use monthly provided curative health services recorded in 2015 HMIS and 2006 HMIS, respectively. For all countries, we did not find any significant changes in the adjusted findings, indicating a homogeneous patterns of use of curative heath services across months over the year. For Zambia due to lack of updated complete HMIS, the performed seasonality adjustement counts only for 2006 LCMS data.

Conclusion

Our paper combined data on healthcare utilization obtained from three household surveys (including Living Condition and Monitoring Survey, Perfomance-based Financing Survey, and Zambia Household Health and Expenditure Survey) with health spending data extracted from the National Health Account to conduct a quasi-longitudinal comparative analysis of the distributional incidence of public and overall health spending on curative health services in Burkina Faso, Malawi and Zambia. To our knowledge, this is the first study exploring distributional incidence of public and overall health spending across different countries and different time points, with specific focus on understanding potential effects of UHC-specific reforms on inequality in spending.

The findings reveal a high heterogeneity in the distribution of health spending across different levels of care and facility typologies and study countries over time. Overall, the inequality declined over time for both public and overall spending, although the decrease of inequality was different across healthcare providers and levels of care. This decline is probably the reflection of the UHC-specific reforms implemented across settings to improve distribution of public and overall financial resources to reach out the most vulnerable segements of the population. A more equal or pro-poor distribution of health spending is observed in Zambia, while it is mostly pro-least poor in Burkina Faso and nuanced in Malawi across health facility typologies. This trend suggests that the study countries implemented different specific-UHC reforms that yielded different impacts on the reduction of inequality in financial benefits. A more explicit comparison between study countries is challenged by the fact that not only did the reform differed, but time points and data structures also varied substantially across settings. In general, similarly to what noted also for the provision of maternal care services, we note that across countries, the utilization patterns captured by our analysis indicate a difficulty on behalf of the poorer segenents of the population to access higher levels of care. While transport costs are not explicitly included in our analysis, we recognize the need to enable poor populations with the means of overcoming them, either by improving transportation options or including reimbursement of these costs as part of a comprehensive package of care.

In Zambia, the user fees were removed since 2006 first in rural areas and 2010 at the national level, this health policy likely resulted in a significant reduction of inequality in healthcare utilization, especially at the primary level of care in rural areas. Consequently, both public and overall health spending spent at health centers and mission health facilities, mostly based in rural areas, tends to be equally distributed or pro-poor for all years from 2006 to 2014, while public and overall health pending at public hospitals remained pro-least-poor over time. In Burkina Faso, both public and overall health spending for inpatient and outpatient health services in 2000 and 2014 were pro-least-poor, while the inequality for outpatient service declined to a slightly pro-poor for public spending and equality for public overall health

spending in 2017. In Malawi, public health spending at public health facilities remained equally distributed over time between 2004 and 2016 while in the same period public health spending at mission health facilities remained pro-least poor. The total public spending remained equally distributed over time while the overall health spending at each health facility type and total overall spending at all health facility types (public, mission and private health facilities) were predominately biased in favour of the least-poor groups. An interesting element of comparison emerges when looking at distributional patterns of mission facilities in Malawi compared to Zambia. Our results suggest that while in Zambia, mission facilities cater to the poorest, this is not the case in Malawi. Since in both countries, mission facilities are mostly located in rural areas, the difference is probably linked to the different funding structures of the two, in particular to the extent to which public and donor subsidies are effectively allocated to mission facilities to ensure that care can be provided free of charge.

Concerning the geographical heterogeneity, the findings reveal a high heterogeneity of financial benefits distribution in Burkina Faso and Malawi, while a more homogenous distribution of financial benefits was observed in Zambia. In Burkina Faso and Malawi, both public and overall spending exhibited different distribution patterns of either equality or pro-poor or pro-least poor distribution pattern in urban/rural and regional and districts levels. In contrary, in Zambia, both public and overall spending tend to be pro-poor across all provinces, indicating a homogeneous distribution of health spending nationwide. However, the distribution of inequality at geographical levels may be biased by the aggregation of our analysis by using health spending data aggregated at the national level. Future research should use disaggregated health expenditure allocated to sub-national levels to analyze geographical disparities in the financial benefits of health spending. Relying on data more accurately disaggregated at the level of the single regions/provinces/districts would reveal more clearly inequalities in allocation patterns, for both public and donor resources. Beyond its contribution to the health financing literature, such an analysis would increase transparency of both public and donor sector by revealing what resources are allowed to what region/province/district. In turn, increased transparency would increase accountability towards the ultimate beneficiaries, increasing political responsiveness within and beyond the health sector (Wild and Domingo, 2010).

Last, we need to note that albeit innovative, our work falls short of fully capturing inequities in the distributional incidence of health spending for curative health services, since the methodology captures the distribution of financial resource consumption by utilization patterns, but does not account for differential healthcare needs across socio-economic groups (horizontal equity) nor for differences in quality of services received. Both elements, health needs and quality of service delivered, should be focus on further research.

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Appendices

Appendix 1.a.
Proportion of annual visits by quintile and related unit subsidy and unit cost (CFA) of overall spending in Burkina Faso (2009-2014)

Year	2009							2014						
Population quintile	Population share (%)	Hospitals (inpatient care)			Outpatient care			Hospitals (inpatient care)				Outpatient care		
		Share of annual visits (%)	Public and donor unity subsidy	OOPE	Share of annual visits (%)	Public and donor unity subsidy	OOPE	Population share (%)	Share of annual visits (%)	Public and donor unity subsidy	OOPE Unit cost	Share of annual visits (%)	Public and donor unity subsidy	OOPE Unit cost
1 (Poorest)	19.93	6.76	2,624,600.59	8,140.34	13.39	59,611.650	270.93	18.93	2.65	715,358.49	36,056.64	12.21	127,125.31	266.15
2	20.43	15.76	2,624,600.59	2,563.62	17.36	59,611.650	148.11	19.62	7.65	715,358.49	8,445.01	16.16	127,125.31	136.07
3	20.91	15.42	2,624,600.59	1,151.33	21.15	59,611.650	602.17	20.53	11.68	715,358.49	28,233.67	20.96	127,125.31	535.32
4	20.08	33.98	2,624,600.59	3,216.79	24.78	59,611.650	602.17	21.79	18.33	715,358.49	10,194.03	23.99	127,125.31	265.06
5 (Least poor)	18.66	28.09	2,624,600.59	5,180.66	23.32	59,611.650	417.08	19.13	59.69	715,358.49	4,261.05	26.69	127,125.31	324.21

Appendix 1.b.

Proportion of annual visits by quintile and related unit subsidy (CFA) of overall spending in Burkina Faso (2017)

Year	2017						
Population quintile	Population share (%)	Hospitals (inpatient care)			Outpatient care		
		Share of annual visits (%)	Public and donor unit subsidy	OOPE	Share of annual visits (%)	Public and donor unity subsidy	OOPE
1 (Poorest)	20.07	12.67	1,221,767.95	8,485.31	24.07	177,095.97	150.76
2	19.94	12.67	1,221,767.95	5,739.57	20.24	177,095.97	121.28
3	20.05	17.33	1,221,767.95	21,400.63	19.41	177,095.97	645.25
4	19.96	26.00	1,221,767.95	8,086.43	16.35	177,095.97	434.29
5 (Least poor)	19.98	31.33	1,221,767.95	9133.91	19.92	177,095.97	485.07

Appendix 2a.

The proportion of annual visits by quintile and related unit subsidy and unit cost (MKW) of overall spending in Malawi (2004)

Year	2004								
Population quintile	Population share (%)	Public health facilities			Mission health facilities			Private health facilities	
		Share of annual visits (%)	Public and donor unit subsidy	OOPE Unit cost	Share of annual visits (%)	Public and donor unit subsidy	OOPE unit cost	Share of annual visits (%)	OOPE unit cost
1 (Poorest)	20.06	16.84	27,547.51	20.57	10.48	55,734.73	277.10	10.38	1,132.74
2	20.21	21.54	27,547.51	21.47	15.58	55,734.73	248.91	9.48	1,298.99
3	20.06	20.55	27,547.51	18.51	20.25	55,734.73	157.56	20.96	542.87
4	19.98	21.75	27,547.51	34.08	25.99	55,734.73	239.28	20.47	504.46
5 (Least poor)	19.69	19.32	27,547.51	66.05	27.70	55,734.73	386.58	38.71	1,313.17

Appendix 2b.

The proportion of annual visits by quintile and related unit subsidy and unit cost (MKW) of overall spending in Malawi (2010)

Year	2010								
Population quintile	Population share (%)	Public health facilities			Mission health facilities			Private health facilities	
		Share of annual visits (%)	Public and donor unit subsidy	OOPE Unit cost	Share of annual visits (%)	Public and donor unit subsidy	OOPE unit cost	Share of annual visits (%)	OOPE unit cost
1 (Poorest)	18.60	19.76	63,142.71	128.78	13.90	80,935.25	667.13	11.12	526.13
2	18.58	17.85	63,142.71	182.81	14.21	80,935.25	895.99	10.16	768.60
3	19.60	21.46	63,142.71	126.25	18.60	80,935.25	494.54	20.45	285.94
4	20.42	21.54	63,142.71	246.10	18.70	80,935.25	1,125.17	20.16	570.84
5 (Least poor)	22.80	19.40	63,142.71	477.46	34.59	80,935.25	1,023.77	38.10	519.43

Appendix 2c.

Proportion of annual visits by quintile and related unit subsidy and unit cost (MKW) of overall spending in Malawi (2016)

Year	2016								
Population quintile	Population share (%)	Public health facilities			Mission health facilities			Private health facilities	
		Share of annual visits (%)	Public and donor unit subsidy	OOPE Unit cost	Share of annual visits (%)	Public and donor unit subsidy	OOPE unit cost	Share of annual visits (%)	OOPE unit cost
1 (Poorest)	20.43	18.97	80,959.41	47.32	7.34	322,967.23	2,714.84	7.18	944.43
2	19.79	19.61	80,959.41	61.19	19.53	322,967.23	1,288.95	11.04	766.25
3	20.15	22.08	80,959.41	44.51	25.29	322,967.23	809.56	15.32	462.93
4	19.59	21.76	80,959.41	89.61	14.95	322,967.23	2,778.13	24.22	576.39
5 (Least poor)	20.05	17.59	80,959.41	189.39	32.89	322,967.23	2,066.11	42.24	584.62

Appendix 3a.
Proportion of annual visits by quintile and related unit subsidy of public spending on curative services in Zambia in 2006

Population quintile	Population share (%)	Public hospital		Mission Facilities		Public health centers	
		Share of annual visits (%)	Unit subsidy	Share of annual visits (%)	Unity subsidy	Share of annual visits (%)	Unity subsidy
1 (Poorest)	19.36	18.05	2,216.07	17.30	10,404.62	20.40	8,823.53
2	19.13	18.03	2,216.07	32,09	10,404.62	23.13	8,823.53
3	20.24	22.74	2,216.07	20,06	10,404.62	21.03	8,823.53
4	20.43	22.07	2,21.,07	15.21	10,404.62	18.09	8,823.53
5 (Least poor)	20.84	19.11	2,216.07	15,34	10,404.62	17.35	8,823.53

Appendix 3b.
Proportion of annual visits by quintile and related unit subsidy of public spending on curative servives in Zambia in 2010

Population quintile	Population share (%)	Public health centers		Outpatient (Public hospitals)		Outpatient (Mission facilities)		Private sector facilities	
		Share of visits (%)	Subsidy Share (%)	Share of visits (%)	Subsidy Share (%)	Share of visits (%)	Subsidy Share (%)	Share of visits (%)	Subsidy Share (%)
1 (Poorest)	20.01	23.55	9,341.82	14.23	10,541.11	20.09	10,526.31	9.02	14,412.42
2	19.87	21.30	9,341.82	19.06	10,541.11	24.07	10,526.31	6.23	14,412.42
3	20.24	20.16	9,341.82	21.29	10,541.11	26.19	10,526.31	15.07	14,412.42
4	19.81	19.23	9,341.82	22.08	10,541.11	15.01	10,526.31	20.11	14,412.42
5 (Least poor)	20.07	15.76	9,341.82	23.34	10,541.11	14.64	10,526.31	49.57	14,412.42

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The Agence Française de Développement (AFD) Group is a public entity which finances, supports and expedites transitions toward a more just and sustainable world. As a French overseas aid platform for sustainable development and investment, we and our partners create shared solutions, with and for the people of the global South.
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